

Minnesota's Forests 2008: Statistics, Methods and Quality Assurance



Minnesota's Forests 2008: Statistics, Methods and Quality Assurance

Forest Inventory Methods

Strategic Model

The Forest Inventory and Analysis (FIA) program of the Northern Research Station (NRS) is part of the national enhanced FIA program that focuses on a set of six strategic objectives (McRoberts 2005):

- A standard set of variables with nationally consistent meanings and measurements
- Field inventories of all forested lands
- Nationally consistent estimation
- Adherence to national precision standards
- Consistent reporting and data distribution
- Credibility with users and stakeholders

To ensure that these objectives are achieved, 10 strategic approaches have been prescribed:

- A national set of prescribed core variables with a national field manual that describes measurement procedures and protocols for each variable
- A national plot configuration
- A nationally consistent sampling design
- Estimation using standardized formulae for sample-based estimators
- A national database of FIA data with core standards and user-friendly public access
- A national information management system
- A nationally consistent set of tables with estimates of prescribed core variables
- Publication of statewide tables with estimates of prescribed core variables at 5-year intervals
- Documentation of the technical aspects of the FIA program, including procedures, protocols, and techniques

- Peer review and publication of the technical documentation for general access

The result of this approach is an inventory program with identifiably new features and a nationally consistent plot configuration, a nationally consistent sampling design for all lands, annual measurement of a proportion of plots in each state, nationally consistent estimation techniques and algorithms, and integration of the ground-sampling components of the FIA inventory and detection monitoring by the U.S. Forest Service's Forest Health Monitoring (FHM) program.

Plot Configuration

The national FIA plot design (Fig. 62) consists of four circular 24-ft-radius subplots (1/24th acre) configured as a central subplot and three peripheral subplots. Centers of the peripheral subplots are located 120 ft from the central subplot and at azimuths of 360°, 120°, and 240° from the center of the central subplot. Trees with a diameter at breast height (d.b.h.) of 5 inches or greater are measured on these subplots. Each subplot contains a circular 6.8-ft-radius microplot (1/300th acre) centered 12 ft east of the subplot center on which each tree at least 1 inch but less than 5 inches d.b.h. is measured.

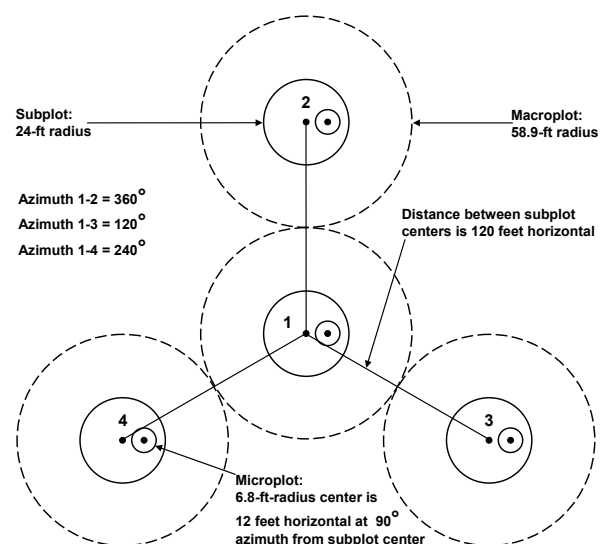


Figure 62.—National FIA plot design (adapted from Bechtold and Patterson 2005).

Forest conditions that occur on any of the four subplots are identified and recorded; if the area of the condition is 1 acre or greater, the condition is mapped on the subplot. Factors that differentiate forest conditions include forest type, stand-size class, stand origin, land use, ownership, and density. Macroplots are not used by the NRS. They have a radius of 58.9 ft and are used for sampling intensification or for sampling relatively rare events. The ¼-acre macroplot currently is used by the Rocky Mountain and Pacific Northwest Stations' FIA programs to sample large trees.

Sample Design

On the basis of historical sampling errors, a sampling intensity of about one plot per 6,000 acres is necessary to satisfy national FIA precision guidelines. Therefore, FIA divided the area of the United States into nonoverlapping, 5,937-acre hexagons and has established a sample plot location in each hexagon. This array of field plots is designated the Federal base sample and is considered an equal probability sample; measurement of the Federal base sample is funded by the Federal Government.

The Federal base sample is divided into five interpenetrating, nonoverlapping panels or subsamples, each of which provides complete, systematic coverage of a state. Each year, plots in a single panel are measured; panels are selected on a 5-year, rotating basis (McRoberts 1999), i.e., the plots measured in 1999 were measured again in 2004 and the plots measured in 2000 were measured again in 2005. For estimation purposes, the measurement of each panel of plots is considered an independent, equal probability sample of all lands in a state and the remeasurement of a panel is considered an equal probability sample of change occurring on all lands in a state. In many states inventoried by NRS-FIA, additional resources have been made available to intensify plot sampling. These resources enable additional sample plots to be measured. In Minnesota, a single-intensity sample was completed in 1999. Double-intensity sampling was completed in 2000 except for the Boundary Waters Canoe Area Wilderness (BWCAW)

and Voyageurs National Park where a single-intensity sample was completed. A double-intensity sample was also completed in 2001 through 2008 except for the BWCAW where a single-intensity sample was completed.

Three-phase Inventory

FIA conducts inventories in three phases. Remotely sensed data are used in phase 1 to obtain initial plot land-cover observations to determine whether a field visit is required. Phase 1 data also are used to classify total area in the population of interest, for latter use in the post-stratification process, to increase the precision of estimates. In phase 2, field crews visit the physical locations of permanent field plots to measure traditional inventory variables such as tree species, diameter, and height. All trees measured in the previous measurement of the plot are remeasured or otherwise accounted for and any new trees that have grown onto the plot are measured. In phase 3, field crews visit a subset of phase 2 plots to obtain measurements for an additional suite of variables associated with forest and ecosystem health. The three phases of the enhanced FIA program as implemented in this inventory are discussed in detail in the sections that follow.

Phase 1

Aerial photographs, digital orthoquads (DOQs: digitally scanned aerial photograph), and satellite imagery are used for initial plot measurement via remotely sensed data and stratification. Phase 1 plot measurement consists of observations of conditions at the plot locations using aerial photographs or DOQs. Analysts determine a digitized geographic location for each field plot and a human interpreter assigns to the plot a land

cover/use with primary focus on identifying forest land.¹ All plot locations that could contain forest land, plus any additional plots that contained forest land at the previous measurement are selected for further measurement via field-crew visits in phase 2.

The combination of natural variability among plots and budgetary constraints prohibits measurement of a sufficient number of plots to satisfy national precision standards for most inventory variables unless the estimation process is enhanced using ancillary data. Thus, the land area is stratified by using remotely sensed data to facilitate stratified estimation.

NRS-FIA uses canopy-density classes obtained from the 2001 National Land Cover Database (NLCD) to derive strata. The NLCD 2001 canopy density layer for the United States was produced through a cooperative project conducted by the Multi-Resolution Land Characteristics (MRLC) Consortium (<http://www.mrlc.gov/>). The layer characterizes subtle variations of forest canopy density as a percentage estimate of forest canopy cover (0 – 100) within every 30-m pixel over the United States (Fig. 63). The method used to map canopy density for NLCD 2001 is described in Huang et al. (2001) and Homer et al. (2004).

Strata Construction

Strata construction methods used by NRS-FIA were developed to work well across the entire 24-state region. Using data on plot location (center of the center subplot), a percent canopy-density value was assigned to each plot. Plots were then aggregated into one of the five canopy-cover classes based on the center of the center subplot. The canopy-cover classification scheme consists of five groupings: 0 to 5, 6 to 50, 51 to 65, 66 to 80,

and 81 to 100 percent. These groupings were based on observed natural clumping of pixel values.

In addition to the classification of every pixel into one of the five canopy-cover classes, every pixel was assigned to an ownership class. In Minnesota, ownership layers, derived from the Minnesota DNR Data Deli (<http://deli.dnr.state.mn.us/>), were used to classify pixels into seven ownership classes: (1) Boundary Waters Canoe Area Wilderness, (2) Chippewa National Forest, (3) Superior National Forest, (4) Voyageurs National Park, (5) other public, (6) private, and (7) water (Fig. 64). The largest ownership class based on pixel counts was private ownership at more than 39 million acres (Fig. 65). Every pixel also was assigned to a county based on the location of the pixel center.

If the number of plots within a canopy cover class/ownership class/county was insufficient for valid estimations then specific collapsing rules were used to combine classes until sample sizes were sufficient. These collapsed classes defined the strata used in the estimation. NRS-FIA required a minimum of four plots per stratum for the 2008 inventory.

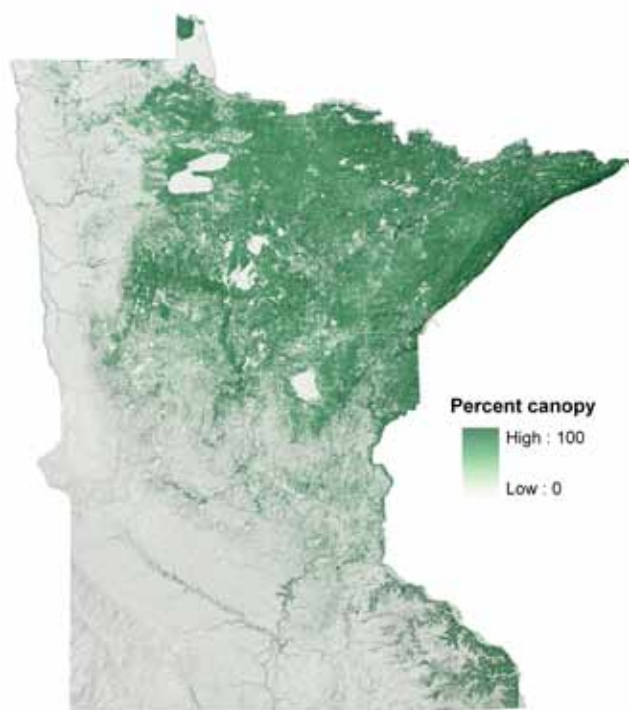


Figure 63.—Canopy density for Minnesota, 2001.

¹Lands satisfying FIA's definition of forest land include commercial timberland, some pastured land with trees, forest plantations, unproductive forested land, and reserved, noncommercial forested land. Forest land requires minimum stocking levels, a 1-acre minimum area, and a minimum bole-to-bole width of 120 ft with continuous canopy. Forest land excludes wooded strips and windbreaks less than 120 ft wide and idle farmland or other previously nonforest land that currently is below minimum stocking levels.

Stratified estimation requires that two tasks be accomplished. First, each plot must be assigned to a stratum. Next, the proportion of the total area in each stratum must be calculated. The first task is accomplished by assigning each plot to the stratum assigned for the pixel containing the center of the center subplot. The second task is accomplished by calculating the proportion of pixels in each stratum. The population estimate for a variable is calculated as the sum across all strata of the product of each stratum's observed proportion (from phase 1) and the variable's estimated mean per unit area for the stratum (from phase 2). Details of the stratum assignments used in Minnesota are presented in the estimation section of this report.

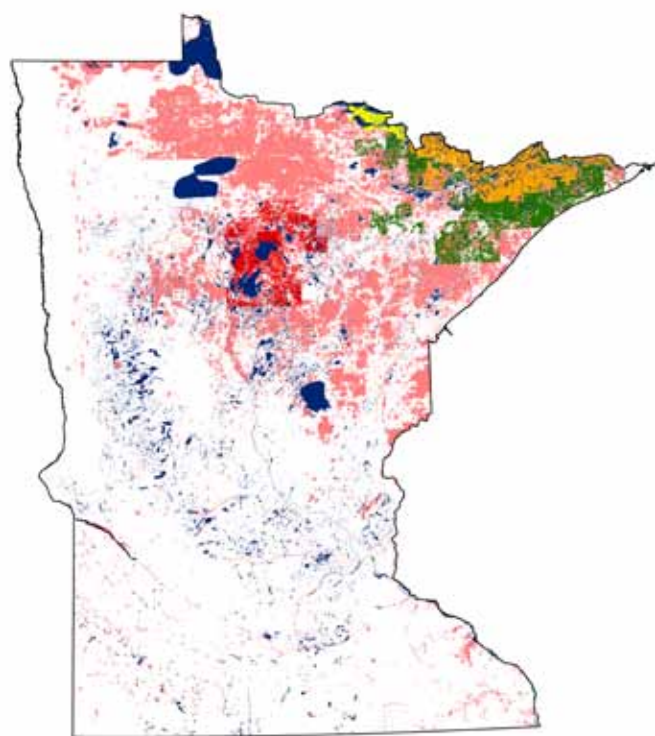


Figure 64.—Land ownership for Minnesota.

Phase 2

In phase 2, field crews record a variety of data for plot locations determined in phase 1 to include accessible forest land. Before visiting plot locations, field crews consult county land records to determine the ownership of plots and then seek permission from private landowners to measure plots on their lands. At the plot field crews determine the location of the geographic center of the center subplot using GPS receivers. They record condition-level observations that include land cover, forest type, stand origin, stand age, stand-size class, site-productivity class, history of forest disturbance, and land use for every condition (major land use of forest stand at least 1 acre in size) that occurs on the plot. They also record information on condition boundaries when multiple conditions are found on a plot. For each tree, field crews record a variety of observations and measurements, including condition, species, live/dead status, lean, diameter, height, crown ratio (percentage of tree height represented by crown), crown class (dominant, codominant, suppressed), damage, and decay status. All trees measured in the previous measurement of the plot are remeasured or otherwise accounted for and any new trees that have grown onto the plot are measured. Office staff use statistical models based on field-crew measurements to calculate values for additional variables, including individual-tree volume, per unit area estimates of number of trees, volume, and

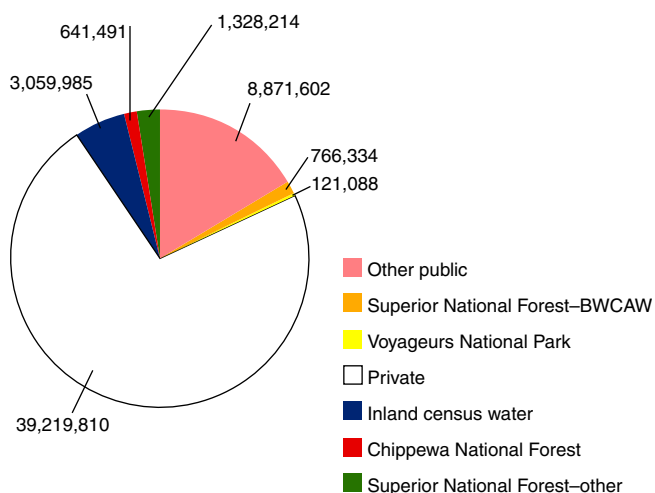


Figure 65.—Ownership class acreages based on pixel counts.

biomass by plot, condition, species group, and live/dead status. The remeasurement of every tree enables the calculation of components of change including growth, mortality, and removals. Additional information on data collection procedures used in phase 2 is available at <http://www.nrs.fs.fed.us/fia/data-collection/>.

Phase 3

The third phase of the enhanced FIA program focuses on forest health. Phase 3 is administered by the FIA program with consultation from other Forest Service programs, other Federal agencies, state natural resource agencies, universities, and the FHM program. The FHM program consists of four interrelated and complementary activities: detection, evaluation, intensive site-ecosystem monitoring, and research on monitoring techniques. Detection monitoring consists of systematic aerial and ground surveys designed to collect baseline information on the current condition of forest ecosystems and to detect changes from those baselines over time. Evaluation studies examine the extent, severity, and probable causes of changes in forest health identified through the detection-monitoring surveys. Intensive site-ecosystem monitoring examines regionally specific ecological processes at a network of sites in representative forested ecosystems. Research on monitoring techniques focuses on developing and refining indicator measurements to improve the efficiency and reliability of data collection and analysis at all levels of the program.

The ground-survey portion of the detection-monitoring program was integrated into the FIA program as phase 3 in 1999. The phase 3 sample consists of a 1:16 subset of the phase 2 plots with one phase 3 plot for about every 95,000 acres. Phase 3 measurements are obtained by field crews during the growing season and include an extended suite of ecological data: lichen diversity and abundance, soil quality (erosion, compaction, and chemistry), vegetation diversity and structure, and down woody material. The incidence and severity of ozone injury for selected bioindicator species also are monitored as part of an associated sampling scheme. All phase 2 measurements are collected

on each phase 3 plot at the same time as the phase 3 measurements. Additional information on data-collection procedures used in phase 3 is available at <http://www.nrs.fs.fed.us/fia/topics/>.

Phase 3 variables are selected to address specific criteria outlined by the Montreal Process Working Group for the conservation and sustainable management of temperate and boreal forests (Montreal Process 1995) and are based on the concept of indicator variables. Observations of an indicator variable represent an index of ecosystem functions that can be monitored over time to assess trends. Indicator variables are used in conjunction with each other, phase 2 data, data from FHM evaluation monitoring studies, and ancillary data to address ecological issues such as vegetation diversity, fuel loading, regional air-quality gradients, and carbon storage. The phase 2 and 3 data of the enhanced FIA program are a primary source of reporting data for the Montreal Process Criteria.

Estimation

Most of the estimates and analysis of forest resources presented in this report, including the estimates in Tables 1-32, 54-61a, and 65, are based on data observed on the 18,127 phase 2 plots across Minnesota (Fig. 66). The analysis of forest-health issues that relate to down woody materials, soils, ozone damage, and crown condition are based on data collected on the 555 phase 3 plots (Fig 67).

About 20 percent of the phase 2 observations were acquired each year from October 1, 2003, through September 30, 2008. These observations, collectively called the 2008 inventory, are within 362 estimation strata defined by five phase 1 canopy-cover classes (0 to 5, 6 to 50, 51 to 65, 66 to 80, 81 to 100) or collapsed canopy-cover classes, and a land-ownership classification based on information obtained from the Minnesota DNR Data Deli, and county groups. Procedures described in Bechtold and Patterson (2005) for stratified estimation with observed stratum areas were used in conjunction with the strata in Table A to produce all estimates. Total area and number of plots within each stratum are shown in Table A.

Integration with Previous Inventories

In 2008, FIA completed measurement of the fifth panel of inventory plots in Minnesota. The 2008 panel along with those surveyed in 2004, 2005, 2006, and 2007 make up the dataset for the seventh full inventory of Minnesota. For simplicity, the seventh inventory often is called the 2008 inventory of Minnesota. Previous inventories of the State's forest resources were completed in 1935, 1953, 1962, 1977, 1990, and 2003 (Zon 1935, Cunningham et al. 1958, Stone 1966, Jakes 1980, Leatherberry et al. 1995, Miles et al. 2007).

Data from new inventories often are compared with data from earlier inventories to determine trends in forest resources. However, for the comparisons to be valid, the procedures used in the two inventories must be similar. Identical classification procedures were used for the 2003 and 2008 inventories, so comparisons between these inventories are relatively simple. Comparisons with earlier inventories (1990, 1977, 1962, 1953, and 1935) are more problematic because there were changes in plot design and data-collection classification methods among these inventories.

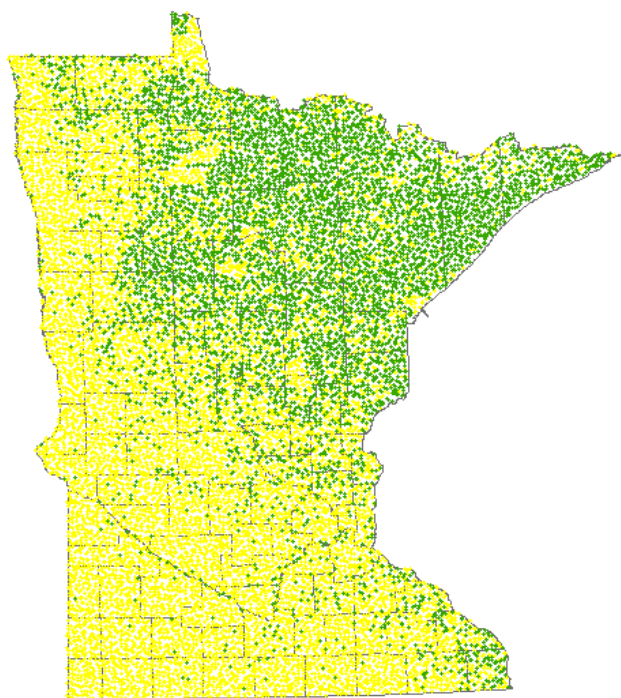


Figure 66.—Approximate location of forest land (green dots) and nonforest land (yellow dots) phase 2 plots, Minnesota, 2008.

For consistency, a new, national plot design was implemented by all five regional FIA units in 1999 in which fixed-radius subplots are used exclusively. Prior to the new plot design (during the 1990 and 1977 inventories), fixed and variable-radius subplots were used. Both designs have strong points but they often produce different classifications for condition characteristics. Procedures for assigning condition attributes such as forest type, stand age, and stocking changed significantly with the introduction of the new annual plot design. However, FIA research (unpublished) comparing these plot designs showed no noticeable difference in volume and tree-count estimates.

For additional information on the sample protocols and estimation procedures for the first two phases of the FIA program, see Bechtold and Patterson (2005). For additional information on phase 3 indicator sampling protocols, see USDA Forest Service (2005) and Woodall and Monleon (2008).

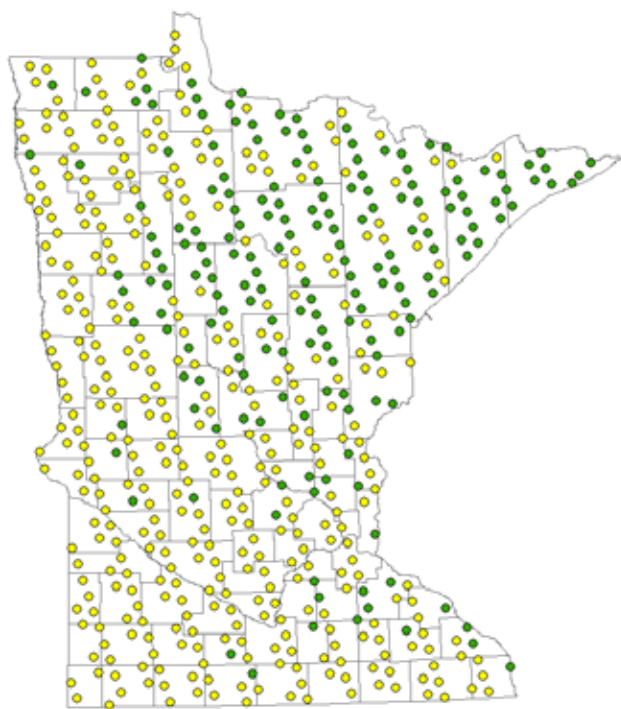


Figure 67.—Approximate location of forest land (green dots) and nonforest land (yellow dots) phase 3 plots, Minnesota, 2008.

Quality of the Estimates

Two general types of error—random variability (precision) and estimation bias (accuracy)—are of interest to users. Random variability refers to the precision of the estimate, which would occur if the entire sampling and estimation process were repeated many times. Estimation bias refers to the difference between the estimate and the “true value” in the absence of this random variability, and to the overestimation or underestimation inherent in the entire estimation process.

Errors in the estimates in this report (both random variability and estimation bias) are affected by various sources. The four primary sources of error common to all sample-based estimates are sampling, measurement, prediction, and nonresponse error. The following sections provide a definition for each source of error in the context of the FIA inventory as well as a discussion of methods used to quantify and/or reduce that source of error. Measures of sampling, measurement, and prediction errors associated with various attributes are presented. Issues of possible bias related to nonresponse also are addressed.

Sampling Error

The process of sampling (selecting a random subset of a population and calculating estimates from this subset) causes estimates to contain error they would not have if every member of the population (e.g., every tree in Minnesota) had been observed and included in the sample. The 2008 inventory is based on a sample of 18,133 plots located randomly across the State (total area of 54 million acres), or a sampling rate of about one plot for every 2,974 acres.

The procedures for statistical estimation outlined in the previous section and described in detail in Bechtold and Patterson (2005) provide the estimates of the population totals and means in this report. Along with every estimate is an associated sampling error that is typically expressed as a percentage of the estimated value (the estimated value plus or minus the sampling error). This

sampling error is the primary measure of the reliability of an estimate. We use a sampling error based on one standard error, that is, the chances are two in three that the results would have been within the limits indicated had a 100-percent inventory been conducted using these methods.

The sampling errors for State-level estimates of the major attributes presented in this report are presented in Table B. Table 65 presents sampling errors for these estimates at the FIA inventory-unit and county-group levels.

Estimates for classifications smaller than the State totals in Table B have larger sampling errors. For example, Table 65 shows that the sampling error for timberland area in any county is higher than that for total timberland area in Minnesota. To compute an approximate sampling error for an estimate that is smaller than a State total, use the following formula:

$$E = \frac{(SE) \sqrt{(\text{State total estimate})}}{\sqrt{(\text{Smaller estimate})}} \quad (1)$$

where:

E = approximate sampling error for smaller estimate

SE = sampling error for State total estimate (percent)

For example, to compute the error on the area of forest land in the spruce/fir forest-type group for the State, proceed as follows:

The total area of the spruce/fir group in Minnesota (from Table 3) is 3,856,080 acres.

The total area of all forest land in the State (from Table 3) is 16,990,266 acres.

The State total error for forest land area (from Table B) is 0.54 percent.

Using formula (1):

$$\text{Sampling error} = E = \frac{(0.54) \sqrt{(16,990,266)}}{\sqrt{(3,856,080)}} = 1.13 \text{ percent.}$$

This approximation works well for estimates of area, volume, number of trees, and biomass. It is less effective for estimates of growth, removals, or mortality. Individuals seeking more accurate sampling errors should use the estimation tools available at <http://fiatools.fs.fed.us>.

The estimators used by FIA are unbiased under the assumptions that the sample plots are a random sample of the total population, and that the observed value for any plot is the true value for that plot. Deviations from these basic assumptions are not reflected in the computation of sampling errors. The following sections on measurement, prediction, and nonresponse error address possible departures from these basic assumptions.

Measurement Error

Errors associated with the methods and instruments used to observe and record the sample attributes are called measurement errors. On FIA plots, attributes such as the diameter and height of a tree are measured with different instruments; other attributes such as species and crown class are observed without the aid of an instrument. On a typical FIA plot, 15 to 50 trees are observed with 15 to 20 attributes recorded on each tree. Also, many attributes that describe the plot and conditions on the plot are observed. Errors in any of these observations affect the quality of the estimates. If a measurement is biased (such as tree diameter consistently taken at an incorrect place on the tree), estimates that use this observation (such as volume) will reflect this bias. Even if measurements are unbiased, high levels of random error in the measurements will add to the total random error of the estimation process.

To ensure that all FIA observations are made to the highest standards possible, a regular program of quality control and quality assurance is an integral part of all FIA data-collection efforts. This program begins with the documentation of protocols and procedures used in the inventory followed by extensive crew training. To assess the quality of the data collected by these trained crews, a random sample of at least 4 percent of all plots is measured independently by a different qualified crew.

These independent measurements are called blind checks. A second measurement on blind-check plots is made by a quality assurance (QA) crew. QA crews have as much or more experience and training in FIA field measurements as that of a standard FIA crew.

The quality of field measurements is assessed nationally through a set of measurement quality objectives (MQOs) that are set for every data item collected. Each MQO consists of two parts: a tolerance or acceptable level of measurement error and an objective in terms of the percentage of measurements within tolerance. Blind-check measurements are used to observe how often individual field crews are meeting these objectives and to assess the overall compliance among all crews. Table C shows the compliance rates for various measurements used to compute the estimates included in this report and in other FIA reports. Columns labeled “Minnesota” are based on blind-check measurements of plots used in this publication. The columns labeled “All NRS States” include all measurements made by FIA crews within the 24-state region (Connecticut, Delaware, Illinois, Indiana, Iowa, Kansas, Maine, Maryland, Massachusetts, Michigan, Minnesota, Missouri, Nebraska, New Hampshire, New Jersey, New York, North Dakota, Ohio, Pennsylvania, Rhode Island, South Dakota, Vermont, West Virginia, and Wisconsin) in which the NRS implemented the FIA program from 2000 through 2008. Training and supervision of crews is a regional effort and crews often work in more than one state. Regional data-quality observations reflect the overall measurement quality of all data collected by FIA in the Northern States.

In Minnesota, variables such as d.b.h. have a low tolerance (± 0.1 inch) and a high percentage of data within the tolerance (93.8 percent). Measurements for determining tree-size class are precise. By contrast, variables such as stand age have a larger tolerance (± 10 years) and fewer data within the tolerance (87.3 percent). The estimate of stand age is based on the composition of all age classes within a stand. Often a stand is heterogeneous by age, but a single value must be assigned to it. This can confound analysis of stand age over time.

Blind-check observations also were used to test for relative bias in the field-crew measurements. Relative bias is defined here as a tendency for standard measurements by field-crews to be higher or lower than measurements by QA crews. The estimated relative bias and limits of 95-percent confidence intervals (based on parametric bootstrap estimates) for the relative bias are presented in Table D. Relative bias is reported only for variables that are measurements of continuous attributes (e.g., diameter and height) and several coded variables that are ordinal in nature (e.g., crown position). Relative bias is not appropriate for most coded variables.

Blind-check measurements do not provide direct observations of true bias in field measurements (average difference between field measurements and true values) because they are paired observations of two field measurements. The QA crew in these blind checks typically has more training and experience with FIA field measurements than the first crew, but both crews use the same methods and instruments to obtain measurements. These methods have been identified as the best available and selected for nationwide use by FIA, and are commonly used by similar natural-resource inventories. A basic assumption is that when applied correctly, these methods provide unbiased observations of the attribute they are designed to measure. Under this assumption, relative bias observations in Table D provide observations of bias due to the difference in experience and training between the field and QA crews. In most cases, there is no significant bias.

Prediction Error

Errors associated with mathematical models (such as volume models) aimed at providing observations of the attributes of interest based on sample attributes are called prediction errors. Area, number of trees, volume, biomass, growth, removals, and mortality are the primary attributes of interest presented in this report. Estimates of area and number of trees are based on direct observation and do not rely on prediction models. Models are used to predict volume and biomass estimates for individual trees. Change estimates such as growth,

mortality, and removals are based on these model-based predictions of volume from both the current plot measurements and the measurements taken in the previous inventory.

Estimates of prediction errors associated with volume models used in this report are included in Hahn (1984) along with model forms, methods used in model development, and model-parameter estimates. The estimated prediction errors are based on observations of 101,642 trees measured in the forest inventories of Minnesota (1980), Minnesota (1977), and Wisconsin (1968). For gross cubic-foot volume of a live tree, standard errors ranged from 1.47 to 28.13 cubic feet. For board-foot volume of a live tree, standard errors ranged from 14.49 to 189.95 board feet.

In comparing FIA estimates with those from other data sources, users need to be aware of the prediction models used in both estimates. If both estimates are based on the same prediction models with matching fitted-parameter values, the prediction bias of one estimate should cancel out that of the other estimate. If the estimates are based on different prediction models, the prediction error of both models must be considered.

Nonresponse Error

Nonresponse error occurs when crews are unable to measure a plot (or a portion of a plot) at a selected location. Nonresponse falls into three classes:

Denied access – Entire plots or portions of plots where the field crew is unable to obtain permission from the landowner to measure trees on the plot.

Hazardous/inaccessible – Entire plots or portions of plots where conditions prevent a crew from safely accessing the plot or measuring trees on the plot.

Other – Plots where the field crew is unable to obtain a valid measurement for reasons other than those stated.

Nonresponse has two effects on the sample: it reduces the sample size, which is reflected in the sampling errors, and it can bias the estimates if the portion of the population not being sampled differs from the portion being sampled.

In FIA, nonresponse rates are relatively low. In the 2008 Minnesota inventory, 18,133 sample plots were selected for observation. Over 98 percent of these are included in the sample used to estimate current resources. On 266 plots, crews were unable to obtain owner permission to measure the plot or part of the plot; hazardous conditions on 68 plots prevented the crew from measuring all or part of the plot.

Even an overall nonresponse rate of 1 percent can cause considerable bias if not properly accounted for. The major source of nonresponse is denied access to plots, which occurs primarily on lands in private ownership. Also, observations for plots on nonforest land and water classes rarely require crews to physically enter the area, and permission is not needed because the observation can be obtained from aerial photos or other sources of remotely sensed information.

The stratified estimation process used by FIA with strata defined by ownership classes and canopy cover class reduces the possible effects of bias caused by nonresponse. Under the stratified estimation process used by FIA, nonresponses are removed from the sample, and stratum estimates (means, totals, and sampling errors) are obtained only from plots with valid observations. The net effect in the estimates of means and totals is that the average of the observed plots within the stratum (ownership-canopy-cover class) becomes the estimate for all nonresponses within that stratum. The nonresponse rate in one stratum does not affect the estimate in other strata. The response rate by ownership is presented in Table E. Response rates by ownership and strata are presented in Table A.

In Table 1 of this report, we acknowledge denied access and hazardous as two land classes in Minnesota within which we are unable to provide estimates for variables

such as forest area and timber volume. However, we do report the total estimated area in each of these classes. In all other tables of this report, we do not acknowledge either of these classes, and in the estimation process we treat the sample where we do have observations as a random sample of the entire State.

The nonresponse plots in this inventory were not permanently removed from the FIA system of plots. In future inventories we will again attempt to measure these plots. At that time we may be able to obtain permission to access these plots, hazardous conditions may have changed, and other circumstances that caused us to drop plots from a specific inventory cycle may well change.

Glossary

Average annual mortality: The average annual change in mortality of trees during the period between inventories. This estimate can be provided in cubic feet for live and growing-stock trees that died or in board feet for sawtimber trees that died.

Average annual net growth: The average annual change in the volume of trees during the period between inventories. Components include the change in volume of trees that have met the minimum size requirements over the inventory period, plus the volume of trees reaching the minimum size during the period (ingrowth), minus the volume of trees that died during the period, minus the volume of cull during the period. Mortality removals (trees killed in the harvesting process and left on site) and diversion removals (trees removed from the forest-land base due to a change from forest to nonforest land) are not included. This estimate can be provided in cubic feet for live and growing-stock trees or in board feet for sawtimber trees.

Average annual removals: The average annual change in removals of trees during the period between inventories. The estimate includes harvest removals, mortality removals (trees killed in the harvesting process and left on site), and diversion removals (trees removed from the forest-land base due to a change from forest to nonforest land). This estimate can be provided in cubic feet for live and growing-stock trees or in board feet for sawtimber trees.

Basal area: Tree area in square feet of the cross section at breast height of a single tree. When the basal areas of all trees in a stand are summed, the result usually is expressed as square feet of basal area per acre.

