

# North Dakota's Forests 2010: Statistics, Methods, and Quality Assurance



# Forest Inventory Methods

## Strategic Model

The Forest Inventory and Analysis program of the Northern Research Station (NRS-FIA) 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 six strategic objectives are achieved, 10 strategic approaches have been prescribed:

- A national set of prescribed core variables with a national field manual
- that prescribes measurement procedures and protocols for each variable
- A nationally consistent plot configuration
- A nationally consistent sampling design
- Estimation using standardized formulas 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 of estimates of prescribed core variables
- Publication of statewide tables of estimates of prescribed core variables at 5-year intervals
- Documentation of the technical aspects of the FIA program including procedures, protocols, and techniques are documented
- Peer review and publication of the technical documentation for general access

The result of the strategic objectives and approaches 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 the detection monitoring by the U.S. Forest Service's Forest Health Monitoring (FHM) program.

## Plot Configuration

The national FIA plot design consists of four 24-foot-radius subplots configured as a central subplot and three peripheral subplots (Fig. 50). Centers of the peripheral subplots are located at distances of 120 ft from the central subplot at azimuths of 360°, 120°, and 240° from the center of the central subplot. Each tree with diameter at breast height (d.b.h.) 5 inches or greater is measured on these subplots. Each subplot contains a 6.8-foot-radius microplot with center located 12 ft east of the subplot center on which each tree with d.b.h. between 1 and 5 inches is measured. 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

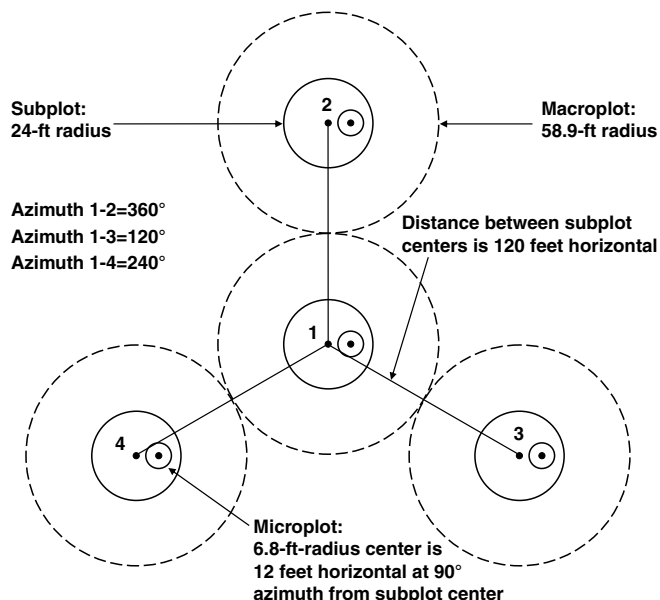


Figure 50.—Current NRS-FIA field-plot design.

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differentiate forest conditions include forest type, stand-size class, stand origin, land use, ownership, and density.

## Sample Design

Historic sampling errors indicate that a sampling intensity of about one plot per 6,000 acres is required to satisfy national FIA precision guidelines. Therefore, FIA divided the area of the United States into nonoverlapping, 5,937-acre hexagons and established a plot in each hexagon as follows: (1) if an existing FHM plot was located in a hexagon, it was selected; (2) if no FHM plot existed in the hexagon, the existing FIA plot from the previous periodic inventory nearest the hexagon center was selected; and (3) if neither an FHM nor FIA plot was located in the hexagon, a new FIA plot was established at a random location in the hexagon (Brand et al. 2000, McRoberts 1999). This array of field plots is designated the Federal base sample and is considered an equal probability sample; its measurement is funded by the Federal government.

The Federal base sample was systematically divided into five interpenetrating, nonoverlapping panels or subsamples, each of which provides complete, systematic coverage of a state. Each year, the plots in a single panel are measured, and panels are selected on a 5-year, rotating basis (McRoberts 1999). For estimation purposes, the measurement of each panel of plots is considered an independent, equal probability sample of all lands in a state.

## Three-phase Inventory

FIA conducts inventories in three phases. Phase 1 (P1) uses remotely sensed data to obtain initial plot land cover observations and to stratify land area in the population of interest to increase the precision of estimates. In Phase 2 (P2), field crews visit the physical locations of permanent field plots to measure traditional inventory variables such as tree species, diameter, and height. In Phase 3 (P3), field crews visit a subset of P2 plots to obtain measurements for an additional suite of variables associated with forest and ecosystem health. The three phases of the enhanced FIA program are discussed in greater detail in the following sections.

### Phase 1

Aerial photographs, digital orthoquads (DOQs: digitally scanned aerial photographs), and satellite imagery are used for initial plot measurement via remotely sensed data and stratification. P1 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 the plot a land cover/use. Lands 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. In addition, 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, idle farmland with trees, and narrow windbreaks. All plot locations that could possibly contain accessible forest land are selected for further measurement during P2.

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 to derive strata. Canopy density

information was obtained from the 2001 National Land Cover Database (NLCD). 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. The method employed to map canopy density for NLCD 2001 is described in detail in Homer et al. (2004) and Huang et al. (2001).

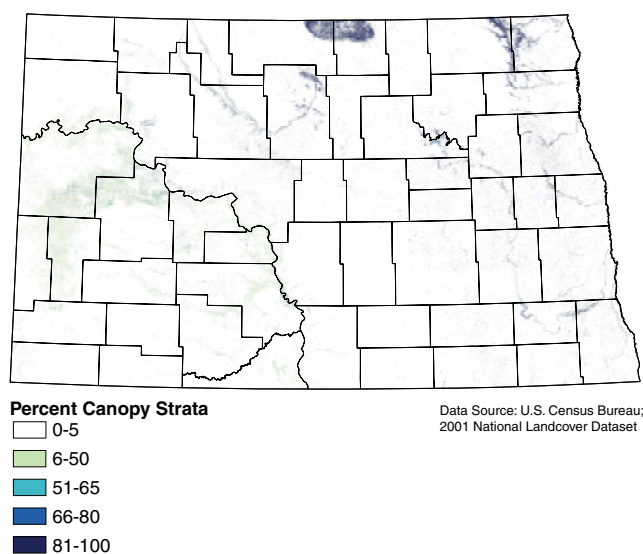
The current strata categorization was optimized for the entire NRS-FIA region. Using plot location information (center of the center subplot), we assigned a percent canopy density value was assigned to each plot. Plots were then aggregated into one of the five strata based on the center of the center subplot. The percent canopy cover stratification scheme consists of five groupings: (1) 0 to 5, (2) 6 to 50, (3) 51 to 65, (4) 66 to 80, and (5) 81 to 100 percent (Fig. 51). These groupings were based on observed natural clumping of pixel values. If there were not enough plots in each of these classes to create strata, then collapsing rules were used to combine classes until sufficient sample sizes were obtained. In addition to classifying of every pixel into one of the five canopy

strata, every pixel was assigned to an ownership stratum. In addition to classifying every pixel into one of the five strata, every pixel is assigned to an ownership stratum based on the Protected Areas Database (PAD) described by DellaSala et al. (2001). In North Dakota, PAD was used to classify pixels into two ownership classes.

Stratified estimation requires two tasks. First, each plot must be assigned to a single stratum. Next, the proportion of each detailed stratum must be calculated (TM land-cover classification, ownership, and county group delineation). The first task is done by assigning each plot to the stratum assigned to the pixel containing the center of the center subplot. The second task is done 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 P1) and the variable's estimated mean per unit area for the stratum (from P2).

## Phase 2

In P2, field crews record a variety of data for plot locations determined in P1 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. Field crews determine the location of the geographic center of the center subplot using geographic positioning system (GPS) receivers. They record subplot-level observations that include land cover, forest type, stand origin, stand age, stand-size class, site productivity class, forest disturbance history, slope, aspect, physiographic class, and ground land use conditions. For each tree, field crews record a variety of observations and measurements including species, live/dead status, lean, diameter, height, crown ratio (percent of tree height represented by crown), crown class (e.g., dominant, co-dominant, suppressed), damage, and decay status. 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 biomass by subplot, by species groups, and by live/dead status.



**Figure 51.**—North Dakota percent canopy strata groupings, 2010.

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## Phase 3

The third phase of the enhanced FIA program focuses on forest health. P3 is administered cooperatively by the FIA program, other Forest Service programs, other Federal agencies, State natural resource agencies, and universities, and it is partially integrated with the FHM program. The FHM program consists of four interrelated and complementary activities: detection monitoring, evaluation monitoring, 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 monitoring studies examine the extent, severity, and probable causes of changes in forest health identified through the detection monitoring surveys. The intensive site ecosystem monitoring program conducts research into regionally specific ecological processes at a network of sites located in representative forested ecosystems. Finally, 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 FHM detection monitoring program was integrated into the FIA program as P3 in 1999. The P3 sample consists of a 1:16 subset of the P2 plots with one P3 plot for approximately every 96,000 acres. P3 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. Because each P3 plot is also a P2 plot, the entire suite of P2 measurements is collected on each P3 plot at the same time as the P3 measurements.

P3 variables were selected to address specific criteria outlined by the Montreal Process working group (Montreal Process 1999) for the conservation and

sustainable management of temperate and boreal forests 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, P2 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 P2 and P3 data of the enhanced FIA program serve as the Nation's environmental report card and are a primary source of reporting data for the Montreal Process Criteria and Indicators (Woodall et al. 2011).

## Estimation

Most of the estimates and analysis presented in this report (including all the estimate tables) are based on data collected on the 7,622 P2 plots across North Dakota. These plots are located within 11 unique strata (Table A) defined by combinations of the five P1 canopy cover classes: (1) 0 to 5, (2) 6 to 50, (3) 51 to 65, (4) 66 to 80, and (5) 81 to 100 percent, a land ownership classification created from the Protected Areas Database, and county groups. Nationally consistent algorithms were used to assign forest type and stand-size class to each condition observed on a plot. For NRS-FIA, panels are measured on an annual basis so that five panel estimates are equivalent to 5-year moving average estimates. Field plot measurements are combined with P1 estimates in the compilation process and table production. Procedures described in Bechtold and Patterson (2005) for stratified estimation with observed stratum areas were used in conjunction with the strata presented in Table A to produce all estimates. Table A shows the total area and number of plots within each stratum.

## Integration with Previous Inventories

In 2010, NRS-FIA completed measurement of the fifth panel of inventory plots in North Dakota. The 2010 panel, along with those surveyed in 2006, 2007,

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2008, and 2009, completed data collection for the fifth inventory of North Dakota's forests. Previous inventories of North Dakota's forest resources were completed in 1956, 1980, 1994 and 2005 (Warner and Chase 1956, Jakes and Smith 1982, Haugen et al. 1999 and Haugen et al. 2009, respectively). Data from new inventories are often 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.

To improve the efficiency and reliability of the inventory, several changes in procedures and definitions have been made since the last North Dakota inventory in 2005 (Haugen et al. 2009). Although these changes will have little impact on statewide estimates of forest area, timber volume, and tree biomass, they may significantly impact plot classification variables such as forest type and stand-size class. Although these changes allow limited comparison of inventory estimates among separate inventories in this report, it is inappropriate to directly compare all portions of the 2006–2010 data with those published for earlier inventories.

For further information about the sample protocols and estimation procedures for the first two phases of the FIA program, please see Bechtold and Patterson (2005). For further information on P3 indicator sampling protocols, please see U.S. Forest Service 2003.

## Quality of the Estimates

The four primary sources of error common to all sample-based estimates are sampling, measurement, prediction, and nonresponse error. For each of these sources of error, a definition within the context of the FIA inventory is provided along with a discussion of methods used to quantify and reduce this error.

### 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 had been observed and included in the estimate. The 2010 FIA inventory of North Dakota is based on a sample of 7,622 plots located randomly across North Dakota (total area of 45.2 million acres), or a sampling rate of about one plot for every 5,936 acres.

The statistical estimation procedures outlined in the previous section and described in detail in Bechtold and Patterson (2005) provide the estimates of the population totals and means presented in this report. Along with every estimate is an associated sampling error that is typically expressed as a percentage of the estimated value but that can also be expressed in the same units as the estimate or as a confidence interval (the estimated value plus or minus the sampling error). This sampling error is the primary measure of the reliability of an estimate. A sampling error can be interpreted to mean that the chances are two out of three that had a 100-percent inventory been taken using these methods, the results would have been within the limits indicated (i.e., 68-percent confidence interval).

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

Estimates for classifications smaller than the State totals in Table B have larger sampling errors. For

example, Table ND-65 shows that the sampling error for timberland area in any county is higher than that for total timberland area in North Dakota. 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

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

The total area of the oak/hickory group in the State (from Table ND-3) is 298,500 acres.

The total area of all forest land in the State (from Table ND-3) is 772,400 acres.

The State total error for forest-land area (from Table B) is 6.09 percent.

Using formula (1):

$$\text{Sampling error} = \frac{(6.09) \sqrt{(772,400)}}{\sqrt{(298,500)}} = 9.97 \text{ percent.}$$

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 Forest Inventory Data Online (FIDO), 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 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, and 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. In addition, 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), then the 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 assurance and quality control 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 intensive 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 are measured independently by a different expert crew. These independent measurements are referred to as blind checks. The purpose of these blind checks is to assess the quality of field measurements. The second measurement on these blind check plots is done by a crew termed the QA crew. In all cases, QA crews have as much or more experience and training in FIA field measurements than standard FIA crews.

The quality of field measurements is assessed nationally through a set of measurement quality objectives (MQOs) that are set for every data item we collect. Each MQO consists of two parts: a tolerance or acceptable level of

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measurement error, and an objective in terms of the percent of measurements within tolerance. The 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 NRS-FIA reports. The columns labeled North Dakota come from blind check measurements of plots used in this report, and the columns labeled All NRS-FIA States come from all measurements made by FIA crews within the entire 24-state area where the Northern Research Station implemented the FIA program over 2006–2010. 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 NRS region.

In addition to the percent compliance to measurement quality objectives, the blind check observations were used to test for relative bias in the field crew measurements. Relative bias is defined here as a tendency for the standard field crew measurements to be higher or lower than those measurements taken by the 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.