Bioindicator species: A tree, woody shrub, or herb species that responds to ambient levels of ozone pollution with distinct visible foliar symptoms that are easy to diagnose.

Biomass: The aboveground volume of live trees (including bark but excluding foliage) reported in dry tons (dry weight). Biomass has four components:

Bole: Biomass of a tree from 1 foot above the ground to a 4-inch top outside bark or to a point where the central stem breaks into limbs.

Tops and limbs: Total biomass of a tree from a 1-foot stump minus the bole.

1-to 5-inch trees: Total aboveground biomass of a tree from 1 to 5 inches in d.b.h.

Stump: Biomass of a tree 5 inches d.b.h. and larger from the ground to a height of 1 foot.

Bulk density: The mass of soil per unit volume. A measure of the ratio of pore space to solid materials in a given soil. It is expressed in units of grams per cubic centimeter of oven-dry soil.

Coarse woody debris (CWD): Dead branches, twigs, and wood splinters 3.0 inches in diameter and larger measured at the smallest end.

Commercial species: Tree species suitable for industrial wood products.

Compacted live crown ratio: The percent of the total length of the tree that supports a full, live crown. To determine compacted live crown ratio for trees that have uneven length crowns, lower branches are visually transferred to fill holes in the upper portions of the crown, until a full, even crown is created.

Corporate: An ownership class of private lands owned by corporations.

County and municipal: An ownership class of public lands owned by counties or local public agencies, or lands leased by these governmental units for more than 50 years. Also known as local government.

Cropland: Land under cultivation within the last 24 months, including cropland harvested, crop failures, cultivated summer fallow, idle cropland used only for pasture, orchards, active Christmas tree plantations indicated by annual shearing, nurseries, and land in soil improvement crops but excluding land cultivated in developing improved pasture.

Crown: The part of a tree or woody plant bearing live branches or foliage.

Crown dieback: Recent mortality of branches with fine twigs, which begins at the terminal portion of a branch and proceeds toward the trunk. Dieback is considered only when it occurs in the upper and outer portions of the tree. When whole branches are dead in the upper crown, without obvious signs of damage such as breaks or animal injury, it is assumed the branches died from the terminal portion of the branch. Dead branches in the lower portion of the live crown are assumed to have died from competition and shading.

Cull tree: A live tree, 5.0 inches in d.b.h. or larger, that is unmerchantable for saw logs now or prospectively because of rot, roughness, or species (see definitions for rotten and rough trees).

Decay class: Qualitative assessment of stage of decay (5 classes) of coarse woody debris based on visual assessments of color of wood, presence/absence of twigs and branches, texture of rotten portions, and structural integrity.

Diameter class: A classification of trees based on diameter outside bark measured at breast height (4-1/2 feet above ground). D.b.h. is the common abbreviation for “diameter at breast height.” With 2-inch diameter classes, the 6-inch class, for example, includes trees 5.0 through 6.9 inches d.b.h. A “diameter at root collar” or d.r.c. measurement is acquired for multi-stemmed woodland species (e.g., Rocky Mountain juniper). Woodland species are generally found in the arid west. To date no woodland species have been tallied in Minnesota.

Down woody material (DWM): Woody pieces of trees and shrubs that have been uprooted (no longer supporting growth) or severed from their root system, not self-supporting, and lying on the ground.

Duff: A soil layer dominated by organic material derived from the decomposition of plant and animal litter and deposited on either an organic or a mineral surface. This layer is distinguished from the litter layer in that the original organic material has undergone sufficient decomposition that the source of this material (e.g., individual plant parts) no longer can be identified.

Effective cation exchange capacity (ECEC): The sum of cations that a soil can adsorb in its natural pH. It is expressed in units of centimoles of positive charge per kilogram of soil.

Federal: An ownership class of public lands owned by the U.S. Government.

Fiber products: Products derived from wood and bark residues, such as pulp, composition board products, and wood chips.

Fine materials: Wood residues not suitable for chipping, such as planer shavings and sawdust.

Fine woody debris (FWD): Dead branches, twigs, and wood splinters 0.1 to 2.9 inches in diameter.

Forest land: Land at least 10-percent stocked by trees of any size, including land that formerly had such tree cover and that will be naturally or artificially regenerated. Forest land includes transition zones, such as areas between heavily forested and nonforested lands that are at least 10-percent stocked with trees and forest areas adjacent to urban and builtup lands. Also included are pinyon-juniper and chaparral areas in the West and afforested areas. The minimum area for classification of forest land is 1 acre and 120 feet wide measured stem-to-stem from the outer-most edge. Unimproved roads and trails, streams, and clearings in forest areas are classified as forest if less than 120 feet wide.

Forest type: A classification of forest land based on the species presently forming a plurality of the live-tree stocking. If softwoods predominate (50 percent or more), then the forest type will be one of the softwood types and vice versa for hardwoods. For the Eastern United States, there are mixed hardwood-pine forest types when the pine and/or redcedar (either eastern or southern) component is between 25 and 49 percent of the stocking. If the pine/redcedar component is less than 25 percent of the stocking, then one of the hardwood forest types is assigned.

Forest-type group: Combinations of forest types that share closely associated species or site requirements and are generally combined for brevity of reporting. See forest type for examples of forest-type group members.

Growing stock: A classification of timber inventory that includes live trees of commercial species meeting specified standards of quality or vigor. Rough and rotten cull trees are excluded. When associated with volume, this includes only trees 5.0 inches d.b.h. and larger.

Hardwood: A dicotyledonous tree, usually broad-leaved and deciduous.

Soft hardwoods: A category of hardwood species with wood generally of low specific gravity (less than 0.5). Notable examples include red maple, paper birch, quaking aspen, and American elm.

Hard hardwoods: A category of hardwood species with wood generally of high specific gravity (greater than 0.5). Notable examples include sugar maple, yellow birch, black walnut, and oaks.

Industrial wood: All commercial roundwood products except fuelwood.

Land area: The area of dry land and land temporarily or partly covered by water, such as marshes, swamps, and river flood plains; streams, sloughs, estuaries, and canals less than 200 feet wide; and lakes, reservoirs, and ponds less than 4.5 acres in area.

Litter: Undecomposed or only partially decomposed organic material that can be readily identified (e.g., plant leaves, twigs).

Live cull: A classification that includes live, cull trees. When associated with volume, it is the net volume in live, cull trees that are 5.0 inches d.b.h. and larger.

Local government: An ownership class of public lands owned by counties or local public agencies, or lands leased by these governmental units for more than 50 years. Also known as county and municipal.

Logging residues: The unused portions of growing-stock and non-growing-stock trees cut or killed by logging and left in the woods.

Merchantable: Refers to a pulpwood or saw log section that meets pulpwood or saw log specifications, respectively.

National Forest: An ownership class of Federal lands, designated by executive order or statute as National Forests or purchase units, and other lands under the administration of the Forest Service, including experimental areas.

Net volume in cubic feet: The gross volume in cubic feet less deductions for rot, roughness, and poor form. Volume is computed for the central stem from a 1-foot stump to a minimum 4.0-inch top diameter outside bark, or to the point where the central stem breaks into limbs.

Noncommercial species: Tree species of typically small size, poor form, or inferior quality, which normally do not develop into trees suitable for industrial wood products.

Noncorporate private: Nongovernmental conservation and natural resource organizations; unincorporated local partnerships, associations, and clubs; individuals; and Native American communities.

Nonforest land: Land that has never supported forests and lands formerly forested where use of timber management is precluded by development for other uses. (Note: Includes area used for crops, improved pasture, residential areas, city parks, improved roads of any width and adjoining clearings, powerline clearings of any width, and 1- to 4.5-acre areas of water classified by the Bureau of the Census as land. If intermingled in forest areas, unimproved roads and nonforest strips must be more than 120 feet wide, and clearings, etc., must be more than 1 acre in area to qualify as nonforest land.)

Nonstocked areas: Timberland less than 10-percent stocked with live trees.

Other red oaks: A group of species in the genus *Quercus* that includes northern pin oak and black oak.

Other white oaks: A group of species in the genus *Quercus* that includes chestnut oak and overcup oak.

Ownership: The property owned by one ownership unit.

Ownership unit: A classification of ownership encompassing all types of legal entities having an ownership interest in land, regardless of the number of people involved. A unit may be an individual, a combination of persons; a legal entity such as a corporation, partnership, club, or trust, or a public agency. An ownership unit has control of a parcel or group of parcels of land.

Ozone: A regional, gaseous air pollutant produced primarily through sunlight-driven chemical reactions of nitrogen dioxide and hydrocarbons in the atmosphere and causing foliar injury to deciduous trees, conifers, shrubs, and herbaceous species.

Ozone bioindicator site: An open area used for ozone injury evaluations on ozone-sensitive species. The area must meet certain site selection guidelines on size, condition, and plant counts to be used for ozone injury evaluations in FIA.

Physiographic class: A measure of soil and water conditions that affect tree growth on a site. The physiographic classes are as follows:

Xeric: Very dry soils where excessive drainage seriously limits both growth and species occurrence. These sites are usually on upland and upper half slopes.

Xeromesic: Moderately dry soils where excessive drainage limits growth and species occurrence to some extent. These sites are usually on the lower half slopes.

Mesic: Deep, well-drained soils. Growth and species occurrence are limited only by climate. These include all cove sites (small sheltered bays) and bottomlands (low land) along intermittent streams.

Hydromesic: Moderately wet soils where insufficient drainage or infrequent flooding limits growth and species occurrence to some extent.

Hydric: Very wet sites where excess water seriously limits both growth and species occurrence.

Poletimber trees: Live trees at least 5.0 inches in d.b.h. but smaller than sawtimber trees.

Primary wood-using mill: A mill that converts roundwood products into other wood products. Common examples are sawmills that convert saw logs into lumber and pulpmills that convert pulpwood into wood pulp.

Productivity class: A classification of forest land in terms of potential annual cubic-foot volume growth per acre at culmination of mean annual increment in fully stocked natural stands.

Pulpwood: Roundwood, whole-tree chips, or wood residues used for the production of wood pulp.

Reserved forest land: Forest land withdrawn from timber utilization through statute, administrative regulation, or designation without regard to productive status.

Residues: Bark and woody materials that are generated in primary wood-using mills when roundwood products are converted to other products. Examples include slabs, edgings, trimmings, miscuts, sawdust, shavings, veneer cores and clippings, and pulp screenings. Includes bark residues and wood residues (both coarse and fine materials) but excludes logging residues.

Rotten tree: A live tree of commercial species that does not contain a saw log now or prospectively primarily because of rot (that is, when rot accounts for more than 50 percent of the total cull volume).

Rough tree: (a) A live tree of commercial species that does not contain a saw log now or prospectively primarily because of roughness (that is, when sound cull due to such factors as poor form, splits, or cracks accounts for more than 50 percent of the total cull volume) or (b) a live tree of noncommercial species.

Roundwood products: Logs, bolts, and other round timber generated from harvesting trees for industrial or consumer use.

Salvable dead tree: A downed or standing dead tree considered currently or potentially merchantable by regional standards.

Saplings: Live trees 1.0 inch through 4.9 inches d.b.h.

Saw log: A log meeting minimum standards of diameter, length, and defect, including logs at least 8 feet long, sound and straight, and with a minimum diameter inside bark of 6 inches for softwoods and 8 inches for hardwoods, or meeting other combinations of size and defect specified by regional standards.

Sawtimber tree: A live tree of commercial species containing at least a 12-foot saw log or two noncontiguous saw logs 8 feet or longer, and meeting regional specifications for freedom from defect. Softwoods must be at least 9.0 inches d.b.h. Hardwoods must be at least 11.0 inches d.b.h.

Sawtimber volume: Net volume of the saw-log portion of live sawtimber in board feet, International 1/4-inch rule (unless specified otherwise), from stump to a minimum 7.0 inches top d.o.b. for softwoods and a minimum 9.0 inches top d.o.b. for hardwoods.

Seedlings: Live trees less than 1.0 inch d.b.h. and at least 1 foot in height.

Select red oaks: A group of species in the genus *Quercus* that includes northern red oak.

Select white oaks: A group of species in the genus *Quercus* that includes bur oak, white oak, and swamp white oak.

Site index: An expression of forest site quality based on the height of a free-growing dominant or codominant tree of a representative species in the forest type at age 50.

Snag: A standing dead tree. In the current inventory, a snag must be 5.0 inches d.b.h./d.r.c. and 4.5 feet tall, and have a lean angle less than 45 degrees from vertical. A snag may be either self-supported by its roots, or supported by another tree or snag.

Softwood: A coniferous tree, usually evergreen, having needles or scale-like leaves.

Soil Order: The broadest category or class of soil based largely on the processes that formed the soil as indicated by the presence or absence of diagnostic horizons or layers. Several dominant soil orders in Minnesota are as follows:

Alfisols: Moist mineral soils that form mostly in cool to hot humid areas. These soils usually form under deciduous forests and are usually quite productive. These soils are more weathered than Inceptisols but less than Spodosols.

Entisols: Mineral soils with no horizons or only the beginning of horizons. These soils are basically unaltered from their parent material. Soils of this order vary widely in productivity.

Histisols: Organic soils that form in saturated wet conditions. These can occur in any wet area and can be very productive when drained.

Inceptisols: Soils with few diagnostic features that have formed quickly from the parent material. They form under a wide variety of climates. These soils are more advanced than Entisols but less than other orders. They vary widely in productivity.

Mollisols: Organic soils that form in semiarid to semihumid areas mostly under prairie vegetation. These are some of the most productive soils.

Spodosols: Mineral soils that form in humid climates usually where it is cold and temperate. Most of these soils develop naturally under forests. They are not naturally very fertile but can be productive with fertilizer.

Sound dead: The net volume in salvable dead trees.

Stand: A group of trees on a minimum of 1 acre of forest land that is stocked by forest trees of any size.

Stand-size class: A classification of forest land based on the size class of live trees in the area. The classes are as follows:

Nonstocked: Forest land stocked with less than 10 percent of full stocking with live trees. Examples are recently cutover areas or recently reverted agricultural fields.

Seedling-sapling: Forest land stocked with at least 10 percent of full stocking with live trees with half or more of such stocking in seedlings or saplings or both.

Poletimber: Forest land stocked with at least 10 percent of full stocking with live trees with half or more of such stocking in poletimber or sawtimber trees or both, and in which the stocking of poletimber exceeds that of sawtimber.

Sawtimber: Forest land stocked with at least 10 percent of full stocking with live trees with half or more of such stocking in poletimber or sawtimber trees or both, and in which the stocking of sawtimber is at least equal to that of poletimber.

State: An ownership class of public lands owned by states or lands leased by states for more than 50 years. Also a general reference to one of the political and geographic subdivisions of the United States.

Stocking: The degree of occupancy of land by trees, measured by basal area or number of trees by size and spacing, or both, compared to a stocking standard; that is, the basal area or number of trees, or both, required to fully utilize the growth potential of the land.

Timberland: Forest land that is producing or is capable of producing crops of industrial wood and not withdrawn from timber utilization by statute or administrative regulation. (Note: Areas qualifying as timberland are capable of producing in excess of 20 cubic feet per acre per year of industrial wood in natural stands. Currently inaccessible and inoperable areas are included.)

Timber products output: All timber products cut from roundwood and byproducts of wood manufacturing plants. Roundwood products include logs, bolts, or other round sections cut from growing-stock trees, cull trees, salvable dead trees, trees on nonforest land, noncommercial species, sapling-size trees, and limbwood. Byproducts from primary manufacturing plants include slabs, edging, trimmings, miscuts, sawdust, shavings, veneer cores and clippings, and screenings of pulpmills that are used as pulpwood chips or other products.

Tree: A woody plant usually having one or more erect perennial stems, a stem diameter at breast height of at least 3.0 inches, a more or less definitely formed crown of foliage, and a height of at least 15 feet at maturity.

Tree size class: A classification of trees based on diameter at breast height, including sawtimber trees, poletimber trees, saplings, and seedlings.

Tops: The wood of a tree above the merchantable height (or above the point on the stem 4.0 inches diameter outside bark (d.o.b.) or to the point where the central stem breaks into limbs). It includes the usable material in the uppermost stem.

Urban forest land: Land that would otherwise meet the criteria for timberland but is in an urban-suburban area surrounded by commercial, industrial, or residential development and not likely to be managed for the production of industrial wood products on a continuing basis. Wood removed would be for land clearing, fuelwood, or esthetic purposes. Such forest land may be associated with industrial, commercial, residential subdivision, industrial parks, golf course perimeters, airport buffer strips, and public urban parks that qualify as forest land.

Unreserved forest land: Forest land not withdrawn from harvest by statute or administrative regulation. This includes forest lands that are not capable of producing in excess of 20 cubic feet per acre per year of industrial wood in natural stands.

Veneer log: A roundwood product from which veneer is sliced or sawn and that usually meets certain standards of minimum diameter and length and maximum defect.

Weight: The weight of wood and bark, oven-dry basis.

Tables of Quality Assurance

Table A.—Area and number of plots in each stratum, Minnesota, 2004-2008

Table B.—State-level estimates of major forest resource attributes and their sampling errors, Minnesota, 2004-2008

Table C.—Measurement quality objective (MQO) tolerance compliance based on blind-check plots, Minnesota, 2004-2008

Table D.—Observed relative bias values (Average [field crew - QA crew]) for measurement variables on blind check plots, Minnesota, 2004-2008

Table E.—FIA nonresponse by ownership, Minnesota, 2004-2008

Tables of Estimates

Gaps in the enumeration of tables are placeholders for future reports.

Area

Table MN-1.—Percentage of area by land status, Minnesota, 2004-2008

Table MN-2.—Area of forest land, in thousand acres, by owner class and forest-land status, Minnesota, 2004-2008

Table MN-3.—Area of forest land, in thousand acres, by forest-type group and productivity class, Minnesota, 2004-2008

Table MN-4.—Area of forest land, in thousand acres, by forest-type group, ownership group, and forest-land status, Minnesota, 2004-2008

Table MN-5.—Area of forest land, in thousand acres, by forest-type group and stand-size class, Minnesota, 2004-2008

Table MN-6.—Area of forest land, in thousand acres, by forest-type group and stand-age class, Minnesota, 2004-2008

Table MN-7.—Area of forest land, in thousand acres, by forest-type group and stand origin, Minnesota, 2004-2008

Table MN-8.—Area of forest land, in thousand acres, by forest-type group and primary disturbance class Minnesota, 2004-2008

Table MN-9.—Area of timberland, in thousand acres, by forest-type group and stand-size class, Minnesota, 2004-2008

Number

Table MN-10.—Number of live trees (at least 1 inch d.b.h./d.r.c.), in thousand trees, on forest land by species group and diameter class, Minnesota, 2004-2008

Table MN-11.—Number of growing-stock trees (at least 5 inches d.b.h.), in thousand trees, on timberland by species group and diameter class, Minnesota, 2004-2008

Volume

Table MN-12.—Net volume of live trees (at least 5 inches d.b.h./d.r.c.), in million cubic feet, by owner class and forest-land status, Minnesota, 2004-2008

Table MN-13.—Net volume of live trees (at least 5 inches d.b.h./d.r.c.), in million cubic feet, on forest land by forest-type group and stand-size class, Minnesota, 2004-2008

Table MN-14.—Net volume of live trees (at least 5 inches d.b.h./d.r.c.), in million cubic feet, on forest land by species group and ownership group, Minnesota, 2004-2008

Table MN-15.—Net volume of live trees (at least 5 inches d.b.h./d.r.c.), in million cubic feet, on forest land by species group and diameter class, Minnesota, 2004-2008

Table MN-16.—Net volume of live trees (at least 5 inches d.b.h./d.r.c.), in million cubic feet, on forest land by forest-type group and stand origin, Minnesota, 2004-2008

Table MN-17.—Net volume of growing-stock trees (at least 5 inches d.b.h./d.r.c.), in million cubic feet, on timberland by species group and diameter class, Minnesota, 2004-2008

Table MN-18.—Net volume of growing-stock trees (at least 5 inches d.b.h.), in million cubic feet, on timberland by species group and ownership group, Minnesota, 2004-2008

Table MN-19.—Net volume of sawtimber trees (International 1/4-inch rule), in million board feet, on timberland by species group and diameter class, Minnesota, 2004-2008

Table MN-19a.—Net volume of sawtimber trees (Doyle rule), in million board feet, on timberland by species group and diameter class, Minnesota, 2004-2008

Table MN-20.—Net volume of saw-log portion of sawtimber trees, in million cubic feet, on timberland by species group and ownership group, Minnesota, 2004-2008

Growth, Mortality, and Removals

Table MN-21.—Average annual net growth of live trees (at least 5 inches d.b.h./d.r.c.), in million cubic feet, by owner class and forest-land status, Minnesota, 1999-2003 to 2004-2008

Table MN-22.—Average annual net growth of live trees (at least 5 inches d.b.h./d.r.c.), in million cubic feet, on forest land by forest-type group and stand-size class, Minnesota, 1999-2003 to 2004-2008

Table MN-23.—Average annual net growth of all live trees (at least 5 inches d.b.h./d.r.c.), in million cubic feet, on forest land by species group and ownership group, Minnesota, 1999-2003 to 2004-2008

Table MN-24.—Average annual net growth of growing-stock trees (at least 5 inches d.b.h./d.r.c.), in million cubic feet, on timberland by species group and ownership group, Minnesota, 1999-2003 to 2004-2008

Table MN-25.—Average annual mortality of live trees (at least 5 inches d.b.h./d.r.c.), in million cubic feet, by owner class and forest-land status, Minnesota, 1999-2003 to 2004-2008

Table MN-26.—Average annual mortality of trees (at least 5 inches d.b.h./d.r.c.), in million cubic feet, on forest land by forest-type group and stand-size class, Minnesota, 1999-2003 to 2004-2008

Table MN-27.—Average annual mortality of trees (at least 5 inches d.b.h./d.r.c.), in million cubic feet, on forest land by species group and ownership group, Minnesota, 1999-2003 to 2004-2008

Table MN-28.—Average annual mortality of growing-stock trees (at least 5 inches d.b.h.), in million cubic feet, on timberland by species group and ownership group, Minnesota, 1999-2003 to 2004-2008

Table MN-29.—Average annual removals of live trees (at least 5 inches d.b.h./d.r.c.), in million cubic feet, on forest land by species group and ownership group, Minnesota, 1999-2003 to 2004-2008

Table MN-30.—Average annual removals of growing-stock trees (at least 5 inches d.b.h.), in million cubic feet, on timberland by species group and ownership group, Minnesota, 1999-2003 to 2004-2008

Weight

Table MN-31.—Aboveground dry weight of live trees (at least 1 inch d.b.h./d.r.c.), in thousand dry short tons, by owner class and forest-land status, Minnesota, 2004-2008

Table MN-32.—Aboveground dry weight of live trees (at least 1 inch d.b.h./d.r.c.), in thousand dry short tons, on forest land by species group and diameter class, Minnesota, 2004-2008

County-Level

Table MN-54.—Area of forest land, in thousand acres, by inventory unit, county, and forest-land status, Minnesota, 2004-2008

Table MN-55.—Area of forest land, in thousand acres, by inventory unit, county, ownership group and forest-land status, Minnesota, 2004-2008

Table MN-56.—Area of forest land, in thousand acres, by inventory unit, county, and forest-type group, Minnesota, 2004-2008

Table MN-57.—Area of timberland, in thousand acres, by inventory unit, county, and stand-size class, Minnesota, 2004-2008

Table MN-58.—Area of timberland, in thousand acres, by inventory unit, county, and stocking class, Minnesota, 2004-2008

Table MN-59.—Net volume of growing-stock trees (at least 5 inches d.b.h.), in million cubic feet, and sawtimber trees (International 1/4-inch rule), on timberland by inventory unit, county, and major species group, Minnesota, 2004-2008

Table MN-59a.—Net volume of growing stock and sawtimber (Doyle rule) on timberland by Forest Survey Unit, county, and major species group, Minnesota, 2004-2008

Table MN-60.—Average annual net growth of growing-stock trees (at least 5 inches d.b.h.), in million cubic feet, and sawtimber trees (International 1/4-inch rule), in million board feet, on timberland by inventory unit, county, and major species group, Minnesota, 1999-2003 to 2004-2008

Table MN-60a.—Average annual net growth of growing-stock trees (at least 5 inches d.b.h.), in million cubic feet, and sawtimber trees (Doyle rule), in million board feet, on timberland by inventory unit, county, and major species group, Minnesota, 1999-2003 to 2004-2008

Table MN-61.—Average annual removals of growing-stock trees (at least 5 inches d.b.h.), in million cubic feet, and sawtimber trees (International 1/4-inch rule), in million board feet, on timberland by inventory unit, county, and major species group, Minnesota, 1999-2003 to 2004-2008

Table MN-61a.—Average annual removals of growing-stock trees (at least 5 inches d.b.h.), in million cubic feet, and sawtimber trees (Doyle rule), in million board feet, on timberland by inventory unit, county, and major species group, Minnesota, 1999-2003 to 2004-2008

Table MN-65.—Sampling errors, in percent, for net volume, average annual net growth, average annual removals, and average annual mortality on timberland, and forest and timberland area by inventory unit and county, Minnesota, 2004-2008

Crowns

Table MN-66.—Mean crown dieback and other statistics for live trees (at least 5 inches d.b.h.) on forest land by species, Minnesota, 2004-2008

Table MN-67.—Mean foliage transparency and other statistics for live trees (at least 5 inches d.b.h.) on forest land by species, Minnesota, 2004-2008

Table MN-68.—Distribution of sapling crown vigor class for live saplings (1-4.9 inches d.b.h.) on forest land by species group, Minnesota, 2004-2008

Table MN-69.—Mean crown density and other statistics for live trees (at least 5 inches d.b.h.) on forest land by species, Minnesota, 2004-2008

Table A.—Area and number of plots in each stratum, Minnesota 2004-2008

Unit ^a	Estimation unit ^b	Strata ^c	Area ^d (acres)	Selected ^e	Nonforest office plots ^f	Field check plots ^g	Field check plots measured ^h	Forest plots measured ⁱ	Forest plots measured for change ^j	Plots not measured ^k	Denied access	Hazardous
1	BWCA	Canopy cover 0 - 6	24,340	6	1	5	5	5	5	0	0	0
1	BWCA	Canopy cover 51 - 65	20,844	6	0	6	6	5	4	0	0	0
1	BWCA	Canopy cover 66 - 80	236,219	40	3	37	32	29	25	6	0	6
1	BWCA	Canopy cover 81 - 100	484,931	98	1	97	87	85	56	10	0	10
1	Inland Census Water Cnty. Grp. 13	Canopy cover 0 - 5	91,280	30	26	4	4	3	3	0	0	0
1	Inland Census Water Cnty. Grp. 13	Canopy cover 6 - 81	12,711	6	1	5	5	4	3	0	0	0
1	Inland Census Water Cnty. Grp. 25	Canopy cover 0 - 81	33,193	13	13	0	0	0	0	0	0	0
1	Inland Census Water Cnty. Grp. 26	Canopy cover 0 - 81	121,084	39	34	5	4	4	1	1	0	1
1	Inland Census Water Cnty. Grp. 7, 40	Canopy cover 0 - 5	305,944	105	98	7	7	5	3	0	0	0
1	Inland Census Water Cnty. Grp. 7, 40	Canopy cover 6 - 81	34,539	7	3	4	4	4	2	1	0	1
1	Private Cnty. Grp. 13	Canopy cover 0 - 66	38,566	10	0	10	9	9	8	1	1	0
1	Private Cnty. Grp. 13	Canopy cover 81 - 100	111,722	52	0	52	47	47	38	6	5	1
1	Private Cnty. Grp. 25	Canopy cover 0 - 5	106,946	40	23	17	16	13	10	1	1	0
1	Private Cnty. Grp. 25	Canopy cover 6 - 51	40,225	12	4	8	7	6	5	1	1	0
1	Private Cnty. Grp. 25	Canopy cover 66 - 80	168,786	56	3	53	52	51	41	1	1	0
1	Private Cnty. Grp. 25	Canopy cover 81 - 100	272,796	101	1	100	94	91	76	6	4	2
1	Private Cnty. Grp. 26	Canopy cover 0 - 5	16,340	8	4	4	4	4	2	0	0	0
1	Private Cnty. Grp. 26	Canopy cover 6 - 51	17,054	8	2	6	6	6	4	0	0	0
1	Private Cnty. Grp. 26	Canopy cover 66 - 80	93,340	23	0	23	22	22	21	1	1	0
1	Private Cnty. Grp. 26	Canopy cover 81 - 100	147,151	56	0	56	52	52	41	4	4	0
1	Private Cnty. Grp. 40	Canopy cover 0 - 5	306,671	112	72	40	39	32	22	2	2	0
1	Private Cnty. Grp. 40	Canopy cover 51 - 65	80,582	27	7	20	19	16	10	1	1	0
1	Private Cnty. Grp. 40	Canopy cover 6 - 50	58,624	16	9	7	7	4	3	0	0	0
1	Private Cnty. Grp. 40	Canopy cover 66 - 80	487,067	174	8	166	155	147	117	11	11	0
1	Private Cnty. Grp. 40	Canopy cover 81 - 100	674,959	204	3	201	191	188	166	11	10	1
1	Private Cnty. Grp. 7	Canopy cover 0 - 5	99,415	45	29	16	14	5	5	2	2	0
1	Private Cnty. Grp. 7	Canopy cover 51 - 65	19,794	7	2	5	5	4	3	0	0	0
1	Private Cnty. Grp. 7	Canopy cover 6 - 50	13,665	9	1	8	7	3	1	1	1	0
1	Private Cnty. Grp. 7	Canopy cover 66 - 80	72,815	14	0	14	14	12	10	0	0	0
1	Private Cnty. Grp. 7	Canopy cover 81 - 100	175,614	67	2	65	62	58	53	3	3	0
1	Public Cnty. Grp. 13	Canopy cover 0 - 66	45,143	20	0	20	20	20	20	0	0	0
1	Public Cnty. Grp. 13	Canopy cover 81 - 100	96,992	23	1	22	21	21	19	1	1	0
1	Public Cnty. Grp. 25	Canopy cover 0 - 5	80,878	20	8	12	12	12	7	0	0	0
1	Public Cnty. Grp. 25	Canopy cover 6 - 51	41,384	12	3	9	9	8	7	0	0	0
1	Public Cnty. Grp. 25	Canopy cover 66 - 80	427,875	148	11	137	136	133	109	2	1	1

(Table A continued on next page)

(Table A continued)

Unit ^a	Estimation unit ^b	Strata ^c	Area ^d (acres)	Selected ^e	Nonforest office plots ^f	Field check plots ^g	Field check plots measured ^h	Forest plots measured ⁱ	Forest plots measured for change ^j	Plots not measured ^k	Denied access	Hazardous
1	Public Cnty, Grp. 25	Canopy cover 81 - 100	835,850	275	8	267	263	258	210	4	0	4
1	Public Cnty, Grp. 26	Canopy cover 0 - 51	24,148	6	2	4	4	4	3	0	0	0
1	Public Cnty, Grp. 26	Canopy cover 66 - 80	108,101	36	0	36	36	36	35	0	0	0
1	Public Cnty, Grp. 26	Canopy cover 81 - 100	205,221	77	0	77	76	76	69	1	0	1
1	Public Cnty, Grp. 40	Canopy cover 0 - 5	97,833	38	18	20	19	16	13	1	0	1
1	Public Cnty, Grp. 40	Canopy cover 51 - 65	56,344	18	5	13	13	12	9	0	0	0
1	Public Cnty, Grp. 40	Canopy cover 6 - 50	19,485	5	3	2	2	2	1	0	0	0
1	Public Cnty, Grp. 40	Canopy cover 66 - 80	554,853	192	13	179	177	174	152	3	1	2
1	Public Cnty, Grp. 40	Canopy cover 81 - 100	809,985	255	6	249	248	244	213	2	1	1
1	Public Cnty, Grp. 7	Canopy cover 0 - 51	26,015	4	2	2	2	1	0	0	0	0
1	Public Cnty, Grp. 7	Canopy cover 66 - 80	41,159	14	3	11	11	9	7	0	0	0
1	Public Cnty, Grp. 7	Canopy cover 81 - 100	102,126	30	1	29	28	27	23	1	1	0
1	Superior NF	Canopy cover 0 - 6	37,619	12	3	9	9	9	8	0	0	0
1	Superior NF	Canopy cover 51 - 65	37,382	14	3	11	11	11	7	0	0	0
1	Superior NF	Canopy cover 66 - 80	418,763	125	2	123	121	120	104	2	0	2
1	Superior NF	Canopy cover 81 - 100	834,449	290	5	285	284	283	251	3	0	3
1	Voyagers	Canopy cover 0 - 66	25,654	5	1	4	3	3	2	1	0	1
1	Voyagers	Canopy cover 81 - 100	95,434	37	1	36	35	35	28	1	0	1
2	Chippewa NF	Canopy cover 0 - 5	40,064	12	5	7	7	6	5	0	0	0
2	Chippewa NF	Canopy cover 6 - 51	36,415	6	2	4	4	3	3	0	0	0
2	Chippewa NF	Canopy cover 66 - 80	243,438	88	3	85	85	83	70	0	0	0
2	Chippewa NF	Canopy cover 81 - 100	321,574	94	1	93	93	93	84	0	0	0
2	Inland Census Water Cnty, Grp. 1	Canopy cover 0 - 81	112,633	32	32	0	0	0	0	0	0	0
2	Inland Census Water Cnty, Grp. 14	Canopy cover 0 - 81	102,385	33	31	2	2	2	1	0	0	0
2	Inland Census Water Cnty, Grp. 21	Canopy cover 0 - 81	168,121	57	55	2	2	1	0	0	0	0
2	Inland Census Water Cnty, Grp. 29, 12	Canopy cover 0 - 81	39,616	12	11	1	1	1	0	0	0	0
2	Inland Census Water Cnty, Grp. 3	Canopy cover 0 - 81	86,201	29	28	1	1	1	1	0	0	0
2	Inland Census Water Cnty, Grp. 38, 27	Canopy cover 0 - 81	316,108	99	0	0	0	0	0	0	0	0
2	Inland Census Water Cnty, Grp. 4	Canopy cover 0 - 81	352,229	115	0	0	0	0	0	0	0	0
2	Inland Census Water Cnty, Grp. 43, 20	Canopy cover 0 - 81	54,332	20	0	0	0	0	0	0	0	0
2	Inland Census Water Cnty, Grp. 9	Canopy cover 0 - 5	243,031	90	88	2	2	1	1	0	0	0
2	Inland Census Water Cnty, Grp. 9	Canopy cover 6 - 81	10,797	4	2	2	2	2	2	0	0	0
2	Private Cnty, Grp. 1	Canopy cover 0 - 5	171,850	73	48	25	23	14	6	2	2	0
2	Private Cnty, Grp. 1	Canopy cover 51 - 65	45,041	9	4	5	4	4	2	1	1	0
2	Private Cnty, Grp. 1	Canopy cover 6 - 50	32,042	9	3	6	6	3	1	0	0	0

(Table A continued on next page)

(Table A continued)

Unit ^a	Estimation unit ^b	Strata ^c	Area ^d (acres)	Selected ^e	Nonforest office plots ^f	Field check plots ^g	Field check plots measured ^h	Forest plots measured ⁱ	Forest plots measured for change ^j	Plots not measured ^k	Denied access	Hazardous
2	Private Cnty. Grp. 1	Canopy cover 66 - 80	159,848	57	0	57	53	51	39	4	3	1
2	Private Cnty. Grp. 1	Canopy cover 81 - 100	130,566	46	2	44	43	43	35	1	1	0
2	Private Cnty. Grp. 12	Canopy cover 0 - 5	204,070	62	52	10	10	6	5	0	0	0
2	Private Cnty. Grp. 12	Canopy cover 51 - 65	28,233	13	6	7	6	5	4	1	1	0
2	Private Cnty. Grp. 12	Canopy cover 6 - 50	24,930	7	5	2	2	1	1	0	0	0
2	Private Cnty. Grp. 12	Canopy cover 66 - 80	92,848	35	9	26	26	24	17	0	0	0
2	Private Cnty. Grp. 12	Canopy cover 81 - 100	140,189	48	2	46	44	40	32	3	2	1
2	Private Cnty. Grp. 14	Canopy cover 0 - 5	145,575	54	38	16	15	10	7	1	1	0
2	Private Cnty. Grp. 14	Canopy cover 51 - 65	51,665	22	6	16	16	13	10	0	0	0
2	Private Cnty. Grp. 14	Canopy cover 6 - 50	26,265	5	1	4	4	3	2	0	0	0
2	Private Cnty. Grp. 14	Canopy cover 66 - 80	156,824	53	2	51	47	41	37	4	4	0
2	Private Cnty. Grp. 14	Canopy cover 81 - 100	103,442	34	2	32	31	30	26	1	1	0
2	Private Cnty. Grp. 20	Canopy cover 0 - 5	115,509	29	21	8	8	5	3	0	0	0
2	Private Cnty. Grp. 20	Canopy cover 51 - 65	25,308	9	2	7	7	4	3	0	0	0
2	Private Cnty. Grp. 20	Canopy cover 6 - 50	20,132	7	3	4	4	4	2	0	0	0
2	Private Cnty. Grp. 20	Canopy cover 66 - 80	113,816	41	3	38	35	34	24	3	3	0
2	Private Cnty. Grp. 20	Canopy cover 81 - 100	76,477	26	0	26	25	25	23	1	1	0
2	Private Cnty. Grp. 21	Canopy cover 0 - 5	153,891	56	34	22	20	18	10	2	2	0
2	Private Cnty. Grp. 21	Canopy cover 51 - 65	45,687	9	2	7	4	4	3	3	3	0
2	Private Cnty. Grp. 21	Canopy cover 6 - 50	31,560	12	7	5	5	4	3	1	1	0
2	Private Cnty. Grp. 21	Canopy cover 66 - 80	236,131	73	3	70	67	61	50	3	3	0
2	Private Cnty. Grp. 21	Canopy cover 81 - 100	307,190	119	2	117	107	105	93	10	10	0
2	Private Cnty. Grp. 27	Canopy cover 0 - 5	125,635	41	36	5	4	2	2	1	1	0
2	Private Cnty. Grp. 27	Canopy cover 6 - 51	18,573	5	3	2	2	2	1	0	0	0
2	Private Cnty. Grp. 27	Canopy cover 66 - 80	41,660	15	1	14	12	12	8	2	2	0
2	Private Cnty. Grp. 27	Canopy cover 81 - 100	158,550	59	6	53	48	47	38	5	0	5
2	Private Cnty. Grp. 29	Canopy cover 0 - 5	210,417	71	65	6	6	2	2	0	0	0
2	Private Cnty. Grp. 29	Canopy cover 6 - 51	24,887	6	3	3	3	3	3	0	0	0
2	Private Cnty. Grp. 29	Canopy cover 66 - 80	35,211	20	1	19	19	18	13	0	0	0
2	Private Cnty. Grp. 29	Canopy cover 81 - 100	49,081	13	0	13	12	12	10	1	1	0
2	Private Cnty. Grp. 3	Canopy cover 0 - 5	383,729	126	107	19	18	9	3	1	1	0
2	Private Cnty. Grp. 3	Canopy cover 51 - 65	44,877	9	0	9	9	8	4	0	0	0
2	Private Cnty. Grp. 3	Canopy cover 6 - 50	51,884	23	14	9	9	7	6	0	0	0
2	Private Cnty. Grp. 3	Canopy cover 66 - 80	120,151	44	6	38	36	33	26	3	1	2
2	Private Cnty. Grp. 3	Canopy cover 81 - 100	101,349	39	0	39	37	37	32	2	2	0

(Table A continued on next page)

(Table A continued)

Unit ^a	Estimation unit ^b	Strata ^c	Area ^d (acres)	Selected ^e	Nonforest office plots ^f	Field check plots ^g	Field check plots measured ^h	Forest plots measured ⁱ	Forest plots measured for change ^j	Plots not measured ^k	Denied access	Hazardous
2	Private Cnty. Grp. 38	Canopy cover 0 - 5	648,467	218	193	25	24	19	12	1	1	0
2	Private Cnty. Grp. 38	Canopy cover 51 - 65	17,591	6	0	6	6	6	3	0	0	0
2	Private Cnty. Grp. 38	Canopy cover 6 - 50	27,065	10	2	8	8	8	7	0	0	0
2	Private Cnty. Grp. 38	Canopy cover 66 - 80	28,880	7	0	7	7	7	5	0	0	0
2	Private Cnty. Grp. 38	Canopy cover 81 - 100	57,640	25	1	24	20	19	15	4	4	0
2	Private Cnty. Grp. 4	Canopy cover 0 - 5	287,459	84	62	22	17	15	12	5	5	0
2	Private Cnty. Grp. 4	Canopy cover 51 - 65	32,913	10	6	4	4	3	3	1	1	0
2	Private Cnty. Grp. 4	Canopy cover 6 - 50	33,743	16	8	8	8	5	4	0	0	0
2	Private Cnty. Grp. 4	Canopy cover 66 - 80	187,286	74	11	63	58	54	45	5	3	2
2	Private Cnty. Grp. 4	Canopy cover 81 - 100	273,454	101	3	98	91	87	68	8	6	2
2	Private Cnty. Grp. 43	Canopy cover 0 - 5	160,563	64	47	17	16	11	4	1	1	0
2	Private Cnty. Grp. 43	Canopy cover 51 - 65	16,916	7	3	4	4	4	3	0	0	0
2	Private Cnty. Grp. 43	Canopy cover 6 - 50	27,459	7	3	4	4	4	2	0	0	0
2	Private Cnty. Grp. 43	Canopy cover 66 - 80	70,703	18	3	15	15	12	11	0	0	0
2	Private Cnty. Grp. 43	Canopy cover 81 - 100	33,653	11	0	11	11	11	6	1	1	0
2	Private Cnty. Grp. 9	Canopy cover 0 - 5	177,489	72	43	29	27	14	9	3	3	0
2	Private Cnty. Grp. 9	Canopy cover 51 - 65	38,965	15	2	13	11	8	4	2	2	0
2	Private Cnty. Grp. 9	Canopy cover 6 - 50	34,166	11	6	5	5	1	0	0	0	0
2	Private Cnty. Grp. 9	Canopy cover 66 - 80	166,648	46	7	39	36	32	26	3	3	0
2	Private Cnty. Grp. 9	Canopy cover 81 - 100	132,112	43	1	42	41	40	34	2	2	0
2	Public Cnty. Grp. 1	Canopy cover 0 - 5	68,536	19	12	7	7	5	5	0	0	0
2	Public Cnty. Grp. 1	Canopy cover 6 - 51	51,415	13	5	8	8	8	5	0	0	0
2	Public Cnty. Grp. 1	Canopy cover 66 - 80	237,849	78	6	72	72	71	61	0	0	0
2	Public Cnty. Grp. 1	Canopy cover 81 - 100	267,181	99	1	98	96	96	85	3	1	2
2	Public Cnty. Grp. 12	Canopy cover 0 - 51	22,880	5	2	3	3	3	3	0	0	0
2	Public Cnty. Grp. 12	Canopy cover 66 - 80	53,607	16	1	15	15	15	12	0	0	0
2	Public Cnty. Grp. 12	Canopy cover 81 - 100	69,852	26	0	26	26	26	24	0	0	0
2	Public Cnty. Grp. 14	Canopy cover 0 - 6	22,423	8	5	3	3	2	1	0	0	0
2	Public Cnty. Grp. 14	Canopy cover 51 - 65	16,785	6	0	6	6	5	4	0	0	0
2	Public Cnty. Grp. 14	Canopy cover 66 - 80	67,844	26	3	23	23	20	17	0	0	0
2	Public Cnty. Grp. 14	Canopy cover 81 - 100	46,976	12	0	12	12	12	11	0	0	0
2	Public Cnty. Grp. 20	Canopy cover 0 - 6	24,884	7	3	4	4	3	2	0	0	0
2	Public Cnty. Grp. 20	Canopy cover 51 - 65	12,987	6	1	5	5	5	3	0	0	0
2	Public Cnty. Grp. 20	Canopy cover 66 - 80	103,744	34	0	34	33	33	30	1	1	0
2	Public Cnty. Grp. 20	Canopy cover 81 - 100	97,578	33	0	33	33	33	30	0	0	0

(Table A continued on next page)

(Table A continued)

Unit ^a	Estimation unit ^b	Strata ^c	Area ^d (acres)	Selected ^e	Nonforest office plots ^f	Field check plots ^g	Field check plots measured ^h	Forest plots measured ⁱ	Forest plots measured for change ^j	Plots not measured ^k	Denied access	Hazardous
2	Public Cnty. Grp. 21	Canopy cover 0 - 5	51,067	18	10	8	8	7	4	0	0	0
2	Public Cnty. Grp. 21	Canopy cover 6 - 51	39,596	12	4	8	8	7	7	0	0	0
2	Public Cnty. Grp. 21	Canopy cover 66 - 80	231,238	85	4	81	81	80	74	1	1	0
2	Public Cnty. Grp. 21	Canopy cover 81 - 100	314,079	109	2	107	107	106	91	0	0	0
2	Public Cnty. Grp. 27	Canopy cover 0 - 5	91,384	27	24	3	3	3	2	0	0	0
2	Public Cnty. Grp. 27	Canopy cover 6 - 51	11,105	4	1	3	3	2	2	0	0	0
2	Public Cnty. Grp. 27	Canopy cover 66 - 80	107,870	35	7	28	27	25	22	1	0	1
2	Public Cnty. Grp. 27	Canopy cover 81 - 100	275,098	106	14	92	90	84	74	2	0	2
2	Public Cnty. Grp. 29	Canopy cover 0 - 5	11,611	6	4	2	2	2	2	0	0	0
2	Public Cnty. Grp. 29	Canopy cover 6 - 81	24,688	8	2	6	6	6	6	0	0	0
2	Public Cnty. Grp. 3	Canopy cover 0 - 51	27,132	7	4	3	3	3	3	0	0	0
2	Public Cnty. Grp. 3	Canopy cover 66 - 80	48,217	12	0	12	12	12	11	0	0	0
2	Public Cnty. Grp. 3	Canopy cover 81 - 100	61,306	25	2	23	23	23	21	0	0	0
2	Public Cnty. Grp. 38	Canopy cover 0 - 5	111,448	47	33	14	14	10	5	0	0	0
2	Public Cnty. Grp. 38	Canopy cover 51 - 65	12,655	6	2	4	4	4	2	0	0	0
2	Public Cnty. Grp. 38	Canopy cover 6 - 50	28,483	8	1	7	7	6	5	0	0	0
2	Public Cnty. Grp. 38	Canopy cover 66 - 80	38,924	11	1	10	10	10	9	0	0	0
2	Public Cnty. Grp. 38	Canopy cover 81 - 100	92,536	27	1	26	26	26	23	0	0	0
2	Public Cnty. Grp. 4	Canopy cover 0 - 5	180,681	51	38	13	13	11	6	0	0	0
2	Public Cnty. Grp. 4	Canopy cover 51 - 65	19,633	6	1	5	5	5	5	0	0	0
2	Public Cnty. Grp. 4	Canopy cover 6 - 50	9,361	4	2	2	2	2	1	0	0	0
2	Public Cnty. Grp. 4	Canopy cover 66 - 80	223,345	73	13	60	59	58	49	1	0	1
2	Public Cnty. Grp. 4	Canopy cover 81 - 100	292,324	105	12	93	93	88	73	0	0	0
2	Public Cnty. Grp. 43	Canopy cover 0 - 81	33,119	9	2	7	7	7	6	0	0	0
2	Public Cnty. Grp. 9	Canopy cover 0 - 5	47,505	9	6	3	3	1	0	0	0	0
2	Public Cnty. Grp. 9	Canopy cover 51 - 65	29,944	14	5	9	9	6	4	0	0	0
2	Public Cnty. Grp. 9	Canopy cover 6 - 50	10,900	5	2	3	2	1	0	1	1	0
2	Public Cnty. Grp. 9	Canopy cover 66 - 80	177,815	58	2	56	56	56	45	0	0	0
2	Public Cnty. Grp. 9	Canopy cover 81 - 100	192,467	57	1	56	55	53	50	1	0	1
3	Inland Census Water Cnty. Grp. 10	Canopy cover 0 - 81	24,099	9	9	0	0	0	0	0	0	0
3	Inland Census Water Cnty. Grp. 15	Canopy cover 0 - 81	78,655	27	26	1	1	0	0	0	0	0
3	Inland Census Water Cnty. Grp. 17, 19, 45	Canopy cover 0 - 81	18,026	4	4	0	0	0	0	0	0	0
3	Inland Census Water Cnty. Grp. 18	Canopy cover 0 - 81	14,191	8	7	1	1	0	0	0	0	0
3	Inland Census Water Cnty. Grp. 2	Canopy cover 0 - 81	54,509	17	16	1	1	1	0	0	0	0
3	Inland Census Water Cnty. Grp. 22, 36	Canopy cover 0 - 81	20,469	9	7	2	2	1	0	0	0	0

(Table A continued on next page)

(Table A continued)

Unit ^a	Estimation unit ^b	Strata ^c	Area ^d (acres)	Selected ^e	Nonforest office plots ^f	Field check plots ^g	Field check plots measured ^h	Forest plots measured ⁱ	Forest plots measured for change ^j	Plots not measured ^k	Denied access	Hazardous
3	Inland Census Water Cnty. Grp. 28	Canopy cover 0 - 81	28,109	11	11	0	0	0	0	0	0	0
3	Inland Census Water Cnty. Grp. 31	Canopy cover 0 - 81	68,669	20	20	0	0	0	0	0	0	0
3	Inland Census Water Cnty. Grp. 34	Canopy cover 0 - 81	156,904	54	54	0	0	0	0	0	0	0
3	Inland Census Water Cnty. Grp. 41	Canopy cover 0 - 81	29,035	9	9	0	0	0	0	0	0	0
3	Inland Census Water Cnty. Grp. 42	Canopy cover 0 - 81	15,877	7	7	0	0	0	0	0	0	0
3	Inland Census Water Cnty. Grp. 46	Canopy cover 0 - 81	34,334	9	9	0	0	0	0	0	0	0
3	Inland Census Water Cnty. Grp. 5, 32	Canopy cover 0 - 81	30,880	8	7	1	1	1	0	0	0	0
3	Inland Census Water Cnty. Grp. 8	Canopy cover 0 - 81	51,647	18	18	0	0	0	0	0	0	0
3	Private Cnty. Grp. 10	Canopy cover 0 - 5	357,689	116	99	17	17	11	6	0	0	0
3	Private Cnty. Grp. 10	Canopy cover 51 - 65	20,767	6	1	5	5	2	2	0	0	0
3	Private Cnty. Grp. 10	Canopy cover 6 - 50	16,374	6	2	4	4	3	1	0	0	0
3	Private Cnty. Grp. 10	Canopy cover 66 - 80	42,739	15	1	14	14	12	7	0	0	0
3	Private Cnty. Grp. 10	Canopy cover 81 - 100	82,508	29	2	27	26	23	20	1	1	0
3	Private Cnty. Grp. 15	Canopy cover 0 - 5	720,873	250	215	35	34	21	13	1	1	0
3	Private Cnty. Grp. 15	Canopy cover 51 - 65	45,232	15	4	11	10	8	6	1	1	0
3	Private Cnty. Grp. 15	Canopy cover 6 - 50	71,991	22	14	8	6	3	2	3	3	0
3	Private Cnty. Grp. 15	Canopy cover 66 - 80	98,388	31	0	31	26	22	15	5	5	0
3	Private Cnty. Grp. 15	Canopy cover 81 - 100	40,597	14	0	14	11	11	9	3	3	0
3	Private Cnty. Grp. 17	Canopy cover 0 - 5	716,034	248	233	15	14	7	4	1	1	0
3	Private Cnty. Grp. 17	Canopy cover 51 - 65	22,722	11	2	9	9	6	4	0	0	0
3	Private Cnty. Grp. 17	Canopy cover 6 - 50	59,453	21	13	8	8	3	2	0	0	0
3	Private Cnty. Grp. 17	Canopy cover 66 - 80	25,565	6	0	6	6	4	4	0	0	0
3	Private Cnty. Grp. 17	Canopy cover 81 - 100	104,226	33	0	33	29	29	25	5	5	0
3	Private Cnty. Grp. 18	Canopy cover 0 - 5	366,504	130	114	16	16	11	8	0	0	0
3	Private Cnty. Grp. 18	Canopy cover 51 - 66	21,299	7	2	5	4	4	4	1	0	1
3	Private Cnty. Grp. 18	Canopy cover 6 - 50	21,651	7	2	5	5	4	0	0	0	0
3	Private Cnty. Grp. 18	Canopy cover 81 - 100	57,181	14	0	14	13	13	9	1	1	0
3	Private Cnty. Grp. 19	Canopy cover 0 - 5	161,244	47	42	5	5	2	0	0	0	0
3	Private Cnty. Grp. 19	Canopy cover 51 - 65	12,886	8	1	7	7	5	3	0	0	0
3	Private Cnty. Grp. 19	Canopy cover 6 - 50	37,461	12	7	5	5	5	1	0	0	0
3	Private Cnty. Grp. 19	Canopy cover 66 - 80	16,710	6	0	6	5	4	2	1	1	0
3	Private Cnty. Grp. 19	Canopy cover 81 - 100	99,281	42	0	42	38	38	34	4	4	0
3	Private Cnty. Grp. 2	Canopy cover 0 - 5	679,656	239	203	36	33	22	13	4	4	0
3	Private Cnty. Grp. 2	Canopy cover 51 - 65	40,312	10	6	4	4	3	1	0	0	0
3	Private Cnty. Grp. 2	Canopy cover 6 - 50	55,023	14	10	4	4	2	1	0	0	0

(Table A continued on next page)

(Table A continued)

Unit ^a	Estimation unit ^b	Strata ^c	Area ^d (acres)	Selected ^e	Nonforest office plots ^f	Field check plots ^g	Field check plots measured ^h	Forest plots measured ⁱ	Forest plots measured for change ^j	Plots not measured ^k	Denied access	Hazardous
3	Private Cnty. Grp. 2	Canopy cover 66 - 80	59,488	24	11	13	13	10	6	0	0	0
3	Private Cnty. Grp. 2	Canopy cover 81 - 100	105,234	30	7	23	20	18	11	3	3	0
3	Private Cnty. Grp. 22	Canopy cover 0 - 5	154,370	57	47	10	9	7	3	1	1	0
3	Private Cnty. Grp. 22	Canopy cover 6 - 51	21,464	4	2	2	2	2	1	0	0	0
3	Private Cnty. Grp. 22	Canopy cover 66 - 80	40,889	13	0	13	12	11	9	1	1	0
3	Private Cnty. Grp. 22	Canopy cover 81 - 100	83,346	29	1	28	28	27	25	0	0	0
3	Private Cnty. Grp. 28	Canopy cover 0 - 5	509,076	171	162	9	9	6	1	0	0	0
3	Private Cnty. Grp. 28	Canopy cover 6 - 51	26,420	6	4	2	1	1	0	1	1	0
3	Private Cnty. Grp. 28	Canopy cover 66 - 80	17,788	5	0	5	4	4	2	1	1	0
3	Private Cnty. Grp. 28	Canopy cover 81 - 100	29,296	8	0	8	6	6	6	2	2	0
3	Private Cnty. Grp. 31	Canopy cover 0 - 5	165,147	65	52	13	13	6	2	0	0	0
3	Private Cnty. Grp. 31	Canopy cover 51 - 65	25,586	7	1	6	4	4	4	2	2	0
3	Private Cnty. Grp. 31	Canopy cover 6 - 50	16,264	5	3	2	1	1	0	1	1	0
3	Private Cnty. Grp. 31	Canopy cover 66 - 80	60,861	20	0	20	20	20	18	0	0	0
3	Private Cnty. Grp. 31	Canopy cover 81 - 100	27,966	5	0	5	4	4	3	1	1	0
3	Private Cnty. Grp. 32	Canopy cover 0 - 5	443,999	153	118	35	34	18	14	2	1	1
3	Private Cnty. Grp. 32	Canopy cover 51 - 65	46,341	9	1	8	8	8	5	0	0	0
3	Private Cnty. Grp. 32	Canopy cover 6 - 50	41,379	14	4	10	9	5	2	1	1	0
3	Private Cnty. Grp. 32	Canopy cover 66 - 80	101,528	34	6	28	25	24	18	4	4	0
3	Private Cnty. Grp. 32	Canopy cover 81 - 100	70,671	31	0	31	28	27	25	3	2	1
3	Private Cnty. Grp. 34	Canopy cover 0 - 5	864,316	297	260	37	36	22	7	2	2	0
3	Private Cnty. Grp. 34	Canopy cover 51 - 65	74,889	36	12	24	23	19	13	2	2	0
3	Private Cnty. Grp. 34	Canopy cover 6 - 50	86,713	29	21	8	7	4	1	1	1	0
3	Private Cnty. Grp. 34	Canopy cover 66 - 80	145,081	41	6	35	32	28	20	4	4	0
3	Private Cnty. Grp. 34	Canopy cover 81 - 100	63,821	14	0	14	12	10	6	2	2	0
3	Private Cnty. Grp. 36	Canopy cover 0 - 5	270,875	89	61	28	27	15	7	1	1	0
3	Private Cnty. Grp. 36	Canopy cover 51 - 65	25,756	5	0	5	5	5	4	0	0	0
3	Private Cnty. Grp. 36	Canopy cover 6 - 50	13,800	5	1	4	4	3	2	0	0	0
3	Private Cnty. Grp. 36	Canopy cover 66 - 80	79,963	29	2	27	27	26	21	0	0	0
3	Private Cnty. Grp. 36	Canopy cover 81 - 100	261,707	91	1	90	84	79	72	6	6	0
3	Private Cnty. Grp. 41	Canopy cover 0 - 5	705,388	244	225	19	19	8	5	0	0	0
3	Private Cnty. Grp. 41	Canopy cover 51 - 65	24,285	7	1	6	6	4	3	0	0	0
3	Private Cnty. Grp. 41	Canopy cover 6 - 50	33,235	9	5	4	4	3	1	0	0	0
3	Private Cnty. Grp. 41	Canopy cover 66 - 80	48,553	17	3	14	12	12	7	2	2	0
3	Private Cnty. Grp. 41	Canopy cover 81 - 100	31,262	9	1	8	8	8	6	0	0	0

(Table A continued on next page)

(Table A continued)

Unit ^a	Estimation unit ^b	Strata ^c	Area ^d (acres)	Selected ^e	Nonforest office plots ^f	Field check plots ^g	Field check plots measured ^h	Forest plots measured ⁱ	Forest plots measured for change ^j	Plots not measured ^k	Denied access	Hazardous
3	Private Cnty. Grp. 42	Canopy cover 0 - 5	226,293	74	68	6	6	3	1	1	0	1
3	Private Cnty. Grp. 42	Canopy cover 6 - 66	30,782	10	3	7	6	5	4	1	1	0
3	Private Cnty. Grp. 42	Canopy cover 81 - 100	54,196	22	1	21	18	18	17	3	3	0
3	Private Cnty. Grp. 45	Canopy cover 0 - 5	212,575	71	62	9	9	7	3	0	0	0
3	Private Cnty. Grp. 45	Canopy cover 51 - 66	19,255	6	1	5	4	1	0	1	1	0
3	Private Cnty. Grp. 45	Canopy cover 6 - 50	23,197	7	5	2	2	1	0	0	0	0
3	Private Cnty. Grp. 45	Canopy cover 81 - 100	102,535	38	1	37	26	24	18	12	12	0
3	Private Cnty. Grp. 46	Canopy cover 0 - 5	335,538	116	98	18	17	8	5	1	1	0
3	Private Cnty. Grp. 46	Canopy cover 51 - 65	15,462	6	4	2	2	1	0	0	0	0
3	Private Cnty. Grp. 46	Canopy cover 6 - 50	17,571	9	6	3	3	3	1	0	0	0
3	Private Cnty. Grp. 46	Canopy cover 66 - 81	41,805	10	1	9	9	8	5	0	0	0
3	Private Cnty. Grp. 5	Canopy cover 0 - 5	391,707	132	105	27	26	12	5	1	1	0
3	Private Cnty. Grp. 5	Canopy cover 6 - 51	41,912	15	3	12	12	12	8	0	0	0
3	Private Cnty. Grp. 5	Canopy cover 66 - 80	42,869	16	2	14	12	10	10	2	2	0
3	Private Cnty. Grp. 5	Canopy cover 81 - 100	51,117	12	2	10	10	9	9	0	0	0
3	Private Cnty. Grp. 8	Canopy cover 0 - 5	605,481	207	190	17	16	9	5	1	1	0
3	Private Cnty. Grp. 8	Canopy cover 51 - 65	35,003	10	7	3	3	3	3	0	0	0
3	Private Cnty. Grp. 8	Canopy cover 6 - 50	53,783	21	17	4	4	0	0	0	0	0
3	Private Cnty. Grp. 8	Canopy cover 66 - 80	43,081	16	5	11	6	6	3	5	5	0
3	Private Cnty. Grp. 8	Canopy cover 81 - 100	45,110	13	1	12	9	9	5	3	3	0
3	Public Cnty. Grp. 10	Canopy cover 0 - 5	11,805	5	3	2	2	2	1	0	0	0
3	Public Cnty. Grp. 10	Canopy cover 6 - 81	16,402	5	2	3	3	2	2	0	0	0
3	Public Cnty. Grp. 15	Canopy cover 0 - 5	18,332	7	7	0	0	0	0	0	0	0
3	Public Cnty. Grp. 15	Canopy cover 6 - 81	13,456	5	0	5	4	4	3	1	1	0
3	Public Cnty. Grp. 17	Canopy cover 0 - 5	14,761	9	8	1	1	0	0	0	0	0
3	Public Cnty. Grp. 17	Canopy cover 6 - 81	26,354	7	0	7	7	7	6	0	0	0
3	Public Cnty. Grp. 18	Canopy cover 0 - 81	18,651	5	3	2	2	1	0	0	0	0
3	Public Cnty. Grp. 19	Canopy cover 0 - 81	29,809	5	1	4	4	3	3	0	0	0
3	Public Cnty. Grp. 2	Canopy cover 0 - 5	25,528	11	9	2	2	1	1	0	0	0
3	Public Cnty. Grp. 2	Canopy cover 6 - 81	20,802	8	1	7	6	5	4	1	0	1
3	Public Cnty. Grp. 22	Canopy cover 0 - 81	35,874	10	0	10	10	10	10	0	0	0
3	Public Cnty. Grp. 28	Canopy cover 0 - 5	15,321	6	3	3	3	2	1	0	0	0
3	Public Cnty. Grp. 28	Canopy cover 6 - 81	7,564	5	0	5	5	4	4	0	0	0
3	Public Cnty. Grp. 31	Canopy cover 0 - 6	17,290	7	5	2	2	1	0	0	0	0
3	Public Cnty. Grp. 31	Canopy cover 51 - 65	12,573	6	2	4	4	4	3	0	0	0

(Table A continued on next page)

(Table A continued)

Unit ^a	Estimation unit ^b	Strata ^c	Area ^d (acres)	Selected ^e	Nonforest office plots ^f	Field check plots ^g	Field check plots measured ^h	Forest plots measured ⁱ	Forest plots measured for change ^j	Plots not measured ^k	Denied access	Hazardous
3	Public Cnty. Grp. 31	Canopy cover 66 - 80	30,096	8	0	8	8	8	7	0	0	0
3	Public Cnty. Grp. 31	Canopy cover 81 - 100	11,853	5	0	5	5	5	4	0	0	0
3	Public Cnty. Grp. 32, 5	Canopy cover 0 - 81	28,672	7	1	6	6	5	3	0	0	0
3	Public Cnty. Grp. 34	Canopy cover 0 - 5	16,380	5	3	2	2	1	1	0	0	0
3	Public Cnty. Grp. 34	Canopy cover 6 - 81	15,806	4	1	3	3	3	3	0	0	0
3	Public Cnty. Grp. 36	Canopy cover 0 - 51	36,167	6	3	3	3	1	1	0	0	0
3	Public Cnty. Grp. 36	Canopy cover 66 - 80	36,344	15	4	11	11	8	7	0	0	0
3	Public Cnty. Grp. 36	Canopy cover 81 - 100	178,440	62	2	60	60	60	50	0	0	0
3	Public Cnty. Grp. 41	Canopy cover 0 - 81	17,783	6	5	1	1	1	0	0	0	0
3	Public Cnty. Grp. 42	Canopy cover 0 - 81	24,731	6	1	5	5	4	2	0	0	0
3	Public Cnty. Grp. 45	Canopy cover 0 - 66	15,117	7	4	3	2	2	1	1	1	0
3	Public Cnty. Grp. 45	Canopy cover 81 - 100	28,145	11	0	11	11	11	9	1	0	1
3	Public Cnty. Grp. 46	Canopy cover 0 - 81	12,503	6	4	2	2	1	1	0	0	0
3	Public Cnty. Grp. 8	Canopy cover 0 - 5	19,524	4	4	0	0	0	0	0	0	0
3	Public Cnty. Grp. 8	Canopy cover 6 - 81	11,061	5	1	4	4	4	3	0	0	0
4	Inland Census Water Cnty. Grp. 11, 35, 37	Canopy cover 0 - 81	23,939	6	6	0	0	0	0	0	0	0
4	Inland Census Water Cnty. Grp. 23	Canopy cover 0 - 81	65,577	20	18	2	2	0	0	0	0	0
4	Inland Census Water Cnty. Grp. 24, 30	Canopy cover 0 - 81	30,078	8	8	0	0	0	0	0	0	0
4	Inland Census Water Cnty. Grp. 33	Canopy cover 0 - 81	28,467	7	7	0	0	0	0	0	0	0
4	Inland Census Water Cnty. Grp. 39	Canopy cover 0 - 81	39,260	11	11	0	0	0	0	0	0	0
4	Inland Census Water Cnty. Grp. 44	Canopy cover 0 - 81	131,670	52	49	3	3	0	0	0	0	0
4	Inland Census Water Cnty. Grp. 6, 16	Canopy cover 0 - 81	31,386	5	5	0	0	0	0	0	0	0
4	Private Cnty. Grp. 11	Canopy cover 0 - 5	1,133,968	387	369	18	18	7	4	0	0	0
4	Private Cnty. Grp. 11	Canopy cover 51 - 66	25,216	8	2	6	6	5	3	0	0	0
4	Private Cnty. Grp. 11	Canopy cover 6 - 50	22,956	5	3	2	2	1	0	0	0	0
4	Private Cnty. Grp. 11	Canopy cover 81 - 100	24,832	12	1	11	10	10	5	1	1	0
4	Private Cnty. Grp. 16	Canopy cover 0 - 5	1,617,418	549	536	13	12	5	4	1	1	0
4	Private Cnty. Grp. 16	Canopy cover 51 - 66	26,445	7	2	5	5	0	0	0	0	0
4	Private Cnty. Grp. 16	Canopy cover 6 - 50	34,551	12	7	5	5	3	1	0	0	0
4	Private Cnty. Grp. 16	Canopy cover 81 - 100	33,607	12	0	12	12	11	5	0	0	0
4	Private Cnty. Grp. 23	Canopy cover 0 - 5	788,910	269	248	21	21	11	3	0	0	0
4	Private Cnty. Grp. 23	Canopy cover 51 - 65	18,713	8	2	6	5	3	3	1	1	0
4	Private Cnty. Grp. 23	Canopy cover 6 - 50	24,019	9	8	1	1	1	0	0	0	0
4	Private Cnty. Grp. 23	Canopy cover 66 - 81	40,396	8	0	8	6	6	5	2	2	0
4	Private Cnty. Grp. 24	Canopy cover 0 - 5	561,260	188	171	17	15	10	6	3	2	1

(Table A continued on next page)

(Table A continued)