The 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 the measurements. These methods have been selected to be the best available and were selected for use nationwide by FIA; they are commonly used by other similar natural resource inventories. A basic assumption is that the methods, when correctly applied, 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 using mathematical models (such as volume models) to provide observations of the attributes of interest based on sample attributes are referred to as prediction errors. Area, number of trees, volume, biomass, growth, removals, and mortality are the primary attributes of interest presented in this report. Area and number of trees estimates are based on direct observation and do not involve the use of prediction models; however, FIA estimates of volume, biomass, growth, removals, and mortality use model-based predictions in the estimation process. Models are used to predict volume and biomass estimates of individual tree volumes. 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.

In comparing FIA estimates to 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, then the prediction bias of one estimate should cancel out that of the other estimate. If the estimates are based on different prediction models, then the user should be aware of the prediction error of both models.

## Nonresponse Error

Nonresponse error refers to the error caused by not being able to observe some of the elements in the sample. In FIA, nonresponse occurs when crews are unable to measure a plot (or a portion of a plot) at a selected location. Nonresponse falls into the following three classes:

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



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

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

Nonresponse has two effects on the sample. First, it reduces the sample size. The reduced sample size is reflected in the sampling errors discussed in that section. Second, nonresponse can bias the estimates if the portion of the population not being sampled differs from the portion being sampled.

In FIA, unlike many survey samples, nonresponse rates are relatively low. In the 2010 North Dakota inventory, a total 7,622 sample plots were selected for observation. All but 20.3 of these plots were included in the sample used to estimate current resources. On 18 plots, crews were unable to obtain owner permission to measure the plot or part of the plot; hazardous conditions on 2.3 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. Nor is permission 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 three ownership classes (Inland Census Water, Public, and Private) and five canopy cover classes 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 from only those 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 class-forest 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 within each stratum is presented in Table E for the North Dakota 2010 inventory.

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, the hazardous conditions may have changed, or other circumstances that caused us to drop plots from a specific inventory cycle will probably be different.

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# Glossary

**Accretion:** The estimated net growth on trees that were measured during the previous inventory (divided by the number of growing seasons between surveys to produce average annual accretion). It does not include growth on trees cut during the period nor those trees that died. This component uses the incremental change in volume between two inventories.

**Average annual mortality of growing stock:** The average annual change in cubic-foot volume of sound wood in growing-stock trees that died over a defined measurement cycle.

**Average annual mortality of sawtimber:** The average annual change in board-foot volume of sound wood in sawtimber trees that died over a defined measurement cycle.

**Average annual net growth of growing stock:** The average annual change in cubic-foot volume of sound wood in live growing-stock trees, and the total volume of trees entering diameter classes greater than 5.0 inches d.b.h., through ingrowth, less volume losses resulting from natural causes. Natural causes include mortality except that due to logging damage, timber stand improvement, or conversion to a nonforest land use.

**Average annual net growth of sawtimber:** The average annual change in the board-foot volume of live sawtimber trees, and the total volume of trees reaching sawtimber size, less volume losses resulting from natural causes. Natural causes include mortality except that due to logging damage, timber stand improvement, or conversion to a nonforest land use.

**Average annual removals from growing stock:** The average cubic-foot volume of wood in live growing-stock trees removed annually for roundwood forest products, in addition to the volume in logging residues or mortality due to logging damage (harvest removals). This component of change also includes the volumes

of growing-stock trees removed due to land use changes (other removals).

**Average annual removals from sawtimber:** The average board-foot volume of wood in live sawtimber trees removed annually for roundwood forest products, in addition to the volume of logging residues or mortality due to logging damage (harvest removals). This component of change also includes the volumes of sawtimber trees removed due to land use changes (other removals).

**Basal area:** The cross-sectional area of a tree stem at breast height, expressed in square feet. When the basal areas of all trees in a stand are summed, the result is usually expressed as square feet of basal area per acre.

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

**Board foot:** A unit of lumber measuring 1-foot long, 1-foot wide, and 1-inch thick, or its equivalent. International ¼-inch rule is used as the U.S. Forest Service standard log rule in the eastern United States.

**Bulk density:** The mass of soil per unit of 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.

**Census water:** Lakes reservoirs, ponds, and similar bodies of water 4.5 acres in size or larger; and rivers or canals more than 200 feet wide (U.S. Census definition).

**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 currently or prospectively suitable for industrial wood products; excludes species of typically small size, poor form, or inferior quality, e.g., hawthorn and sumac.

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**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.

**Condition:** A delineation of a land area based upon land use, forest type, stand size, regeneration status, reserved status, tree density, and owner class.

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

**County and municipal:** A class of public lands owned by counties or local public agencies, or lands leased by these governmental units for more than 50 years.

**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 decrement:** The net volume of rough and rotten cull trees in the previous inventory that are classified as growing-stock trees in the current inventory (divided by the number of growing seasons between inventories to compute average annual cull decrement).

**Cull increment:** The net volume of growing-stock trees in the previous inventory that are classified as rough and rotten cull trees in the current inventory (divided by the number of growing seasons between inventories to compute average annual cull increment).

**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.)

**Diameter at breast height (d.b.h.):** The diameter outside bark of a standing tree measured at 4.5 feet above the ground.

**Diameter at root collar (d.r.c.):** The diameter of a tree measured at the ground line or stem root collar, measured outside of the bark.

**Decay class:** Qualitative assessment of stage of decay (five 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 (4.5 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.

**Dry ton:** A unit of measure of dry weight equivalent to 2,000 pounds or 907.1848 Kg.

**Dry weight:** The weight of wood and bark as it would be if it had been oven dried; usually expressed in pounds or tons.

**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.

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**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) can no longer be identified.

**Effective cation exchange capacity (ECEC):** The sum of cations that a soil can adsorb in its natural pH. 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 industry:** An ownership class of private lands owned by companies or individuals operating wood-using plants.

**Forest land:** Land at least 10 percent stocked by forest 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 forest trees and forest areas adjacent to urban or developed 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. Roadside, streamside, and shelterbelt strips of trees must have a crown width of at least 120 feet to qualify as forest land. 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 and named for a composition of tree species that form a plurality of live-tree stocking. If softwoods predominate (50 percent or more), then the forest type will be one of the softwood types and likewise 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:** A combination of forest types that share closely associated species or site requirements and are generally combined for brevity of reporting.

**North Dakota forest-type groups:** Forest types are a classification of forest land based upon the species forming a plurality of live tree stocking. Forest-type groups are a combination of forest types that share closely associated species or site requirements and are generally combined for brevity of reporting. The following forest type groups are listed in the actual North Dakota data tables for the years 2006-2010. A brief description of each group is listed below giving the top five (if listed) local species found in each group (from high to low). The local name for the forest-type group is also highlighted in bold if different from the official listing.

**Hardwoods:**

***Oak/hickory group bur oak:*** Forests in which bur oak and ash comprises a plurality of the stocking. Found in both upland and lowland areas statewide. The top five local species (based on number of live trees 1" or larger) found in this group included green ash, bur oak, chokecherry, American elm, and quaking aspen.

***Elm/ash/cottonwood group:*** Forests in which elm, ash, or cottonwood, singly or in combination, comprise a plurality of stocking. Found statewide in the bottomlands along rivers and streams with elm/ash also on upland areas. The top five local species making up this forest type included green ash, boxelder, American elm, plains cottonwood, and chokecherry.

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*Aspen/birch group aspen:* Forests in which quaking aspen, paper birch, and river birch, singly or in combination, comprise a plurality of stocking. Can be found statewide but is mostly in the northern regions of the State. The top five local species making up this forest type included quaking aspen, green ash, bur oak, chokecherry and boxelder.

*Other hardwoods group:* Hardwood forests that do not have a single species usually forming a plurality. These can be found statewide in both lowland and upland areas. The top five local species included green ash, American plum, chokecherry, serviceberry spp., and American elm.

*Exotic hardwoods group:* A mixture of nonnative and native species found in the southeast part of the State in mostly upland areas. The four local species included Siberian elm, green ash, American elm, and eastern redcedar.

**Softwoods:**

*Spruce/fir group spruce:* A softwood forest type in which spruce (nonnative) comprises a plurality of the stocking. Found in the northeast part of the State. The two local species included white spruce (Black Hills spruce) and boxelder.

*Pinyon/juniper group Rocky Mountain juniper:* Forest in which Rocky Mountain juniper comprises a plurality of the stocking. Found in the Badland areas of western North Dakota. The two local species included Rocky Mountain juniper and green ash.

*Ponderosa pine group:* Forests in which Ponderosa pine comprises a plurality of the stocking or is found with Rocky Mountain juniper. Ponderosa occurs in the southwestern part of the State. The two local species included Rocky Mountain juniper and ponderosa pine.

**Gross growth:** The sum of accretion and ingrowth.

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

**Growing-stock volume:** Net or gross volume in cubic feet of growing-stock trees 5.0 inches and larger d.b.h. measured from the 1-foot stump to a minimum 4.0-inch top diameter outside bark on the central stem, or to the point where the central stem splits into limbs. Net volume equals gross volume minus deduction for cull defects.

**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.

**Ingrowth:** The estimated net volume of trees that became 5.0 inches and larger d.b.h. during the period between inventories (divided by the number of growing seasons between surveys to produce average annual ingrowth). Also, the estimated net volume of trees 5.0 inches and larger d.b.h. that are growing on land that was reclassified from noncommercial forest land or nonforest land to timberland.

**Introduction:** The intentional or unintentional escape, release, dissemination, or placement of a species into an ecosystem as a result of human activity. “Introduced” is not synonymous and should not be confused with the term “invasive” (USDA definition).

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**Invasive species:** Those species whose introduction does, or is likely to, cause economic or environmental harm or harm to human health. For the purpose of this policy only, a plant species is considered “invasive” only when it occurs on the Federal or state-specific noxious weed list or a list developed by the state-specific Department of Agriculture with their partners and approved by the State Technical Committee, which prohibits or cautions its use due to invasive qualities (USDA definition).

**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.

**Land use:** A classification of land that indicates the primary use at the time of the inventory. Major categories are forest land and nonforest land.

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

**Live aboveground 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.

*Saplings:* Total aboveground biomass of a tree from 1.0 to 4.9 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.

**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.

**Logging residues:** The unused portions of growing-stock and nongrowing-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 cubic-foot volume:** 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.

**Net board-foot volume:** The gross volume in board feet less the deductions for rot, roughness, and poor form. Volume is computed from the 1-foot stump to a minimum 7.0-inch diameter outside bark for softwoods and a minimum 9.0-inch outside bark for hardwoods on the central stem. This estimate includes all softwoods 9.0 inches d.b.h. and larger, and all hardwoods 11.0 inches d.b.h. and larger.

**Noncensus water:** Streams/ivers 120 to 200 feet wide and bodies of water 1 to 4.5 acres in size, where the U.S. Bureau of the Census (1990) classifies such water as land.

**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.

**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

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width, and 1- to 4.5-acre areas of water classified by the U.S. 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.)

**Nonindustrial private:** An ownership class of private lands where the owner does not operate wood-using plants.

**Nonnative species:** Within a particular ecosystem, any species; including its seeds, eggs, spores, or other biological material capable of propagating that species; that is not native to that ecosystem (USDA definition).

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

**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.

**Owner class:** A classification of land into categories of ownership.

*Forest industry:* Land owned by private companies which operate primary wood-using mills.

*Nonindustrial private:* Land owned by other corporate, individuals, or trusts (NGOs) and on which are no operate primary wood-using mills.

*Other corporate:* Land owned by timber investment or real estate companies.

*Public:* Land owned by Federal, State, county, or municipal government.

**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:

*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 and bottomlands 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 paper.

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**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. Examples include national forest wilderness areas, national parks, and national monuments.

**Residues:** Bark and woody materials that are generated in primary wood-using mills when roundwood products are converted to other products. Examples are 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. Roundwood products include sawlogs, veneer, cooperage logs, bolts, pulpwood logs, fuelwood, pilings, poles posts, ties, mine timbers, and various other round or split products.

**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 diameter outside bark (d.o.b.).

**Sawtimber volume:** Net or gross volume in board-foot (International ¼-inch rule) or cubic-foot of the sawlog portion of live sawtimber trees measured from the 1-foot stump to a minimum 7.0-inches top diameter outside bark (for softwoods) or 9.0 inches top diameter outside bark (for hardwoods), on the central stem, or to the point where the central stem splits into smaller limbs. Net volume equals gross volume minus deduction for rough and rotten cull.

**Seedling:** Live tree smaller than 1.0 inch d.b.h./d.r.c. and at least 6.0 inches in height for softwoods and 12.0 inches in height for hardwoods.

**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.



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**Sound dead:** The net volume in salvable dead trees.

**Species group:** A combination of tree species that share closely associated understory plants or site requirements are combined into species groups.

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

**Standing dead tree:** A standing dead tree must be at least 5 inches d.b.h. and larger; is at least 4.5 feet in height; and has a lean of less than 45 degrees from the vertical. A snag should be self-supported or supported by another tree.

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

*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.

*Sapling-seedling:* 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.

**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.

**Stocking class:** At the tree level, stocking is the density expressed as a percent of total tree density required to fully utilize the growth potential of the land. At the stand level it is expressed as the sum of the stocking values of all trees sampled. The classes include:

*Overstocked:* Forest stand with stocking  $\geq 100$  percent.

*Fully stocked:* Forest stand that contains 60-99 percent of full stocking.

*Moderately stocked:* Forest stand that contains 35-59 percent of full stocking.

*Poorly stocked:* Forest stand that contains only 10-34 percent of full stocking.

*Nonstocked:* Forest stand with less than 10 percent of full stocking.

**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.

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**Tree:** A woody plant usually having one or more erect perennial stems, a stem diameter at breast height of at least 3 inches, a more or less definitely formed crown of foliage, and a height of at least 15 feet at maturity.

**Tree class:** A classification of tree quality or condition of the tree for saw log production. Tree class for sawtimber-size trees are based on current conditions. Tree class for poletimber-size trees is based on the prospected determination or forecast of the potential tree quality when the tree reaches sawtimber size.

**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.

**Total live tree biomass:** The total mass of live trees and associated saplings expressed in pounds or tons (dry weight) per unit area. The total tree and sapling biomass (excluding foliage) has five 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 splits into smaller limbs. This includes protruding twigs from the central stem.

***Tops and limbs:*** Total biomass of a tree from the 12-inch stump minus the bole. This does not include any twigs protruding from the central stem below the 4-inch top.

***Sapling trees:*** Total biomass of a tree from 1 to 4.9 inches diameter measured at the root collar d.b.h. or d.r.c.

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

***Belowground:*** Total biomass of the belowground portion of the stump and the coarse roots of all trees and saplings.

**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. 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 (approximately 12 percent moisture content).