Unit ^a	Estimation unit ^b	Strata ^c	Area ^d (acres)	Selected ^e	Nonforest office plots ^f	Field check plots ^g	Field check plots measured ^h	Forest plots measured ⁱ	Forest plots measured for change ^j	Plots not measured ^k	Denied access	Hazardous
4	Private Cnty. Grp. 24	Canopy cover 51 - 66	22,471	10	0	10	9	9	9	1	1	0
4	Private Cnty. Grp. 24	Canopy cover 6 - 50	20,155	9	1	8	8	7	5	0	0	0
4	Private Cnty. Grp. 24	Canopy cover 81 - 100	23,635	6	0	6	6	6	3	0	0	0
4	Private Cnty. Grp. 30	Canopy cover 0 - 5	920,662	301	279	22	22	18	14	0	0	0
4	Private Cnty. Grp. 30	Canopy cover 51 - 65	16,922	10	4	6	6	6	3	0	0	0
4	Private Cnty. Grp. 30	Canopy cover 6 - 50	25,287	13	5	8	8	7	6	0	0	0
4	Private Cnty. Grp. 30	Canopy cover 66 - 80	23,707	10	0	10	9	9	9	1	1	0
4	Private Cnty. Grp. 30	Canopy cover 81 - 100	37,607	14	1	13	11	11	10	2	2	0
4	Private Cnty. Grp. 33	Canopy cover 0 - 5	1,509,668	508	486	22	21	8	3	1	1	0
4	Private Cnty. Grp. 33	Canopy cover 51 - 65	15,799	6	1	5	5	5	2	0	0	0
4	Private Cnty. Grp. 33	Canopy cover 6 - 50	19,920	6	3	3	3	0	0	0	0	0
4	Private Cnty. Grp. 33	Canopy cover 66 - 80	18,742	6	3	3	3	2	2	0	0	0
4	Private Cnty. Grp. 33	Canopy cover 81 - 100	21,029	10	2	8	6	5	3	3	2	1
4	Private Cnty. Grp. 35	Canopy cover 0 - 5	589,192	204	189	15	14	9	5	1	1	0
4	Private Cnty. Grp. 35	Canopy cover 6 - 66	42,036	9	4	5	4	4	4	1	1	0
4	Private Cnty. Grp. 35	Canopy cover 81 - 100	27,109	9	0	9	8	8	8	1	1	0
4	Private Cnty. Grp. 37	Canopy cover 0 - 5	1,129,142	388	368	20	20	10	6	0	0	0
4	Private Cnty. Grp. 37	Canopy cover 51 - 65	14,609	8	3	5	5	3	2	0	0	0
4	Private Cnty. Grp. 37	Canopy cover 6 - 50	29,225	9	4	5	5	4	3	0	0	0
4	Private Cnty. Grp. 37	Canopy cover 66 - 80	21,626	5	0	5	5	5	2	0	0	0
4	Private Cnty. Grp. 37	Canopy cover 81 - 100	34,321	10	2	8	8	6	3	0	0	0
4	Private Cnty. Grp. 39	Canopy cover 0 - 5	2,439,810	834	818	16	15	7	1	1	1	0
4	Private Cnty. Grp. 39	Canopy cover 51 - 81	32,055	9	0	9	8	7	6	1	1	0
4	Private Cnty. Grp. 39	Canopy cover 6 - 50	23,701	8	4	4	4	3	2	0	0	0
4	Private Cnty. Grp. 44	Canopy cover 0 - 5	6,145,263	2,052	2,004	48	45	19	9	3	3	0
4	Private Cnty. Grp. 44	Canopy cover 51 - 65	26,991	17	8	9	8	8	4	2	1	1
4	Private Cnty. Grp. 44	Canopy cover 6 - 50	46,755	9	4	5	4	3	3	1	1	0
4	Private Cnty. Grp. 44	Canopy cover 66 - 81	46,374	13	0	13	11	10	7	2	2	0
4	Private Cnty. Grp. 6	Canopy cover 0 - 5	868,013	306	297	9	8	4	3	1	1	0
4	Private Cnty. Grp. 6	Canopy cover 51 - 66	20,154	6	0	6	6	4	3	0	0	0
4	Private Cnty. Grp. 6	Canopy cover 6 - 50	18,134	4	1	3	3	1	0	0	0	0
4	Private Cnty. Grp. 6	Canopy cover 81 - 100	16,610	4	0	4	4	4	4	0	0	0
4	Public Cnty. Grp. 11	Canopy cover 0 - 81	22,739	5	5	0	0	0	0	0	0	0
4	Public Cnty. Grp. 16, 6	Canopy cover 0 - 81	38,583	8	6	2	2	1	1	0	0	0
4	Public Cnty. Grp. 23	Canopy cover 0 - 81	26,876	12	9	3	3	1	1	0	0	0

(Table A continued on next page)

(Table A continued)

Unit ^a	Estimation unit ^b	Strata ^c	Area ^d (acres)	Selected ^e	Nonforest office plots ^f	Field check plots ^g	Field check plots measured ^h	Forest plots measured ⁱ	Forest plots measured for change ^j	Plots not measured ^k	Denied access	Hazardous
4	Public Cnty, Grp. 24	Canopy cover 0 - 5	46,151	18	13	5	5	5	1	0	0	0
4	Public Cnty, Grp. 24	Canopy cover 6 - 66	17,114	7	1	6	6	6	4	0	0	0
4	Public Cnty, Grp. 24	Canopy cover 81 - 100	11,089	5	0	5	5	5	3	0	0	0
4	Public Cnty, Grp. 30	Canopy cover 0 - 5	51,334	13	9	4	4	1	0	0	0	0
4	Public Cnty, Grp. 30	Canopy cover 6 - 66	28,942	6	2	4	4	3	2	0	0	0
4	Public Cnty, Grp. 30	Canopy cover 81 - 100	29,748	14	0	14	14	12	9	0	0	0
4	Public Cnty, Grp. 33	Canopy cover 0 - 81	24,900	8	8	0	0	0	0	0	0	0
4	Public Cnty, Grp. 35	Canopy cover 0 - 81	12,944	5	3	2	2	2	1	0	0	0
4	Public Cnty, Grp. 37	Canopy cover 0 - 5	22,360	5	4	1	1	0	0	0	0	0
4	Public Cnty, Grp. 37	Canopy cover 6 - 81	9,807	4	0	4	4	4	4	0	0	0
4	Public Cnty, Grp. 39	Canopy cover 0 - 81	49,243	14	10	4	4	4	1	0	0	0
4	Public Cnty, Grp. 44	Canopy cover 0 - 81	179,167	69	57	12	12	4	2	0	0	0
All units	All ownerships	All strata	53,984,183	18,127	11,004	7,123	6,823	6,139	4,921	334	266	68

^aThe following table lists the counties in each group used to define the estimation strata.

Unit	County group code	County group name	County name
1	7	Carlton	Carlton
	13	Cook	Cook
	25	Koochiching	Koochiching
	26	Lake	Lake
	40	St. Louis	St. Louis
2	1	Atkin	Atkin
	3	Becker	Becker
	4	Beltrami	Beltrami
	9	Cass	Cass
	12	Clearwater	Clearwater
	14	Crow Wing	Crow Wing
	20	Hubbard	Hubbard
	21	Itasca	Itasca
	27	Lake of the Woods	Lake of the Woods
	29	Mahnomen	Mahnomen
	38	Roseau	Roseau
	43	Wadena	Wadena
3	2	Anoka-Dakota-Ramsey-Washington	Anoka Dakota

Unit	County group code	County group name	County name
			Ramsey
			Washington
	5	Benton-Sherburne	Benton
			Sherburne
	8	Carver-Hennepin-Scott	Carver
			Hennepin
			Scott
	10	Chisago-Isanti	Chisago
			Isanti
	15	Douglas-Todd	Douglas
			Todd
	17	Fillmore-Olmstead	Fillmore
			Olmstead
	18	Goodhue	Goodhue
	19	Houston	Houston
	22	Kanabec	Kanabec
	28	Le Sueur-Rice	Le Sueur
			Rice
	31	Mille Lacs	Mille Lacs
	32	Morrison	Morrison

(Table A continued on next page)

(Table A continued)

Unit	County group code	County group name	County name	Unit	County group code	County group name	County name
	34	Otter Tail	Otter Tail				Red Lake
	36	Pine	Pine		37	Polk	Polk
	41	Stearns	Stearns		39	Brown	Brown
	42	Wabasha	Wabasha			Southern Group	Cottonwood
	45	Winona	Winona				Jackson
	46	Wright	Wright				Martin
4	6	Blue Earth-Faribault	Blue Earth				Redwood
			Faribault				Watonwan
	11	Clay-Norman	Clay		44	Western Group	Big Stone
			Norman				Chippewa
	16	Eastern Group	Dodge				Grant
			Freeborn				Lac qui Parle
			Mower				Lincoln
			Steele				Lyon
			Waseca				Murray
	23	Kandiyohi-Meeker	Kandiyohi				Nobles
			Meeker				Pipestone
	24	Kittson	Kittson				Pope
	30	Marshall	Marshall				Rock
	33	Northern Group	McLeod				Stevens
			Nicollet				Swift
			Renville				Traverse
			Sibley				Wilkin
	35	Pennington-Red Lake	Pennington				Yellow Medicine

^aClassification based on Minnesota DNR Data Deli ownership layers.

Note: This ownership call is used for stratification purposes only. Ownership stored in the FIADB is based on field crew information.

^cCanopy cover class. Obtained from the MRLC.

^dTotal area based on pixel counts.

^eTotal number of plots selected to be sampled.

^fSelected plots whose observed classification as nonforest based on examination of aerial photographs and/or digital orthoquads.

^gSelected plots that required field measurement.

^hField check plots where measurement was completed successfully. Excludes plots that were denied access, hazardous, or lost and measurement was not possible.

ⁱField check plots where forest condition was present on plot and measurement was completed in 2004 inventory. These plots are used to estimate current conditions, e.g., area, volume, number of trees, and biomass.

^jField check plots measured in both 1993 inventory and 2004 inventory where a forest condition was found on plot and measurement was completed. These plots are used to estimate change between inventories, e.g., growth, removals, mortality, and area change.

^kPlots selected for field measurement but not measured due to denied access, hazardous condition, or other complications.

Table B.—State-level estimates of major forest resource attributes and their sampling errors, Minnesota 2004-2008

Item	State total	Sampling error
Growing stock on timberland		
Volume	<i>million cubic feet</i> 14,525	1.29
Average annual net growth	421	3.39
Average annual removals	297	5.85
Average annual mortality	243	2.68
Sawtimber on timberland	<i>million board feet^a</i>	
Volume	36,606	1.91
Average annual net growth	1,311	3.96
Average annual removals	789	7.38
Average annual mortality	575	4.07
Area	<i>thousand acres</i>	
Forest land	16,990	0.54
Timberland	15,595	0.62
Biomass (above-ground live trees)	<i>million dry tons</i>	
Forest land	458	1.05
Timberland	428	1.09

^aInternational ¼-inch rule.

Table C.—Measurement quality objective (MQO) tolerance compliance based on blind-check plots, Minnesota 2004-2008

Variable	Tolerance	Objective	Minnesota		All NRS States	
			Data within tolerance	Records	Data within tolerance	Records
Plot Level						
National Variables						
Distance to Road	No Tolerance	90.0%	86.1%	452	83.3%	1,903
Water on Plot	No Tolerance	90.0%	86.5%	452	87.1%	1,903
Regional Variables						
ELEVATION_GPS	± 50 ft	99.0%	89.2%	446	86.5%	1,809
LAT_DECIMAL_DEG	± 0.0001 dg	99.0%	95.1%	446	92.4%	1,811
LON_DECIMAL_DEG	± 0.0001 dg	99.0%	91.9%	446	90.3%	1,811
LAT_FEET	± 140 ft		98.2%	446	99.3%	1,811
LON_FEET	± 140 ft		96.9%	446	98.3%	1,811
Number of blind check plots				448		1,970
Condition Level						
National Variables						
Condition Status	No Tolerance	99.0%	99.1%	762	99.1%	3,586
Reserve Status	No Tolerance	99.0%	99.3%	762	99.6%	3,586
Owner Group	No Tolerance	99.0%	97.1%	550	98.3%	1,921
Forest Type (Type)	No Tolerance	95.0%	94.5%	550	85.2%	1,921
Forest Type (Group)	No Tolerance	99.0%	96.0%	550	91.5%	1,921
Stand Size	No Tolerance	99.0%		550	88.8%	1,921
Regeneration Status	No Tolerance	99.0%	97.6%	550	98.0%	1,921
Tree Density	No Tolerance	99.0%	96.4%	550	97.1%	1,921
Owner Class	No Tolerance	99.0%	94.0%	550	95.1%	1,921
Owner Status	No Tolerance	99.0%	95.6%	550	96.5%	1,921
Regeneration Species	No Tolerance	99.0%	97.5%	550	98.1%	1,921
Stand Age	± 10%	95.0%	87.3%	550	77.5%	1,921
Disturbance 1	No Tolerance	99.0%	93.8%	548	88.0%	1,905
Disturbance Year 1	± 1 yr	99.0%			50.0%	26
Disturbance 2	No Tolerance	99.0%	67.6%	34	88.1%	244
Disturbance 3	No Tolerance	99.0%	90.9%	11	96.6%	29
Disturbance Year 3	± 1 yr	99.0%				

(Table C continued on next page)

(Table C continued on next page)

(Table C Continued)

Variable	Tolerance	Objective	Minnesota		All NRS States	
			Data within tolerance	Records	Data within tolerance	Records
Treatment 1	No Tolerance	99.0%	96.5%	548	96.3%	1,905
Treatment Year 1	± 1 yr	99.0%	91.3%	23	95.8%	119
Treatment 2	No Tolerance	99.0%	57.1%	42	84.0%	188
Treatment Year 2	± 1 yr	99.0%	100.0%	9	100.0%	12
Treatment 3	No Tolerance	99.0%	100.0%	27	97.6%	41
Treatment Year 3	± 1 yr	99.0%	100.0%	1	100.0%	1
Physiographic Class	No Tolerance	80.0%	79.1%	550	80.2%	1,921
Present Nonforest Use	No Tolerance	99.0%	96.5%	762	92.9%	3,586
Regional Variables						
NC_LAND_USE	No Tolerance	99.0%	96.3%	762	93.0%	3,586
Number of blind check conditions				762		3,586
Boundary Level						
National Variables						
Boundary Change	No Tolerance	99.0%	74.6%	118	79.2%	562
Constraining Condition	No Tolerance	99.0%	89.0%	118	92.5%	562
Left Azimuth	± 10 degrees	90.0%	83.1%	118	82.7%	562
Corner Mapped	No Tolerance	90.0%	97.5%	118	96.3%	562
Corner Azimuth	± 10 degrees	90.0%	100.0%	3	91.7%	36
Corner Distance	± 1 ft	90.0%	66.7%	3	86.1%	36
Right Azimuth	± 10 degrees	90.0%	84.7%	118	83.6%	562
Number of blind check boundaries				118		562
Subplot Level						
National Variables						
Subplot Center Cond	No Tolerance	99.0%	97.9%	1,785	97.4%	7,488
Microplot Center Cond	No Tolerance	99.0%	97.6%	1,785	97.2%	7,488
Slope	± 10%	90.0%	98.9%	1,745	98.1%	7,067
Aspect	± 10 ^a	90.0%	94.4%	1,678	89.4%	6,659
Snow/Water Depth	± 0.5 ft		54.1%	1,785	69.1%	7,488
Number of blind check subplots				1,785		7,488

(Table C continued on next page)

(Table C Continued)

Variable	Tolerance	Objective	Minnesota		All NRS States	
			Data within tolerance	Records	Data within tolerance	Records
Tree Level						
National Variables						
DBH	± 0.1 /20 inch	95.0%	93.8%	7,631	93.7%	31,293
DRC	± 0.1 /20 inch	95.0%	.	.	91.7%	24
Azimuth	± 10 ^a	90.0%	99.3%	7,929	99.1%	32,900
Horizontal Distance	± 0.2 /1.0 ft	90.0%	98.7%	7,929	98.5%	32,900
Species	No Tolerance	95.0%	98.1%	7,929	97.5%	32,900
Tree Genus	No Tolerance	99.0%	99.7%	7,928	99.5%	32,855
Tree Status	No Tolerance	95.0%	98.9%	7,929	98.9%	32,900
Rotten/Missing Cull	± 10%	90.0%	98.5%	4,387	98.6%	21,153
Total Length	± 10%	90.0%	84.4%	4,272	81.1%	20,703
Actual Length	± 10%	90.0%	79.8%	549	76.0%	2,375
Compacted Crown Ratio	± 10%	80.0%	79.0%	6,344	84.2%	26,967
Uncompacted Crown Ratio (P3)	± 10%	90.0%	65.7%	108	80.9%	1,027
Crown Class	No Tolerance	85.0%	81.9%	6,344	82.1%	26,967
Decay Class	± 1 class	90.0%	93.4%	1,082	94.5%	4,191
Cause of Death	No Tolerance	80.0%	80.2%	1,082	86.2%	4,191
Condition	No Tolerance	99.0%	97.8%	7,929	97.7%	32,900
Mortality Year	± 1 yr	70.0%	96.2%	632	95.5%	1,372
Crown position	No Tolerance		97.5%	81	86.9%	834
Crown light exposure	± 1 class	85.0%	82.4%	108	91.3%	1,027
Sapling crown vigor class	No Tolerance	85.0%	92.6%	27	77.7%	193
Crown density	± 10%	90.0%	64.2%	81	79.7%	834
Crown dieback	± 10%	90.0%	98.8%	81	97.2%	834
Transparency	± 10%	90.0%	98.8%	81	91.7%	834
Regional Variables						
NC Tree Class	No Tolerance	90.0%	89.8%	7,205	91.1%	29,985
NC Damage Agent 1	No Tolerance	90.0%	92.2%	6,344	90.9%	26,967
NC Damage Agent 2	No Tolerance	90.0%	83.1%	978	86.1%	4,920
Missouri damage code	No Tolerance		.	.	.	.
Utilization	No Tolerance	99.0%	100.0%	384	100.0%	1,003

(Table C continued on next page)

(Table C Continued)

Variable	Tolerance	Objective	Minnesota		All NRS States	
			Data within tolerance	Records	Data within tolerance	Records
NC Tree Grade	No Tolerance	90.0%	63.4%	621	68.5%	2,747
DBH-live & decay code 1-2 trees	± 0.1 /20 inch	95.0%	93.6%	6,666	93.8%	28,413
DBH-decay code 3-4-5 trees	± 1 /20 inch	95.0%	99.0%		99.2%	1,300
Total length trees 40 ft plus	± 10%	90.0%	85.8%	3,450	82.5%	16,832
Total length trees less than 40 ft	± 10%	90.0%	78.5%	822	74.8%	3,871
Total Length trees lt 5 inch	± 10%	90.0%	51.9%	27	64.3%	277
Number of blind check trees				7,929		32,900
Seedling Level						
National Variables						
Species	No Tolerance	85.0%	95.5%	1,137	91.0%	5,518
Genus	No Tolerance	90.0%	98.5%	1,137	96.7%	5,518
Seedling Count	± 20%	90.0%	77.9%	1,137	67.7%	5,518
Seedling Count coded	No Tolerance	90.0%	81.7%	1,137	72.5%	5,518
Number of blind check microplots				611		2,437
Site Tree Level						
National Variables						
Condition list	No Tolerance	99.0%	91.6%	919	93.2%	2,976
Diameter	± 0.1 /20 inch	95.0%	91.5%	907	91.6%	2,935
Species	No Tolerance	95.0%	98.8%	919	98.1%	2,976
Genus	No Tolerance	99.0%	99.7%	919	99.8%	2,976
Azimuth	± 10 degrees	90.0%	99.4%	907	98.7%	2,935
Distance	± 5 ft	90.0%	99.6%	907	99.5%	2,935
Total_length	± 10 percent	90.0%	91.4%	907	92.7%	2,935
Diameter_age	± 5 years	95.0%	97.7%	907	92.3%	2,935
Regional Variables						
Site_index_method	No Tolerance	99.0%	100.0%	919	99.9%	2,976
Field_site_index	No Tolerance	99.0%	100.0%	919	99.8%	2,976
Number of blind check site index trees				919		2,976

Table D.—Observed relative bias values (Average [field crew - QA crew]) for measurement variables on blind-check plots, Minnesota 2004-2008

Variable	Unit of measure	Minnesota				All NRS States			
		Relative bias	95% CI limits		Number of observations	Relative bias	95% CI limits		Number of observations
			Lower	Upper			Lower	Upper	
Plot Level									
National Variables									
Distance to Road	code	-0.08	-0.15	-0.02	452	-0.04	-0.07	-0.01	1,903
Regional Variables									
ELEVATION_GPS	feet	13.68	-2.92	37.66	446	60.26	1.35	196.53	1,809
LAT_DECIMAL_DEG	degree	0.00	0.00	0.00	446	0.00	0.00	0.00	1,811
LON_DECIMAL_DEG	degree	0.00	0.00	0.00	446	0.46	0.00	1.39	1,811
LAT_FEET	feet	-308.25	-909.58	-2.78	446	-77.01	-225.30	-1.00	1,811
LON_FEET	feet	211.63	6.13	597.60	446	5,576.19	5.59	16,662.63	1,811
Number of blind-check plots					468	1,970			
Condition Level									
National Variables									
Stand Size	code	-0.02	-0.05	0.01	550	0.00	-0.01	0.02	1,921
Stand Age	years	-0.17	-1.00	0.58	550	-0.56	-1.60	0.19	1,921
Number of blind-check conditions					762	3,586			
Subplot Level									
National Variables									
Slope	percent	-0.06	-0.25	0.11	1,745	0.06	-0.08	0.17	7,067
Aspect	degrees	3.53	1.69	5.28	1,678	0.42	-0.62	1.47	6,659
Snow/Water Depth	feet	-0.36	-0.68	-0.01	1,785	-0.11	-0.22	0.01	7,488
Number of blind-check subplots					1,785	7,488			
Tree Level									
National Variables									
DBH	inches	-0.12	-0.15	-0.10	7,631	-0.07	-0.08	-0.06	31,293
DRC	inches					-0.04	-0.16	0.04	24
Rotten/Missing Cull	percent	-0.15	-0.28	-0.02	4,387	-0.06	-0.10	-0.01	21,153
Total Length	feet	0.62	0.24	1.00	4,272	0.16	-0.07	0.38	20,703
Actual Length	feet	-2.11	-5.40	0.15	549	-2.55	-3.87	-1.26	2,375

(Table D continued on next page)

(Table D Continued)

Variable	Unit of measure	Minnesota				All NRS States			
		Relative bias	95% CI limits		Number of observations	Relative bias	95% CI limits		Number of observations
			Lower	Upper			Lower	Upper	
Compacted Crown Ratio	percent	-1.31	-1.69	-0.99	6,344	-0.13	-0.25	-0.01	26,967
Uncompacted Crown Ratio (P3)	percent	7.76	4.71	11.32	108	-0.15	-1.01	0.61	1,027
Crown position	code	0.00	-0.04	0.04	81	-0.09	-0.11	-0.06	834
Crown light exposure	code	-0.31	-0.50	-0.13	108	0.02	-0.04	0.06	1,027
Sapling crown vigor class	code	0.00	-0.07	0.11	27	-0.10	-0.18	-0.02	193
Crown density	percent	-1.91	-4.75	0.90	81	0.91	0.30	1.68	834
Crown dieback	percent	0.25	-0.80	1.45	81	-0.57	-0.97	-0.11	834
Transparency	percent	-0.56	-1.94	0.62	81	-1.09	-1.65	-0.52	834
Regional Variables									
NC Tree Class	code	-0.13	-0.19	-0.05	7,205	-0.09	-0.12	-0.05	29,985
DBH-live & decay code 1-2 trees	inches	-0.12	-0.14	-0.09	6,666	-0.06	-0.08	-0.06	28,413
DBH-decay code 3-4-5 trees	inches	-0.03	-0.07	0.01	309	-0.03	-0.06	-0.02	1,300
Total length trees 40 ft plus	feet	1.12	0.83	1.40	3,450	0.71	0.58	0.86	16,832
Total length trees less than 40 ft	feet	-1.47	-3.33	-0.13	822	-2.22	-3.32	-1.12	3,871
Total Length trees lt 5 inch	feet	-0.07	-5.64	5.75	27	2.44	0.65	4.14	277
Number of blind-check trees					7,929	32,900			
Seedling Level									
National Variables									
Seedling Count	number	-9.78	-14.79	-5.31	1,137	-15.57	-23.17	-10.43	5,518
Seedling Count coded	number	0.01	-0.04	0.05	1,137	0.00	-0.02	0.02	5,518
Number of blind-check microplots					611	2,437			
Site Tree Level									
National Variables									
Diameter	inches	-0.02	-0.03	-0.01	907	0.00	-0.01	0.00	2,935
Total_length	feet	-0.43	-0.92	0.03	907	-0.15	-0.37	0.06	2,935
Diameter_age	years	-0.15	-0.36	0.02	907	0.08	-0.06	0.23	2,935
Regional Variables									
Field_site_index	feet	0.00	0.00	0.00	919	0.07	0.01	0.16	2,976
Number of blind-check SI trees					919	2,976			

Table E.—FIA nonresponse by ownership, Minnesota 2004-2008

Owner and strata	Plots Selected	Observed	Denied Access	Hazardous	Other	Response Rate
			number of plots			
National forest	791	773	0	21	0	97.7%
Inland water	1,010	1,009	0	2	0	99.9%
Private	13,334	13,079	255	24	0	98.1%
Other public	2,998	2,972	11	21	0	99.1%
Total	18,133	17,833	266	68	0	98.3%

Table MN-1.—Percentage of area by land status, Minnesota 2004-2008

Land status	Percentage of area
Accessible forest land	
Unreserved forest land	
Timberland	27.9
Unproductive	0.9
Total unreserved forest land	28.8
Reserved forest land	
Productive	1.4
Unproductive	0.0
Total reserved forest land	1.5
All accessible forest land	30.3
Nonforest and other land	
Nonforest land	61.7
Water	
Census	5.7
Non-Census	0.6
All nonforest and other land	68.0
Nonsampled land	
Access denied	1.4
Hazardous conditions	0.4
Other	--
All land	100.0

Total area (thousands of acres) 54,009

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

Table MN-2.—Area of forest land, in thousand acres, by owner class and forest-land status, Minnesota 2004-2008

Owner class	Unreserved forests			Reserved forests			All forest land
	Timberland	Unproductive	Total	Productive	Unproductive	Total	
Forest Service							
National forest	1,803.6	63.9	1,867.5	580.4	22.0	602.4	2,469.9
Other national forest	11.4	--	11.4	63.7	--	63.7	75.1
Other Federal							
National Park Service	--	--	--	106.5	1.3	107.7	107.7
Bureau of Land Management	0.7	--	0.7	--	--	--	0.7
Fish and Wildlife Service	61.7	1.5	63.2	2.6	--	2.6	65.8
Department of Defense or Energy	13.6	--	13.6	--	--	--	13.6
Other Federal	121.1	4.5	125.6	6.7	--	6.7	132.3
State and local government							
State	3,306.3	157.1	3,463.4	70.2	--	70.2	3,533.7
Local (county, municipal, etc.)	2,953.9	110.0	3,063.9	20.3	1.8	22.1	3,086.0
Other non-Federal lands	9.3	--	9.3	--	--	--	9.3
Private							
Undifferentiated private	7,327.3	168.8	7,496.1	--	--	--	7,496.1
All owners	15,609.1	505.7	16,114.8	850.4	25.1	875.5	16,990.3

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 MN-3.—Area of forest land, in thousand acres, by forest-type group and productivity class, Minnesota 2004-2008

Forest-type group	Site productivity class (cubic feet/acre/year)							All classes
	0-19	20-49	50-84	85-119	120-164	165-224	225+	
White / red / jack pine group	22.0	321.8	312.1	271.0	70.6	--	4.9	1,002.3
Spruce / fir group	213.5	2,924.8	559.4	121.6	36.8	--	--	3,856.1
Other eastern softwoods group	2.3	13.9	3.3	--	--	--	--	19.5
Exotic softwoods group	--	--	7.0	1.2	--	--	--	8.2
Oak / pine group	13.1	87.7	151.5	45.1	7.3	--	3.9	308.5
Oak / hickory group	66.4	930.6	875.9	207.6	17.0	--	--	2,097.5
Elm / ash / cottonwood group	71.2	1,039.1	342.6	91.9	12.9	--	--	1,557.7
Maple / beech / birch group	10.7	652.9	389.3	116.1	10.1	--	--	1,179.0
Aspen / birch group	109.7	1,843.9	3,007.0	1,440.6	82.8	21.3	--	6,505.3
Other hardwoods group	11.9	84.8	60.8	11.1	--	--	--	168.7
Exotic hardwoods group	0.8	0.7	2.1	2.2	--	--	--	5.8
Nonstocked	9.2	148.4	99.9	21.1	3.1	--	--	281.6
All forest-type groups	530.8	8,048.5	5,810.8	2,329.6	240.5	21.3	8.8	16,990.3

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 MN-4.—Area of forest land, in thousand acres, by forest-type group, ownership group, and forest-land status, Minnesota 2004-2008

Forest-type group	Forest Service			Other Federal			State and local government			Undifferentiated private			All forest land
	Timber-land	Other forest land		Timber-land	Other forest land		Timber-land	Other forest land		Timber-land	Other forest land		
White / red / jack pine group	233.5	128.2	12.1	12.6	280.4	7.9	318.7	8.9	1,002.3				
Spruce / fir group	460.4	213.0	61.4	19.8	2,130.6	160.9	789.1	20.8	3,856.1				
Other eastern softwoods group	--	--	--	--	--	2.3	17.1	--	19.5				
Exotic softwoods group	--	--	--	--	--	--	8.2	--	8.2				
Oak / pine group	46.0	30.9	5.0	10.5	60.9	5.6	142.8	6.7	308.5				
Oak / hickory group	32.8	5.5	26.4	6.4	381.2	38.2	1,556.3	50.9	2,097.5				
Elm / ash / cottonwood group	85.1	28.8	23.6	5.3	421.6	48.1	917.8	27.4	1,557.7				
Maple / beech / birch group	117.5	17.2	11.9	2.7	397.6	16.1	610.3	5.7	1,179.0				
Aspen / birch group	803.7	268.8	51.4	65.8	2,445.9	68.8	2,760.1	40.9	6,505.3				
Other hardwoods group	19.0	17.6	5.5	--	37.0	8.3	80.6	0.7	168.7				
Exotic hardwoods group	--	--	--	--	--	--	5.1	0.8	5.8				
Nonstocked	17.0	19.9	--	--	114.3	3.2	121.1	6.0	281.6				
All forest-type groups	1,815.0	730.0	197.3	123.0	6,269.5	359.3	7,327.3	168.8	16,990.3				

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 MN-5.—Area of forest land, in thousand acres, by forest-type group and stand-size class, Minnesota 2004-2008

Forest-type group	Stand-size class				Chaparral	Nonstocked	All size classes
	Large diameter	Medium diameter	Small diameter				
White / red / jack pine group	520.9	330.9	150.5	--	--	--	1,002.3
Spruce / fir group	486.1	1,220.7	2,149.3	--	--	--	3,856.1
Other eastern softwoods group	9.9	4.3	5.3	--	--	--	19.5
Exotic softwoods group	3.7	--	4.6	--	--	--	8.2
Oak / pine group	165.3	81.2	62.0	--	--	--	308.5
Oak / hickory group	1,277.3	615.8	204.4	--	--	--	2,097.5
Elm / ash / cottonwood group	443.0	693.0	421.7	--	--	--	1,557.7
Maple / beech / birch group	628.0	420.3	130.7	--	--	--	1,179.0
Aspen / birch group	1,282.7	2,515.7	2,707.0	--	--	--	6,505.3
Other hardwoods group	7.0	10.9	150.8	--	--	--	168.7
Exotic hardwoods group	2.1	3.0	0.8	--	--	--	5.8
Nonstocked	--	--	--	--	--	281.6	281.6
All forest-type groups	4,825.9	5,895.8	5,986.9	--	--	281.6	16,990.3

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 MN-6.—Area of forest land, in thousand acres, by forest-type group and stand-age class, Minnesota 2004-2008

Forest type group	Nonstocked	0-20	21-40	41-60	61-80	81-100	100-120	121-140	141-160	161-180	181-200	201+	All classes
White / red / jack pine group	--	146.3	288.1	221.9	186.8	117.9	32.5	3.4	--	5.5	--	--	0.0
Spruce / fir group	--	258.2	434.7	924.0	923.6	619.8	344.7	232.1	70.9	32.3	13.5	--	2.2
Other eastern softwoods group	--	--	8.5	7.6	3.3	--	--	--	--	--	--	--	0.0
Exotic softwoods group	--	4.6	3.7	--	--	--	--	--	--	--	--	--	0.0
Oak / pine group	--	48.9	49.3	87.7	70.3	21.7	12.2	18.4	--	--	--	--	0.0
Oak / hickory group	--	170.5	148.2	528.1	655.2	400.8	150.8	41.7	2.3	--	--	--	0.0
Elm / ash / cottonwood group	--	121.2	180.3	417.5	456.0	213.5	116.7	36.5	10.0	6.1	--	--	0.0
Maple / beech / birch group	--	129.2	77.7	217.6	450.4	236.6	51.7	4.8	4.2	--	0.7	--	6.1
Aspen / birch group	--	1,806.5	1,386.5	1,613.6	1,381.7	268.0	39.2	5.5	--	4.4	--	--	0.0
Other hardwoods group	--	65.1	11.7	32.7	33.0	15.0	11.2	--	--	--	--	--	0.0
Exotic hardwoods group	--	0.8	5.1	--	--	--	--	--	--	--	--	--	5.8
Nonstocked	281.6	--	--	--	--	--	--	--	--	--	--	--	0.0
Total	281.6	2,751.2	2,593.7	4,050.6	4,160.4	1,893.1	759.1	342.2	87.3	48.3	14.3	8.3	16,990.3

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 MN-7.—Area of forest land, in thousand acres, by forest-type group and stand origin, Minnesota 2004-2008

Forest-type group	Stand origin		All forest land
	Natural stands	Artificial regeneration	
White / red / jack pine group	648.4	353.9	1,002.3
Spruce / fir group	3,753.1	103.0	3,856.1
Other eastern softwoods group	19.5	--	19.5
Exotic softwoods group	2.3	5.9	8.2
Oak / pine group	260.4	48.1	308.5
Oak / hickory group	2,075.9	21.6	2,097.5
Elm / ash / cottonwood group	1,544.6	13.0	1,557.7
Maple / beech / birch group	1,162.1	17.0	1,179.0
Aspen / birch group	6,435.1	70.2	6,505.3
Other hardwoods group	157.7	10.9	168.7
Exotic hardwoods group	5.1	0.7	5.8
Nonstocked	255.9	25.7	281.6
All forest-type groups	16,320.1	670.1	16,990.3

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 MN-8.—Area of forest land, in thousand acres, by forest-type group and primary disturbance class, Minnesota 2004-2008

Forest-type group	Disturbance class								All forest land
	None	Insects	Disease	Weather	Fire	Domestic animals	Wild animals	Human	Other
White / red / jack pine group	955.0	2.2	--	2.9	8.3	0.6	4.9	28.4	--
Spruce / fir group	3,754.6	19.7	16.0	35.0	5.1	4.4	14.5	6.7	--
Other eastern softwoods group	19.5	--	--	--	--	--	--	--	--
Exotic softwoods group	8.2	--	--	--	--	--	--	--	--
Oak / pine group	295.7	--	--	2.9	--	--	--	--	--
Oak / hickory group	1,907.7	--	--	26.9	6.9	46.5	4.8	93.8	--
Elm / ash / cottonwood group	1,470.1	6.3	0.7	37.3	1.7	14.3	17.5	9.8	--
Maple / beech / birch group	1,122.0	0.7	--	7.3	--	13.2	5.7	26.5	--
Aspen / birch group	6,204.2	12.1	5.2	71.1	22.2	18.6	82.9	86.0	3.0
Other hardwoods group	154.4	1.4	--	3.2	4.2	1.5	1.7	2.2	--
Exotic hardwoods group	5.8	--	--	--	--	--	--	--	--
Nonstocked	249.5	--	--	4.6	6.8	0.8	5.2	14.7	--
All forest-type groups	16,146.9	42.5	32.7	191.2	55.3	100.0	140.6	274.5	3.0
All forest-type groups	16,146.9	42.5	32.7	191.2	55.3	100.0	140.6	274.5	3.0

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 MN-9.—Area of timberland, in thousand acres, by forest-type group and stand-size class, Minnesota 2004-2008

Forest-type group	Stand-size class					All size classes
	Large diameter	Medium diameter	Small diameter	Chaparral	Nonstocked	
White / red / jack pine group	442.9	276.1	125.7	--	--	844.7
Spruce / fir group	450.5	1,137.0	1,854.0	--	--	3,441.5
Other eastern softwoods group	9.9	4.3	2.9	--	--	17.1
Exotic softwoods group	3.7	--	4.6	--	--	8.2
Oak / pine group	127.9	67.8	59.1	--	--	254.8
Oak / hickory group	1,226.5	577.7	192.4	--	--	1,996.7
Elm / ash / cottonwood group	417.8	643.6	386.7	--	--	1,448.1
Maple / beech / birch group	616.2	398.2	122.9	--	--	1,137.4
Aspen / birch group	1,130.4	2,369.3	2,561.3	--	--	6,061.0
Other hardwoods group	7.0	10.9	124.1	--	--	142.0
Exotic hardwoods group	2.1	3.0	--	--	--	5.1
Nonstocked	--	--	--	--	252.5	252.5
All forest-type groups	4,435.0	5,488.0	5,433.7	--	252.5	15,609.1

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 MN-10.—Number of live trees (at least 1 inch d.b.h./d.r.c.), in thousand trees, on forest land by species group and diameter class, Minnesota 2004-2008

Species group	Diameter class (inches)																All classes
	1.0- 2.9	3.0- 4.9	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- 24.9	25.0- 28.9	29.0- 32.9	33.0- 36.9	37.0+		
Softwood species groups																	
Eastern softwood species groups																	
Other yellow pines	679	1,345	361	251	180	84	34	17	--	--	--	--	--	--	--	--	2,950
Eastern white and red pines	55,414	39,176	34,633	31,887	19,985	10,681	6,379	4,240	3,073	2,032	2,162	710	254	139	--	--	210,763
Jack pine	46,611	35,770	24,424	17,508	12,011	6,472	2,619	852	292	57	--	--	--	--	--	--	146,615
Spruce and balsam fir	2,080,819	712,482	246,745	95,610	32,645	10,084	3,407	1,705	674	187	149	17	--	--	--	--	3,184,523
Other eastern softwoods	530,300	267,945	136,148	80,440	39,290	19,418	9,731	4,170	1,951	792	459	86	--	--	--	--	1,090,731
All softwoods	2,713,822	1,056,717	442,311	225,697	104,111	46,740	22,169	10,984	5,989	3,067	2,770	812	254	139	--	--	4,635,582
Hardwood species groups																	
Eastern hardwood species groups																	
Select white oaks	92,038	43,511	26,382	20,345	14,116	11,641	6,438	4,462	3,117	1,696	1,976	669	250	42	59	--	226,741
Select red oaks	56,392	15,757	10,026	9,962	10,022	8,819	6,871	5,105	2,726	1,424	1,600	468	197	33	--	--	129,403
Other red oaks	3,956	1,569	1,110	670	765	706	699	454	390	289	318	148	60	--	17	--	11,152
Hickory	8,511	3,859	2,238	1,272	729	434	372	74	20	--	--	--	--	--	--	--	17,511
Yellow birch	14,610	6,828	1,446	1,175	783	253	340	359	264	76	197	33	17	--	--	--	26,381
Hard maple	214,824	52,771	32,664	21,005	12,035	7,053	3,676	1,953	1,238	616	637	67	19	--	--	--	348,556
Soft maple	360,550	88,563	45,595	27,382	14,573	6,395	2,661	1,516	691	655	455	294	168	54	--	--	549,552
Beech	--	--	--	27	--	--	--	--	--	--	--	--	--	--	--	--	27
Ash	606,319	172,605	87,942	52,972	28,745	13,551	6,370	3,505	1,412	834	600	150	52	--	--	--	975,057
Cottonwood and aspen	2,751,226	674,775	213,595	114,251	71,720	46,193	27,040	13,607	5,702	2,682	1,389	271	194	44	93	--	3,922,782
Basswood	137,103	51,732	24,358	20,197	15,126	9,312	6,265	3,820	1,938	1,329	758	213	129	35	--	--	272,313
Black walnut	2,007	753	780	574	316	336	282	106	171	59	34	--	--	--	--	--	5,417
Other eastern soft hardwoods	613,992	219,534	106,378	71,715	41,866	19,313	7,735	3,776	1,398	570	272	197	53	18	16	--	1,086,834
Other eastern hard hardwoods	4,559	762	721	191	204	115	75	70	18	18	20	18	--	--	--	--	6,771
Eastern noncommercial hardwoods	753,703	73,711	12,216	2,624	749	232	68	44	--	34	--	36	--	--	--	--	843,416
All hardwoods	5,619,791	1,406,729	565,479	344,336	211,748	124,352	68,891	38,850	19,086	10,281	8,256	2,564	1,137	226	185	--	8,421,912
All species groups	8,333,613	2,463,446	1,007,790	570,032	315,859	171,092	91,060	49,834	25,076	13,348	11,026	3,377	1,391	365	185	--	13,057,494

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

Table MN-11.—Number of growing-stock trees (at least 5 inches d.b.h.), in thousand trees, on timberland by species group and diameter class, Minnesota 2004-2008

Species group	Diameter class (inches)														33.0-36.9	37.0+ 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	21.0-24.9	25.0-28.9	29.0-32.9					
Softwood species groups																
Eastern softwood species groups																
Other yellow pines	287	251	140	84	34	17	--	--	--	--	--	--	--	--	813	--
Eastern white and red pines	32,139	30,266	18,779	9,474	5,532	3,652	2,748	1,761	1,725	495	173	40	--	--	106,781	--
Jack pine	18,990	13,512	8,516	4,547	1,922	454	191	57	--	--	--	--	--	--	48,189	--
Spruce and balsam fir	224,334	84,775	29,065	8,865	3,054	1,525	474	127	117	17	--	--	--	--	352,353	--
Other eastern softwoods	122,708	70,545	31,558	14,156	7,013	3,064	1,310	489	322	53	--	--	--	--	251,218	--
All softwoods	398,459	199,349	88,058	37,125	17,554	8,712	4,722	2,433	2,164	566	173	40	--	--	759,354	--
Hardwood species groups																
Eastern hardwood species groups																
Select white oaks	23,222	17,491	11,752	8,388	3,980	2,792	1,938	909	808	204	43	10	--	--	71,535	--
Select red oaks	7,773	8,213	8,646	6,899	5,419	3,952	1,975	993	996	266	155	--	--	--	45,287	--
Other red oaks	790	468	610	439	485	305	338	195	197	36	38	--	17	3,918	--	--
Hickory	2,073	1,161	713	265	276	48	20	--	--	--	--	--	--	--	4,557	--
Yellow birch	902	811	478	90	89	214	117	34	38	--	--	--	--	--	2,774	--
Hard maple	27,817	17,561	9,309	4,402	2,416	1,058	501	275	208	13	--	--	--	--	63,560	--
Soft maple	35,938	21,921	10,653	3,332	1,494	604	312	188	151	98	21	38	--	--	74,749	--
Beech	27	--	--	--	--	--	--	--	--	--	--	--	--	--	27	--
Ash	74,009	45,896	24,917	10,979	4,968	2,586	986	614	301	31	52	--	--	--	165,339	--
Cottonwood and aspen	199,172	104,047	64,688	37,284	21,402	10,284	4,162	1,739	894	197	119	20	51	444,061	--	--
Basswood	21,751	18,352	13,907	8,045	5,379	3,032	1,379	930	519	18	39	--	--	73,351	--	--
Black walnut	756	543	287	260	214	16	127	16	--	--	--	--	--	2,220	--	--
Other eastern soft hardwoods	81,109	55,684	32,470	11,824	4,743	2,055	478	277	42	16	--	--	--	188,698	--	--
Other eastern hard hardwoods	573	155	180	60	23	53	--	18	20	18	--	--	--	1,099	--	--
All hardwoods	475,912	292,303	178,610	92,267	50,889	26,998	12,335	6,187	4,174	896	466	68	69	1,141,174	--	--
All species groups	874,372	491,652	266,667	129,392	68,443	35,710	17,057	8,620	6,338	1,461	639	108	69	1,900,528	--	--

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

Table MN-12.—Net volume of live trees (at least 5 inches d.b.h./d.r.c.), in million cubic feet, by owner class and forest-land status, Minnesota 2004-2008

Owner class	Unreserved forests			Reserved forests			All forest land
	Timberland	Unproductive	Total	Productive	Unproductive	Total	
Forest Service							
National forest	2,163.7	17.4	2,181.2	640.6	7.3	647.9	2,829.1
Other national forest	15.4	--	15.4	77.5	--	77.5	93.0
Other Federal							
National Park Service	--	--	--	135.8	0.7	136.5	136.5
Bureau of Land Management	2.1	--	2.1	--	--	--	2.1
Fish and Wildlife Service	108.6	1.5	110.1	15.0	--	15.0	125.1
Department of Defense or Energy	18.2	--	18.2	--	--	--	18.2
Other Federal	128.3	0.7	129.0	2.6	--	2.6	131.6
State and local government							
State	2,807.9	30.6	2,838.5	142.7	--	142.7	2,981.2
Local (county, municipal, etc.)	3,089.9	32.4	3,122.3	58.9	3.7	62.6	3,184.8
Other non-Federal lands	3.5	--	3.5	--	--	--	3.5
Private							
Undifferentiated private	8,507.4	86.6	8,594.1	--	--	--	8,594.1
All owners	16,845.2	169.2	17,014.5	1,073.1	11.7	1,084.8	18,099.3

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

Table MN-13.—Net volume of live trees (at least 5 inches d.b.h./d.r.c.), in million cubic feet, on forest land by forest-type group and stand-size class, Minnesota 2004-2008

Forest-type group	Stand-size class					All size classes
	Large diameter	Medium diameter	Small diameter	Chaparral	Nonstocked	
White / red / jack pine group	1,275.8	458.5	20.7	--	--	1,755.0
Spruce / fir group	854.7	1,501.3	460.7	--	--	2,816.7
Other eastern softwoods group	9.9	2.2	0.1	--	--	12.2
Exotic softwoods group	5.9	--	2.1	--	--	8.0
Oak / pine group	331.4	100.8	13.4	--	--	445.6
Oak / hickory group	2,459.2	712.2	44.3	--	--	3,215.7
Elm / ash / cottonwood group	890.6	841.7	103.9	--	--	1,836.2
Maple / beech / birch group	1,327.7	539.7	31.3	--	--	1,898.7
Aspen / birch group	2,349.8	3,138.6	544.6	--	--	6,033.0
Other hardwoods group	5.8	11.4	39.2	--	--	56.4
Exotic hardwoods group	4.0	1.7	0.2	--	--	6.0
Nonstocked	--	--	--	--	15.7	15.7
All forest-type groups	9,514.9	7,308.2	1,260.5	--	15.7	18,099.3

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

Table MN-14.—Net volume of live trees (at least 5 inches d.b.h./d.r.c.), in million cubic feet, on forest land by species group and ownership group, Minnesota 2004-2008

Species group	Ownership group				All owners
	Forest Service	Other Federal	State and local government	Undifferentiated private	
Softwood species groups					
Eastern softwood species groups					
Other yellow pines	--	--	--	6.8	6.8
Eastern white and red pines	572.4	40.0	438.1	529.8	1,580.4
Jack pine	184.8	17.2	131.8	128.5	462.4
Spruce and balsam fir	528.5	37.5	781.6	549.2	1,896.7
Other eastern softwoods	252.9	38.2	1,030.4	478.5	1,800.0
All softwoods	1,538.6	132.9	2,382.0	1,692.8	5,746.3
Hardwood species groups					
Eastern hardwood species groups					
Select white oaks	20.2	12.2	177.5	892.8	1,102.6
Select red oaks	16.0	18.1	305.0	620.1	959.1
Other red oaks	--	2.8	14.6	98.3	115.7
Hickory	--	--	2.3	32.6	34.9
Yellow birch	17.4	0.5	24.7	16.1	58.6
Hard maple	91.7	11.2	240.5	346.0	689.3
Soft maple	67.0	38.3	233.8	424.1	763.2
Beech	--	--	--	0.1	0.1
Ash	86.3	18.0	456.8	848.5	1,409.5
Cottonwood and aspen	674.7	131.6	1,575.2	1,989.8	4,371.3
Basswood	59.6	11.3	256.2	640.6	967.6
Black walnut	--	--	4.1	31.8	36.0
Other eastern soft hardwoods	348.6	36.3	488.3	909.9	1,783.1
Other eastern hard hardwoods	0.0	--	1.5	12.6	14.1
Eastern noncommercial hardwoods	2.0	0.5	7.2	38.2	47.9
All hardwoods	1,383.4	280.6	3,787.6	6,901.3	12,353.0
All species groups	2,922.1	413.6	6,169.6	8,594.1	18,099.3

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

Table MN-15.—Net volume of live trees (at least 5 inches d.b.h./d.r.c.), in million cubic feet, on forest land by species group and diameter class, Minnesota 2004-2008

Species group	Diameter class (inches)															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- 24.9	25.0- 28.9	29.0- 32.9	33.0- 36.9	37.0+					
Softwood species groups																		
Eastern softwood species groups																		
Other yellow pines	1	1	2	1	1	1	--	--	--	--	--	--	--	--	7			
Eastern white and red pines	92	182	203	173	158	149	144	126	179	93	44	38	--	--	1,580			
Jack pine	58	92	114	97	59	26	12	3	--	--	--	--	--	--	462			
Spruce and balsam fir	648	552	335	167	82	58	30	11	11	3	--	--	--	--	1,897			
Other eastern softwoods	345	426	353	259	184	107	63	32	24	6	--	--	--	--	1,800			
All softwoods	1,145	1,255	1,007	697	484	341	249	172	214	102	44	38	--	--	5,746			
Hardwood species groups																		
Eastern hardwood species groups																		
Select white oaks	60	100	122	157	125	121	112	77	120	60	32	5	12	--	1,103			
Select red oaks	22	51	92	129	146	150	107	71	109	45	29	6	--	--	959			
Other red oaks	2	3	7	10	13	12	15	13	19	12	6	--	5	--	116			
Hickory	5	6	7	6	8	2	1	--	--	--	--	--	--	--	35			
Yellow birch	3	6	7	3	6	9	9	3	9	2	1	--	--	--	59			
Hard maple	85	121	120	107	79	57	45	28	39	6	2	--	--	--	689			
Soft maple	117	154	142	95	58	43	27	31	32	31	23	12	--	--	763			
Beech	0	--	--	--	--	--	--	--	--	--	--	--	--	--	0			
Ash	221	294	283	208	141	103	57	42	39	15	8	--	--	--	1,409			
Cottonwood and aspen	551	670	751	757	640	439	241	141	95	26	25	8	27	--	4,371			
Basswood	64	117	154	148	143	117	77	64	49	14	15	5	--	--	968			
Black walnut	2	3	3	6	6	3	7	3	2	--	--	--	--	--	36			
Other eastern soft hardwoods	275	409	421	291	168	108	49	26	13	15	5	3	1	--	1,783			
Other eastern hard hardwoods	2	1	2	2	1	2	1	1	1	2	--	--	--	--	14			
Eastern noncommercial hardwoods	23	11	6	3	1	1	--	1	--	2	--	--	--	--	48			
All hardwoods	1,432	1,947	2,116	1,921	1,535	1,167	746	500	527	230	147	39	45	--	12,353			
All species groups	2,577	3,201	3,123	2,618	2,020	1,508	995	672	741	333	191	77	45	--	18,099			

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

Table MN-16.—Net volume of live trees (at least 5 inches d.b.h./d.r.c.), in million cubic feet, on forest land by forest-type group and stand origin, Minnesota 2004-2008

Forest-type group	Stand origin		All forest land
	Natural stands	Artificial regeneration	
White / red / jack pine group	1,203.9	551.1	1,755.0
Spruce / fir group	2,737.2	79.5	2,816.7
Other eastern softwoods group	12.2	--	12.2
Exotic softwoods group	0.5	7.5	8.0
Oak / pine group	412.8	32.8	445.6
Oak / hickory group	3,214.4	1.3	3,215.7
Elm / ash / cottonwood group	1,833.0	3.2	1,836.2
Maple / beech / birch group	1,891.7	7.0	1,898.7
Aspen / birch group	5,995.6	37.4	6,033.0
Other hardwoods group	55.6	0.9	56.4
Exotic hardwoods group	4.4	1.6	6.0
Nonstocked	15.0	0.8	15.7
All forest-type groups	17,376.3	723.0	18,099.3

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

Table MN-17.—Net volume of growing-stock trees (at least 5 inches d.b.h./d.r.c.), in million cubic feet, on timberland by species group and diameter class, Minnesota 2004-2008

Species group	Diameter class (inches)														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	21.0-24.9	25.0-28.9	29.0-32.9	33.0-36.9	37.0+			
Softwood species groups																
Eastern softwood species groups																
Other yellow pines	1	1	1	1	1	1	--	--	--	--	--	--	--	--	6	
Eastern white and red pines	86	174	191	153	137	128	129	109	142	65	30	10	--	--	1,353	
Jack pine	46	72	82	70	44	15	8	3	--	--	--	--	--	--	341	
Spruce and balsam fir	589	490	300	148	73	52	22	7	9	3	--	--	--	--	1,692	
Other eastern softwoods	319	385	297	203	143	84	47	22	19	4	--	--	--	--	1,525	
All softwoods	1,041	1,123	871	575	399	279	206	141	170	72	30	10	--	--	4,918	
Hardwood species groups																
Eastern hardwood species groups																
Select white oaks	53	88	104	116	81	80	73	44	53	18	6	2	--	--	718	
Select red oaks	18	44	81	103	118	120	80	52	71	29	23	--	--	--	738	
Other red oaks	2	2	5	6	9	9	13	9	12	3	4	--	5	--	79	
Hickory	4	6	7	4	6	1	1	--	--	--	--	--	--	--	29	
Yellow birch	2	4	5	1	2	6	5	1	2	--	--	--	--	--	28	
Hard maple	74	103	95	71	55	33	21	14	13	1	--	--	--	--	480	
Soft maple	95	127	108	54	35	19	14	10	12	12	3	8	--	--	497	
Beech	0	--	--	--	--	--	--	--	--	--	--	--	--	--	0	
Ash	190	260	250	175	115	81	42	33	21	3	8	--	--	--	1,177	
Cottonwood and aspen	518	616	689	631	525	349	186	99	67	21	17	4	14	--	3,734	
Basswood	58	108	143	130	125	96	58	48	35	2	5	--	--	--	807	
Black walnut	2	3	3	4	5	1	5	1	--	--	--	--	--	--	25	
Other eastern soft hardwoods	215	327	338	192	110	65	20	13	3	2	--	--	--	--	1,284	
Other eastern hard hardwoods	1	1	2	1	1	2	--	1	1	2	--	--	--	--	11	
All hardwoods	1,233	1,688	1,829	1,490	1,186	860	517	326	290	92	65	13	18	--	9,608	
All species groups	2,274	2,811	2,700	2,064	1,584	1,139	723	467	461	164	96	23	18	--	14,525	

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

Table MN-18.—Net volume of growing-stock trees (at least 5 inches d.b.h.), in million cubic feet, on timberland by species group and ownership group, Minnesota 2004-2008

Species group	Ownership group				All owners
	Forest Service	Other Federal	State and local government	Undifferentiated private	
Softwood species groups					
Eastern softwood species groups					
Other yellow pines	--	--	--	6.3	6.3
Eastern white and red pines	398.2	15.6	420.1	519.5	1,353.4
Jack pine	91.6	4.3	123.2	121.6	340.8
Spruce and balsam fir	380.2	21.2	756.3	534.5	1,692.2
Other eastern softwoods	178.6	31.1	894.0	421.1	1,524.8
All softwoods	1,048.6	72.3	2,193.6	1,603.1	4,917.5
Hardwood species groups					
Eastern hardwood species groups					
Select white oaks	19.2	7.2	122.6	568.6	717.7
Select red oaks	11.2	16.7	226.9	483.5	738.3
Other red oaks	--	0.7	10.9	67.3	78.9
Hickory	--	--	2.3	27.1	29.4
Yellow birch	7.4	0.5	11.5	8.6	27.9
Hard maple	69.3	9.1	184.0	217.8	480.2
Soft maple	31.3	14.1	169.3	282.4	497.0
Beech	--	--	--	0.1	0.1
Ash	61.7	12.3	386.7	716.4	1,177.1
Cottonwood and aspen	488.7	68.6	1,367.1	1,809.4	3,733.8
Basswood	56.8	9.6	224.6	516.3	807.3
Black walnut	--	--	2.5	22.2	24.7
Other eastern soft hardwoods	211.9	20.0	400.3	652.2	1,284.3
Other eastern hard hardwoods	0.0	--	0.7	10.3	11.0
All hardwoods	957.6	158.8	3,109.3	5,382.1	9,607.7
All species groups	2,006.2	231.1	5,302.8	6,985.1	14,525.3

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

Table MN-19.—Net volume of sawtimber trees (International 1/4-inch rule), in million board feet, on timberland by species group and diameter class, Minnesota 2004-2008

Species group	Diameter class (inches)														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	21.0-24.9	25.0-28.9	29.0-32.9	33.0-36.9	37.0+				
Softwood species groups															
Eastern softwood species groups															
Other yellow pines	7	7	5	3	--	--	--	--	--	--	--	--	--	21	
Eastern white and red pines	950	771	711	685	706	611	815	380	182	64	--	--	--	5,874	
Jack pine	392	343	228	78	46	16	--	--	--	--	--	--	--	1,104	
Spruce and balsam fir	1,501	760	389	284	123	42	55	15	--	--	--	--	--	3,170	
Other eastern softwoods	1,493	1,039	752	453	261	123	112	26	--	--	--	--	--	4,259	
All softwoods	4,343	2,920	2,085	1,502	1,136	792	981	421	182	64	--	--	--	14,427	
Hardwood species groups															
Eastern hardwood species groups															
Select white oaks	--	474	352	363	346	212	263	95	32	9	--	--	--	2,147	
Select red oaks	--	421	517	548	378	255	357	149	121	--	--	--	--	2,746	
Other red oaks	--	27	40	40	61	45	58	16	22	--	--	--	--	336	
Hickory	--	16	26	6	3	--	--	--	--	--	--	--	--	51	
Yellow birch	--	6	8	28	23	7	13	--	--	--	--	--	--	85	
Hard maple	--	297	246	157	100	70	68	8	--	--	--	--	--	946	
Soft maple	--	221	152	90	66	50	61	61	17	41	--	--	--	759	
Ash	--	753	526	385	204	163	108	13	42	--	--	--	--	2,195	
Cottonwood and aspen	--	2,686	2,391	1,646	905	491	336	109	87	20	75	8,746	--	2,313	
Basswood	--	556	569	454	280	241	179	8	26	--	--	--	--	75	
Black walnut	--	19	24	3	26	4	--	--	--	--	--	--	--	1,753	
Other eastern soft hardwoods	--	789	486	298	94	64	14	8	--	--	--	--	--	33	
Other eastern hard hardwoods	--	4	2	7	--	4	7	8	--	--	--	--	--		
All hardwoods	--	6,269	5,340	4,026	2,486	1,606	1,465	475	347	71	101	101	101	22,185	
All species groups	4,343	9,189	7,425	5,528	3,622	2,398	2,446	897	529	134	101	101	101	36,612	

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

Table MN-19a.—Net volume of sawtimber trees (Doyle rule), in million board feet, on timberland by species group and diameter class, Minnesota 2004-2008

Species group	Diameter class (inches)												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	21.0-24.9	25.0-28.9	29.0-32.9	33.0-36.9	37.0+		
Softwood species groups													
Eastern softwood species groups													
Other yellow pines	2	3	3	2	--	--	--	--	--	--	--	10	
Eastern white and red pines	328	369	426	473	543	523	726	365	201	70	--	4,024	
Jack pine	135	164	137	54	35	14	--	--	--	--	--	540	
Spruce and balsam fir	519	363	233	196	94	36	48	15	--	--	--	1,505	
Other eastern softwoods	516	497	451	313	201	106	100	25	--	--	--	2,206	
All softwoods	1,501	1,396	1,249	1,038	873	679	873	405	201	70	--	8,285	
Hardwood species groups													
Eastern hardwood species groups													
Select white oaks	--	198	180	214	227	152	213	85	36	11	--	1,316	
Select red oaks	--	176	264	322	248	183	288	134	137	--	--	1,753	
Other red oaks	--	11	21	24	40	32	46	14	25	--	30	243	
Hickory	--	7	13	4	2	--	--	--	--	--	--	25	
Yellow birch	--	2	4	17	15	5	10	--	--	--	--	53	
Hard maple	--	124	126	92	66	50	54	7	--	--	--	520	
Soft maple	--	92	78	53	43	36	49	56	19	47	--	474	
Ash	--	314	269	227	134	117	86	12	48	--	--	1,207	
Cottonwood and aspen	--	1,120	1,223	968	595	352	269	100	98	23	85	4,835	
Basswood	--	232	291	267	184	173	143	7	29	--	--	1,327	
Black walnut	--	8	12	1	17	3	--	--	--	--	--	42	
Other eastern soft hardwoods	--	329	249	175	62	46	12	7	--	--	--	879	
Other eastern hard hardwoods	--	2	1	4	--	3	5	7	--	--	--	23	
All hardwoods	--	2,615	2,733	2,368	1,633	1,153	1,176	429	394	80	115	12,695	
All species groups	1,501	4,011	3,982	3,406	2,506	1,832	2,049	834	595	151	115	20,980	

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

Table MN-20.—Net volume of saw-log portion of sawtimber trees, in million cubic feet, on timberland by species group and ownership group, Minnesota 2004-2008

Species group	Ownership group				All owners
	Forest Service	Other Federal	State and local government	Undifferentiated private	
Softwood species groups					
Eastern softwood species groups					
Other yellow pines	--	--	--	3.6	3.6
Eastern white and red pines	303.9	9.7	315.6	353.0	982.1
Jack pine	53.4	1.2	66.0	70.3	190.9
Spruce and balsam fir	129.1	7.5	215.5	189.0	541.0
Other eastern softwoods	102.8	17.4	375.7	216.2	712.1
All softwoods	589.1	35.7	972.8	832.1	2,429.8
Hardwood species groups					
Eastern hardwood species groups					
Select white oaks	9.3	2.4	45.8	284.3	341.8
Select red oaks	5.0	10.6	130.2	291.4	437.2
Other red oaks	--	0.5	7.2	45.1	52.8
Hickory	--	--	0.2	7.9	8.1
Yellow birch	4.1	0.4	5.7	3.3	13.4
Hard maple	19.3	4.6	51.9	73.4	149.2
Soft maple	4.3	7.8	32.8	73.3	118.2
Ash	12.4	5.0	98.0	235.7	351.0
Cottonwood and aspen	217.3	35.0	492.4	657.8	1,402.5
Basswood	27.6	3.5	94.1	244.1	369.4
Black walnut	--	--	0.5	11.5	12.0
Other eastern soft hardwoods	45.4	2.9	90.6	139.4	278.3
Other eastern hard hardwoods	--	--	0.2	5.0	5.1
All hardwoods	344.7	72.7	1,049.4	2,072.2	3,539.1
All species groups	933.8	108.5	2,022.3	2,904.3	5,968.9

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

Table MN-21.—Average annual net growth of live trees (at least 5 inches d.b.h./d.r.c.), in million cubic feet, by owner class and forest-land status, Minnesota 1999-2003 to 2004-2008

Owner class	Unreserved forests			Reserved forests			All forest land
	Timberland	Unproductive	Total	Productive	Unproductive	Total	
Forest Service							
National forest	36.4	0.6	37.0	-10.5	0.5	-10.0	27.0
Other national forest	1.6	--	1.6	0.2	0.0	0.3	1.8
Other Federal							
National Park Service	--	--	--	-0.1	0.2	0.1	0.1
Fish and Wildlife Service	1.8	--	1.8	1.3	--	1.3	3.1
Department of Defense or Energy	0.5	--	0.5	--	--	--	0.5
Other Federal	2.4	0.2	2.7	0.5	--	0.5	3.2
State and local government							
State	62.0	1.4	63.5	2.2	0.2	2.4	65.9
Local (county, municipal, etc.)	58.8	1.7	60.5	0.9	--	0.9	61.4
Other non-Federal lands	0.5	--	0.5	--	--	--	0.5
Private							
Undifferentiated private	265.1	6.5	271.6	0.3	--	0.3	271.9
All owners	429.2	10.5	439.7	-5.1	0.8	-4.3	435.4

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

Table MN-22.—Average annual net growth of live trees (at least 5 inches d.b.h./d.r.c), in million cubic feet, on forest land by forest-type group and stand-size class, Minnesota 1999-2003 to 2004-2008

Forest-type group	Stand-size class					All size classes
	Large diameter	Medium diameter	Small diameter	Chaparral	Non stocked	
White / red / jack pine group	26.7	28.7	7.4	--	--	62.8
Spruce / fir group	6.4	22.3	16.2	--	--	44.8
Other eastern softwoods group	0.2	0.2	0.2	--	--	0.6
Exotic softwoods group	0.3	0.3	0.1	--	--	0.7
Oak / pine group	3.3	6.4	2.7	--	--	12.4
Oak / hickory group	61.7	28.4	4.2	--	--	94.3
Elm / ash / cottonwood group	31.5	22.3	5.6	--	--	59.4
Maple / beech / birch group	22.2	12.1	2.1	--	--	36.4
Aspen / birch group	5.5	68.6	44.2	--	--	118.3
Other hardwoods group	0.0	0.4	2.0	--	--	2.4
Exotic hardwoods group	--	0.7	--	--	--	0.7
Nonstocked	--	--	--	--	2.5	2.5
All forest-type groups	157.9	190.3	84.7	--	2.5	435.4

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

Table MN-23.—Average annual net growth of all live trees (at least 5 inches d.b.h./d.r.c.), in million cubic feet, on forest land by species group and ownership group, Minnesota 1999-2003 to 2004-2008

Species group	Ownership group				All owners
	Forest Service	Other Federal	State and local government	Undifferentiated private	
Softwood species groups					
Eastern softwood species groups					
Other yellow pines	--	--	--	0.7	0.7
Eastern white and red pines	17.0	1.3	14.9	30.3	63.6
Jack pine	1.8	0.3	2.9	0.9	5.8
Spruce and balsam fir	8.6	0.8	14.6	14.6	38.6
Other eastern softwoods	1.8	0.2	17.2	9.0	28.2
All softwoods	29.2	2.5	49.6	55.6	136.9
Hardwood species groups					
Eastern hardwood species groups					
Select white oaks	0.5	0.4	5.6	25.4	32.0
Select red oaks	0.7	0.2	7.8	23.2	31.9
Other red oaks	--	0.1	0.4	2.9	3.4
Hickory	--	--	0.1	1.4	1.5
Yellow birch	0.4	--	0.4	0.6	1.3
Hard maple	0.6	0.2	4.5	9.1	14.4
Soft maple	2.3	1.3	8.3	22.2	34.1
Ash	1.0	0.4	12.1	25.3	38.7
Cottonwood and aspen	-2.3	0.6	30.0	56.4	84.6
Basswood	-0.5	0.2	4.6	17.0	21.4
Black walnut	--	0.0	0.7	1.5	2.2
Other eastern soft hardwoods	-2.9	0.8	3.4	29.1	30.4
Other eastern hard hardwoods	--	--	-0.1	0.8	0.7
Eastern noncommercial hardwoods	0.0	0.0	0.3	1.5	1.8
All hardwoods	-0.3	4.3	78.1	216.3	298.4
All species groups	28.9	6.8	127.8	271.9	435.4

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

Table MN-24.—Average annual net growth of growing-stock trees (at least 5 inches d.b.h./d.r.c.), in million cubic feet, on timberland by species group and ownership group, Minnesota 1999-2003 to 2004-2008

Species group	Ownership group				All owners
	Forest Service	Other Federal	State and local government	Undifferentiated private	
Softwood species groups					
Eastern softwood species groups					
Other yellow pines	--	--	--	0.6	0.6
Eastern white and red pines	18.7	0.9	14.5	31.6	65.6
Jack pine	3.6	0.1	2.8	0.7	7.2
Spruce and balsam fir	10.1	0.3	16.9	15.5	42.8
Other eastern softwoods	3.6	-0.1	17.9	10.2	31.5
All softwoods	35.9	1.1	52.2	58.6	147.8
Hardwood species groups					
Eastern hardwood species groups					
Select white oaks	0.5	0.4	4.3	17.4	22.5
Select red oaks	0.5	0.4	7.2	16.6	24.7
Other red oaks	--	0.0	0.2	2.2	2.4
Hickory	--	--	0.0	1.3	1.4
Yellow birch	0.2	--	0.2	0.2	0.6
Hard maple	0.8	1.6	4.1	6.2	12.6
Soft maple	1.3	0.3	6.0	12.5	20.1
Ash	1.5	0.2	11.5	23.4	36.6
Cottonwood and aspen	7.5	2.3	33.3	57.3	100.3
Basswood	-0.4	0.6	4.7	16.3	21.2
Black walnut	--	0.0	0.3	1.2	1.5
Other eastern soft hardwoods	3.3	0.3	3.2	18.5	25.3
Other eastern hard hardwoods	--	--	-0.1	0.5	0.5
All hardwoods	15.0	6.1	74.8	173.7	269.7
All species groups	51.0	7.2	127.0	232.3	417.4

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

Table MN-25.—Average annual mortality of live trees (at least 5 inches d.b.h./d.r.c.), in million cubic feet, by owner class and forest-land status, Minnesota 1999-2003 to 2004-2008