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\*All tables contain forest attribute estimates for North Dakota for measurements taken from 2006 to 2010, except where indicated.

\*\*Gaps in enumeration of tables are placeholders for future tables such as forest health indicator population estimates (e.g., downed woody material).

**Table A.— Area and number of plots in each stratum used for stratification and estimation, North Dakota, 2010**

| Unit code | Estimation unit description <sup>a</sup> | Canopy cover stratum <sup>b</sup> | Acres      | Selected <sup>c</sup> | Office selected <sup>d</sup> | Field selected <sup>e</sup> | Field sampled <sup>f</sup> | Total plots sampled for change <sup>h</sup> | Field sampled for change <sup>g</sup> | Not measured <sup>i</sup> |
|-----------|--|-----------------------------------|------------|-----------------------|------------------------------|-----------------------------|----------------------------|---|---------------------------------------|---------------------------|
| 1         | Public Unit 1                            | Canopy cover 0 - 5                | 1,485,000  | 261                   | 252                          | 9                           | 9                          | 261   | 9                                     | 0                         |
| 1         | Dakota Prairie NGL                       | Canopy cover 6 - 100              | 159,000    | 20                    | 11                           | 9                           | 9                          | 20  | 9                                     | 0                         |
| 1         | Public Unit 1                            | Canopy cover 51 - 100             | 62,000     | 10                    | 1                            | 9                           | 9                          | 10  | 9                                     | 0                         |
| 1         | Public Unit 1                            | Canopy cover 6 - 50               | 103,000    | 18                    | 10                           | 8                           | 7                          | 17  | 7                                     | 1                         |
| 1         | Private Unit 1                           | Canopy cover 0 - 5                | 40,192,000 | 6,765                 | 6,688                        | 77                          | 72                         | 6,757                                       | 69                                    | 5                         |
| 1         | Private Unit 1                           | Canopy cover 51 - 65              | 156,000    | 26                    | 10                           | 16                          | 13                         | 23  | 13                                    | 3                         |
| 1         | Inland Census Water Unit 1               | Canopy cover 0 - 100              | 1,103,000  | 175                   | 166                          | 9                           | 6                          | 175   | 9                                     | 2                         |
| 1         | Private Unit 1                           | Canopy cover 6 - 50               | 716,000    | 127                   | 75                           | 52                          | 37                         | 118   | 43                                    | 6                         |
| 1         | Private Unit 1                           | Canopy cover 66 - 80              | 118,000    | 20                    | 5                            | 15                          | 14                         | 18  | 13                                    | 1                         |
| 1         | Dakota Prairie NGL                       | Canopy cover 0 - 5                | 944,000    | 157                   | 148                          | 9                           | 8                          | 157   | 9                                     | 0                         |
| 1         | Private Unit 1                           | Canopy cover 81 - 100             | 209,000    | 43                    | 3                            | 40                          | 38                         | 40  | 37                                    | 2                         |

<sup>a</sup>Description of the sub-population undergoing post-stratification. County groups are defined by one or more contiguous counties used for population estimation.

<sup>b</sup>A stratum within each estimation unit defined by partitioning the full range of percent canopy (0 - 100%) into 5 strata.

<sup>c</sup>Total plots selected to be sampled.

<sup>d</sup>Plots determined to have no chance of being forested during a prefield interpretation procedure. These plots are withheld from field sampling and considered remotely sampled.

<sup>e</sup>Plots determined to have some chance of being forested or that were forested or nonsampled on a previous visit.

<sup>f</sup>Field selected plots that were successfully sampled in the field.

<sup>g</sup>Field selected plots that were successfully sampled in the field and found to intersect forest land.

<sup>h</sup>Plots in the sample that were successfully sampled in the previous cycle.

<sup>i</sup>Plots in the sample that were successfully sampled in the previous cycle and that were sent to the field for sampling.

<sup>j</sup>Plots selected as part of the sample, but completely nonsampled.

**Table B.—State-level estimates of major forest resource attributes and their sampling errors, North Dakota, 2010**

| <b>Item</b>                                    | <b>State total</b>                    | <b>Sampling error</b> |
|--|---------------------------------------|-----------------------|
| Growing stock on timberland                    | <i>million cubic feet</i>             | <i>percent</i>        |
| Volume   | 341.2                                 | 16.68                 |
| Average annual net growth                      | 6.8                                   | 38.25                 |
| Average annual removals                        | 2.6                                   | 60.52                 |
| Average annual mortality                       | 6.5                                   | 34.19                 |
| Sawtimber:                                     | <i>million board feet<sup>a</sup></i> |                       |
| Volume   | 1,183.0                               | 22.61                 |
| Average annual net growth                      | 29.6                                  | 38.03                 |
| Average annual removals                        | 7.5                                   | 68.25                 |
| Average annual mortality                       | 17.4                                  | 57.35                 |
| Area:  | <i>acres</i>                          |                       |
| Forest land                                    | 772,427.0                             | 6.09                  |
| Timberland                                     | 533,842.0                             | 7.80                  |
| Biomass (Aboveground live trees and saplings): | <i>short dry tons</i>                 |                       |
| Forest land                                    | 18,361,063.0                          | 8.33                  |
| Timberland                                     | 14,813,190.0                          | 10.35                 |

<sup>a</sup>International ¼-inch rule.

All results for forest land except where indicated.



**Table C.—Compliance to measurement quality objectives (MQO) tolerances of variables based on blind check plots, North Dakota, 2010**

| Variable                    | Tolerance      | Objective (%) | North Dakota               |              | All NRS States             |              |
|-----------------------------|----------------|---------------|----------------------------|--------------|----------------------------|--------------|
|                             |                |               | % of data within tolerance | Observations | % of data within tolerance | Observations |
| <b>Plot Level</b>           |                |               |                            |              |                            |              |
| National Variables          |                |               |                            |              |                            |              |
| Distance to Road            | No Tolerance   | 90.0          | 73.7                       | 19           | 82.3                       | 2,010        |
| Water on Plot               | No Tolerance   | 90.0          | 89.5                       | 19           | 85.7                       | 2,010        |
| Regional Variables          |                |               |                            |              |                            |              |
| Elevation                   | ±50 feet       | 99.0          | 89.5                       | 19           | 88.0                       | 1,886        |
| Latitude - decimal degrees  | ±0.0001 degree | 99.0          | 100.0                      | 19           | 100.0                      | 1,888        |
| Longitude - decimal degrees | ±0.0001 degree | 99.0          | 94.7                       | 19           | 89.1                       | 1,888        |
| Latitude - distance         | ±140 feet      | .             | .                          | .            | .                          | .            |
| Longitude - distance        | ±140 feet      | .             | .                          | .            | .                          | .            |
| Number of plots             |                |               |                            | 20           |                            | 2,114        |
| <b>Condition Level</b>      |                |               |                            |              |                            |              |
| National Variables          |                |               |                            |              |                            |              |
| Condition Status            | No Tolerance   | 99.0          | 98.8                       | 163          | 98.9                       | 4,732        |
| Reserve Status              | No Tolerance   | 99.0          | 100.0                      | 163          | 99.7                       | 4,732        |
| Owner Group                 | No Tolerance   | 99.0          | 95.5                       | 22           | 97.8                       | 2,348        |
| Forest Type (Type)          | No Tolerance   | 95.0          | 77.3                       | 22           | 86.4                       | 2,348        |
| Forest Type (Group)         | No Tolerance   | 99.0          | 90.9                       | 22           | 92.5                       | 2,348        |
| Stand Size                  | No Tolerance   | 99.0          | 72.7                       | 22           | 89.4                       | 2,348        |
| Regeneration Status         | No Tolerance   | 99.0          | 100.0                      | 22           | 98.0                       | 2,348        |
| Tree Density                | No Tolerance   | 99.0          | 86.4                       | 22           | 96.8                       | 2,348        |
| Owner Class                 | No Tolerance   | 99.0          | 77.3                       | 22           | 94.3                       | 2,348        |
| Owner Status                | No Tolerance   | 99.0          | 100.0                      | 22           | 97.4                       | 2,348        |
| Regeneration Species        | No Tolerance   | 99.0          | 100.0                      | 22           | 98.1                       | 2,348        |
| Stand Age                   | ±10 percent    | 95.0          | 81.8                       | 22           | 82.9                       | 2,348        |
| Disturbance 1               | No Tolerance   | 99.0          | 85.7                       | 21           | 87.7                       | 2,313        |
| Disturbance Year 1          | ±1 year        | 99.0          | 100.0                      | 6            | 83.2                       | 119          |
| Disturbance 2               | No Tolerance   | 99.0          | 100.0                      | 9            | 87.1                       | 379          |
| Disturbance Year 2          | ±1 year        | 99.0          | 100.0                      | 1            | 72.7                       | 11           |
| Disturbance 3               | No Tolerance   | 99.0          | 100.0                      | 1            | 98.2                       | 56           |

(Table C continued on next page)

(Table C continued)

| Variable                   | North Dakota |               |                            | All NRS States |                            |              |
|----------------------------|--------------|---------------|----------------------------|----------------|----------------------------|--------------|
|                            | Tolerance    | Objective (%) | % of data within tolerance | Observations   | % of data within tolerance | Observations |
| Disturbance Year 3         | ±1 year      | 99.0          | .                          | .              | 50.0                       | 2            |
| Treatment 1                | No Tolerance | 99.0          | 100.0                      | 21             | 97.4                       | 2,313        |
| Treatment Year 1           | ±1 year      | 99.0          | .                          | .              | 94.2                       | 156          |
| Treatment 2                | No Tolerance | 99.0          | .                          | .              | 80.2                       | 212          |
| Treatment Year 2           | ±1 year      | 99.0          | .                          | .              | 95.8                       | 24           |
| Treatment 3                | No Tolerance | 99.0          | .                          | .              | 93.7                       | 63           |
| Treatment Year 3           | ±1 year      | 99.0          | .                          | .              | 66.7                       | 3            |
| Physiographic Class        | No Tolerance | 80.0          | 81.8                       | 22             | 81.3                       | 2,348        |
| Present Nonforest Use      | No Tolerance | 99.0          | 73.0                       | 163            | 88.0                       | 4,732        |
| Regional Variables         |              |               |                            |                |                            |              |
| NC Land Use                | No Tolerance | 99.0          | 91.9                       | 123            | 97.5                       | 3,660        |
| Number of conditions       |              |               |                            | 163            |                            | 4,732        |
| <b>Boundary Level</b>      |              |               |                            |                |                            |              |
| National Variables         |              |               |                            |                |                            |              |
| Boundary Change            | No Tolerance | 99.0          | 80.0                       | 5              | 80.3                       | 701          |
| Constraining Condition     | No Tolerance | 99.0          | 80.0                       | 5              | 94.0                       | 701          |
| Left Azimuth               | ±10 degrees  | 90.0          | 100.0                      | 5              | 85.7                       | 701          |
| Corner Mapped              | No Tolerance | 90.0          | 100.0                      | 5              | 96.7                       | 701          |
| Corner Azimuth             | ±10 degrees  | 90.0          | 100.0                      | 1              | 95.1                       | 61           |
| Corner Distance            | ±1 foot      | 90.0          | 100.0                      | 1              | 90.2                       | 61           |
| Right Azimuth              | ±10 degrees  | 90.0          | 100.0                      | 5              | 86.4                       | 701          |
| Number of boundaries       |              |               |                            | 5              |                            | 701          |
| <b>Subplot Level</b>       |              |               |                            |                |                            |              |
| National Variables         |              |               |                            |                |                            |              |
| Subplot Center Condition   | No Tolerance | 99.0          | 96.1                       | 76             | 97.9                       | 8,235        |
| Microplot Center Condition | No Tolerance | 99.0          | 96.1                       | 76             | 97.6                       | 8,235        |
| Slope                      | ±10 percent  | 90.0          | 96.7                       | 60             | 98.3                       | 7,243        |
| Aspect                     | ±10 degrees  | 90.0          | 100.0                      | 59             | 91.6                       | 6,957        |
| Snow/Water Depth           | ±0.5 foot    |               | 97.1                       | 69             | 68.8                       | 7,703        |
| Number of subplots         |              |               |                            | 76             |                            | 8,235        |

(Table C continued)

| Variable                     | Tolerance               | Objective (%) | North Dakota               |              | All NRS States             |              |
|------------------------------|-------------------------|---------------|----------------------------|--------------|----------------------------|--------------|
|                              |                         |               | % of data within tolerance | Observations | % of data within tolerance | Observations |
| <b>Tree Level</b>            |                         |               |                            |              |                            |              |
| <b>National Variables</b>    |                         |               |                            |              |                            |              |
| DBH                          | ±0.1 inch per 20 inches | 95.0          | 95.7                       | 188          | 94.9                       | 32,160       |
| DRC                          | ±0.1 inch per 20 inches | 95.0          | 79.3                       | 29           | 72.1                       | 43           |
| Azimuth                      | ±10 degrees             | 90.0          | 99.2                       | 251          | 99.3                       | 35,316       |
| Horizontal Distance          | ±0.2 foot per 1.0 foot  | 90.0          | 97.6                       | 251          | 98.8                       | 35,316       |
| Species                      | No Tolerance            | 95.0          | 98.8                       | 251          | 98.0                       | 35,620       |
| Tree Genus                   | No Tolerance            | 99.0          | 100.0                      | 251          | 99.6                       | 35,579       |
| Tree Status                  | No Tolerance            | 95.0          | 99.2                       | 251          | 98.9                       | 35,620       |
| Rotten/Missing Cull          | ±10 percent             | 90.0          | 98.0                       | 150          | 98.2                       | 22,817       |
| Total Length                 | ±10 percent             | 90.0          | 82.0                       | 133          | 78.4                       | 22,476       |
| Actual Length                | ±10 percent             | 90.0          | 62.5                       | 16           | 73.8                       | 2,710        |
| Compacted Crown Ratio        | ±10 percent             | 80.0          | 90.5                       | 179          | 83.3                       | 28,939       |
| Uncompacted Crown Ratio (P3) | ±10 percent             | 90.0          | .                          | .            | 66.7                       | 15           |
| Crown Class                  | No Tolerance            | 85.0          | 91.1                       | 179          | 81.2                       | 28,939       |
| Decay Class                  | ±1 class                | 90.0          | 98.2                       | 56           | 95.2                       | 4,967        |
| Cause of Death               | No Tolerance            | 80.0          | 83.9                       | 56           | 84.1                       | 4,967        |
| Condition                    | No Tolerance            | 99.0          | 100.0                      | 251          | 98.1                       | 35,620       |
| Mortality Year               | ±1 year                 | 70.0          | .                          | .            | 92.8                       | 527          |
| Crown Position               | No Tolerance            |               | .                          | .            | 71.4                       | 14           |
| Crown Light Exposure         | ±1 class                | 85.0          | .                          | .            | 73.3                       | 15           |
| Sapling Crown Vigor Class    | No Tolerance            | 85.0          | .                          | .            | 100.0                      | 1            |
| Crown Density                | ±10 percent             | 90.0          | .                          | .            | 57.1                       | 14           |
| Crown Dieback                | ±10 percent             | 90.0          | .                          | .            | 100.0                      | 14           |
| Transparency                 | ±10 percent             | 90.0          | .                          | .            | 71.4                       | 14           |
| <b>Regional Variables</b>    |                         |               |                            |              |                            |              |
| NC Tree Class                | No Tolerance            | 90.0          | 93.6                       | 204          | 91.2                       | 31,640       |
| NC Damage Agent 1            | No Tolerance            | 90.0          | 90.5                       | 179          | 88.5                       | 28,939       |
| NC Damage Agent 2            | No Tolerance            | 90.0          | 87.9                       | 58           | 82.3                       | 6,316        |
| Missouri Damage Code         | No Tolerance            |               | .                          | .            | .                          | .            |
| Utilization                  | No Tolerance            | 99.0          | .                          | .            | 100.0                      | 1,140        |

(Table C continued on next page)

(Table C continued)

| Variable                                  | North Dakota            |               |                            | All NRS States |                            |              |
|---|-------------------------|---------------|----------------------------|----------------|----------------------------|--------------|
|   | Tolerance               | Objective (%) | % of data within tolerance | Observations   | % of data within tolerance | Observations |
| NC Tree Grade                             | No Tolerance            | 90.0          | .                          | .              | 66.5                       | 752          |
| DBH-Live & Trees with Decay Code 1 or 2   | ±0.1 inch per 20 inches | 95.0          | 95.6                       | 181            | 94.8                       | 30,178       |
| DBH-Trees with Decay Codes 3, 4 or 5      | ±1 inch per 20 inches   | 95.0          | 100.0                      | 7              | 99.4                       | 1,410        |
| Total Length-trees 40 feet and greater    | ±10 percent             | 90.0          | 84.7                       | 59             | 80.2                       | 18,075       |
| Total Length-trees less than 40 feet      | ±10 percent             | 90.0          | 79.7                       | 74             | 71.0                       | 4,401        |
| Total Length-trees less than 5 inches DBH | ±10 percent             | 90.0          | 75.0                       | 16             | 60.4                       | 260          |
| Number of trees                           |                         |               |                            | 251            |                            | 35,620       |
| <b>Seedling Level</b>                     |                         |               |                            |                |                            |              |
| National Variables                        |                         |               |                            |                |                            |              |
| Species                                   | No Tolerance            | 85.0          | 100.0                      | 42             | 91.7                       | 6,746        |
| Genus                                     | No Tolerance            | 90.0          | 100.0                      | 42             | 96.7                       | 6,746        |
| Seedling Count                            | ±20 percent             | 90.0          | 47.6                       | 42             | 65.5                       | 6,746        |
| Seedling Count (coded)                    | No Tolerance            | 90.0          | 61.9                       | 42             | 70.1                       | 6,746        |
| Number of microplots                      |                         |               |                            | 21             |                            | 2,871        |
| <b>Site Tree Level</b>                    |                         |               |                            |                |                            |              |
| National Variables                        |                         |               |                            |                |                            |              |
| Condition List                            | No Tolerance            | 99.0          | 100.0                      | 25             | 92.9                       | 2,765        |
| Diameter                                  | ±0.1 inch per 20 inches | 95.0          | 100.0                      | 25             | 95.6                       | 2,747        |
| Species                                   | No Tolerance            | 95.0          | 84.0                       | 25             | 98.7                       | 2,765        |
| Genus                                     | No Tolerance            | 99.0          | 100.0                      | 25             | 99.9                       | 2,765        |
| Azimuth                                   | ±10 degrees             | 90.0          | 100.0                      | 25             | 98.8                       | 2,747        |
| Distance                                  | ±5 feet                 | 90.0          | 100.0                      | 25             | 99.1                       | 2,747        |
| Total Length                              | ±10 percent             | 90.0          | 100.0                      | 25             | 95.7                       | 2,747        |
| Diameter Age                              | ±5 years                | 95.0          | 96.0                       | 25             | 96.8                       | 2,747        |
| Regional Variables                        |                         |               |                            |                |                            |              |
| Site Index Method                         | No Tolerance            | 99.0          | 100.0                      | 25             | 99.9                       | 2,765        |
| Field Site Index                          | No Tolerance            | 99.0          | 100.0                      | 25             | 100.0                      | 2,765        |
| Number of site trees                      |                         |               |                            | 25             |                            | 2,765        |

**Table D.—Observed relative bias values (Average [field crew-QA crew]) for measurement variables, blind check plots, North Dakota, 2010**

| Variable                    | Unit of measure | North Dakota  |               |       |                        |               | All NRS States |               |       |                    |                        |
|-----------------------------|-----------------|---------------|---------------|-------|------------------------|---------------|----------------|---------------|-------|--------------------|------------------------|
|                             |                 | Relative bias | 95% CI limits |       | Number of observations | Relative bias | Lower          | 95% CI limits |       | Upper observations | Number of observations |
|                             |                 |               | Lower         | Upper |                        |               |                | Lower         | Upper |                    |                        |
| <b>Plot Level</b>           |                 |               |               |       |                        |               |                |               |       |                    |                        |
| National Variables          |                 |               |               |       |                        |               |                |               |       |                    |                        |
| Distance to Road            | code            | -0.05         | -0.32         | 0.16  | 19                     | 0.0           | -0.1           | 0.0           | 0.0   | 2,010              |                        |
| Water on Plot               | code            | -0.21         | -0.79         | 0.16  | 19                     | 0.1           | 0.1            | 0.2           | 0.2   | 2,010              |                        |
| Regional Variables          |                 |               |               |       |                        |               |                |               |       |                    |                        |
| Elevation                   | foot            | -3.79         | -24.89        | 16.58 | 19                     | 318.1         | 105.6          | 575.7         | 0.0   | 1,886              |                        |
| Latitude - decimal degrees  | degree          | 0.00          | 0.00          | 0.00  | 19                     | 0.0           | 0.0            | 0.0           | 0.0   | 1,888              |                        |
| Longitude - decimal degrees | degree          | 0.00          | 0.00          | 0.00  | 19                     | 0.0           | 0.0            | 0.0           | 0.0   | 1,888              |                        |
| Latitude - distance         | foot            |               |               |       |                        |               |                |               |       |                    |                        |
| Longitude - distance        | foot            |               |               |       |                        |               |                |               |       |                    |                        |
| Number of plots             |                 |               |               |       | 20                     |               |                |               |       | 2,114              |                        |
| <b>Condition Level</b>      |                 |               |               |       |                        |               |                |               |       |                    |                        |
| National Variables          |                 |               |               |       |                        |               |                |               |       |                    |                        |
| Condition Status            | code            | -0.02         | -0.04         | 0.00  | 163                    | 0.0           | 0.0            | 0.0           | 0.0   | 4,732              |                        |
| Reserve Status              | code            | 0.00          | 0.00          | 0.00  | 163                    | 0.0           | 0.0            | 0.0           | 0.0   | 4,732              |                        |
| Owner Group                 | code            | 1.82          | 0.00          | 5.45  | 22                     | 0.2           | 0.0            | 0.4           | 0.4   | 2,348              |                        |
| Forest Type (Type)          | code            | -0.32         | -71.93        | 70.45 | 22                     | 5.6           | 1.5            | 9.3           | 9.3   | 2,348              |                        |
| Forest Type (Group)         | code            | 0.00          | -68.18        | 68.18 | 22                     | 5.8           | 1.7            | 9.5           | 9.5   | 2,348              |                        |
| Stand Size                  | code            | -0.18         | -0.36         | 0.00  | 22                     | 0.0           | 0.0            | 0.0           | 0.0   | 2,348              |                        |
| Regeneration Status         | code            | 0.00          | 0.00          | 0.00  | 22                     | 0.0           | 0.0            | 0.0           | 0.0   | 2,348              |                        |
| Tree Density                | code            | 0.05          | -0.09         |       | 22                     | 0.0           | 0.0            | 0.0           | 0.0   | 2,348              |                        |
| Owner Class                 | code            | 1.32          | -1.27         | 5.86  | 22                     | 0.2           | 0.0            | 0.4           | 0.4   | 2,348              |                        |
| Owner Status                | code            | 0.00          | 0.00          | 0.00  | 22                     | 0.0           | 0.0            | 0.0           | 0.0   | 2,348              |                        |
| Regeneration Species        | code            | 0.00          | 0.00          | 0.00  | 22                     | 1.6           | -0.5           | 3.9           | 3.9   | 2,348              |                        |
| Stand Age                   | year            | 4.23          | 0.07          | 9.77  | 22                     | -0.5          | -1.4           | 0.1           | 0.1   | 2,348              |                        |
| Disturbance 1               | code            | 2.19          | -6.57         | 9.86  | 21                     | 0.5           | 0.0            | 1.0           | 1.0   | 2,313              |                        |
| Disturbance Year 1          | year            | -0.17         | -0.58         | 0.00  | 6                      | 873.1         | 369.4          | 1410.5        | 119   | 119                |                        |
| Disturbance 2               | code            | 0.00          | 0.00          | 0.00  | 9                      | -3.1          | -4.8           | -1.5          | -1.5  | 379                |                        |

(Table D continued on next page)

(Table D continued)

| Variable               | Unit of measure | North Dakota  |       |               |                        | All NRS States |       |               |                        |
|------------------------|-----------------|---------------|-------|---------------|------------------------|----------------|-------|---------------|------------------------|
|                        |                 | 95% CI limits |       | Relative bias | Number of observations | 95% CI limits  |       | Relative bias | Number of observations |
|                        |                 | Lower         | Upper |               |                        | Lower          | Upper |               |                        |
| Disturbance Year 2     | year            | 0.00          | 0.00  | 0.00          | 1                      | 726.9          | 0.0   | 2180.0        | 11                     |
| Disturbance 3          | code            | 0.00          | 0.00  | 0.00          | 1                      | 0.4            | 0.0   | 1.1           | 56                     |
| Disturbance Year 3     | year            |               |       |               |                        | 1.0            | 0.0   | 2.0           | 2                      |
| Treatment 1            | code            | 0.00          | 0.00  | 0.00          | 21                     | 0.1            | -0.1  | 0.2           | 2,313                  |
| Treatment Year 1       | year            |               |       |               |                        | 0.1            | 0.0   | 0.2           | 156                    |
| Treatment 2            | code            |               |       |               |                        | 2.8            | 0.7   | 5.3           | 212                    |
| Treatment Year 2       | year            |               |       |               |                        | -0.1           | -0.3  | 0.2           | 24                     |
| Treatment 3            | code            |               |       |               |                        | -1.0           | -3.0  | 0.5           | 63                     |
| Treatment Year 3       | year            |               |       |               |                        | -0.7           | -1.3  | 0.0           | 3                      |
| Physiographic Class    | code            | 0.86          | 0.00  | 2.18          | 22                     | 0.1            | 0.0   | 0.3           | 2,348                  |
| Present Nonforest Use  | code            | -1.02         | -1.95 | 0.01          | 163                    | 0.1            | 0.0   | 0.2           | 4,732                  |
| Regional Variables     |                 |               |       |               |                        |                |       |               |                        |
| NC Land Use            | code            | -0.45         | -1.04 | -0.09         | 123                    | -0.1           | -0.1  | 0.0           | 3,660                  |
| Number of conditions   |                 |               |       |               | 163                    |                |       |               | 4,732                  |
| <b>Boundary Level</b>  |                 |               |       |               |                        |                |       |               |                        |
| National Variables     |                 |               |       |               |                        |                |       |               |                        |
| Boundary Change        | code            | 0.20          | 0.00  | 0.60          | 5                      | 0.0            | 0.0   | 0.1           | 701                    |
| Constraining Condition | cond            | -0.20         | -0.60 | 0.00          | 5                      | 0.0            | 0.0   | 0.0           | 701                    |
| Left Azimuth           | degree          | -0.60         | -4.80 | 2.00          | 5                      | 2.6            | -0.8  | 5.9           | 701                    |
| Corner Mapped          | code            | 0.00          | 0.00  | 0.00          | 5                      | 0.0            | 0.0   | 0.0           | 701                    |
| Corner Azimuth         | degree          | 1.00          | 1.00  | 1.00          | 1                      | -0.6           | -2.2  | 1.1           | 61                     |
| Corner Distance        | foot            | 0.00          | 0.00  | 0.00          | 1                      | 0.1            | -0.2  | 0.4           | 61                     |
| Right Azimuth          | degree          | -0.40         | -2.90 | 1.30          | 5                      | -1.0           | -4.3  | 2.5           | 701                    |
| Number of boundaries   |                 |               |       |               | 5                      |                |       |               | 701                    |