Owner class	Unreserved forests		Reserved forests		All forest land
	Timberland	Unproductive	Productive	Unproductive	
Forest Service					
National forest	37.3	0.1	37.4	28.7	66.2
Other national forest	1.0	--	1.0	--	2.4
Other Federal					
National Park Service	--	--	--	--	3.9
Fish and Wildlife Service	1.5	--	1.5	--	1.5
Department of Defense or Energy	0.7	--	0.7	--	0.7
Other Federal	1.6	--	1.6	--	2.2
State and local government					
State	65.3	1.2	66.5	2.8	69.4
Local (county, municipal, etc.)	45.9	0.4	46.3	0.1	46.4
Other non-Federal lands	0.2	--	0.2	--	0.2
Private					
Undifferentiated private	143.3	3.4	146.7	0.2	146.9
All owners	296.8	5.1	301.9	0.1	339.8

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

Table MN-26.—Average annual mortality of trees (at least 5 inches d.b.h./d.r.c.), in million cubic feet, on forest land by forest-type group and stand-size class, Minnesota 1999-2003 to 2004-2008

Forest-type group	Stand-size class					All size classes
	Large diameter	Medium diameter	Small diameter	Chaparral	Non stocked	
White / red / jack pine group	9.8	6.6	0.0	--	--	16.4
Spruce / fir group	13.3	28.8	9.7	--	--	51.8
Other eastern softwoods group	--	--	0.1	--	--	0.1
Exotic softwoods group	--	0.0	--	--	--	0.0
Oak / pine group	6.0	1.3	0.1	--	--	7.5
Oak / hickory group	26.0	10.8	0.8	--	--	37.6
Elm / ash / cottonwood group	14.6	11.9	2.8	--	--	29.3
Maple / beech / birch group	16.2	8.9	0.3	--	--	25.5
Aspen / birch group	68.8	89.5	11.7	--	--	169.9
Other hardwoods group	0.1	0.4	0.6	--	--	1.1
Nonstocked	--	--	--	--	0.5	0.5
All forest-type groups	154.9	158.2	26.1	--	0.5	339.8

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

Table MN-27.—Average annual mortality of trees (at least 5 inches d.b.h./d.r.c.), in million cubic feet, on forest land by species group and ownership group, Minnesota 1999-2003 to 2004-2008

Species group	Ownership group				All owners
	Forest Service	Other Federal	State and local government	Undifferentiated private	
Softwood species groups					
Eastern softwood species groups					
Other yellow pines	--	--	--	0.0	0.0
Eastern white and red pines	3.0	0.0	2.2	2.7	8.0
Jack pine	4.8	0.4	3.0	4.8	13.1
Spruce and balsam fir	16.1	1.0	24.5	15.4	57.0
Other eastern softwoods	3.6	0.6	10.0	4.9	19.1
All softwoods	27.5	2.1	39.7	27.8	97.2
Hardwood species groups					
Eastern hardwood species groups					
Select white oaks	0.0	--	1.0	3.6	4.7
Select red oaks	0.1	0.3	2.6	5.6	8.7
Other red oaks	--	--	0.1	1.0	1.1
Hickory	--	--	0.0	0.2	0.3
Yellow birch	0.0	--	0.1	0.1	0.3
Hard maple	1.6	--	2.0	3.4	6.9
Soft maple	0.9	0.2	2.3	4.0	7.4
Ash	1.2	0.3	3.4	7.0	11.9
Cottonwood and aspen	24.6	4.4	49.1	58.1	136.2
Basswood	0.9	0.1	1.5	6.1	8.6
Black walnut	--	--	--	0.1	0.1
Other eastern soft hardwoods	11.5	0.8	14.0	28.2	54.6
Other eastern hard hardwoods	--	--	0.1	0.0	0.1
Eastern noncommercial hardwoods	0.1	0.0	0.2	1.5	1.9
All hardwoods	41.1	6.1	76.4	119.0	242.6
All species groups	68.6	8.2	116.0	146.9	339.8

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

Table MN-28.—Average annual mortality of growing-stock trees (at least 5 inches d.b.h.), in million cubic feet, on timberland by species group and ownership group, Minnesota 1999-2003 to 2004-2008

Species group	Ownership group				All owners
	Forest Service	Other Federal	State and local government	Undifferentiated private	
Softwood species groups					
Eastern softwood species groups					
Other yellow pines	--	--	--	0.0	0.0
Eastern white and red pines	0.9	--	1.9	2.6	5.5
Jack pine	1.5	0.0	2.6	4.6	8.7
Spruce and balsam fir	10.0	0.5	22.2	13.9	46.6
Other eastern softwoods	1.9	0.6	8.9	4.3	15.7
All softwoods	14.3	1.1	35.7	25.4	76.5
Hardwood species groups					
Eastern hardwood species groups					
Select white oaks	0.0	--	0.8	2.0	2.9
Select red oaks	0.1	0.0	1.2	4.1	5.4
Other red oaks	--	--	0.1	0.6	0.7
Hickory	--	--	0.0	0.2	0.2
Yellow birch	0.0	--	0.1	0.1	0.2
Hard maple	0.6	--	1.3	2.5	4.4
Soft maple	0.5	--	1.6	2.5	4.6
Ash	0.3	0.2	2.5	5.2	8.1
Cottonwood and aspen	12.2	1.1	38.5	47.1	98.9
Basswood	0.8	0.1	1.2	2.8	5.0
Black walnut	--	--	--	0.1	0.1
Other eastern soft hardwoods	3.8	0.5	10.6	19.2	34.1
Other eastern hard hardwoods	--	--	0.1	0.0	0.1
All hardwoods	18.3	1.9	57.9	86.3	164.5
All species groups	32.6	3.1	93.6	111.7	241.0

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

Table MN-29.—Average annual removals of live trees (at least 5 inches d.b.h./d.r.c.), in million cubic feet, on forest land by species group and ownership group, Minnesota 1999-2003 to 2004-2008

Species group	Ownership group				All owners
	Forest Service	Other Federal	State and local government	Undifferentiated private	
Softwood species groups					
Eastern softwood species groups					
Eastern white and red pines	1.9	--	2.2	7.1	11.2
Jack pine	0.3	1.5	10.6	9.1	21.5
Spruce and balsam fir	0.8	0.0	18.8	12.4	32.1
Other eastern softwoods	0.1	--	2.1	0.6	2.8
All softwoods	3.1	1.5	33.8	29.3	67.6
Hardwood species groups					
Eastern hardwood species groups					
Select white oaks	--	--	1.1	4.6	5.6
Select red oaks	0.3	--	4.0	5.5	9.7
Other red oaks	--	--	0.4	0.5	0.9
Yellow birch	--	--	0.0	0.3	0.4
Hard maple	0.1	--	1.6	5.1	6.8
Soft maple	0.0	--	4.2	7.8	12.0
Ash	0.0	0.0	2.1	4.7	6.8
Cottonwood and aspen	4.7	1.2	72.6	61.3	139.9
Basswood	0.3	--	1.8	5.6	7.7
Black walnut	--	--	0.9	0.1	1.0
Other eastern soft hardwoods	2.5	0.1	13.2	12.5	28.3
Other eastern hard hardwoods	--	--	0.1	--	0.1
Eastern noncommercial hardwoods	--	--	0.1	0.3	0.3
All hardwoods	8.0	1.3	102.1	108.2	219.6
All species groups	11.1	2.8	135.8	137.4	287.2

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

Table MN-30.—Average annual removals of growing-stock trees (at least 5 inches d.b.h.), in million cubic feet, on timberland by species group and ownership group, Minnesota 1999-2003 to 2004-2008

Species group	Ownership group				All owners
	Forest Service	Other Federal	State and local government	Undifferentiated private	
Softwood species groups					
Eastern softwood species groups					
Eastern white and red pines	3.5	--	3.4	6.9	13.7
Jack pine	0.7	1.4	10.2	8.9	21.2
Spruce and balsam fir	2.1	0.0	19.7	12.4	34.3
Other eastern softwoods	0.2	--	3.7	1.2	5.2
All softwoods	6.5	1.4	37.0	29.4	74.3
Hardwood species groups					
Eastern hardwood species groups					
Select white oaks	--	--	1.4	3.9	5.3
Select red oaks	0.2	--	4.8	5.2	10.2
Other red oaks	--	--	0.4	0.4	0.7
Yellow birch	0.8	--	0.2	0.3	1.4
Hard maple	0.1	--	1.9	4.4	6.4
Soft maple	0.1	--	4.9	7.1	12.1
Ash	0.4	--	5.5	6.0	12.0
Cottonwood and aspen	4.6	1.2	74.5	55.1	135.4
Basswood	0.3	--	1.7	5.4	7.3
Black walnut	--	--	0.8	0.1	0.9
Other eastern soft hardwoods	2.7	0.1	13.6	11.0	27.4
Other eastern hard hardwoods	--	--	0.1	--	0.1
All hardwoods	9.3	1.2	109.7	99.0	219.2
All species groups	15.8	2.6	146.8	128.4	293.5

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

Table MN-31.—Aboveground dry weight of live trees (at least 1 inch d.b.h./d.r.c.), in thousand dry short tons, by owner class and forest-land status, Minnesota 2004-2008

Owner class	Unreserved forests			Reserved forests			All forest land
	Timberland	Unproductive	Total	Productive	Unproductive	Total	
Forest Service							
National forest	51,062	670	51,731	13,961	193	14,154	65,886
Other national forest	341	--	341	1,686	--	1,686	2,027
Other Federal							
National Park Service	--	--	--	3,044	14	3,059	3,059
Bureau of Land Management	43	--	43	--	--	--	43
Fish and Wildlife Service	2,631	44	2,676	305	--	305	2,981
Department of Defense or Energy	579	--	579	--	--	--	579
Other Federal	2,905	54	2,959	80	--	80	3,039
State and local government							
State	72,237	1,158	73,395	3,571	--	3,571	76,966
Local (county, municipal, etc.)	77,649	1,094	78,743	1,260	110	1,370	80,113
Other non-Federal lands	178	--	178	--	--	--	178
Private							
Undifferentiated private	220,660	2,568	223,229	--	--	--	223,229
All owners	428,286	5,588	433,874	23,907	317	24,224	458,099

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 MN-32.—Aboveground dry weight of live trees (at least 1 inch d.b.h./d.r.c.), in thousand dry short tons, on forest land by species group and diameter class, Minnesota 2004-2008

Species group	Diameter class (Inches)																All classes	
	1.0- 2.9	3.0- 4.9	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- 22.9	23.0- 24.9	25.0- 26.9	27.0- 28.9	29.0+			
Softwood species groups																		
Eastern softwood species groups																		
Other yellow pines	3	33	18	28	35	27	17	11	--	--	--	--	--	--	--	171		
Eastern white and red pines	167	625	1,676	3,250	3,559	2,996	2,704	2,523	2,419	2,100	1,730	1,243	744	768	1,303	27,810		
Jack pine	122	546	1,092	1,700	2,077	1,748	1,060	474	217	51	--	--	--	--	--	9,087		
Spruce and balsam fir	5,232	10,811	10,955	9,058	5,387	2,649	1,290	916	477	171	141	43	--	40	--	47,170		
Other eastern softwoods	1,565	3,991	6,525	7,596	6,058	4,264	2,914	1,654	994	483	203	149	65	23	--	36,484		
All softwoods	7,088	16,006	20,267	21,633	17,115	11,683	7,986	5,578	4,107	2,805	2,074	1,435	810	831	1,303	120,722		
Hardwood species groups																		
Eastern hardwood species groups																		
Select white oaks	422	1,328	2,016	3,155	3,691	4,634	3,648	3,466	3,184	2,180	1,803	1,565	769	927	1,373	34,160		
Select red oaks	284	478	791	1,687	2,889	3,934	4,376	4,434	3,110	2,070	1,885	1,261	926	380	984	29,488		
Other red oaks	17	49	85	104	208	301	386	363	422	364	274	271	283	52	309	3,487		
Hickory	36	115	176	221	217	206	249	65	18	--	--	--	--	--	--	1,303		
Yellow birch	61	191	112	174	196	100	173	246	238	84	190	75	59	--	25	1,927		
Hard maple	1,001	1,725	2,826	3,727	3,575	3,133	2,254	1,634	1,295	786	840	251	63	118	59	23,288		
Soft maple	1,392	2,247	3,245	3,959	3,485	2,304	1,351	1,000	603	696	341	345	231	410	708	22,317		
Beech	--	--	2	--	--	--	--	--	--	--	--	--	--	--	--	2		
Ash	2,055	4,386	6,008	7,447	6,877	4,985	3,382	2,437	1,371	1,016	729	270	158	226	188	41,535		
Cottonwood and aspen	8,368	12,242	11,795	13,308	14,265	14,115	11,734	7,963	4,349	2,532	989	739	243	235	1,105	103,971		
Basswood	382	929	1,185	2,023	2,538	2,387	2,254	1,820	1,190	987	524	211	145	91	311	16,979		
Black walnut	6	17	66	92	87	139	158	78	167	64	49	--	--	--	--	926		
Other eastern soft hardwoods	2,578	5,743	7,508	10,395	10,227	6,930	3,897	2,469	1,115	558	216	83	148	179	203	52,245		
Other eastern hard hardwoods	12	19	55	35	57	51	40	55	17	25	36	--	46	--	--	447		
Eastern noncommercial hardwoods	2,162	1,517	882	361	171	81	28	24	--	24	--	--	23	25	--	5,297		
All hardwoods	18,767	30,987	36,751	46,688	48,484	43,299	33,930	26,054	17,080	11,388	7,878	5,071	3,093	2,642	5,267	337,377		
All species groups	25,855	46,993	57,017	68,321	65,600	54,982	41,916	31,632	21,187	14,192	9,952	6,506	3,903	3,473	6,570	458,099		

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.

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 MN-54.—Area of forest land, in thousand acres, by inventory unit, county, and forest-land status, Minnesota 2004-2008

Inventory unit and county	Unreserved forests			Reserved forests			All forest land
	Timberland	Unproductive	Total	Productive	Unproductive	Total	
Aspen-Birch							
Carlton	342.1	2.7	344.9	2.9	--	2.9	347.8
Cook	627.8	12.3	640.1	213.0	5.5	218.5	858.6
Koochiching	1,593.9	80.6	1,674.5	7.8	--	7.8	1,682.4
Lake	907.9	45.0	952.9	252.2	11.0	263.2	1,216.2
St. Louis	2,756.8	144.5	2,901.3	302.5	6.8	309.3	3,210.6
Total	6,228.5	285.1	6,513.7	778.5	23.3	801.8	7,315.5
Northern Pine							
Aitkin	782.4	18.4	800.8	2.8	--	2.8	803.6
Becker	331.9	6.1	337.9	2.5	--	2.5	340.4
Beltrami	889.5	24.7	914.3	--	--	--	914.3
Cass	844.7	14.1	858.8	--	--	--	858.8
Clearwater	285.2	3.4	288.6	5.4	--	5.4	294.0
Crow Wing	370.7	3.9	374.6	0.8	--	0.8	375.4
Hubbard	392.1	--	392.1	--	--	--	392.1
Itasca	1,275.8	55.0	1,330.8	--	--	--	1,330.8
Lake of the Woods	455.5	16.4	471.9	--	--	--	471.9
Mahnomen	99.5	--	99.5	--	--	--	99.5
Roseau	291.0	1.6	292.6	--	--	--	292.6
Wadena	128.6	2.8	131.4	--	--	--	131.4
Total	6,147.1	146.2	6,293.3	11.4	--	11.4	6,304.6

(Table MN-55 continued on next page)

(Table MN-54 continued)

Inventory unit and county	Unreserved forests			Reserved forests			All forest land
	Timberland	Unproductive	Total	Productive	Unproductive	Total	
Central Hardwood							
Anoka-Dakota-Ramsey-Washington	127.8	3.9	131.7	12.7	--	12.7	144.4
Benton-Sherburne	111.7	5.2	117.0	--	--	--	117.0
Carver-Hennepin-Scott	74.8	--	74.8	4.5	--	4.5	79.4
Chisago-Isanti	112.2	--	112.2	6.6	--	6.6	118.8
Douglas-Todd	172.6	4.0	176.5	--	--	--	176.5
Fillmore-Olmstead	139.2	4.2	143.3	7.5	--	7.5	150.9
Goodhue	79.1	0.7	79.8	--	--	--	79.8
Houston	129.4	4.6	133.9	2.6	--	2.6	136.5
Kanabec	148.3	--	148.3	--	--	--	148.3
Le Sueur-Rice	65.1	--	65.1	--	--	--	65.1
Mille Lacs	144.0	--	144.0	7.5	--	7.5	151.6
Morrison	206.7	--	206.7	--	--	--	206.7
Otter Tail	209.9	12.8	222.7	2.5	--	2.5	225.1
Pine	494.4	3.5	497.9	14.4	--	14.4	512.3
Stearns	85.3	5.1	90.4	--	--	--	90.4
Wabasha	71.9	6.5	78.4	--	--	--	78.4
Winona	126.6	1.0	127.6	--	--	--	127.6
Wright	45.4	--	45.4	--	--	--	45.4
Total	2,544.4	51.5	2,595.8	58.3	--	58.3	2,654.2
Prairie							
Blue Earth-Faribault	41.2	--	41.2	--	--	--	41.2
Clay-Norman	35.6	2.2	37.8	--	--	--	37.8
Eastern Group	34.6	--	34.6	--	--	--	34.6
Kandiyohi-Meeker	54.8	6.7	61.5	--	--	--	61.5
Kittson	84.6	4.2	88.7	2.2	--	2.2	90.9
Marshall	128.7	4.0	132.7	--	--	--	132.7
Northern Group	38.8	--	38.8	--	--	--	38.8
Pennington-Red Lake	65.4	--	65.4	--	--	--	65.4
Polk	64.8	1.5	66.2	--	--	--	66.2
Southern Group	53.4	--	53.4	--	--	--	53.4
Western Group	87.3	4.3	91.6	--	1.8	1.8	93.4
Total	689.1	22.9	712.0	2.2	1.8	4.0	716.0
All counties	15,609.1	505.7	16,114.8	850.4	25.1	875.5	16,990.3

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.

Anoka-Dakota-Ramsey-Washington = Anoka, Dakota, Ramsey, and Washington counties

Carver-Hennepin-Scott = Carver, Hennepin, and Scott counties

Eastern Group = Dodge, Freeborn, Mower, Steele, and Waseca counties

Northern Group = McLeod, Nicollet, Renville, and Sibley counties

Southern Group = Brown, Cottonwood, Jackson, Martin, Redwood, and Watonwan counties

Western Group = Big Stone, Chippewa, Grant, Lac qui Parle, Lincoln, Lyon, Murray, Nobles, Pipestone, Pope, Rock, Stevens, Swift, Traverse, Wilkin, and Yellow Medicine counties

Table MN-55.—Area of forest land, in thousand acres, by inventory unit, county, ownership group and forest-land status, Minnesota 2004-2008

Inventory unit and county	Forest Service			Other Federal			State and local government			Undifferentiated private			All forest land
	Timber-land	Other forest land		Timber-land	Other forest land		Timber-land	Other forest land		Timber-land	Other forest land		
Aspen-Birch													
Carlton	--	--		3.5	--		124.2	2.9		214.4	2.7	347.8	
Cook	380.6	226.5		24.2	--		110.3	2.3		112.6	2.0	858.6	
Koochiching	--	--		18.1	10.6		1,184.3	67.8		391.5	10.1	1,682.4	
Lake	387.3	257.1		11.9	6.7		297.9	33.6		210.9	10.8	1,216.2	
St. Louis	500.9	231.4		6.7	97.0		1,195.4	93.7		1,053.9	31.8	3,210.6	
Total	1,268.7	715.0		64.3	114.2		2,912.0	200.3		1,983.4	57.4	7,315.5	
Northern Pine													
Aitkin	--	--		10.2	--		483.5	20.3		288.7	0.8	803.6	
Becker	--	--		36.1	--		121.9	2.5		173.9	6.1	340.4	
Beltrami	52.3	--		--	--		434.9	18.6		402.3	6.2	914.3	
Cass	234.9	10.9		6.4	--		359.9	--		243.6	3.2	858.8	
Clearwater	--	--		--	--		112.3	8.7		173.0	--	294.0	
Crow Wing	--	--		--	--		98.1	4.7		272.6	--	375.4	
Hubbard	--	--		--	--		190.5	--		201.6	--	392.1	
Itasca	259.1	4.1		--	--		523.9	22.7		492.8	28.2	1,330.8	
Lake of the Woods	--	--		30.1	1.7		284.2	14.6		141.2	--	471.9	
Mahnomen	--	--		7.2	--		20.3	--		72.1	--	99.5	
Roseau	--	--		--	--		159.9	--		131.1	1.6	292.6	
Wadena	--	--		--	--		29.0	2.8		99.7	--	131.4	
Total	546.3	15.0		90.0	1.7		2,818.4	94.9		2,692.5	46.0	6,304.6	
Central Hardwood													
Anoka-Dakota-Ramsey-Washington	--	--		--	2.9		18.9	9.8		108.9	3.9	144.4	
Benton-Sherburne	--	--		3.3	--		9.2	--		99.2	5.2	117.0	
Carver-Hennepin-Scott	--	--		4.5	--		26.2	4.5		44.1	--	79.4	
Chisago-Isanti	--	--		--	--		5.3	6.6		106.9	--	118.8	
Douglas-Todd	--	--		--	--		16.6	--		155.9	4.0	176.5	
Fillmore-Olmstead	--	--		--	--		11.1	7.5		128.0	4.2	150.9	
Goodhue	--	--		--	--		0.8	--		78.4	0.7	79.8	
Houston	--	--		6.6	2.6		8.1	--		114.7	4.6	136.5	
Kanabec	--	--		--	--		38.7	--		109.6	--	148.3	
Le Sueur-Rice	--	--		--	--		8.5	--		56.6	--	65.1	
Mille Lacs	--	--		--	--		38.7	7.5		105.4	--	151.6	
Morrison	--	--		13.6	--		14.1	--		178.9	--	206.7	
Otter Tail	--	--		--	--		7.9	2.5		201.9	12.8	225.1	

(Table MN-55 continued on next page)

(Table MN-55 continued)

Inventory unit and county	Forest Service			Other Federal			State and local government			Undifferentiated private		
	Timber-land	Other forest land		Timber-land	Other forest land		Timber-land	Other forest land		Timber-land	Other forest land	All forest land
Pine	--	--	--	2.9	--	--	154.5	16.5	--	337.0	1.4	512.3
Stearns	--	--	--	--	--	--	3.6	3.0	--	81.7	2.2	90.4
Wabasha	--	--	--	--	--	--	19.3	--	--	52.6	6.5	78.4
Winona	--	--	--	3.8	--	--	36.5	--	--	86.2	1.0	127.6
Wright	--	--	--	--	--	--	6.3	--	--	39.2	--	45.4
Total	--	--	--	34.7	5.5	5.5	424.3	57.9	--	2,085.3	46.3	2,654.2
Prairie												
Blue Earth-Faribault	--	--	--	--	--	--	2.8	--	--	38.4	--	41.2
Clay-Norman	--	--	--	--	--	--	--	--	--	35.6	2.2	37.8
Eastern Group	--	--	--	--	--	--	--	--	--	34.6	--	34.6
Kandiyohi-Meeker	--	--	--	--	--	--	2.0	--	--	52.8	6.7	61.5
Kittson	--	--	--	--	--	--	28.5	2.2	--	56.1	4.2	90.9
Marshall	--	--	--	4.1	--	--	43.5	--	--	81.1	4.0	132.7
Northern Group	--	--	--	--	--	--	3.0	--	--	35.8	--	38.8
Pennington-Red Lake	--	--	--	--	--	--	7.2	--	--	58.2	--	65.4
Polk	--	--	--	--	--	1.5	12.9	--	--	51.8	--	66.2
Southern Group	--	--	--	--	--	--	2.6	--	--	50.7	--	53.4
Western Group	--	--	--	4.1	--	--	12.3	4.1	--	70.9	2.0	93.4
Total	--	--	--	8.2	1.5	1.5	114.8	6.3	--	566.1	19.1	716.0
All counties	1,815.0	730.0		197.3	123.0	123.0	6,269.5	359.3		7,327.3	168.8	16,990.3

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.

Anoka-Dakota-Ramsey-Washington = Anoka, Dakota, Ramsey, and Washington counties

Carver-Hennepin-Scott = Carver, Hennepin, and Scott counties

Eastern Group = Dodge, Freeborn, Mower, Steele, and Waseca counties

Northern Group = McLeod, Nicollet, Renville, and Sibley counties

Southern Group = Brown, Cottonwood, Jackson, Martin, Redwood, and Watonwan counties

Western Group = Big Stone, Chippewa, Grant, Lac qui Parle, Lincoln, Lyon, Murray, Nobles, Pipestone, Pope, Rock, Stevens, Swift, Traverse, Wilkin, and Yellow Medicine counties

Table MN-56.—Area of forest land, in thousand acres, by inventory unit, county, and forest-type group, Minnesota 2004-2008

Forest Survey Unit and county	White-red-jack pine	Spruce-fir	Other softwoods	Forest type group							Nonstocked	All groups	
				Oak-pine	Oak-hickory	Elm-ash-cottonwood	Maple-beech-birch	Aspen-birch	Other hardwoods				
Aspen-Birch													
Carlton	11.6	45.8	--	0.7	22.7	42.3	40.6	179.3	--	4.9	347.8		
Cook	66.5	227.8	--	18.3	--	19.4	53.2	425.0	32.1	16.3	858.6		
Koochiching	47.0	900.2	--	5.8	7.6	144.3	15.8	520.4	10.5	30.7	1,682.4		
Lake	119.6	420.3	--	14.6	5.5	56.9	103.8	478.8	11.1	5.6	1,216.2		
St. Louis	261.7	947.9	--	55.4	18.7	226.1	148.3	1,465.1	32.5	54.9	3,210.6		
Total	506.4	2,542.1	--	94.8	54.5	489.0	361.7	3,068.6	86.2	112.4	7,315.5		
Northern Pine													
Aitkin	3.7	207.7	--	7.2	94.6	102.6	138.8	225.8	11.3	11.8	803.6		
Becker	14.6	24.6	--	10.9	109.5	10.4	52.7	102.8	6.6	8.4	340.4		
Beltrami	33.6	255.1	--	19.8	66.8	94.1	46.2	375.7	7.7	15.3	914.3		
Cass	90.6	85.7	--	47.3	120.5	48.6	38.4	413.5	1.0	13.3	858.8		
Clearwater	6.5	22.1	--	5.4	43.2	25.0	31.2	150.6	2.0	8.1	294.0		
Crow Wing	20.4	19.2	--	16.6	99.6	26.7	41.2	142.7	3.2	5.8	375.4		
Hubbard	59.4	19.8	--	29.1	69.3	0.7	2.8	199.2	--	11.7	392.1		
Itasca	94.1	296.4	--	15.8	37.2	132.5	96.1	626.0	4.5	28.1	1,330.8		
Lake of the Woods	23.3	253.1	--	2.3	5.2	20.1	--	155.0	2.6	10.3	471.9		
Mahnomen	4.7	0.1	--	--	40.2	9.6	7.6	37.3	--	--	99.5		
Roseau	22.0	50.2	--	--	11.7	17.1	--	186.6	3.5	1.4	292.6		
Wadena	44.8	3.5	--	14.9	27.0	7.3	--	29.4	1.8	2.8	131.4		
Total	417.7	1,237.5	--	169.3	724.8	494.7	455.0	2,644.6	44.1	116.9	6,304.6		

(Table MN-56 continued on next page)

(Table MN-56 continued)

Forest Survey Unit and county	White-red-jack pine	Spruce-fir	Other softwoods	Oak-pine	Oak-hickory	Forest type group					Nonstocked	All groups	
						Elm-ash-cottonwood	Maple-beech-birch	Aspen-birch	Other hardwoods				
Central Hardwood													
Anoka	1.8	1.9	--	--	1.6	20.5	13.6	1.2	13.4	1.2	6.8	62.0	
Benton	3.1	--	1.2	--	--	19.9	2.2	2.1	10.1	--	0.7	39.3	
Carver	--	1.1	--	--	--	10.2	3.1	--	--	--	--	14.4	
Chisago	2.2	3.1	--	--	3.8	37.2	3.3	5.6	1.9	--	--	57.2	
Dakota	2.5	--	--	--	--	11.1	11.5	4.0	--	--	1.4	30.5	
Douglas	--	2.4	--	--	--	22.4	1.3	11.5	10.3	--	--	47.9	
Fillmore	1.4	--	--	--	--	54.0	13.3	24.8	3.6	--	--	97.1	
Goodhue	--	--	3.3	--	4.4	45.6	23.3	3.3	--	--	--	79.8	
Hennepin	--	--	--	--	--	5.1	15.6	13.8	--	2.7	--	37.3	
Houston	1.3	--	2.6	--	--	100.2	20.5	8.1	1.6	1.5	0.8	136.5	
Isanti	4.4	2.8	--	--	--	17.9	21.8	1.1	9.2	--	4.3	61.6	
Kanabec	--	2.9	--	--	--	59.1	22.5	18.2	45.6	--	--	148.3	
Le Sueur	--	--	--	--	--	5.2	16.4	3.7	--	--	--	25.3	
Mille Lacs	--	4.1	--	--	3.0	47.6	45.3	17.6	30.6	2.5	0.8	151.6	
Morrison	8.4	4.8	5.8	--	2.4	77.5	27.6	3.3	68.3	3.3	5.3	206.7	
Olmsted	--	--	--	--	--	37.7	11.4	3.9	--	0.7	--	53.8	
Otter Tail	11.4	1.5	--	--	--	105.0	21.1	40.6	28.9	7.5	9.2	225.1	
Pine	16.2	40.5	2.3	--	10.3	76.6	32.4	69.2	258.5	2.2	4.2	512.3	
Ramsey	--	--	--	--	--	--	--	--	2.0	--	0.7	2.7	
Rice	--	--	--	--	--	18.9	8.3	12.6	--	--	--	39.8	
Scott	--	--	2.9	--	--	8.8	10.8	2.3	--	2.9	--	27.7	
Sherburne	10.5	--	2.2	--	--	43.6	10.2	2.9	8.3	--	--	77.7	
Stearns	--	--	--	--	--	42.0	16.9	16.6	10.3	--	4.5	90.4	
Todd	1.6	2.8	--	--	1.8	73.1	5.9	6.2	28.1	9.1	--	128.7	
Wabasha	2.9	2.1	1.0	--	--	47.5	10.8	8.6	5.7	--	--	78.4	
Washington	2.1	0.7	--	--	3.9	30.3	7.3	--	2.9	--	1.9	49.2	
Winona	2.5	--	--	--	--	85.7	8.4	25.8	2.2	--	3.0	127.6	
Wright	--	--	--	--	2.2	18.8	11.6	11.3	1.6	--	--	45.4	
Total	72.3	70.8	21.4	33.5	1,121.3	396.1	318.2	543.1	33.7	43.7	2,654.2	--	

(Table MN-56 continued on next page)

(Table MN-56 continued)

Forest Survey Unit and county	White-red-jack pine	Spruce-fir	Other softwoods	Oak-pine	Oak-hickory	Forest type group				Aspen-birch	Other hardwoods	Nonstocked	All groups
						Elm-ash-cottonwood	Maple-beech-birch						
Prairie													
Big Stone	--	--	--	--	--	3.7	--	--	--	--	--	--	3.7
Blue Earth	--	--	--	--	--	11.6	12.0	5.1	--	--	1.0	--	29.8
Brown	--	--	--	--	--	3.0	3.7	8.0	--	--	--	--	14.6
Chippewa	--	--	--	--	--	--	3.9	--	--	--	--	--	3.9
Clay	--	--	--	--	--	7.3	7.0	5.4	3.0	--	--	--	22.6
Cottonwood	--	--	--	--	--	--	4.4	--	--	--	--	--	4.4
Dodge	--	--	--	--	--	2.3	3.7	6.6	1.4	--	--	--	13.9
Faribault	--	--	--	--	--	4.8	6.7	--	--	--	--	--	11.5
Freeborn	--	--	--	--	--	3.8	--	--	--	--	--	--	3.8
Grant	4.0	--	--	--	--	0.9	--	--	--	--	--	--	4.8
Jackson	--	--	--	--	--	4.9	2.9	--	--	--	--	--	7.8
Kandiyohi	--	--	--	6.7	32.6	5.8	--	--	--	--	--	--	45.1
													90.9
Lac qui Parle	--	--	--	--	--	--	5.4	--	--	--	3.6	--	8.9
Lincoln	--	--	--	--	--	--	--	2.2	--	--	--	--	2.2
Lyon	--	--	--	--	--	--	4.5	--	--	--	--	--	4.5
													3.4
Marshall	--	3.3	--	--	--	10.6	12.5	--	103.8	--	--	2.5	132.7
Martin	--	--	--	--	--	0.9	4.7	--	--	--	--	--	5.6
Meeker	--	--	--	--	--	11.5	4.9	--	--	--	--	--	16.4
Mower	--	--	--	--	--	--	2.8	--	--	--	--	--	2.8
Murray	--	--	--	--	--	1.8	--	--	--	--	--	--	1.8
Nicollet	--	--	--	--	--	0.7	5.0	4.3	--	--	--	0.7	10.6
Norman	--	--	--	--	--	7.7	4.0	--	3.5	--	--	--	15.2
Pennington	--	--	--	--	--	3.6	2.9	--	26.0	--	--	--	32.5
Polk	--	2.5	--	--	--	34.2	5.7	5.5	18.4	--	--	--	66.2
Pope	2.0	--	--	--	--	13.5	10.6	--	1.2	--	--	--	27.3
Red Lake	--	--	--	--	--	8.6	4.5	--	19.8	--	--	--	32.9
Redwood	--	--	4.0	--	--	4.4	3.6	--	--	--	--	--	12.0
Renville	--	--	--	--	--	1.8	10.3	--	--	--	--	--	12.0
Sibley	--	--	--	--	--	2.7	8.0	2.0	--	--	--	--	12.7
Steele	--	--	--	--	--	1.4	1.5	--	1.4	--	--	0.7	5.1
Stevens	--	--	--	--	--	--	5.7	--	--	--	--	--	5.7
Swift	--	--	--	2.3	--	1.7	12.5	--	--	--	--	--	16.5
													2.2
Waseca	--	--	--	--	--	--	4.0	5.0	--	--	--	--	9.1
Watowan	--	--	--	--	--	3.8	1.1	--	--	--	--	4.0	8.9
Wilkin	--	--	--	--	--	--	3.9	--	--	--	0.8	--	4.6
Yellow Medicine	--	--	--	--	4.2	--	--	--	--	--	3.0	--	7.2
Total	6.0	5.8	6.3	10.9	196.9	177.9	44.2	249.0	174.5	10.4	8.6	281.6	716.0
All counties	1,002.3	3,856.1	27.7	308.5	2,097.5	1,557.7	1,179.0	6,505.3	174.5	174.5	8.6	281.6	16,990.3

All table cells without observations in the inventory sample are indicated by --. Columns and rows may not add to their totals due to rounding.