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(Table D continued)

| Variable                     | Unit of measure | North Dakota  |       |                        |               | All NRS States |       |                        |        |
|------------------------------|-----------------|---------------|-------|------------------------|---------------|----------------|-------|------------------------|--------|
|                              |                 | 95% CI limits |       | Number of observations | Relative bias | 95% CI limits  |       | Number of observations |        |
|                              |                 | Lower         | Upper |                        |               | Lower          | Upper |                        |        |
| <b>Subplot Level</b>         |                 |               |       |                        |               |                |       |                        |        |
| National Variables           |                 |               |       |                        |               |                |       |                        |        |
| Subplot Center Condition     | code            | -0.03         | 0.05  | 76                     | 0.0           | 0.0            | 0.0   | 0.0                    | 8,235  |
| Microplot Center Condition   | code            | -0.03         | 0.05  | 76                     | 0.0           | 0.0            | 0.0   | 0.0                    | 8,235  |
| Slope                        | percent         | -1.35         | 0.90  | 60                     | 0.0           | -0.1           | 0.1   | 0.1                    | 7,243  |
| Aspect                       | degree          | -0.35         | 0.03  | 59                     | 1.0           | 0.2            | 1.9   | 1.9                    | 6,957  |
| Snow/Water Depth             | foot            | -1.83         | 0.00  | 69                     | -0.1          | -0.2           | 0.0   | 0.0                    | 7,703  |
| Number of subplots           |                 |               |       | 76                     |               |                |       |                        | 8,235  |
| <b>Tree Level</b>            |                 |               |       |                        |               |                |       |                        |        |
| National Variables           |                 |               |       |                        |               |                |       |                        |        |
| DBH                          | inch            | -0.05         | -0.01 | 188                    | -0.1          | -0.1           | 0.0   | 0.0                    | 32,160 |
| DRC                          | inch            | -0.42         | -0.04 | 29                     | 0.0           | -0.2           | 0.2   | 0.2                    | 43     |
| Azimuth                      | degree          | -0.46         | 2.64  | 251                    | 0.0           | -0.1           | 0.1   | 0.1                    | 35,316 |
| Horizontal Distance          | foot            | -0.02         | 0.02  | 251                    | 0.0           | 0.0            | 0.0   | 0.0                    | 35,316 |
| Species                      | code            | -0.03         | 0.03  | 251                    | 0.1           | -0.2           | 0.3   | 0.3                    | 35,620 |
| Tree Genus                   | code            | 0.00          | 0.00  | 251                    | 0.1           | -0.2           | 0.3   | 0.3                    | 35,579 |
| Tree Status                  | code            | -0.01         | 0.02  | 251                    | 0.0           | 0.0            | 0.0   | 0.0                    | 35,620 |
| Rotten/Missing Cull          | percent         | -0.12         | 2.62  | 150                    | -0.1          | -0.2           | -0.1  | -0.1                   | 22,817 |
| Total Length                 | foot            | 0.95          | 4.07  | 133                    | 0.2           | 0.0            | 0.4   | 0.4                    | 22,476 |
| Actual Length                | foot            | -6.47         | 9.94  | 16                     | -2.5          | -4.1           | -1.1  | -1.1                   | 2,710  |
| Compacted Crown Ratio        | percent         | -1.97         | 1.16  | 179                    | -0.1          | -0.2           | 0.0   | 0.0                    | 28,939 |
| Uncompacted Crown Ratio (P3) | percent         | -0.14         | -0.02 | 179                    | 6.3           | -4.8           | 12.7  | 12.7                   | 15     |
| Crown Class                  | code            | -0.07         | -0.02 | 179                    | 0.0           | 0.0            | 0.0   | 0.0                    | 28,939 |
| Decay Class                  | code            | 0.05          | 0.18  | 56                     | 0.0           | 0.0            | 0.0   | 0.0                    | 4,967  |
| Cause of Death               | code            | 4.46          | 8.57  | 56                     | 2.3           | 1.9            | 2.7   | 2.7                    | 4,967  |
| Condition                    | code            | 0.00          | 0.00  | 251                    | 0.0           | 0.0            | 0.0   | 0.0                    | 35,620 |
| Mortality Year               | year            |               |       |                        | 0.1           | 0.1            | 0.2   | 0.2                    | 527    |
| Crown Position               | code            |               |       |                        | 0.1           | -0.3           | 0.4   | 0.4                    | 14     |
| Crown Light Exposure         | code            |               |       |                        | -0.4          | -1.1           | 0.2   | 0.2                    | 15     |

(Table D continued on next page)

(Table D continued)

| Variable                                  | Unit of measure | North Dakota  |               |       |                        | All NRS States |               |       |                        |
|---|-----------------|---------------|---------------|-------|------------------------|----------------|---------------|-------|------------------------|
|   |                 | Relative bias | 95% CI limits |       | Number of observations | Relative bias  | 95% CI limits |       | Number of observations |
|   |                 |               | Lower         | Upper |                        |                | Lower         | Upper |                        |
| Sapling Crown Vigor Class                 | code            |               |               |       | 0.0                    | 0.0            | 0.0           | 0.0   | 1                      |
| Crown Density                             | percent         |               |               |       | -0.4                   | -9.1           | 7.9           | 7.9   | 14                     |
| Crown Dieback                             | percent         |               |               |       | -1.4                   | -3.2           | -0.4          | -0.4  | 14                     |
| Transparency                              | percent         |               |               |       | -4.3                   | -8.8           | 0.4           | 0.4   | 14                     |
| Regional Variables                        |                 |               |               |       |                        |                |               |       |                        |
| NC Tree Class                             | code            | -0.01         | 0.03          | 204   | 0.0                    | -0.1           | 0.0           | 0.0   | 31,640                 |
| NC Damage Agent 1                         | code            | 4.47          | 16.85         | 179   | 5.5                    | 4.1            | 6.8           | 6.8   | 28,939                 |
| NC Damage Agent 2                         | code            | 41.93         | 75.24         | 58    | 20.5                   | 17.3           | 23.8          | 23.8  | 6,316                  |
| Missouri Damage Code                      | code            |               |               |       |                        |                |               |       |                        |
| Utilization                               | code            |               |               |       | 0.0                    | 0.0            | 0.0           | 0.0   | 1,140                  |
| NC Tree Grade                             | code            |               |               |       | -1.5                   | -10.2          | 7.3           | 7.3   | 752                    |
| DBH-Live & Trees with Decay Code 1 or 2   | inch            | -0.03         | -0.02         | 181   | 0.0                    | 0.0            | 0.0           | 0.0   | 30,178                 |
| DBH-Trees with Decay Codes 3, 4 or 5      | inch            | -0.03         | 0.00          | 7     | 0.0                    | 0.0            | 0.0           | 0.0   | 1,410                  |
| Total Length-trees 40 feet and greater    | foot            | 0.75          | 2.65          | 59    | 0.8                    | 0.7            | 0.9           | 0.9   | 18,075                 |
| Total Length-trees less than 40 feet      | foot            | 3.93          | 5.97          | 74    | -2.2                   | -3.1           | -1.5          | -1.5  | 4,401                  |
| Total Length-trees less than 5 inches DBH | foot            | 0.31          | 4.16          | 16    | -0.7                   | -2.7           | 0.9           | 0.9   | 260                    |
| Number of trees                           |                 |               |               | 251   |                        |                |               |       | 35,620                 |
| <b>Seedling Level</b>                     |                 |               |               |       |                        |                |               |       |                        |
| National Variables                        |                 |               |               |       |                        |                |               |       |                        |
| Species                                   | code            | 0.00          | 0.00          | 42    | 0.0                    | 0.0            | 0.0           | 0.0   | 6,746                  |
| Genus                                     | code            | 0.00          | 0.00          | 42    | 0.0                    | 0.0            | 0.0           | 0.0   | 6,746                  |
| Seedling Count                            | number          | -35.22        | -14.46        | 42    | -15.9                  | -22.8          | -11.8         | -11.8 | 6,746                  |
| Seedling Count (coded)                    | number          | -0.29         | 0.02          | 42    | 0.0                    | 0.0            | 0.0           | 0.0   | 6,746                  |
| Number of microplots                      |                 |               |               | 21    |                        |                |               |       | 2,871                  |

(Table D continued on next page)



(Table D continued)

| Variable               | Unit of measure | North Dakota  |               |       |                        | All NRS States |               |       |                        |
|------------------------|-----------------|---------------|---------------|-------|------------------------|----------------|---------------|-------|------------------------|
|                        |                 | Relative bias | 95% CI limits |       | Number of observations | Relative bias  | 95% CI limits |       | Number of observations |
|                        |                 |               | Lower         | Upper |                        |                | Lower         | Upper |                        |
| <b>Site Tree Level</b> |                 |               |               |       |                        |                |               |       |                        |
| National Variables     |                 |               |               |       |                        |                |               |       |                        |
| Condition List         | code            | 0.00          | 0.00          | 0.00  | 25                     | -5.8           | -13.6         | 2.1   | 2,765                  |
| Diameter               | inch            | 0.00          | -0.02         | 0.01  | 25                     | 0.0            | 0.0           | 0.0   | 2,747                  |
| Species                | code            | -1.92         | -4.44         | -0.12 | 25                     | 0.0            | -0.1          | 0.0   | 2,765                  |
| Genus                  | code            | 0.00          | 0.00          | 0.00  | 25                     | 0.0            | -0.1          | 0.0   | 2,765                  |
| Azimuth                | degree          | 0.00          | -0.32         | 0.32  | 25                     | 0.1            | -0.4          | 0.5   | 2,747                  |
| Distance               | foot            | 0.00          | -0.03         | 0.03  | 25                     | 0.0            | -0.1          | 0.0   | 2,747                  |
| Total Length           | foot            | -0.28         | -0.66         | 0.00  | 25                     | -0.3           | -0.5          | -0.1  | 2,747                  |
| Diameter Age           | year            | 0.84          | 0.00          | 2.52  | 25                     | 0.1            | 0.0           | 0.2   | 2,747                  |
| Regional Variables     |                 |               |               |       |                        |                |               |       |                        |
| Site Index Method      | code            | 0.00          | 0.00          | 0.00  | 25                     | 0.0            | 0.0           | 0.0   | 2,765                  |
| Field Site Index       | feet            | 0.00          | 0.00          | 0.00  | 25                     | 0.0            | 0.0           | 0.0   | 2,765                  |
| Number of site trees   |                 |               |               |       | 25                     |                |               |       | 2,765                  |

Table E.—FIA nonresponse by strata, North Dakota, 2010

| Owner                      | Strata (um) | Number of plots selected | Sampled      | Denied access  | Hazardous | Other      | Response Rate (%) |
|----------------------------|-------------|--------------------------|--------------|----------------|-----------|------------|-------------------|
| Private Unit 1             | 2           | 127                      | 121          | 6              | 0         | 0          | 95.2              |
| Dakota Prairie NGL         | 1           | 157                      | 156.8        | 0              | 0.3       | 0          | 99.8              |
| Private Unit 1             | 4           | 20                       | 19           | 1              | 0         | 0          | 95                |
| Public Unit 1              | 1           | 261                      | 261          | 0              | 0         | 0          | 100               |
| Inland Census Water Unit 1 | 1,2,3,4,5   | 175                      | 173          | 0              | 2         | 0          | 98.9              |
| Private Unit 1             | 3           | 26                       | 23           | 3              | 0         | 0          | 88.5              |
| Dakota Prairie NGL         | 2,3,4,5     | 20                       | 20           | 0              | 0         | 0          | 100               |
| Private Unit 1             | 5           | 43                       | 41           | 2              | 0         | 0          | 95.3              |
| Public Unit 1              | 2           | 18                       | 17           | 1              | 0         | 0          | 94.4              |
| Private Unit 1             | 1           | 6,765                    | 6,760        | 5              | 0         | 0          | 99.9              |
| Public Unit 1              | 3,4,5       | 10                       | 10           | 0              | 0         | 0          | 100               |
| <b>Total</b>               |             | <b>7,622</b>             | <b>7,622</b> | <b>7,601.8</b> | <b>18</b> | <b>2.3</b> | <b>97.0</b>       |

number of plots

Strata codes:

- 1: Canopy cover 0 - 5
- 2: Canopy cover 6 - 50
- 3: Canopy cover 51 - 65
- 4: Canopy cover 66 - 80
- 5: Canopy cover 81 - 100

Table ND-1.—Percentage of area by land status, North Dakota, 2010

| Land status                            | Percentage of area |
|--|--------------------|
| <b>Accessible forest land</b>          |                    |
| Unreserved forest land                 |                    |
| Timberland                             | 1.1                |
| Unproductive                           | 0.5                |
| Total unreserved forest land           | 1.6                |
| Reserved forest land                   |                    |
| Productive                             | 0.0                |
| Unproductive                           | 0.0                |
| Total reserved forest land             | 0.0                |
| <b>All accessible forest land</b>      | <b>1.6</b>         |
| <b>Nonforest and other land</b>        |                    |
| Nonforest land                         | 94.9               |
| Water                                  |                    |
| Census                                 | 2.5                |
| Non-Census                             | 0.7                |
| <b>All nonforest and other land</b>    | <b>98.1</b>        |
| <b>Nonsampled land</b>                 |                    |
| Access denied                          | 0.2                |
| Hazardous conditions                   | 0.0                |
| Other                                  | --                 |
| <b>All land</b>                        | <b>100.0</b>       |
| <b>Total area (thousands of acres)</b> | <b>45,247</b>      |

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 ND-2.—Area of forest land, in thousand acres, by owner class and forest land status, North Dakota, 2010**

| Owner class                       | Unreserved forests |              |       | Reserved forests |              |       | All forest land |
|-----------------------------------|--------------------|--------------|-------|------------------|--------------|-------|-----------------|
|                                   | Timberland         | Unproductive | Total | Productive       | Unproductive | Total |                 |
| <b>Forest Service</b>             |                    |              |       |                  |              |       |                 |
| National grassland                | 30.0               | 57.1         | 87.1  | --               | --           | --    | 87.1            |
| <b>Other Federal</b>              |                    |              |       |                  |              |       |                 |
| National Park Service             | --                 | --           | --    | 8.7              | 12.1         | 20.8  | 20.8            |
| Bureau of Land Management         | 0.9                | 11.9         | 12.8  | --               | --           | --    | 12.8            |
| Fish and Wildlife Service         | 39.9               | --           | 39.9  | --               | --           | --    | 39.9            |
| Other Federal                     | 20.8               | 4.8          | 25.6  | --               | --           | --    | 25.6            |
| <b>State and local government</b> |                    |              |       |                  |              |       |                 |
| State                             | 38.1               | 14.9         | 53.0  | --               | --           | --    | 53.0            |
| Local (county, municipal, etc.)   | 6.0                | --           | 6.0   | --               | --           | --    | 6.0             |
| <b>Private</b>                    |                    |              |       |                  |              |       |                 |
| Undifferentiated private          | 398.1              | 129.1        | 527.2 | --               | --           | --    | 527.2           |
| <b>All owners</b>                 | 533.8              | 217.8        | 751.6 | 8.7              | 12.1         | 20.8  | 772.4           |

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 ND-3.—Area of forest land, in thousand acres, by forest-type group and productivity class, North Dakota, 2010**

| 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+      |              |
| Spruce / fir group            | --   | 3.2          | --          | --        | --        | --        | --        | 3.2          |
| Pinyon / juniper group        | 75.0   | 6.0          | --          | --        | --        | --        | --        | 81.1         |
| Ponderosa pine group          | --   | 5.9          | --          | --        | --        | --        | --        | 5.9          |
| Oak / hickory group           | 102.8  | 176.6        | 19.1        | --        | --        | --        | --        | 298.5        |
| Elm / ash / cottonwood group  | 8.5  | 150.1        | 23.6        | --        | --        | --        | --        | 182.2        |
| Aspen / birch group           | 9.2  | 45.4         | 50.3        | --        | --        | --        | --        | 104.9        |
| Other hardwoods group         | 33.0   | 55.0         | --          | --        | --        | --        | --        | 88.0         |
| Exotic hardwoods group        | --   | 4.1          | --          | --        | --        | --        | --        | 4.1          |
| Nonstocked                    | 1.5  | 3.0          | --          | --        | --        | --        | --        | 4.5          |
| <b>All forest-type groups</b> | <b>229.9</b>                                   | <b>449.5</b> | <b>93.0</b> | <b>--</b> | <b>--</b> | <b>--</b> | <b>--</b> | <b>772.4</b> |

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

**Table ND-4.—Area of forest land, in thousand acres, by forest-type group, ownership group, and land status, North Dakota, 2010**

| 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 | --  |                 |
|                               |                |                   |             |               |                   |             |                            |                   |              |                          |                   |     |                 |
| Spruce / fir group            | --             | --                | --          | --            | --                | --          | --                         | --                | --           | --                       | --                | 3.2 | 81.1            |
| Pinyon / juniper group        | --             | 49.6              | --          | --            | 12.0              | --          | --                         | 6.0               | --           | --                       | 13.5              | --  | 5.9             |
| Ponderosa pine group          | --             | --                | --          | --            | --                | --          | --                         | --                | --           | --                       | --                | --  | 298.5           |
| Oak / hickory group           | 24.0           | 3.0               | 15.3        | 16.7          | 9.0               | --          | --                         | --                | 147.4        | 83.1                     | --                | 2.3 | 182.2           |
| Elm / ash / cottonwood group  | --             | --                | 33.3        | 6.2           | 26.9              | --          | --                         | --                | 113.6        | 74.5                     | 3.0               | --  | 104.9           |
| Aspen / birch group           | --             | --                | 13.0        | --            | 8.2               | --          | --                         | 2.7               | 46.4         | 4.1                      | --                | --  | 88.0            |
| Other hardwoods group         | 6.0            | 3.0               | --          | 2.6           | --                | --          | --                         | --                | 4.1          | 3.0                      | --                | --  | 4.5             |
| Exotic hardwoods group        | --             | --                | --          | --            | --                | --          | --                         | --                | --           | --                       | --                | --  | 772.4           |
| Nonstocked                    | --             | 1.5               | --          | --            | --                | --          | --                         | --                | 3.0          | --                       | --                | --  |                 |
| <b>All forest-type groups</b> | <b>30.0</b>    | <b>57.1</b>       | <b>61.6</b> | <b>37.5</b>   | <b>44.1</b>       | <b>14.9</b> | <b>398.1</b>               | <b>129.1</b>      | <b>772.4</b> |                          |                   |     |                 |

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

**Table ND-5.—Area of forest land, in thousand acres, by forest-type group and stand-size class, North Dakota, 2010**

| Forest-type group             | Stand-size class |                 |                |           |            | All size classes |
|-------------------------------|------------------|-----------------|----------------|-----------|------------|------------------|
|                               | Large diameter   | Medium diameter | Small diameter | Chaparral | Nonstocked |                  |
| Spruce / fir group            | --               | --              | 3.2            | --        | --         | 3.2              |
| Pinyon / juniper group        | 54.3             | 12.6            | 14.2           | --        | --         | 81.1             |
| Ponderosa pine group          | --               | 5.9             | --             | --        | --         | 5.9              |
| Oak / hickory group           | 69.0             | 206.2           | 23.3           | --        | --         | 298.5            |
| Elm / ash / cottonwood group  | 113.9            | 24.0            | 44.4           | --        | --         | 182.2            |
| Aspen / birch group           | 10.4             | 49.9            | 44.5           | --        | --         | 104.9            |
| Other hardwoods group         | --               | 1.6             | 86.4           | --        | --         | 88.0             |
| Exotic hardwoods group        | 1.5              | 2.7             | --             | --        | --         | 4.1              |
| Nonstocked                    | --               | --              | --             | --        | 4.5        | 4.5              |
| <b>All forest-type groups</b> | <b>249.0</b>     | <b>302.9</b>    | <b>216.1</b>   | <b>--</b> | <b>4.5</b> | <b>772.4</b>     |

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

**Table ND-6.—Area of forest land, in thousand acres, by forest-type group and stand-age class, North Dakota, 2010**

| Forest-type group             | Stand-age class (years) |      |       |       |       |        |         |         |         |         |         | All classes |       |
|-------------------------------|-------------------------|------|-------|-------|-------|--------|---------|---------|---------|---------|---------|-------------|-------|
|                               | Non stocked             | 1-20 | 21-40 | 41-60 | 61-80 | 81-100 | 101-120 | 121-140 | 141-160 | 161-180 | 181-200 |             | 201+  |
| Spruce / fir group            | --                      | --   | --    | 3.2   | --    | --     | --      | --      | --      | --      | --      | --          | 3.2   |
| Plinyon / juniper group       | --                      | --   | 0.3   | 30.2  | 28.2  | 16.4   | 6.0     | --      | --      | --      | --      | --          | 81.1  |
| Ponderosa pine group          | --                      | --   | --    | --    | 5.9   | --     | --      | --      | --      | --      | --      | --          | 5.9   |
| Oak / hickory group           | --                      | 11.4 | 17.2  | 71.7  | 124.9 | 64.4   | 8.9     | --      | --      | --      | --      | --          | 298.5 |
| Elm / ash / cottonwood group  | --                      | 8.4  | 28.4  | 63.2  | 30.7  | 35.3   | 11.1    | 5.1     | --      | --      | --      | --          | 182.2 |
| Aspen / birch group           | --                      | 15.4 | 22.6  | 46.6  | 20.2  | --     | --      | --      | --      | --      | --      | --          | 104.9 |
| Other hardwoods group         | --                      | 5.9  | 20.1  | 43.9  | 5.4   | 12.6   | --      | --      | --      | --      | --      | --          | 88.0  |
| Exotic hardwoods group        | --                      | --   | --    | 2.7   | 1.5   | --     | --      | --      | --      | --      | --      | --          | 4.1   |
| Nonstocked                    | 4.5                     | --   | --    | --    | --    | --     | --      | --      | --      | --      | --      | --          | 4.5   |
| <b>All forest-type groups</b> | 4.5                     | 41.0 | 88.7  | 261.5 | 216.9 | 128.8  | 26.0    | 5.1     | --      | --      | --      | --          | 772.4 |

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 ND-7.—Area of forest land, in thousand acres, by forest-type group and stand origin, North Dakota, 2010**

| Forest-type group             | Stand origin   |                         | All forest land |
|-------------------------------|----------------|-------------------------|-----------------|
|                               | Natural stands | Artificial regeneration |                 |
| Spruce / fir group            | --             | 3.2                     | 3.2             |
| Pinyon / juniper group        | 81.1           | --                      | 81.1            |
| Ponderosa pine group          | 5.9            | --                      | 5.9             |
| Oak / hickory group           | 298.2          | 0.3                     | 298.5           |
| Elm / ash / cottonwood group  | 177.9          | 4.4                     | 182.2           |
| Aspen / birch group           | 104.9          | --                      | 104.9           |
| Other hardwoods group         | 86.4           | 1.6                     | 88.0            |
| Exotic hardwoods group        | 4.1            | --                      | 4.1             |
| Nonstocked                    | 4.5            | --                      | 4.5             |
| <b>All forest-type groups</b> | <b>763.0</b>   | <b>9.5</b>              | <b>772.4</b>    |

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

**Table ND-8.—Area of forest land, in thousand acres, by forest-type group and primary disturbance class, North Dakota, 2010**

| Forest-type group             | Disturbance class |             |            |             |             |                  |              |           |           |           | All forest land |
|-------------------------------|-------------------|-------------|------------|-------------|-------------|------------------|--------------|-----------|-----------|-----------|-----------------|
|                               | None              | Insects     | Disease    | Weather     | Fire        | Domestic animals | Wild animals | Human     | Other     |           |                 |
| Spruce / fir group            | 3.2               | --          | --         | --          | --          | --               | --           | --        | --        | --        | 3.2             |
| Pinyon / juniper group        | 37.7              | --          | --         | --          | --          | 43.3             | --           | --        | --        | --        | 81.1            |
| Ponderosa pine group          | --                | --          | --         | --          | --          | --               | 5.9          | --        | --        | --        | 5.9             |
| Oak / hickory group           | 139.7             | --          | --         | 9.5         | 7.9         | 133.0            | 8.4          | --        | --        | --        | 298.5           |
| Elm / ash / cottonwood group  | 61.9              | --          | --         | 29.4        | 13.9        | 60.6             | 16.4         | --        | --        | --        | 182.2           |
| Aspen / birch group           | 54.9              | 14.0        | 3.5        | 3.8         | 2.8         | 21.3             | 4.7          | --        | --        | --        | 104.9           |
| Other hardwoods group         | 23.0              | --          | --         | --          | 2.6         | 59.7             | 2.7          | --        | --        | --        | 88.0            |
| Exotic hardwoods group        | --                | --          | 4.1        | --          | --          | --               | --           | --        | --        | --        | 4.1             |
| Nonstocked                    | 3.0               | --          | --         | --          | --          | 1.5              | --           | --        | --        | --        | 4.5             |
| <b>All forest-type groups</b> | <b>323.4</b>      | <b>14.0</b> | <b>7.6</b> | <b>42.8</b> | <b>27.2</b> | <b>319.3</b>     | <b>38.1</b>  | <b>--</b> | <b>--</b> | <b>--</b> | <b>772.4</b>    |

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

**Table ND-9.—Area of timberland, in thousand acres, by forest-type group and stand-size class, North Dakota, 2010**

| Forest-type group             | Stand-size class |                 |                |           |            | All size classes |
|-------------------------------|------------------|-----------------|----------------|-----------|------------|------------------|
|                               | Large diameter   | Medium diameter | Small diameter | Chaparral | Nonstocked |                  |
| Spruce / fir group            | --               | --              | 3.2            | --        | --         | 3.2              |
| Ponderosa pine group          | --               | 5.9             | --             | --        | --         | 5.9              |
| Oak / hickory group           | 63.1             | 125.2           | 7.5            | --        | --         | 195.7            |
| Elm / ash / cottonwood group  | 113.9            | 21.7            | 38.2           | --        | --         | 173.8            |
| Aspen / birch group           | 10.4             | 49.9            | 35.4           | --        | --         | 95.7             |
| Other hardwoods group         | --               | 1.6             | 50.8           | --        | --         | 52.4             |
| Exotic hardwoods group        | 1.5              | 2.7             | --             | --        | --         | 4.1              |
| Nonstocked                    | --               | --              | --             | --        | 3.0        | 3.0              |
| <b>All forest-type groups</b> | <b>188.8</b>     | <b>207.0</b>    | <b>135.0</b>   | <b>--</b> | <b>3.0</b> | <b>533.8</b>     |

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

**Table ND-10.—Number of live trees (at least 1 inch d.b.h/d.r.c.), in thousands, on forest land by species group, species, and diameter class, North Dakota, 2010**