All table cells without observations in the inventory sample are indicated by --. Columns and rows may not add to their totals due to rounding.

Table MN-57.—Area of timberland, in thousand acres, by inventory unit, county, and stand-size class, Minnesota, 2004-2008

Inventory unit and county	Stand-size class				All size classes
	Large diameter	Medium diameter	Small diameter	Chaparral	Nonstocked
Aspen-Birch					
Carlton	55.6	168.6	113.0	--	4.9
Cook	209.9	200.0	213.9	--	3.9
Koochiching	203.9	526.9	832.4	--	30.7
Lake	237.4	341.5	327.6	--	1.5
St. Louis	528.2	948.6	1,232.4	--	47.6
Total	1,235.0	2,185.6	2,719.3	--	88.6
Northern Pine					
Aitkin	214.0	298.3	258.3	--	11.8
Becker	141.3	123.1	59.2	--	8.4
Beltrami	162.8	348.7	362.7	--	15.3
Cass	281.0	307.2	243.2	--	13.3
Clearwater	82.6	116.5	78.0	--	8.1
Crow Wing	129.1	163.7	72.1	--	5.8
Hubbard	116.0	146.3	118.1	--	11.7
Itasca	311.8	416.6	519.2	--	28.1
Lake of the Woods	45.9	205.4	194.0	--	10.3
Mahnomen	34.7	48.1	16.7	--	--
Roseau	26.1	114.6	148.9	--	1.4
Wadena	29.8	49.0	47.1	--	2.8
Total	1,575.1	2,337.5	2,117.6	--	116.9
Central Hardwood					
Anoka-Dakota-Ramsey-Washington	53.4	46.1	17.4	--	10.9
Benton-Sherburne	71.6	22.7	16.7	--	0.7
Carver-Hennepin-Scott	34.3	25.4	15.1	--	--
Chisago-Isanti	59.3	25.6	23.0	--	4.3
Douglas-Todd	116.3	27.9	28.4	--	--
Fillmore-Olmstead	102.5	26.6	10.1	--	--
Goodhue	52.0	20.4	6.8	--	--
Houston	94.7	24.6	9.2	--	0.8
Kanabec	61.8	57.6	28.9	--	--
Le Sueur-Rice	36.9	15.4	12.8	--	--
Mille Lacs	57.9	66.8	18.6	--	0.8
Morrison	98.4	61.7	41.3	--	5.3
Otter Tail	106.8	50.3	48.9	--	3.8
Pine	159.5	206.8	124.0	--	4.2
Stearns	43.3	27.2	10.3	--	4.5
Total	1,575.1	2,337.5	2,117.6	--	116.9

(Table MN-57 continued on next page)

(Table MN-57 continued)

Inventory unit and county	Stand-size class				All size classes
	Large diameter	Medium diameter	Small diameter	Chaparral	
Wabasha	49.3	15.8	6.8	--	--
Winona	91.3	26.7	5.6	--	3.0
Wright	31.6	6.4	7.4	--	--
Total	1,321.0	753.8	431.1	--	38.4
Prairie					2,544.4
Blue Earth-Faribault	37.4	1.0	2.8	--	--
Clay-Norman	18.1	14.4	3.2	--	--
Eastern Group	22.9	7.8	3.2	--	0.7
Kandiyohi-Meeker	38.5	11.5	4.8	--	--
Kitson	8.9	37.7	37.3	--	0.6
Marshall	13.7	50.8	61.7	--	2.5
Northern Group	24.9	7.6	5.6	--	0.7
Pennington-Red Lake	13.1	29.3	23.0	--	--
Polk	29.9	24.8	10.1	--	--
Southern Group	40.2	7.0	2.2	--	4.0
Western Group	56.4	19.1	11.8	--	--
Total	303.9	211.0	165.7	--	8.6
All counties	4,435.0	5,488.0	5,433.7	--	252.5

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.

Anoka-Dakota-Ramsey-Washington = Anoka, Dakota, Ramsey, and Washington counties

Carver-Hennepin-Scott = Carver, Hennepin, and Scott counties

Eastern Group = Dodge, Freeborn, Mower, Steele, and Waseca counties

Northern Group = McLeod, Nicollet, Renville, and Sibley counties

Southern Group = Brown, Cottonwood, Jackson, Martin, Redwood, and Watonwan counties

Western Group = Big Stone, Chippewa, Grant, Lac qui Parle, Lincoln, Lyon, Murray, Nobles, Pipestone, Pope, Rock, Stevens, Swift, Traverse, Wilkin, and Yellow Medicine counties

Table MN-58.—Area of timberland, in thousand acres, by inventory unit, county, and stocking class, Minnesota 2004-2008

Inventory unit and county	Stocking class of growing-stock trees					All classes
	Nonstocked	Poorly stocked	Moderately stocked	Fully stocked	Overstocked	
Aspen-Birch						
Carlton	7.4	40.6	104.9	155.8	33.4	342.1
Cook	8.1	147.6	193.3	231.6	47.2	627.8
Koochiching	39.4	244.7	520.4	575.3	214.1	1,593.9
Lake	7.9	161.3	359.4	330.8	48.6	907.9
St. Louis	72.9	614.6	972.9	828.1	268.2	2,756.8
Total	135.6	1,208.8	2,150.9	2,121.5	611.6	6,228.5
Northern Pine						
Aitkin	14.3	128.4	283.6	286.0	70.1	782.4
Becker	19.4	81.4	125.8	96.8	8.5	331.9
Beltrami	17.4	110.3	329.0	323.9	108.9	889.5
Cass	24.6	145.9	264.1	305.4	104.8	844.7
Clearwater	12.9	63.9	103.6	94.6	10.2	285.2
Crow Wing	14.9	57.3	133.5	151.4	13.5	370.7
Hubbard	13.9	63.6	120.4	165.5	28.8	392.1
Itasca	41.0	238.2	370.9	463.3	162.3	1,275.8
Lake of the Woods	14.2	95.6	183.9	138.0	23.9	455.5
Mahnomen	3.6	17.5	38.4	33.3	6.7	99.5
Roseau	2.8	42.8	99.2	109.5	36.7	291.0
Wadena	2.8	20.3	49.3	42.0	14.3	128.6
Total	181.7	1,065.2	2,101.5	2,209.8	588.8	6,147.1
Central Hardwood						
Anoka-Dakota-Ramsey-Washington	15.9	41.4	37.6	27.6	5.3	127.8
Benton-Sherburne	3.7	20.9	33.3	46.9	7.0	111.7
Carver-Hennepin-Scott	1.5	32.1	13.4	25.7	2.1	74.8
Chisago-Isanti	5.9	27.8	45.2	30.4	2.8	112.2
Douglas-Todd	1.4	59.3	44.6	61.1	6.1	172.6
Fillmore-Olmstead	9.6	63.8	52.8	13.0	--	139.2
Goodhue	7.5	38.0	25.9	7.7	--	79.1
Houston	5.2	33.5	69.1	17.9	3.6	129.4
Kanabec	1.4	26.5	36.2	77.7	6.4	148.3
Le Sueur-Rice	8.1	22.2	22.9	10.5	1.5	65.1
Mille Lacs	0.8	25.6	42.1	62.1	13.5	144.0
Morrison	10.9	32.4	60.5	98.0	4.8	206.7
Otter Tail	17.5	30.3	91.3	64.9	5.8	209.9
Pine	4.2	89.5	152.9	204.9	42.9	494.4
Stearns	15.2	22.0	34.1	11.3	2.6	85.3

(Table MN-58 continued on next page)

(Table MN-58 continued)

Inventory unit and county	Stocking class of growing-stock trees				
	Nonstocked	Poorly stocked	Moderately stocked	Fully stocked	Overstocked
Wabasha	--	42.1	17.9	11.9	--
Winona	10.1	36.5	57.6	21.7	0.7
Wright	1.1	7.8	23.5	10.9	2.0
Total	120.2	651.6	861.2	804.4	107.0
Prairie					
Blue Earth-Faribault	1.0	12.6	21.2	6.5	--
Clay-Norman	1.4	13.8	12.7	7.7	--
Eastern Group	2.4	14.6	9.5	8.2	--
Kandiyohi-Meeker	0.1	9.9	22.4	21.7	0.7
Kittson	0.8	17.7	30.9	29.5	5.6
Marshall	2.9	22.6	37.1	47.5	18.5
Northern Group	0.7	18.8	7.0	9.8	2.4
Pennington-Red Lake	--	20.8	6.9	33.6	4.1
Polk	4.2	21.0	17.7	21.2	0.7
Southern Group	14.8	23.8	7.8	7.0	--
Western Group	13.6	38.1	20.5	14.8	0.3
Total	41.9	213.6	193.7	207.6	32.4
All counties	479.4	3,139.3	5,307.3	5,343.3	1,339.8

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.

Anoka-Dakota-Ramsey-Washington = Anoka, Dakota, Ramsey, and Washington counties

Carver-Hennepin-Scott = Carver, Hennepin, and Scott counties

Eastern Group = Dodge, Freeborn, Mower, Steele, and Waseca counties

Northern Group = McLeod, Nicollet, Renville, and Sibley counties

Southern Group = Brown, Cottonwood, Jackson, Martin, Redwood, and Watonwan counties

Western Group = Big Stone, Chippewa, Grant, Lac qui Parle, Lincoln, Lyon, Murray, Nobles, Pipestone, Pope, Rock, Stevens, Swift, Traverse, Wilkin, and

Yellow Medicine counties

Table MN-59.—Net volume of growing-stock trees (at least 5 inches d.b.h.), in million cubic feet, and sawtimber trees (International 1/4-inch rule), on timberland by inventory unit, county, and major species group, Minnesota 2004-2008

Inventory unit and county	Growing-stock					Sawtimber				
	Major species group					Major species group				
	Pine	Other softwoods	Soft hardwoods	Hard hardwoods	All species	Pine	Other softwoods	Soft hardwoods	Hard hardwoods	All species
Aspen-Birch										
Carlton	44.7	70.0	230.2	32.6	377.4	206.0	171.3	372.2	58.9	808.5
Cook	56.3	229.8	302.0	56.0	644.1	176.1	750.8	655.7	137.6	1,720.2
Koochiching	63.7	632.4	413.4	15.2	1,124.7	251.2	1,300.4	628.9	42.4	2,222.9
Lake	137.5	336.5	331.3	68.1	873.5	518.9	833.5	696.0	134.3	2,182.7
St. Louis	330.9	749.3	1,007.0	48.0	2,135.2	1,472.7	1,633.3	1,945.6	75.6	5,127.2
Total	633.2	2,017.9	2,283.9	220.0	5,155.0	2,625.0	4,689.2	4,298.4	448.8	12,061.4
Northern Pine										
Aitkin	21.1	136.4	477.8	165.9	801.3	82.0	277.7	1,036.9	487.5	1,884.2
Becker	25.0	25.7	149.5	118.4	318.6	109.4	76.6	334.6	303.1	823.7
Beltrami	62.3	226.5	399.0	77.4	765.2	256.4	484.6	827.9	156.4	1,725.3
Cass	228.3	94.2	490.4	147.5	960.4	1,015.3	187.7	1,152.0	362.0	2,717.0
Clearwater	15.2	30.0	169.1	52.1	266.3	75.1	89.5	365.0	101.3	631.0
Crow Wing	59.3	11.8	214.7	138.9	424.7	228.4	19.8	487.1	391.6	1,126.9
Hubbard	122.5	29.8	202.8	62.9	418.0	504.3	97.8	380.8	122.4	1,105.3
Itasca	244.5	310.9	605.8	65.4	1,226.7	1,097.3	823.2	1,276.0	111.1	3,307.5
Lake of the Woods	34.1	200.2	128.1	2.2	364.6	112.0	371.3	192.9	3.2	679.4
Mahnomen	5.5	2.4	65.4	33.1	106.5	16.7	8.4	130.4	70.8	226.3
Roseau	24.2	35.3	102.9	14.6	177.0	74.5	84.4	156.4	31.0	346.3
Wadena	43.2	1.3	32.4	21.4	98.3	105.5	3.7	44.6	46.7	200.5
Total	885.2	1,104.6	3,037.8	900.0	5,927.5	3,676.9	2,524.7	6,384.5	2,187.1	14,773.3
Central Hardwood										
Anoka-Dakota-Ramsey-Washington	26.2	3.2	38.7	57.1	125.2	89.5	13.1	56.0	220.4	379.1
Benton-Sherburne	33.2	0.6	39.5	66.4	139.6	139.9	--	101.7	236.5	478.1
Carver-Hennepin-Scott	0.9	4.6	38.9	28.8	73.1	3.1	--	92.6	112.4	208.1
Chisago-Isanti	12.4	3.7	50.9	69.0	136.0	51.3	2.4	95.0	287.2	435.9
Douglas-Todd	3.0	5.0	117.6	107.9	233.6	4.7	25.6	336.7	388.3	755.3
Fillmore-Olmstead	2.8	0.8	57.6	57.3	118.5	12.3	1.5	119.5	189.2	322.4
Goodhue	--	2.8	32.7	25.2	60.7	--	7.5	73.8	92.4	173.8
Houston	1.6	3.2	61.0	89.9	155.6	--	11.1	184.9	352.3	548.3
Kanabec	1.4	1.5	113.1	59.5	175.5	4.7	0.7	216.8	190.7	412.9
Le Sueur-Rice	--	0.1	17.0	41.1	58.2	--	--	36.3	154.7	191.0
Millie Lacs	2.8	2.3	111.8	73.5	190.5	13.2	0.6	195.3	210.1	419.2
Morrison	20.9	10.2	125.6	94.0	250.7	87.2	31.0	280.8	353.0	751.9
Otter Tail	5.0	6.7	133.5	102.2	247.4	3.2	21.3	367.6	361.5	753.6

(Table MN-59 continued on next page)

(Table MN-59 continued)

Inventory unit and county	Growing-stock					Sawtimber				
	Major species group				All species	Major species group				All species
	Pine	Other softwoods	Soft hardwoods	Hard hardwoods		Pine	Other softwoods	Soft hardwoods	Hard hardwoods	
Pine	56.0	32.1	385.5	108.6	582.2	230.5	63.1	800.8	324.2	1,418.7
Stearns	--	0.8	40.8	29.8	71.4	--	1.6	104.7	95.9	202.2
Wabasha	5.5	1.2	31.9	24.2	62.9	18.7	--	66.3	85.9	170.9
Winona	5.0	0.1	59.2	70.2	134.5	20.0	--	150.7	241.9	412.6
Wright	--	0.1	34.0	24.2	58.3	--	--	87.2	97.9	185.1
Total	176.6	79.1	1,489.3	1,128.8	2,873.7	678.4	179.5	3,366.8	3,994.4	8,219.1
Prairie										
Blue Earth-Faribault	--	0.5	44.9	14.9	60.4	--	--	164.7	52.8	217.4
Clay-Norman	--	--	13.8	17.7	31.6	--	--	23.1	68.3	91.4
Eastern Group	--	--	28.0	18.6	46.6	--	--	90.5	68.5	158.9
Kandiyohi-Meeker	1.2	1.6	41.4	26.6	70.8	0.9	3.0	129.0	104.2	237.1
Kittson	--	--	35.7	6.4	42.1	--	--	26.7	20.8	47.5
Marshall	--	3.9	52.9	9.9	66.7	--	5.2	66.8	14.8	86.9
Northern Group	--	0.1	27.7	15.8	43.6	--	--	98.0	58.3	156.4
Pennington-Red Lake	--	--	30.0	7.5	37.5	--	--	27.6	21.3	48.9
Polk	--	0.8	20.5	30.8	52.1	--	--	56.8	84.3	141.2
Southern Group	--	4.0	15.6	20.1	39.8	--	6.4	42.2	48.0	96.6
Western Group	5.7	3.2	35.9	33.2	78.0	22.5	15.4	110.7	127.3	275.9
Total	6.9	14.2	346.5	201.4	569.0	23.5	30.0	836.1	668.7	1,558.3
All counties	1,701.8	3,215.7	7,157.5	2,450.3	14,525.3	7,003.8	7,423.4	14,885.8	7,299.0	36,612.1

All table cells without observations in the inventory sample are indicated by --. Table value of 0.0 indicates the volume rounds to less than 0.1 million cubic or board feet. Columns and rows may not add to their totals due to rounding.

Anoka-Dakota-Ramsey-Washington = Anoka, Dakota, Ramsey, and Washington counties

Carver-Hennepin-Scott = Carver, Hennepin, and Scott counties

Eastern Group = Dodge, Freeborn, Mower, Steele, and Waseca counties

Northern Group = McLeod, Nicollet, Renville, and Sibley counties

Southern Group = Brown, Cottonwood, Jackson, Martin, Redwood, and Watonwan counties

Western Group = Big Stone, Chippewa, Grant, Lac qui Parle, Lincoln, Lyon, Murray, Nobles, Pipestone, Pope, Rock, Stevens, Swift, Traverse, Wilkin, and Yellow Medicine counties

Table MN-59a.—Net volume of growing-stock and sawtimber (Doyle rule) on timberland by Forest Survey Unit, county, and major species group, Minnesota 2004-2008

Forest Survey Unit and county	Growing stock					Sawtimber				
	Major species group					Major species group				
	Pine	Other softwoods	Soft hardwoods	Hard hardwoods	All species	Pine	Other softwoods	Soft hardwoods	Hard hardwoods	All species
(In million cubic feet)										
(In million board feet) ¹										
Aspen-Birch										
Carlton	44.7	70.0	230.2	32.6	377.4	132.0	87.0	185.9	31.9	436.8
Cook	56.3	228.5	298.5	53.6	636.9	107.9	430.8	344.2	68.1	951.0
Koochiching	63.7	627.7	413.1	13.8	1,118.3	147.9	620.4	330.1	22.5	1,120.9
Lake	138.6	345.8	336.3	68.1	888.8	335.2	437.0	377.6	73.2	1,223.0
St. Louis	330.9	748.9	1,004.1	46.8	2,130.8	1,032.0	787.2	1,003.5	37.4	2,860.1
Total	634.2	2,020.8	2,282.2	215.0	5,152.2	1,755.2	2,362.3	2,241.2	233.1	6,591.8
Northern Pine										
Aitkin	21.1	136.4	476.7	165.9	800.1	55.4	129.2	556.0	300.4	1,040.9
Becker	26.3	26.4	153.8	118.4	325.0	80.7	41.1	187.5	167.6	476.9
Beltrami	62.3	225.5	399.0	77.4	764.2	169.6	222.6	442.1	81.0	915.2
Cass	228.3	94.2	490.4	147.5	960.4	679.9	94.2	635.3	200.8	1,610.2
Clearwater	15.2	30.0	169.1	52.1	266.3	57.1	45.6	192.4	50.0	345.1
Crow Wing	59.3	11.8	216.1	138.9	426.1	149.8	9.5	259.5	218.6	637.4
Hubbard	122.5	29.8	202.8	62.9	418.0	332.7	54.8	188.1	66.3	642.0
Itasca	244.5	310.9	605.8	65.4	1,226.7	758.2	424.1	696.4	59.7	1,938.5
Lake of the Woods	34.1	200.2	128.1	2.2	364.6	50.4	170.9	99.1	1.5	321.8
Mahnomen	5.5	2.4	65.4	33.1	106.5	10.0	4.2	66.2	39.8	120.1
Roseau	24.2	35.3	102.1	14.6	176.1	33.0	39.3	81.7	17.3	171.3
Wadena	43.2	1.3	32.4	21.4	98.3	53.7	2.0	20.8	26.4	102.8
Total	886.5	1,104.2	3,041.5	900.0	5,932.2	2,430.5	1,237.6	3,424.9	1,229.2	8,322.3
Central Hardwood										
Anoka-Dakota-Ramsey-Washington	26.2	3.2	37.7	57.1	124.2	47.0	6.2	29.4	154.6	237.2
Benton-Sherburne	33.2	0.6	39.5	66.4	139.6	66.5	--	67.5	141.3	275.3
Carver-Hennepin-Scott	0.9	4.6	34.8	25.4	65.6	1.3	--	51.3	77.9	130.4
Chisago-Isanti	12.4	3.7	50.9	69.0	136.0	26.3	0.8	60.9	216.6	304.7
Douglas-Todd	3.0	5.0	117.6	107.9	233.6	2.3	16.2	184.4	239.9	442.8
Fillmore-Olmstead	2.8	0.8	58.9	62.0	124.4	7.3	0.5	74.9	121.3	203.9
Goodhue	--	2.8	32.7	25.2	60.7	--	3.0	45.1	58.9	107.0
Houston	1.6	3.2	61.0	89.9	155.6	--	5.1	131.6	248.1	384.8
Kanabec	1.4	1.5	113.1	59.5	175.5	2.9	0.2	115.4	125.4	243.9
Le Sueur-Rice	--	0.1	17.0	41.1	58.2	--	--	21.7	114.6	136.3
Mille Lacs	2.8	2.3	111.8	73.5	190.5	7.6	0.2	100.1	120.4	228.4
Morrison	20.9	10.2	125.6	94.0	250.7	57.1	13.9	161.4	218.2	450.6
Otter Tail	5.0	6.7	133.5	102.2	247.4	1.1	9.5	199.9	222.4	432.8

(Table MN-59a continued on next page)

(Table MN-59a continued)

Forest Survey Unit and county	Growing stock					Sawtimber				
	Major species group					Major species group				
	Pine	Other softwoods	hardwoods	Soft hardwoods	All species	Pine	Other softwoods	hardwoods	Soft hardwoods	All species
	(In million cubic feet)					(In million board feet) ¹				
Pine	56.0	32.1	385.5	108.6	582.2	147.9	35.0	415.9	187.3	786.1
Stearns	--	0.8	40.8	29.8	71.4	--	0.8	68.9	67.9	137.6
Wabasha	5.5	1.2	31.9	24.2	62.9	8.5	--	38.4	63.1	110.0
Winona	5.0	0.1	59.2	70.2	134.5	10.1	--	125.7	156.4	292.2
Wright	--	0.1	34.0	24.2	58.3	--	--	51.2	85.1	136.3
Total	176.6	79.0	1,485.5	1,130.1	2,871.2	386.0	91.6	1,943.5	2,619.3	5,040.4
Prairie										
Blue Earth-Faribault	--	0.5	44.9	14.9	60.4	--	--	132.9	35.2	168.1
Clay-Norman	--	--	13.8	17.7	31.6	--	--	11.7	42.3	54.0
Eastern Group	--	--	28.0	18.6	46.6	--	--	72.5	43.4	115.9
Kandiyohi-Meeker	1.2	1.6	41.4	26.6	70.8	0.3	1.0	77.3	70.2	148.8
Kittson	--	--	35.7	6.4	42.1	--	--	12.7	12.1	24.8
Marshall	--	3.9	52.9	9.9	66.7	--	2.4	30.3	10.6	43.3
Northern Group	--	0.1	27.7	15.8	43.6	--	--	80.4	37.3	117.7
Pennington-Red Lake	--	--	30.0	7.5	37.5	--	--	15.2	12.6	27.8
Polk	--	0.8	20.5	30.8	52.1	--	--	30.6	44.0	74.5
Southern Group	--	4.0	15.6	20.1	39.8	--	2.8	25.0	24.9	52.7
Western Group	5.7	3.2	35.9	33.2	78.0	14.5	9.4	88.0	80.2	192.2
Total	6.9	14.2	346.5	201.4	569.0	14.9	15.7	576.5	412.8	1,019.9
All counties	1,704.1	3,218.2	7,155.8	2,446.5	14,524.7	4,586.6	3,707.2	8,186.1	4,494.5	20,974.4

All table cells without observations in the inventory sample are indicated by --. Table value of 0.0 indicates the volume rounds to less than 0.1 million cubic or board feet. Columns and rows may not add to their totals due to rounding.

¹ Doyle rule.

Anoka-Dakota-Ramsey-Washington = Anoka, Dakota, Ramsey, and Washington counties

Carver-Hennepin-Scott = Carver, Hennepin, and Scott counties

Eastern Group = Dodge, Freeborn, Mower, Steele, and Waseca counties

Northern Group = McLeod, Nicollet, Renville, and Sibley counties

Southern Group = Brown, Cottonwood, Jackson, Martin, Redwood, and Watonwan counties

Western Group = Big Stone, Chippewa, Grant, Lac qui Parle, Lincoln, Lyon, Murray, Nobles, Pipestone, Pope, Rock, Stevens, Swift, Traverse, Wilkin, and Yellow Medicine counties

Table MN-60.—Average annual net growth of growing-stock trees (at least 5 inches d.b.h.), in million cubic feet, and sawtimber trees (International 1/4-inch rule), in million board feet, on timberland by inventory unit, county, and major species group, Minnesota 1999-2003 to 2004-2008

Inventory unit and county	Growing-stock					Sawtimber				
	Major species group			All species		Major species group			All species	
	Pine	Other softwoods	Hard hardwoods			Pine	Other softwoods	Hard hardwoods		
Aspen-Birch										
Carlton	1.6	0.9	3.8	6.8		8.4	2.3	11.7	2.1	24.5
Cook	5.5	4.8	-4.0	0.8	7.2	20.6	15.1	-5.3	2.2	32.5
Koochiching	3.2	14.1	11.9	0.8	30.0	16.4	33.0	22.1	2.0	73.4
Lake	7.3	8.3	3.9	0.7	20.1	29.1	17.7	14.3	2.7	63.8
St. Louis	12.6	19.8	18.9	1.1	52.3	54.1	58.8	50.8	2.5	166.3
Total	30.2	47.9	34.6	3.8	116.5	128.6	126.9	93.6	11.5	360.6
Northern Pine										
Altken	0.8	1.9	12.7	6.7	22.1	5.0	3.2	34.6	23.7	66.4
Becker	-0.1	0.4	1.4	4.2	5.9	-1.8	0.0	1.2	18.1	17.6
Beltrami	2.8	5.6	8.6	1.9	18.9	10.7	16.8	27.3	3.3	58.1
Cass	7.9	1.9	14.0	4.4	28.2	37.0	6.0	30.3	14.0	87.4
Clearwater	0.3	1.0	4.5	1.0	6.7	1.7	4.5	14.2	2.3	22.7
Crow Wing	4.0	0.3	9.5	5.1	18.8	15.0	0.8	29.7	19.1	64.5
Hubbard	3.0	0.3	8.4	2.3	14.0	16.1	4.2	22.9	4.1	47.4
Itasca	7.9	8.1	12.4	1.7	30.1	40.3	30.2	23.8	3.4	97.7
Lake of the Woods	1.0	3.2	1.7	0.0	5.9	4.0	8.6	1.9	0.0	14.4
Mahnomen	0.5	0.1	1.5	1.3	3.5	1.4	0.8	5.3	4.3	11.8
Roseau	1.0	1.7	2.9	0.8	6.4	4.7	6.3	7.0	1.7	19.7
Wadena	1.6	0.0	2.0	0.7	4.4	1.5	0.2	4.1	2.2	8.0
Total	30.8	24.4	79.6	30.2	165.0	135.7	81.6	202.2	96.1	515.7
Central Hardwood										
Anoka-Dakota-Ramsey-Washington	2.9	0.1	3.2	3.7	9.9	6.2	0.4	8.2	13.9	28.6
Benton-Sherburne	2.2	0.1	2.1	1.9	6.3	12.1	--	5.2	9.8	27.1
Carver-Hennepin-Scott	0.0	0.4	2.0	1.4	3.8	0.3	--	4.9	4.5	9.7
Chisago-Isanti	0.8	0.2	3.6	3.1	7.7	4.9	0.6	8.6	13.3	27.4
Douglas-Todd	0.4	0.1	4.9	2.3	7.7	0.2	0.9	13.8	10.3	25.3
Fillmore-Olmstead	0.1	0.1	2.0	2.0	4.2	0.6	0.1	2.2	7.6	10.5
Goodhue	--	0.1	1.7	0.4	2.3	--	0.5	2.1	1.5	4.1
Houston	0.2	0.1	1.6	3.1	5.1	--	0.1	6.4	15.4	21.8
Kanabec	0.1	0.1	3.8	1.9	5.9	0.5	0.2	8.8	7.9	17.3
Le Sueur-Rice	--	0.0	1.2	1.0	2.2	--	--	2.5	4.0	6.4
Millie Lacs	0.1	0.0	3.2	1.4	4.8	0.8	0.0	7.8	6.4	15.0
Morrison	0.1	-0.5	5.9	3.4	8.9	1.2	-1.3	14.8	17.3	32.1
Otter Tail	0.7	-0.2	7.0	5.3	12.9	0.8	-1.4	26.3	19.7	45.5
Pine	2.8	0.8	9.3	3.0	15.9	13.4	2.3	26.1	11.7	53.5
Stearns	--	0.1	2.4	0.7	3.2	--	0.1	5.4	1.5	7.0

(Table MN-60 continued on next page)

(Table MN-60 continued)

Inventory unit and county	Growing-stock					Sawtimber				
	Major species group			All species		Major species group				All species
	Pine	Other softwoods	Soft hardwoods			Pine	Other softwoods	Soft hardwoods	Hard hardwoods	
Wabasha	0.5	0.2	0.9	0.7	2.4	2.6	-0.2	0.8	2.7	5.9
Winona	0.5	0.0	1.3	1.2	3.0	2.5	--	3.0	4.6	10.1
Wright	--	0.0	2.6	0.6	3.3	--	--	6.4	2.1	8.5
Total	11.7	1.7	58.6	37.4	109.3	46.0	2.2	153.6	154.1	356.0
Prairie										
Blue Earth-Faribault	--	0.1	1.2	0.2	1.5	--	--	3.5	0.3	3.8
Clay-Norman	--	--	1.3	1.2	2.5	--	--	3.3	4.3	7.5
Eastern Group	--	--	1.3	1.5	2.7	--	--	2.3	5.3	7.5
Kandiyohi-Meeker	0.2	0.1	1.8	0.5	2.6	0.2	--	3.6	1.5	5.3
Kittson	--	--	1.9	0.4	2.3	--	--	1.6	0.7	2.3
Marshall	--	0.0	2.4	0.5	2.9	--	0.2	3.8	0.3	4.4
Northern Group	--	0.0	2.4	0.6	3.0	--	--	7.5	3.3	10.8
Pennington-Red Lake	--	--	1.5	0.3	1.9	--	--	2.9	0.9	3.7
Polk	--	0.1	1.1	0.9	2.1	--	--	5.0	4.5	9.5
Southern Group	--	--	0.5	1.0	1.4	--	--	1.5	1.4	2.8
Western Group	0.6	0.0	1.5	1.4	3.6	1.4	0.4	3.7	5.6	11.1
Total	0.8	0.3	17.0	8.4	26.6	1.6	0.7	38.6	27.9	68.7
All counties	73.5	74.2	189.8	79.9	417.4	311.9	211.4	488.0	289.6	1,301.0

All table cells without observations in the inventory sample are indicated by --. Table value of 0.0 indicates the volume rounds to less than 0.1 million cubic or board feet. Columns and rows may not add to their totals due to rounding.

Anoka-Dakota-Ramsey-Washington = Anoka, Dakota, Ramsey, and Washington counties

Carver-Hennepin-Scott = Carver, Hennepin, and Scott counties

Eastern Group = Dodge, Freeborn, Mower, Steele, and Waseca counties

Northern Group = McLeod, Nicollet, Renville, and Sibley counties

Southern Group = Brown, Cottonwood, Jackson, Martin, Redwood, and Watonwan counties

Western Group = Big Stone, Chippewa, Grant, Lac qui Parle, Lincoln, Lyon, Murray, Nobles, Pipestone, Pope, Rock, Stevens, Swift, Traverse, Wilkin, and Yellow Medicine counties

Table MN-60a.—Average annual net growth of growing-stock trees (at least 5 inches d.b.h.), in million cubic feet, and sawtimber trees (Doyle rule), in million board feet, on timberland by inventory unit, county, and major species group, Minnesota 1999-2003 to 2004-2008

Inventory unit and county	Growing-stock					Sawtimber				
	Major species group					Major species group				
	Pine	Other softwoods	Soft hardwoods	Hard hardwoods	All species	Pine	Other softwoods	Soft hardwoods	Hard hardwoods	All species
Aspen-Birch										
Carlton	1.6	0.9	3.8	0.5	6.8	4.2	1.1	5.0	1.0	11.2
Cook	5.5	4.8	-4.0	0.8	7.2	12.5	5.3	-3.1	1.1	15.7
Koochiching	3.2	14.1	11.9	0.8	30.0	9.8	11.0	7.5	1.1	29.4
Lake	7.3	8.3	3.9	0.7	20.1	14.2	5.6	7.2	1.5	28.6
St. Louis	12.6	19.8	18.9	1.1	52.3	33.8	23.8	21.1	1.2	79.9
Total	30.2	47.9	34.6	3.8	116.5	74.6	46.7	37.7	5.8	164.8
Northern Pine										
Altikin	0.8	1.9	12.7	6.7	22.1	2.6	0.1	16.2	13.9	32.8
Becker	-0.1	0.4	1.4	4.2	5.9	-3.2	-0.3	-0.7	9.6	5.4
Beltrami	2.8	5.6	8.6	1.9	18.9	5.5	6.8	12.2	1.0	25.5
Cass	7.9	1.9	14.0	4.4	28.2	18.8	2.4	13.3	7.0	41.6
Clearwater	0.3	1.0	4.5	1.0	6.7	1.2	1.7	6.6	0.8	10.4
Crow Wing	4.0	0.3	9.5	5.1	18.8	9.4	0.4	15.2	9.7	34.8
Hubbard	3.0	0.3	8.4	2.3	14.0	7.8	1.6	10.2	1.7	21.4
Itasca	7.9	8.1	12.4	1.7	30.1	22.4	12.1	11.2	1.6	47.2
Lake of the Woods	1.0	3.2	1.7	0.0	5.9	1.5	3.2	0.5	0.0	5.1
Mahnomen	0.5	0.1	1.5	1.3	3.5	0.6	0.3	2.2	2.1	5.3
Roseau	1.0	1.7	2.9	0.8	6.4	1.8	3.0	2.7	0.8	8.2
Wadena	1.6	0.0	2.0	0.7	4.4	0.4	0.1	1.8	1.0	3.3
Total	30.8	24.4	79.6	30.2	165.0	68.8	31.3	91.5	49.3	240.9
Central Hardwood										
Anoka-Dakota-Ramsey-Washington	2.9	0.1	3.2	3.7	9.9	2.0	0.2	5.5	9.1	16.8
Benton-Sherburne	2.2	0.1	2.1	1.9	6.3	5.9	--	3.6	5.7	15.2
Carver-Hennepin-Scott	0.0	0.4	2.0	1.4	3.8	0.1	--	3.0	3.2	6.3
Chisago-Isanti	0.8	0.2	3.6	3.1	7.7	1.7	0.2	5.6	11.2	18.8
Douglas-Todd	0.4	0.1	4.9	2.3	7.7	0.1	0.5	6.8	6.1	13.5
Fillmore-Olmstead	0.1	0.1	2.0	2.0	4.2	0.4	0.0	0.9	4.5	5.9
Goodhue	--	0.1	1.7	0.4	2.3	--	0.2	0.8	0.9	1.8
Houston	0.2	0.1	1.6	3.1	5.1	--	0.0	3.9	9.5	13.5
Kanabec	0.1	0.1	3.8	1.9	5.9	0.2	0.1	4.1	4.5	8.9
Le Sueur-Rice	--	0.0	1.2	1.0	2.2	--	--	1.3	2.0	3.3
Mille Lacs	0.1	0.0	3.2	1.4	4.8	0.4	0.0	3.6	3.2	7.2
Morrison	0.1	-0.5	5.9	3.4	8.9	0.1	-0.7	8.4	10.0	17.8
Otter Tail	0.7	-0.2	7.0	5.3	12.9	0.3	-1.0	14.3	12.7	26.3
Pine	2.8	0.8	9.3	3.0	15.9	6.4	1.1	10.8	6.2	24.4
Stearns	--	0.1	2.4	0.7	3.2	--	0.0	3.1	1.0	4.2

(Table MN-60a continued on next page)

(Table MN-60a continued)

Inventory unit and county	Growing-stock					Sawtimber				
	Major species group			All species	Pine	Major species group			Pine	All species
	Other	Soft	Hard			Other	Soft	Hard		
	softwoods	hardwoods	hardwoods	species		softwoods	hardwoods	hardwoods		species
Wabasha	0.5	0.2	0.9	2.4	1.1	-0.1	0.2	2.1	3.4	3.4
Winona	0.5	0.0	1.3	3.0	1.2	--	2.1	2.4	5.8	5.8
Wright	--	0.0	2.6	3.3	--	--	2.8	1.4	4.2	4.2
Total	11.7	1.7	58.6	109.3	19.9	0.5	80.8	95.9	197.1	197.1
Prairie										
Blue Earth-Faribault	--	0.1	1.2	1.5	--	--	2.4	-0.2	2.2	2.2
Clay-Norman	--	--	1.3	2.5	--	--	1.6	2.3	3.9	3.9
Eastern Group	--	--	1.3	2.7	--	--	1.8	3.3	5.1	5.1
Kandiyohi-Meeker	0.2	0.1	1.8	2.6	0.1	--	1.6	0.8	2.4	2.4
Kittson	--	--	1.9	2.3	--	--	0.7	0.4	1.1	1.1
Marshall	--	0.0	2.4	2.9	--	0.1	1.5	0.2	1.9	1.9
Northern Group	--	0.0	2.4	3.0	--	--	5.4	2.1	7.4	7.4
Pennington-Red Lake	--	--	1.5	1.9	--	--	1.6	0.5	2.1	2.1
Polk	--	0.1	1.1	2.1	--	--	2.2	2.1	4.3	4.3
Southern Group	--	--	0.5	1.4	--	--	0.7	0.5	1.2	1.2
Western Group	0.6	0.0	1.5	3.6	0.9	0.3	1.5	3.1	5.9	5.9
Total	0.8	0.3	17.0	26.6	1.0	0.4	21.0	15.1	37.5	37.5
All counties	73.5	74.2	189.8	417.4	164.3	78.9	230.9	166.1	640.3	640.3

All table cells without observations in the inventory sample are indicated by --. Table value of 0.0 indicates the volume rounds to less than 0.1 million cubic or board feet. Columns and rows may not add to their totals due to rounding.