| Species group/Species                  | 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 |             |
| <b>Softwood species groups</b>         |                         |         |         |         |          |           |           |           |           |           |           |           |           |           |             |
| <b>Eastern softwood species groups</b> |                         |         |         |         |          |           |           |           |           |           |           |           |           |           |             |
| Spruce and balsam fir                  |                         |         |         |         |          |           |           |           |           |           |           |           |           |           |             |
| White spruce                           | 446                     | 891     | --      | --      | --       | --        | --        | --        | --        | --        | --        | --        | --        | --        | 1,337       |
| All species                            | 446                     | 891     | --      | --      | --       | --        | --        | --        | --        | --        | --        | --        | --        | --        | 1,337       |
| Other eastern softwoods                |                         |         |         |         |          |           |           |           |           |           |           |           |           |           |             |
| Eastern redcedar                       | --                      | --      | 36      | 31      | --       | 31        | --        | --        | --        | --        | --        | --        | --        | --        | 97          |
| Ponderosa pine                         | 446                     | --      | 394     | 107     | --       | --        | --        | --        | --        | --        | 36        | --        | --        | --        | 982         |
| All species                            | 446                     | --      | 429     | 138     | --       | 31        | --        | --        | --        | --        | 36        | --        | --        | --        | 1,080       |
| <b>Other softwood species group</b>    |                         |         |         |         |          |           |           |           |           |           |           |           |           |           |             |
| Woodland softwoods                     |                         |         |         |         |          |           |           |           |           |           |           |           |           |           |             |
| Rocky Mountain juniper                 | 15,645                  | 6,746   | 3,710   | 3,019   | 1,839    | 1,250     | 407       | 132       | 168       | 73        | 36        | --        | 36        | --        | 33,062      |
| All species                            | 15,645                  | 6,746   | 3,710   | 3,019   | 1,839    | 1,250     | 407       | 132       | 168       | 73        | 36        | --        | 36        | --        | 33,062      |
| <b>All softwoods</b>                   | 16,537                  | 7,637   | 4,140   | 3,157   | 1,839    | 1,281     | 407       | 132       | 168       | 73        | 36        | --        | 36        | --        | 35,479      |
| <b>Hardwood species groups</b>         |                         |         |         |         |          |           |           |           |           |           |           |           |           |           |             |
| <b>Eastern hardwood species groups</b> |                         |         |         |         |          |           |           |           |           |           |           |           |           |           |             |
| Select white oaks                      |                         |         |         |         |          |           |           |           |           |           |           |           |           |           |             |
| Bur oak                                | 12,905                  | 18,937  | 12,909  | 6,858   | 3,508    | 1,409     | 855       | 298       | 405       | 288       | 194       | --        | --        | --        | 58,596      |
| All species                            | 12,905                  | 18,937  | 12,909  | 6,858   | 3,508    | 1,409     | 855       | 298       | 405       | 288       | 194       | --        | --        | --        | 58,596      |
| Ash                                    |                         |         |         |         |          |           |           |           |           |           |           |           |           |           |             |
| Black ash                              | --                      | 764     | 48      | --      | --       | --        | --        | --        | --        | --        | --        | --        | --        | --        | 812         |
| Green ash                              | 38,529                  | 20,131  | 12,516  | 7,342   | 3,407    | 1,551     | 777       | 566       | 136       | 36        | 104       | --        | --        | --        | 85,094      |
| All species                            | 38,529                  | 20,895  | 12,564  | 7,342   | 3,407    | 1,551     | 777       | 566       | 136       | 36        | 104       | --        | --        | --        | 85,906      |
| Cottonwood and aspen                   |                         |         |         |         |          |           |           |           |           |           |           |           |           |           |             |
| Balsam poplar                          | 382                     | --      | 418     | 337     | 192      | 31        | 31        | --        | --        | --        | --        | --        | --        | --        | 1,390       |
| Eastern cottonwood                     | --                      | 478     | 223     | 230     | 143      | 112       | 74        | 69        | --        | 38        | 38        | --        | --        | 71        | 1,477       |
| Plains cottonwood                      | 956                     | --      | 293     | 651     | 499      | 536       | 179       | 394       | 209       | --        | 209       | 133       | --        | 36        | 4,382       |
| Quaking aspen                          | 41,926                  | 18,085  | 6,830   | 3,101   | 1,795    | 758       | 564       | 153       | 69        | --        | --        | --        | --        | --        | 73,281      |
| All species                            | 43,264                  | 18,563  | 7,764   | 4,319   | 2,629    | 1,436     | 847       | 616       | 278       | 38        | 248       | 287       | 133       | 108       | 80,530      |
| <b>Basswood</b>                        |                         |         |         |         |          |           |           |           |           |           |           |           |           |           |             |
| American basswood                      | 1,146                   | --      | 184     | 262     | 31       | 78        | 160       | 253       | 37        | --        | --        | 31        | --        | --        | 2,182       |
| All species                            | 1,146                   | --      | 184     | 262     | 31       | 78        | 160       | 253       | 37        | --        | --        | 31        | --        | --        | 2,182       |
| Other eastern soft hardwoods           |                         |         |         |         |          |           |           |           |           |           |           |           |           |           |             |
| Boxelder                               | 5,910                   | 1,724   | 2,525   | 1,469   | 1,171    | 933       | 291       | 248       | 222       | 78        | 37        | --        | --        | --        | 14,609      |
| Paper birch                            | --                      | --      | 192     | 77      | 38       | --        | --        | --        | --        | --        | --        | --        | --        | --        | 307         |
| Black cherry                           | --                      | --      | 34      | --      | --       | --        | --        | --        | --        | --        | --        | --        | --        | --        | 34          |
| Black willow                           | 464                     | --      | --      | --      | --       | 74        | --        | --        | --        | --        | 37        | --        | --        | --        | 576         |
| American elm                           | 9,141                   | 3,658   | 2,572   | 1,073   | 718      | 254       | 73        | 109       | 37        | --        | 36        | --        | --        | --        | 17,707      |
| Siberian elm                           | 382                     | 444     | 104     | 107     | 163      | 105       | --        | 72        | --        | --        | --        | --        | --        | --        | 1,377       |
| Slippery elm                           | --                      | --      | --      | 36      | --       | --        | --        | --        | --        | --        | --        | --        | --        | --        | 36          |
| All species                            | 15,897                  | 5,826   | 5,427   | 2,762   | 2,091    | 1,367     | 364       | 429       | 260       | 78        | 110       | 36        | --        | --        | 34,645      |

(Table ND-10 continued on next page)

(Table ND-10 continued)

| Species group/Species           | Diameter class (Inches) |             |             |             |              |               |               |               |               |               |               |               |               |               |       |         | All classes |
|---------------------------------|-------------------------|-------------|-------------|-------------|--------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|-------|---------|-------------|
|                                 | 1.0-<br>2.9             | 3.0-<br>4.9 | 5.0-<br>6.9 | 7.0-<br>8.9 | 9.0-<br>10.9 | 11.0-<br>12.9 | 13.0-<br>14.9 | 15.0-<br>16.9 | 17.0-<br>18.9 | 19.0-<br>20.9 | 21.0-<br>24.9 | 25.0-<br>28.9 | 29.0-<br>32.9 | 33.0-<br>36.9 | 37.0+ |         |             |
| Eastern noncommercial hardwoods |                         |             |             |             |              |               |               |               |               |               |               |               |               |               |       |         |             |
| Serviceberry spp.               | 3,805                   | --          | --          | --          | --           | --            | --            | --            | --            | --            | --            | --            | --            | --            | --    | 3,805   |             |
| Hawthorn spp.                   | 5,729                   | --          | --          | --          | --           | --            | --            | --            | --            | --            | --            | --            | --            | --            | --    | 5,729   |             |
| Apple spp.                      | --                      | --          | 107         | 72          | --           | --            | --            | --            | --            | --            | --            | --            | --            | --            | --    | 179     |             |
| Eastern hophornbeam             | 1,910                   | 382         | 61          | --          | --           | --            | --            | --            | --            | --            | --            | --            | --            | --            | --    | 2,354   |             |
| Pin cherry                      | 1,592                   | --          | --          | --          | --           | --            | --            | --            | --            | --            | --            | --            | --            | --            | --    | 1,592   |             |
| Chokecherry                     | 24,891                  | --          | --          | --          | --           | --            | --            | --            | --            | --            | --            | --            | --            | --            | --    | 24,891  |             |
| American plum                   | 5,059                   | --          | --          | --          | --           | --            | --            | --            | --            | --            | --            | --            | --            | --            | --    | 5,059   |             |
| Peachleaf willow                | --                      | --          | 107         | 36          | 31           | --            | 36            | --            | --            | --            | --            | --            | --            | --            | --    | 209     |             |
| Bebb willow                     | --                      | 382         | --          | --          | --           | --            | --            | --            | --            | --            | --            | --            | --            | --            | --    | 382     |             |
| Russian-olive                   | --                      | --          | --          | 41          | --           | --            | --            | --            | --            | --            | --            | --            | --            | --            | --    | 41      |             |
| All species                     | 42,986                  | 764         | 276         | 148         | 31           | --            | 36            | --            | --            | --            | --            | --            | --            | --            | --    | 44,240  |             |
| All hardwoods                   | 154,727                 | 64,985      | 39,123      | 21,691      | 11,697       | 5,842         | 3,038         | 2,161         | 1,116         | 440           | 655           | 383           | 133           | --            | 108   | 306,100 |             |
| All species groups              | 171,264                 | 72,622      | 43,263      | 24,847      | 13,536       | 7,123         | 3,446         | 2,293         | 1,285         | 512           | 691           | 419           | 169           | --            | 108   | 341,579 |             |

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 ND-11.—Number of growing-stock trees (at least 5 inch d.b.h/d.r.c.), in thousands, on timberland by species group, species, and diameter class, North Dakota, 2010**

| Species group/Species                  | 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+ |             |
| <b>Softwood species groups</b>         |                         |         |          |           |           |           |           |           |           |           |           |           |       |             |
| <b>Eastern softwood species groups</b> |                         |         |          |           |           |           |           |           |           |           |           |           |       |             |
| Other eastern softwoods                | --                      | 31      | --       | --        | --        | --        | --        | --        | --        | --        | --        | --        | --    | 31          |
| Ponderosa pine                         | 179                     | 36      | --       | --        | --        | --        | --        | --        | --        | --        | --        | --        | --    | 215         |
| All Species                            | 179                     | 66      | --       | --        | --        | --        | --        | --        | --        | --        | --        | --        | --    | 245         |
| All softwoods                          | 179                     | 66      | --       | --        | --        | --        | --        | --        | --        | --        | --        | --        | --    | 245         |
| <b>Hardwood species groups</b>         |                         |         |          |           |           |           |           |           |           |           |           |           |       |             |
| <b>Eastern hardwood species groups</b> |                         |         |          |           |           |           |           |           |           |           |           |           |       |             |
| Select white oaks                      |                         |         |          |           |           |           |           |           |           |           |           |           |       |             |
| Bur oak                                | 2,287                   | 1,233   | 762      | 254       | 327       | 92        | 307       | 220       | 146       | 31        | --        | --        | --    | 5,658       |
| All Species                            | 2,287                   | 1,233   | 762      | 254       | 327       | 92        | 307       | 220       | 146       | 31        | --        | --        | --    | 5,658       |
| Ash                                    |                         |         |          |           |           |           |           |           |           |           |           |           |       |             |
| Black ash                              | 48                      | --      | --       | --        | --        | --        | --        | --        | --        | --        | --        | --        | --    | 48          |
| Green ash                              | 2,641                   | 1,929   | 1,080    | 717       | 366       | 345       | 99        | --        | 66        | --        | --        | --        | --    | 7,244       |
| All Species                            | 2,688                   | 1,929   | 1,080    | 717       | 366       | 345       | 99        | --        | 66        | --        | --        | --        | --    | 7,291       |
| Cottonwood and aspen                   |                         |         |          |           |           |           |           |           |           |           |           |           |       |             |
| Balsam poplar                          | 189                     | 153     | 192      | --        | 31        | --        | --        | --        | --        | --        | --        | --        | --    | 565         |
| Eastern cottonwood                     | 154                     | 230     | 107      | 112       | 38        | 69        | --        | 38        | 38        | --        | --        | --        | --    | 788         |
| Plains cottonwood                      | 181                     | 357     | 428      | 463       | 143       | 285       | 209       | --        | 173       | 250       | 133       | --        | --    | 2,622       |
| Quaking aspen                          | 5,490                   | 2,590   | 1,407    | 576       | 405       | 92        | --        | --        | --        | --        | --        | --        | --    | 10,561      |
| All Species                            | 6,013                   | 3,330   | 2,134    | 1,152     | 617       | 446       | 209       | 38        | 211       | 250       | 133       | --        | --    | 14,536      |
| Basswood                               |                         |         |          |           |           |           |           |           |           |           |           |           |       |             |
| American basswood                      | --                      | --      | --       | --        | 37        | 143       | 37        | --        | --        | --        | --        | --        | --    | 218         |
| All Species                            | --                      | --      | --       | --        | 37        | 143       | 37        | --        | --        | --        | --        | --        | --    | 218         |
| <b>Other eastern soft hardwoods</b>    |                         |         |          |           |           |           |           |           |           |           |           |           |       |             |
| Boxelder                               | 167                     | 92      | 107      | --        | --        | 66        | 76        | 41        | --        | --        | --        | --        | --    | 549         |
| Paper birch                            | 92                      | --      | --       | --        | --        | --        | --        | --        | --        | --        | --        | --        | --    | 92          |
| Black willow                           | --                      | --      | --       | --        | --        | --        | --        | --        | 37        | --        | --        | --        | --    | 37          |
| American elm                           | 693                     | 308     | 171      | 71        | 37        | 72        | --        | --        | 36        | 36        | --        | --        | --    | 1,423       |
| Siberian elm                           | --                      | 31      | 133      | 68        | --        | --        | --        | --        | --        | --        | --        | --        | --    | 231         |
| All Species                            | 951                     | 430     | 411      | 139       | 37        | 138       | 76        | 41        | 73        | 36        | --        | --        | --    | 2,333       |
| All hardwoods                          | 11,940                  | 6,923   | 4,388    | 2,263     | 1,385     | 1,165     | 728       | 299       | 496       | 316       | 133       | --        | --    | 30,036      |
| All species groups                     | 12,119                  | 6,989   | 4,388    | 2,263     | 1,385     | 1,165     | 728       | 299       | 496       | 316       | 133       | --        | --    | 30,281      |

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 ND-12.—Net volume of all live trees (at least 5 inches d.b.h./d.r.c.), in million cubic feet, by owner class and forest land status, North Dakota, 2010**

| Owner class                       | Unreserved forests |              | Total | Reserved forests |              | Total | All forest land |
|-----------------------------------|--------------------|--------------|-------|------------------|--------------|-------|-----------------|
|                                   | Timberland         | Unproductive |       | Productive       | Unproductive |       |                 |
| <b>Forest Service</b>             |                    |              |       |                  |              |       |                 |
| National grassland                | 26.2               | 23.9         | 50.1  | --               | --           | --    | 50.1            |
| <b>Other Federal</b>              |                    |              |       |                  |              |       |                 |
| National Park Service             | --                 | --           | --    | 3.2              | 6.6          | 9.8   | 9.8             |
| Bureau of Land Management         | --                 | 6.7          | 6.7   | --               | --           | --    | 6.7             |
| Fish and Wildlife Service         | 29.9               | --           | 29.9  | --               | --           | --    | 29.9            |
| Other Federal                     | 13.4               | 3.1          | 16.4  | --               | --           | --    | 16.4            |
| <b>State and local government</b> |                    |              |       |                  |              |       |                 |
| State                             | 34.8               | 6.2          | 41.0  | --               | --           | --    | 41.0            |
| Local (county, municipal, etc.)   | 21.3               | --           | 21.3  | --               | --           | --    | 21.3            |
| <b>Private</b>                    |                    |              |       |                  |              |       |                 |
| Undifferentiated private          | 466.9              | 69.1         | 536.0 | --               | --           | --    | 536.0           |
| <b>All owners</b>                 | 592.4              | 109.1        | 701.5 | 3.2              | 6.6          | 9.8   | 711.2           |

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 ND-13.—Net volume of all 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, North Dakota, 2010

| Forest-type group             | Stand-size class |                 |                |           |            | All size classes |
|-------------------------------|------------------|-----------------|----------------|-----------|------------|------------------|
|                               | Large diameter   | Medium diameter | Small diameter | Chaparral | Nonstocked |                  |
| Spruce / fir group            | --               | --              | 1.2            | --        | --         | 1.2              |
| Pinyon / juniper group        | 31.9             | 5.8             | 1.1            | --        | --         | 38.8             |
| Ponderosa pine group          | --               | 3.7             | --             | --        | --         | 3.7              |
| Oak / hickory group           | 122.4            | 164.8           | 1.9            | --        | --         | 289.0            |
| Elm / ash / cottonwood group  | 236.9            | 42.3            | 8.1            | --        | --         | 287.3            |
| Aspen / birch group           | 14.6             | 52.7            | 9.5            | --        | --         | 76.8             |
| Other hardwoods group         | --               | 0.5             | 9.1            | --        | --         | 9.6              |
| Exotic hardwoods group        | 1.6              | 3.3             | --             | --        | --         | 4.9              |
| <b>All forest-type groups</b> | <b>407.4</b>     | <b>273.1</b>    | <b>30.8</b>    | <b>--</b> | <b>--</b>  | <b>711.2</b>     |