Anoka-Dakota-Ramsey-Washington = Anoka, Dakota, Ramsey, and Washington counties

Carver-Hennepin-Scott = Carver, Hennepin, and Scott counties

Eastern Group = Dodge, Freeborn, Mower, Steele, and Waseca counties

Northern Group = McLeod, Nicollet, Renville, and Sibley counties

Southern Group = Brown, Cottonwood, Jackson, Martin, Redwood, and Watonwan counties

Western Group = Big Stone, Chippewa, Grant, Lac qui Parle, Lincoln, Lyon, Murray, Nobles, Pipestone, Pope, Rock, Stevens, Swift, Traverse, Wilkin, and Yellow Medicine counties

Table MN-61.—Average annual removals of growing-stock trees (at least 5 inches d.b.h.), in million cubic feet, and sawtimber trees (International 1/4-inch rule), in million board feet, on timberland by inventory unit, county, and major species group, Minnesota 1999-2003 to 2004-2008

Inventory unit and county	Growing-stock					Sawtimber				
	Major species group				All species	Major species group				All species
	Pine	Other softwoods	Soft hardwoods	Hard hardwoods		Pine	Other softwoods	Soft hardwoods	Hard hardwoods	
Aspen-Birch										
Carlton	0.4	0.0	6.5	0.9	7.8	2.2	--	12.3	--	14.5
Cook	0.3	0.4	1.9	0.0	2.6	0.9	0.1	4.0	--	5.0
Koochiching	0.7	14.8	27.3	0.1	43.0	3.0	19.9	64.3	--	87.2
Lake	0.6	3.4	10.6	2.3	16.8	2.6	4.5	25.4	6.9	39.5
St. Louis	7.1	9.6	36.0	2.3	55.0	31.2	21.0	83.9	3.6	139.7
Total	9.1	28.2	82.3	5.6	125.2	39.9	45.5	190.0	10.5	285.9
Northern Pine										
Aitkin	1.2	1.4	6.9	0.8	10.3	3.1	2.9	20.6	1.5	28.1
Becker	0.4	0.5	4.5	0.8	6.1	0.6	1.7	16.0	2.6	20.9
Beltrami	3.5	0.4	13.9	0.2	18.0	10.4	1.1	43.0	--	54.5
Cass	4.1	1.6	7.5	1.4	14.7	10.3	4.1	19.0	3.9	37.2
Clearwater	1.4	0.4	1.7	1.6	5.1	7.4	1.6	6.0	5.1	20.1
Crow Wing	1.4	0.3	5.7	1.2	8.6	4.3	1.0	18.6	5.0	28.9
Hubbard	4.3	0.1	7.6	0.0	12.1	12.8	0.4	14.4	--	27.5
Itasca	2.5	4.4	19.2	1.4	27.5	7.0	12.0	53.6	2.7	75.3
Lake of the Woods	3.1	1.6	3.6	0.1	8.4	10.5	2.2	2.5	--	15.2
Mahnomen	--	--	0.7	1.1	1.8	--	--	1.4	1.9	3.3
Roseau	1.5	--	3.9	0.0	5.5	5.8	--	4.0	--	9.8
Wadena	1.0	--	0.4	0.1	1.5	2.7	--	1.2	0.2	4.2
Total	24.6	10.6	75.7	8.7	119.6	75.0	27.0	200.2	22.9	325.0
Central Hardwood										
Anoka-Dakota-Ramsey-Washington	--	--	7.0	0.9	7.9	--	--	27.2	2.5	29.7
Benton-Sherburne	--	--	0.0	0.4	0.4	--	--	--	1.3	1.3
Carver-Hennepin-Scott	--	0.0	0.2	0.0	0.3	--	--	0.9	--	0.9
Chisago-Isanti	--	--	2.6	0.5	3.1	--	--	5.0	1.5	6.5
Douglas-Todd	--	--	0.1	0.0	0.2	--	--	0.7	--	0.7
Fillmore-Olmstead	--	--	0.9	1.2	2.1	--	--	2.1	4.7	6.8
Goodhue	--	--	3.2	1.5	4.6	--	--	12.3	6.6	18.9
Houston	--	--	1.1	3.0	4.1	--	--	4.6	14.7	19.3
Kanabec	--	--	0.7	0.2	0.9	--	--	2.7	1.0	3.7
Le Sueur-Rice	--	--	0.0	--	0.0	--	--	--	--	--
Mille Lacs	0.0	0.4	0.5	0.4	1.3	--	0.6	--	1.9	2.5
Morrison	0.8	0.0	--	0.2	1.0	1.2	--	--	--	1.2
Otter Tail	--	--	0.4	--	0.4	--	--	0.8	--	0.8
Pine	0.2	0.2	11.5	1.4	13.3	0.2	0.6	27.9	3.0	31.7
Stearns	--	--	0.2	0.3	0.5	--	--	0.9	0.6	1.5

(Table MN-61 continued on next page)

(Table MN-61 continued)

Inventory unit and county	Growing-stock						Sawtimber					
	Major species group			All species			Major species group			All species		
	Pine	softwoods	hardwoods	hardwoods	hardwoods	hardwoods	Pine	softwoods	hardwoods	hardwoods	hardwoods	species
Wabasha	0.2	--	1.6	0.7	2.5	2.5	--	--	7.2	3.0	10.2	10.2
Winona	--	--	0.0	0.5	0.5	0.5	--	--	--	2.2	2.2	2.2
Total	1.2	0.6	30.1	11.2	43.1	43.1	1.4	1.2	92.1	43.1	137.8	137.8
Prairie												
Blue Earth-Faribault	--	--	0.0	--	0.0	0.0	--	--	--	--	--	--
Clay-Norman	--	--	--	0.0	0.0	0.0	--	--	--	--	--	--
Eastern Group	--	--	0.3	0.2	0.5	0.5	--	--	1.3	0.9	2.3	2.3
Kandiyohi-Meeker	--	--	0.2	0.6	0.8	0.8	--	--	0.6	2.7	3.3	3.3
Kittson	--	--	0.7	0.1	0.7	0.7	--	--	0.2	--	0.2	0.2
Marshall	--	--	1.2	0.0	1.2	1.2	--	--	3.4	--	3.4	3.4
Pennington-Red Lake	--	--	0.1	--	0.1	0.1	--	--	--	--	--	--
Polk	--	--	0.8	1.0	1.8	1.8	--	--	2.6	3.8	6.4	6.4
Western Group	--	--	0.1	0.5	0.5	0.5	--	--	--	1.0	1.0	1.0
Total	--	--	3.3	2.3	5.6	5.6	--	--	8.1	8.4	16.5	16.5
All counties	34.9	39.4	191.4	27.8	293.5	293.5	116.3	73.7	490.3	84.9	765.2	765.2

All table cells without observations in the inventory sample are indicated by --. Table value of 0.0 indicates the volume rounds to less than 0.1 million cubic or board feet. Columns and rows may not add to their totals due to rounding.

Anoka-Dakota-Ramsey-Washington = Anoka, Dakota, Ramsey, and Washington counties

Carver-Hennepin-Scott = Carver, Hennepin, and Scott counties

Eastern Group = Dodge, Freeborn, Mower, Steele, and Waseca counties

Northern Group = McLeod, Nicollet, Renville, and Sibley counties

Southern Group = Brown, Cottonwood, Jackson, Martin, Redwood, and Watonwan counties

Western Group = Big Stone, Chippewa, Grant, Lac qui Parle, Lincoln, Lyon, Murray, Nobles, Pipestone, Pope, Rock, Stevens, Swift, Traverse, Wilkin, and Yellow Medicine counties

Table MN-61a.—Average annual removals of growing-stock trees (at least 5 inches d.b.h.), in million cubic feet, and sawtimber trees (Doyle rule), in million board feet, on timberland by inventory unit, county, and major species group, Minnesota 1999-2003 to 2004-2008

Inventory unit and county	Growing-stock					Sawtimber				
	Major species group				All species	Major species group				All species
	Pine	Other softwoods	Soft hardwoods	Hard hardwoods		Pine	Other softwoods	Soft hardwoods	Hard hardwoods	
Aspen-Birch										
Carlton	0.4	0.0	6.5	0.9	7.8	1.2	--	5.6	--	6.9
Cook	0.3	0.4	1.9	0.0	2.6	0.3	--	2.0	--	2.3
Koochiching	0.7	14.8	27.3	0.1	43.0	1.9	8.5	30.0	--	40.3
Lake	0.6	3.4	10.6	2.3	16.8	1.5	2.0	13.0	4.3	20.9
St. Louis	7.1	9.6	36.0	2.3	55.0	20.1	9.5	40.9	2.1	72.6
Total	9.1	28.2	82.3	5.6	125.2	25.0	20.0	91.5	6.4	142.9
Northern Pine										
Aitkin	1.2	1.4	6.9	0.8	10.3	1.0	0.9	12.6	0.6	15.2
Becker	0.4	0.5	4.5	0.8	6.1	0.2	0.8	8.7	1.6	11.4
Beltrami	3.5	0.4	13.9	0.2	18.0	4.7	0.5	23.4	--	28.5
Cass	4.1	1.6	7.5	1.4	14.7	5.5	1.7	8.5	2.2	17.8
Clearwater	1.4	0.4	1.7	1.6	5.1	6.5	0.9	3.1	2.9	13.3
Crow Wing	1.4	0.3	5.7	1.2	8.6	2.4	0.6	9.1	2.7	14.8
Hubbard	4.3	0.1	7.6	0.0	12.1	5.1	0.1	6.0	--	11.3
Itasca	2.5	4.4	19.2	1.4	27.5	3.7	4.6	29.4	1.2	38.9
Lake of the Woods	3.1	1.6	3.6	0.1	8.4	5.3	0.9	1.0	--	7.1
Mahnomen	--	--	0.7	1.1	1.8	--	--	0.6	0.8	1.5
Roseau	1.5	--	3.9	0.0	5.5	2.6	--	1.6	--	4.3
Wadena	1.0	--	0.4	0.1	1.5	1.2	--	0.6	--	1.8
Total	24.6	10.6	75.7	8.7	119.6	38.1	11.0	104.5	12.0	165.7
Central Hardwood										
Anoka-Dakota-Ramsey-Washington	--	--	7.0	0.9	7.9	--	--	26.8	1.2	28.1
Benton-Sherburne	--	--	0.0	0.4	0.4	--	--	--	0.8	0.8
Carver-Hennepin-Scott	--	0.0	0.2	0.0	0.3	--	--	0.4	--	0.4
Chisago-Isanti	--	--	2.6	0.5	3.1	--	--	2.3	0.8	3.1
Douglas-Todd	--	--	0.1	0.0	0.2	--	--	0.3	--	0.3
Fillmore-Olmstead	--	--	0.9	1.2	2.1	--	--	0.9	3.5	4.4
Goodhue	--	--	3.2	1.5	4.6	--	--	7.7	4.4	12.0
Houston	--	--	1.1	3.0	4.1	--	--	3.0	11.0	14.0
Kanabec	--	--	0.7	0.2	0.9	--	--	1.3	0.5	1.9
Le Sueur-Rice	--	--	0.0	--	0.0	--	--	--	--	--
Mille Lacs	0.0	0.4	0.5	0.4	1.3	--	0.2	--	1.1	1.3
Morrison	0.8	0.0	--	0.2	1.0	0.4	--	--	--	0.4
Otter Tail	--	--	0.4	--	0.4	--	--	0.3	--	0.3
Pine	0.2	0.2	11.5	1.4	13.3	0.1	0.2	13.5	2.1	15.8
Stearns	--	--	0.2	0.3	0.5	--	--	0.4	0.3	0.6

(Table MN-61a continued on next page)

(Table MN-61a continued)

Inventory unit and county	Growing-stock						Sawtimber					
	Major species group			All species			Major species group			All species		
	Pine	softwoods	hardwoods	Soft	Hard	Hardwoods	Pine	softwoods	hardwoods	Soft	Hard	Hardwoods
Wabasha	0.2	--	1.6	0.7	2.5	0.7	--	--	7.4	1.8	9.2	
Winona	--	--	0.0	0.5	0.5	0.5	--	--	--	1.4	1.4	
Total	1.2	0.6	30.1	11.2	43.1	0.5	0.4	64.4	28.8	94.1		
Prairie												
Blue Earth-Faribault	--	--	0.0	--	0.0	--	--	--	--	--	--	--
Clay-Norman	--	--	--	0.0	0.0	--	--	--	--	--	--	--
Eastern Group	--	--	0.3	0.2	0.5	--	--	--	1.1	0.6	1.7	
Kandiyohi-Meeker	--	--	0.2	0.6	0.8	--	--	--	0.3	1.8	2.1	
Kittson	--	--	0.7	0.1	0.7	--	--	--	0.1	--	0.1	
Marshall	--	--	1.2	0.0	1.2	--	--	--	1.4	--	1.4	
Pennington-Red Lake	--	--	0.1	--	0.1	--	--	--	--	--	--	
Polk	--	--	0.8	1.0	1.8	--	--	--	1.0	2.4	3.4	
Western Group	--	--	0.1	0.5	0.5	--	--	--	--	0.6	0.6	
Total	--	--	3.3	2.3	5.6	--	--	--	3.8	5.4	9.2	
All counties	34.9	39.4	191.4	27.8	293.5	63.6	31.4	264.3	52.6	411.9		

All table cells without observations in the inventory sample are indicated by --. Table value of 0.0 indicates the volume rounds to less than 0.1 million cubic or board feet. Columns and rows may not add to their totals due to rounding.

Anoka-Dakota-Ramsey-Washington = Anoka, Dakota, Ramsey, and Washington counties

Carver-Hennepin-Scott = Carver, Hennepin, and Scott counties

Eastern Group = Dodge, Freeborn, Mower, Steele, and Waseca counties

Northern Group = McLeod, Nicollet, Renville, and Sibley counties

Southern Group = Brown, Cottonwood, Jackson, Martin, Redwood, and Watonwan counties

Western Group = Big Stone, Chippewa, Grant, Lac qui Parle, Lincoln, Lyon, Murray, Nobles, Pipestone, Pope, Rock, Stevens, Swift, Traverse, Wilkin, and Yellow Medicine counties

Table MN-65.—Sampling errors, in percent, for net volume, average annual net growth, average annual removals, and average annual mortality on timberland, and forest and timberland area by inventory unit and county, Minnesota 2004-2008

Inventory unit and county	Forest area	Timberland area	Growing stock				Sawtimber			
			Volume	Average annual net growth	Average annual removals	Average annual mortality	Volume	Average annual net growth	Average annual removals	Average annual mortality
Aspen-Birch										
Carlton	3.99	4.14	9.29	25.60	36.11	20.62	13.93	26.04	50.00	36.65
Cook	4.21	4.81	8.04	52.76	38.25	12.82	10.49	43.06	48.81	17.14
Koochiching	1.37	1.60	5.02	13.91	16.27	9.93	8.09	21.85	19.52	17.25
Lake	3.09	3.63	6.14	17.52	24.94	11.97	8.32	18.19	29.34	17.44
St. Louis	1.46	1.61	3.71	8.12	15.16	6.48	5.51	9.45	16.62	10.09
Total	0.62	0.83	2.29	7.00	9.62	4.53	3.46	8.42	11.20	7.08
Northern Pine										
Aitkin	2.23	2.44	5.59	14.64	28.52	11.78	7.87	18.80	35.67	15.90
Becker	3.85	4.14	7.64	27.51	43.92	15.23	9.85	36.03	51.67	20.11
Beltrami	2.99	3.12	6.38	15.29	25.64	11.51	8.84	15.61	29.11	17.55
Cass	3.07	3.13	6.49	10.54	24.09	13.10	9.10	12.17	27.24	15.04
Clearwater	4.56	4.98	9.39	19.25	50.34	20.46	12.57	18.81	56.57	27.64
Crow Wing	4.24	4.39	8.00	15.73	43.22	17.43	10.38	15.42	50.17	21.48
Hubbard	2.88	2.88	8.83	18.75	32.72	17.83	12.91	18.44	32.23	21.53
Itasca	2.21	2.38	5.65	11.43	18.30	9.36	8.08	12.27	21.60	16.85
Lake of the Woods	3.88	3.97	8.21	36.21	38.34	15.74	13.40	32.15	60.67	21.17
Mahnomen	7.77	7.77	11.46	38.36	63.06	31.45	16.91	46.07	48.78	51.58
Roseau	4.75	4.76	11.95	29.19	41.08	21.44	19.04	29.13	67.52	38.85
Wadena	9.01	9.43	16.78	25.98	48.32	37.84	23.74	44.46	55.95	57.97
Total	0.90	0.95	2.18	5.08	9.53	4.44	3.18	5.57	11.56	6.16

(Table MN-65 continued on next page)

(Table MN-65 continued)

Inventory unit and county	Forest area	Timberland area	Growing stock				Sawtimber			
			Volume	Average annual net growth	Average annual removals	Average annual mortality	Volume	Average annual net growth	Average annual removals	Average annual mortality
Central Hardwood										
Anoka-Dakota-Ramsey-Washington	10.17	11.68	17.06	31.40	63.12	31.04	21.23	32.20	69.33	64.76
Benton-Sherburne	9.65	10.22	16.79	25.68	59.87	22.82	18.53	26.87	69.02	31.65
Carver-Hennepin-Scott	12.51	13.63	25.61	32.02	80.84	38.20	34.28	52.15	80.84	46.05
Chisago-Isanti	9.79	9.66	15.26	27.95	66.55	32.71	21.59	36.07	80.25	51.01
Douglas-Todd	7.11	7.25	11.98	13.28	67.02	28.04	13.91	17.10	82.73	50.85
Fillmore-Olmstead	4.78	6.24	12.55	22.22	43.66	18.62	16.81	31.95	56.54	24.12
Goodhue	9.05	9.09	16.60	43.45	53.13	38.73	21.02	93.05	61.53	61.14
Houston	6.71	7.90	14.68	23.96	58.50	23.99	18.70	21.89	61.61	37.44
Kanabec	5.50	5.50	11.40	13.60	68.73	27.15	16.68	17.34	77.98	56.05
Le Sueur-Rice	11.37	11.37	28.54	22.07	100.00	67.95	37.25	33.72	--	100.00
Mille Lacs	5.48	6.45	12.34	34.14	94.19	31.89	18.64	32.62	94.19	40.51
Morrison	6.49	6.49	11.74	15.32	90.33	27.60	14.97	18.66	98.81	36.49
Otter Tail	7.13	7.42	11.64	27.70	49.16	24.29	13.62	27.60	61.64	32.19
Pine	2.92	3.26	7.07	16.78	25.94	15.31	10.56	17.88	28.17	21.25
Stearns	11.82	11.67	21.44	28.07	70.93	29.71	32.15	27.33	68.24	--
Wabasha	9.04	9.91	19.12	39.50	72.40	43.88	26.70	72.99	91.28	53.05
Winona	6.39	6.63	15.32	34.10	100.00	19.40	23.13	32.59	100.00	26.65
Wright	17.68	17.68	36.75	29.46	--	62.73	48.32	41.54	--	76.07
Total	1.71	1.81	3.34	6.47	17.50	6.77	4.55	7.17	21.56	9.82
Prairie										
Blue Earth-Faribault	17.83	17.83	31.50	66.90	97.95	40.64	36.39	93.54	--	43.96
Clay-Norman	16.73	18.42	31.64	39.23	100.00	69.21	43.16	44.23	--	100.00
Eastern Group	16.59	16.59	31.58	88.81	100.00	78.01	42.99	100.00	100.00	83.13
Kandiyohi-Meeker	11.39	14.98	18.85	61.22	100.00	60.14	18.69	53.03	100.00	67.81
Kittson	9.53	11.02	21.37	34.44	93.01	36.73	54.05	36.73	100.00	92.48
Marshall	8.98	9.65	15.36	39.32	61.23	39.56	29.51	44.74	69.80	74.78
Northern Group	22.76	22.76	29.11	74.64	--	75.02	33.06	94.80	--	85.18
Pennington-Red Lake	13.84	13.84	24.57	36.10	100.00	43.03	39.06	67.28	--	68.66
Polk	12.67	12.76	20.74	29.07	66.70	39.06	23.96	26.55	67.38	100.00
Southern Group	15.51	15.51	27.09	32.26	--	48.31	38.90	36.09	--	90.45
Western Group	12.28	12.44	25.62	37.41	100.00	55.38	29.50	45.54	100.00	66.97
Total	4.01	4.24	7.77	16.44	35.84	17.39	10.79	22.33	42.23	27.61
All counties	0.53	0.61	1.41	3.44	6.24	2.84	2.05	3.95	7.61	4.21

Sampling errors that exceed 100% are reported as 100%.

Table MN-66.—Mean crown dieback and other statistics for live trees (at least 5 inches d.b.h.) on forest land by species, Minnesota 2004-2008

Class	Species Group	Species	Plots	Trees	Min	Max	Mean	Standard Error
Hardwood	Ash	black ash	31	165	0	99	7.45	2.03
		green ash	22	98	0	99	4.84	2.18
		white ash	1	1	5	5		
		American basswood	26	114	0	95	3.07	2.09
	Black walnut	black walnut	4	5	0	5		
		balsam poplar	20	100	0	50	5.65	1.25
	Cottonwood and aspen	bigtooth aspen	9	21	0	10	0.71	0.52
		eastern cottonwood	3	16	0	5	0.94	
		quaking aspen	86	673	0	99	3.57	0.72
	Eastern noncommercial hardwoods	American mountain-ash	1	1	0	0		
		apple spp.	1	1	0	0		
		eastern hophornbeam	4	4	0	0		
		mountain maple	1	1	5	5		
	Hard maple	willow spp.	1	2	0	80	40	
		sugar maple	19	199	0	50	2.91	1.1
	Hickory	bitternut hickory	3	8	0	25	4.38	
		rock elm	1	2	5	15	10	
	Other eastern hard hardwoods	American elm	28	51	0	40	2.45	0.87
		black cherry	6	8	0	10		
		black willow	2	9	0	0		
		boxelder	12	61	0	35	4.26	1.41
		butternut	2	4	0	25	13.75	
		hackberry	4	23	0	5	0.87	0.32
		paper birch	63	299	0	99	4.26	0.74
		slippery elm	7	21	0	20	3.81	1
		northern pin oak	4	8	0	20	3.75	
	Other red oaks	northern red oak	29	142	0	60	5.7	1.28
		bur oak	34	194	0	65	4.69	0.9
	Select white oaks	white oak	6	15	0	10		
		red maple	42	191	0	80	3.48	1.06
	Soft maple	silver maple	4	35	0	30	1.43	1.24
		yellow birch	5	11	0	35	5.91	
Softwood	Eastern white and red pines	eastern white pine	6	24	0	20	1.88	1.29
		red pine	9	74	0	5	0.47	0.26
	Jack pine	jack pine	8	57	0	40	3.07	1.13
		eastern redcedar	2	21	0	5	0.48	0.03
	Other eastern softwoods	northern white-cedar	17	278	0	60	6.53	2.55
		tamarack (native)	19	82	0	15	3.29	0.67
		Scotch pine	1	11	0	5	0.91	
	Other yellow pines	balsam fir	44	236	0	80	2.29	1.03
		black spruce	29	221	0	40	3.19	0.7
		white spruce	17	39	0	5	0.77	0.49

Table MN-67.—Mean foliage transparency and other statistics for live trees (at least 5 inches d.b.h.) on forest land by species, Minnesota 2004-2008

Class	Species Group	Species	Plots	Trees	Min	Max	Mean	Standard Error
Hardwood	Ash	black ash	31	165	0	99	23.96	1.8
		green ash	22	98	5	99	22.8	1.39
		white ash	1	1	10	10	10	
	Basswood	American basswood	26	114	0	60	18.6	1.09
		black walnut	4	5	15	25	19	
	Cottonwood and aspen	balsam poplar	20	100	10	70	23	1.73
		bigtooth aspen	9	21	10	35	21.19	2.65
		eastern cottonwood	3	16	15	25	20.94	
		quaking aspen	86	673	0	99	22.12	0.83
	Eastern noncommercial hardwoods	American mountain-ash	1	1	25	25	25	
		apple spp.	1	1	0	0	0	
		eastern hophornbeam	4	4	20	30	22.5	
		mountain maple	1	1	25	25	25	
		willow spp.	1	2	25	30	27.5	
	Hard maple	sugar maple	19	199	0	40	19.12	1.39
	Hickory	bitternut hickory	3	8	15	40	23.13	
		rock elm	1	2	20	25	22.5	
	Other eastern hard hardwoods	American elm	28	51	10	35	20.49	0.8
		black cherry	6	8	15	55	25	
		black willow	2	9	15	30	22.22	
		boxelder	12	61	5	35	19.43	1.66
		butternut	2	4	25	70	48.75	
		hackberry	4	23	0	25	19.57	1.3
		paper birch	63	299	0	99	21.6	0.75
		slippery elm	7	21	15	30	22.62	0.33
	Other red oaks	northern pin oak	4	8	5	25	18.75	
	Select red oaks	northern red oak	29	142	0	40	19.4	0.63
		bur oak	34	194	0	45	20.72	0.61
	Select white oaks	white oak	6	15	15	25	21.67	
		red maple	42	191	0	80	20.05	1.25
	Soft maple	silver maple	4	35	15	30	20.57	0.6
	Yellow birch	yellow birch	5	11	15	30	21.82	
Softwood	Eastern white and red pines	eastern white pine	6	24	0	30	16.88	1.03
		red pine	9	74	0	35	18.45	1.34
		jack pine	8	57	10	60	17.72	1.04
	Other eastern softwoods	eastern redcedar	2	21	0	30	18.57	1.25
		northern white-cedar	17	278	0	60	23	2.28
		tamarack (native)	19	82	0	35	20.73	0.91
	Other yellow pines	Scotch pine	1	11	30	35	32.73	
		balsam fir	44	236	0	55	17.35	1.67
		black spruce	29	221	0	25	14.37	1.36
		white spruce	17	39	0	35	18.21	2.63

Table MN-68.—Distribution of sapling crown vigor class for live saplings (1-4.9 inches d.b.h.) on forest land by species group, Minnesota 2004-2008

Class	Species Group	Species	Plots	Trees	Good	SE	Fair	SE	Poor	SE
Hardwood	Ash	black ash	24	99	88.89	5	8.08	4	3.03	3
		green ash	12	27	92.59	4	7.41	4	0	0
		American basswood	11	36	66.67	16	33.33	16	0	0
		black walnut	1	1	100		0		0	0
		Cottonwood and aspen	12	22	68.18	11	27.27	11	4.55	5
	Cottonwood and aspen	balsam poplar	5	22	59.09	15	40.91	15	0	0
		bigtooth aspen	55	407	65.6	5	31.7	5	2.7	2
	Eastern noncommercial hardwoods	quaking aspen								
		chokecherry	9	14	50		28.57		21.43	
		eastern hophornbeam	12	41	85.37	11	14.63	11	0	0
		mountain maple	7	46	80.43	11	15.22	8	4.35	4
		pin cherry	4	10	70		30		0	0
	Hard maple	serviceberry spp.	1	3	0		100		0	0
		sugar maple	17	41	87.8	7	12.2	7	0	0
		American elm	12	17	76.47		23.53		0	0
		black cherry	5	12	75		16.67		8.33	0
		boxelder	5	5	100		0		0	0
	Other eastern soft hardwoods	hackberry	3	3	100		0		0	0
		paper birch	17	32	75	12	18.75	13	6.25	7
		slippery elm	2	2	100		0		0	0
		northern red oak	6	11	81.82		18.18		0	0
		bur oak	9	13	69.23		30.77		0	0
	Select red oaks	red maple	21	52	80.77	13	17.31	11	1.92	2
		silver maple	1	10	70		30		0	0
		yellow birch	6	13	84.62		15.38		0	0
Softwood	Eastern white and red pines	yellow birch								
		eastern white pine	2	2	100		0		0	0
		red pine	3	9	77.78		22.22		0	0
		jack pine	1	1	0		100		0	0
		Other eastern softwoods	1	1	100		0		0	0
	Jack pine	eastern redcedar	2	13	7.69		69.23		23.08	0
		northern white-cedar	10	34	76.47	14	17.65	11	5.88	4
		tamarack (native)	37	181	71.27	12	22.1	10	6.63	5
		balsam fir	18	106	47.17	14	49.06	14	3.77	3
		black spruce								
	Spruce and balsam fir	white spruce	4	6	100		0		0	0

Table MN-69.—Mean crown density and other statistics for live trees (at least 5 inches d.b.h.) on forest land by species, Minnesota 2004-2008

Class	Species Group	Species	Plots	Trees	Min	Max	Mean	Standard Error
Hardwood	Ash	black ash	31	165	5	90	43	2.83
		green ash	22	98	10	75	48.37	1.71
		white ash	1	1	50	50	50	
	Basswood	American basswood	26	114	5	85	50.26	2.02
		black walnut	4	5	35	70	57	
	Cottonwood and aspen	balsam poplar	20	100	5	70	43.1	2.82
		bigtooth aspen	9	21	30	70	50.71	2.57
		eastern cottonwood	3	16	40	55	46.88	
		quaking aspen	86	673	5	80	47.06	1.11
	Eastern noncommercial hardwoods	American mountain-ash	1	1	40	40	40	
		apple spp.	1	1	35	35	35	
		eastern hophornbeam	4	4	40	60	48.75	
		mountain maple	1	1	35	35	35	
		willow spp.	1	2	5	30	17.5	
		sugar maple	19	199	15	85	51.53	2.07
		bitternut hickory	3	8	25	70	42.5	
		rock elm	1	2	40	70	55	
		Other eastern hard hardwoods	28	51	10	80	46.47	2.13
		American elm	6	8	30	60	43.75	
	Other eastern soft hardwoods	black cherry	2	9	30	65	46.67	
		black willow	12	61	20	65	49.18	2.16
		boxelder	2	4	10	30	18.75	
		butternut	4	23	25	60	39.78	3.29
		hackberry	63	299	5	75	48.08	1.58
		paper birch	7	21	20	70	40.95	2.69
		slippery elm	4	8	40	65	55.63	
		northern pin oak	29	142	20	70	46.55	1.97
		northern red oak	34	194	5	70	44.25	1.51
		bur oak	6	15	30	75	46	
		white oak	42	191	10	75	48.38	1.63
Softwood	Soft maple	red maple	4	35	10	70	50.43	1.31
		silver maple	5	11	20	70	46.82	
	Yellow birch	yellow birch	6	24	30	80	45.63	1.58
		eastern white pine	9	74	20	85	51.28	3.86
	Eastern white and red pines	red pine	8	57	10	75	47.46	3.57
		jack pine	2	21	45	70	58.1	0.8
	Other eastern softwoods	eastern redcedar	17	278	5	80	43.78	2.23
		northern white-cedar	19	82	15	80	42.62	3.73
		tamarack (native)	1	11	20	35	29.55	
	Other yellow pines	Scotch pine	44	236	10	85	51.57	2.85
		balsam fir	29	221	5	80	48.39	1.87
		black spruce	17	39	20	80	52.82	7.61
	Spruce and balsam fir	white spruce						



<http://www.nrs.fs.fed.us/>