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 ND-14.—Net volume of all live trees (at least 5 inches d.b.h./d.r.c.), in million cubic feet, on forest land by species group, species, and ownership group, North Dakota, 2010

| Species group/Species                  | Ownership group |               |                            |                          |  | All owners |
|--|-----------------|---------------|----------------------------|--------------------------|--|------------|
|  | Forest Service  | Other Federal | State and local government | Undifferentiated private |  |            |
| <b>Softwood species groups</b>         |                 |               |                            |                          |  |            |
| <b>Eastern softwood species groups</b> |                 |               |                            |                          |  |            |
| Other eastern softwoods                | --              | --            | --                         | 0.5                      |  | 0.5        |
| Eastern redcedar                       | --              | --            | --                         | 3.4                      |  | 3.4        |
| Ponderosa pine                         | --              | --            | --                         | 3.9                      |  | 3.9        |
| All Species                            |                 |               |                            |                          |  |            |
| <b>Other softwood species group</b>    |                 |               |                            |                          |  |            |
| Woodland softwoods                     | 23.6            | 9.1           | 3.4                        | 5.1                      |  | 41.2       |
| Rocky Mountain juniper                 | 23.6            | 9.1           | 3.4                        | 5.1                      |  | 41.2       |
| All Species                            | 23.6            | 9.1           | 3.4                        | 9.0                      |  | 45.2       |

(Table ND-14 continued on next page)

(Table ND-14 continued)

| Species group/Species                  | Ownership group |               |                            |                          |              | All owners |
|--|-----------------|---------------|----------------------------|--------------------------|--------------|------------|
|  | Forest Service  | Other Federal | State and local government | Undifferentiated private |              |            |
| <b>Hardwood species groups</b>         |                 |               |                            |                          |              |            |
| <b>Eastern hardwood species groups</b> |                 |               |                            |                          |              |            |
| Select white oaks                      |                 |               |                            |                          |              |            |
| Bur oak                                | 12.3            | 12.0          | 8.9                        | 138.6                    | 171.8        |            |
| All Species                            | 12.3            | 12.0          | 8.9                        | 138.6                    | 171.8        |            |
| Ash                                    |                 |               |                            |                          |              |            |
| Black ash                              | 0.1             | --            | --                         | --                       | 0.1          |            |
| Green ash                              | 6.7             | 21.8          | 5.2                        | 97.4                     | 131.1        |            |
| All Species                            | 6.8             | 21.8          | 5.2                        | 97.4                     | 131.2        |            |
| Cottonwood and aspen                   |                 |               |                            |                          |              |            |
| Balsam poplar                          | --              | 0.2           | --                         | 5.1                      | 5.3          |            |
| Eastern cottonwood                     | --              | 3.1           | 8.3                        | 29.3                     | 40.7         |            |
| Plains cottonwood                      | --              | --            | 30.3                       | 96.8                     | 127.1        |            |
| Quaking aspen                          | --              | 5.4           | 2.7                        | 67.9                     | 75.9         |            |
| All Species                            | --              | 8.6           | 41.3                       | 199.1                    | 249.1        |            |
| Basswood                               |                 |               |                            |                          |              |            |
| American basswood                      | 6.3             | --            | --                         | 12.4                     | 18.7         |            |
| All Species                            | 6.3             | --            | --                         | 12.4                     | 18.7         |            |
| Other eastern soft hardwoods           |                 |               |                            |                          |              |            |
| Boxelder                               | 0.8             | 8.9           | 3.1                        | 38.7                     | 51.5         |            |
| Paper birch                            | --              | --            | --                         | 0.9                      | 0.9          |            |
| Black cherry                           | --              | 0.0           | --                         | --                       | 0.0          |            |
| Black willow                           | --              | --            | --                         | 3.8                      | 3.8          |            |
| American elm                           | 0.4             | 2.2           | 0.2                        | 29.3                     | 32.1         |            |
| Siberian elm                           | --              | --            | --                         | 4.8                      | 4.8          |            |
| Slippery elm                           | --              | --            | --                         | 0.1                      | 0.1          |            |
| All Species                            | 1.2             | 11.1          | 3.3                        | 77.7                     | 93.3         |            |
| Eastern noncommercial hardwoods        |                 |               |                            |                          |              |            |
| Apple spp.                             | --              | --            | --                         | 0.5                      | 0.5          |            |
| Eastern hophornbeam                    | --              | --            | --                         | 0.1                      | 0.1          |            |
| Peachleaf willow                       | --              | --            | 0.2                        | 1.1                      | 1.3          |            |
| Russian-olive                          | --              | --            | --                         | 0.2                      | 0.2          |            |
| All Species                            | --              | --            | 0.2                        | 1.8                      | 2.0          |            |
| <b>All hardwoods</b>                   | <b>26.5</b>     | <b>53.6</b>   | <b>58.9</b>                | <b>527.0</b>             | <b>666.1</b> |            |
| <b>All species groups</b>              | <b>50.1</b>     | <b>62.8</b>   | <b>62.3</b>                | <b>536.0</b>             | <b>711.2</b> |            |

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 ND-15.—Net volume of all live trees (at least 5 inches d.b.h./d.r.c.), in million cubic feet, on forest land by species group, species, and diameter class, North Dakota, 2010**

| Species group/Species                  | 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+ |    |   |             |
| <b>Softwood species groups</b>         |                         |         |          |           |           |           |           |           |           |           |           |           |       |    |   |             |
| <b>Eastern softwood species groups</b> |                         |         |          |           |           |           |           |           |           |           |           |           |       |    |   |             |
| Other eastern softwoods                |                         |         |          |           |           |           |           |           |           |           |           |           |       |    |   |             |
| Eastern redcedar                       | 0                       | 0       | --       | 0         | --        | --        | --        | --        | --        | --        | --        | --        | --    | -- | 1 |             |
| Ponderosa pine                         | 0                       | 0       | --       | --        | --        | --        | --        | --        | --        | 3         | --        | --        | --    | 3  |   |             |
| All Species                            | 0                       | 1       | --       | 0         | --        | 0         | --        | --        | --        | 3         | --        | --        | --    | 4  |   |             |
| <b>Other softwood species group</b>    |                         |         |          |           |           |           |           |           |           |           |           |           |       |    |   |             |
| Woodland softwoods                     |                         |         |          |           |           |           |           |           |           |           |           |           |       |    |   |             |
| Rocky Mountain Juniper                 | 4                       | 8       | 8        | 9         | 4         | 2         | 3         | 2         | 1         | --        | 1         | --        | --    | 41 |   |             |
| All Species                            | 4                       | 8       | 8        | 9         | 4         | 2         | 3         | 2         | 1         | --        | 1         | --        | --    | 41 |   |             |
| <b>All softwoods</b>                   | 5                       | 8       | 8        | 9         | 4         | 2         | 3         | 2         | 1         | 3         | 1         | --        | --    | 45 |   |             |

(Table ND-15 continued on next page)

(Table ND-15 continued)

| Species group/Species                  | 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+     |            |             |
| <b>Hardwood species groups</b>         |                         |           |           |           |           |           |           |           |           |           |           |           |           |            |             |
| <b>Eastern hardwood species groups</b> |                         |           |           |           |           |           |           |           |           |           |           |           |           |            |             |
| Select white oaks                      |                         |           |           |           |           |           |           |           |           |           |           |           |           |            |             |
| Bur oak                                | 27                      | 29        | 27        | 18        | 16        | 8         | 16        | 14        | 13        | 3         | --        | --        | --        | 172        |             |
| All Species                            | 27                      | 29        | 27        | 18        | 16        | 8         | 16        | 14        | 13        | 3         | --        | --        | --        | 172        |             |
| Ash                                    | 0                       | --        | --        | --        | --        | --        | --        | --        | --        | --        | --        | --        | --        | 0          |             |
| Black ash                              | 21                      | 27        | 22        | 17        | 14        | 17        | 5         | 1         | 5         | --        | --        | --        | --        | 131        |             |
| Green ash                              | 22                      | 27        | 22        | 17        | 14        | 17        | 5         | 1         | 5         | --        | --        | --        | --        | 131        |             |
| All Species                            | 22                      | 27        | 22        | 17        | 14        | 17        | 5         | 1         | 5         | --        | --        | --        | --        | 131        |             |
| Cottonwood and aspen                   |                         |           |           |           |           |           |           |           |           |           |           |           |           |            |             |
| Balsam poplar                          | 1                       | 2         | 2         | 0         | 1         | --        | --        | --        | --        | --        | --        | --        | --        | 5          |             |
| Eastern cottonwood                     | 1                       | 1         | 1         | 2         | 2         | 2         | --        | 3         | 3         | --        | --        | --        | 26        | 41         |             |
| Plains cottonwood                      | 1                       | 3         | 5         | 8         | 4         | 13        | 10        | --        | 18        | 34        | 23        | --        | 8         | 127        |             |
| Quaking aspen                          | 16                      | 15        | 16        | 11        | 12        | 4         | 2         | --        | --        | --        | --        | --        | --        | 76         |             |
| All Species                            | 18                      | 22        | 24        | 21        | 19        | 19        | 12        | 3         | 21        | 34        | 23        | --        | 34        | 249        |             |
| Basswood                               |                         |           |           |           |           |           |           |           |           |           |           |           |           |            |             |
| American basswood                      | 0                       | 1         | 0         | 1         | 3         | 7         | 1         | --        | --        | 4         | --        | --        | --        | 19         |             |
| All Species                            | 0                       | 1         | 0         | 1         | 3         | 7         | 1         | --        | --        | 4         | --        | --        | --        | 19         |             |
| Other eastern soft hardwoods           |                         |           |           |           |           |           |           |           |           |           |           |           |           |            |             |
| Boxelder                               | 4                       | 5         | 8         | 10        | 5         | 6         | 8         | 4         | 1         | --        | --        | --        | --        | 51         |             |
| Paper birch                            | 0                       | 0         | 0         | --        | --        | --        | --        | --        | --        | --        | --        | --        | --        | 1          |             |
| Black cherry                           | 0                       | --        | --        | --        | --        | --        | --        | --        | --        | --        | --        | --        | --        | 0          |             |
| Black willow                           | --                      | --        | --        | 1         | --        | --        | --        | --        | 3         | --        | --        | --        | --        | 4          |             |
| American elm                           | 5                       | 5         | 6         | 3         | 2         | 3         | 1         | --        | 3         | 4         | --        | --        | --        | 32         |             |
| Siberian elm                           | 0                       | 0         | 1         | 1         | --        | 2         | --        | --        | --        | --        | --        | --        | --        | 5          |             |
| Slippery elm                           | --                      | 0         | --        | --        | --        | --        | --        | --        | --        | --        | --        | --        | --        | 0          |             |
| All Species                            | 10                      | 11        | 15        | 16        | 6         | 11        | 9         | 4         | 7         | 4         | --        | --        | --        | 93         |             |
| Eastern noncommercial hardwoods        |                         |           |           |           |           |           |           |           |           |           |           |           |           |            |             |
| Apple spp.                             | 0                       | 0         | --        | --        | --        | --        | --        | --        | --        | --        | --        | --        | --        | 1          |             |
| Eastern hophornbeam                    | 0                       | --        | --        | --        | --        | --        | --        | --        | --        | --        | --        | --        | --        | 0          |             |
| Peachleaf willow                       | 0                       | 0         | 0         | --        | 1         | --        | --        | --        | --        | --        | --        | --        | --        | 1          |             |
| Russian-olive                          | --                      | 0         | --        | --        | --        | --        | --        | --        | --        | --        | --        | --        | --        | 0          |             |
| All Species                            | 0                       | 1         | 0         | --        | 1         | 0         | --        | --        | --        | --        | --        | --        | --        | 2          |             |
| <b>All hardwoods</b>                   | <b>78</b>               | <b>90</b> | <b>89</b> | <b>74</b> | <b>59</b> | <b>62</b> | <b>43</b> | <b>22</b> | <b>46</b> | <b>46</b> | <b>23</b> | <b>--</b> | <b>34</b> | <b>666</b> |             |
| <b>All species groups</b>              | <b>82</b>               | <b>98</b> | <b>97</b> | <b>83</b> | <b>63</b> | <b>64</b> | <b>46</b> | <b>24</b> | <b>47</b> | <b>48</b> | <b>24</b> | <b>--</b> | <b>34</b> | <b>711</b> |             |

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

**Table ND-16.—Net volume of all 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, North Dakota, 2010**

| Forest-type group             | Stand origin   |                         | All forest land |
|-------------------------------|----------------|-------------------------|-----------------|
|                               | Natural stands | Artificial regeneration |                 |
| Spruce / fir group            | --             | 1.2                     | 1.2             |
| Pinyon / juniper group        | 38.8           | --                      | 38.8            |
| Ponderosa pine group          | 3.7            | --                      | 3.7             |
| Oak / hickory group           | 289.0          | --                      | 289.0           |
| Elm / ash / cottonwood group  | 264.7          | 22.6                    | 287.3           |
| Aspen / birch group           | 76.8           | --                      | 76.8            |
| Other hardwoods group         | 9.1            | 0.5                     | 9.6             |
| Exotic hardwoods group        | 4.9            | --                      | 4.9             |
| <b>All forest-type groups</b> | <b>687.0</b>   | <b>24.3</b>             | <b>711.2</b>    |

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 ND-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, species, and diameter class, North Dakota, 2010**

| Species group/Species               | 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+ |     |             |
| <b>Softwood species groups</b>      |                         |         |          |           |           |           |           |           |           |           |           |           |       |     |             |
| Eastern softwood species groups     |                         |         |          |           |           |           |           |           |           |           |           |           |       |     |             |
| Other eastern softwoods             |                         |         |          |           |           |           |           |           |           |           |           |           |       |     |             |
| Eastern redcedar                    | --                      | 0       | --       | --        | --        | --        | --        | --        | --        | --        | --        | --        | --    | 0   |             |
| Ponderosa pine                      | 0                       | 0       | --       | --        | --        | --        | --        | --        | --        | --        | --        | --        | --    | 0   |             |
| All species                         | 0                       | 0       | --       | --        | --        | --        | --        | --        | --        | --        | --        | --        | --    | 0   |             |
| <b>All softwoods</b>                |                         |         |          |           |           |           |           |           |           |           |           |           |       |     |             |
| <b>Hardwood species groups</b>      |                         |         |          |           |           |           |           |           |           |           |           |           |       |     |             |
| Eastern hardwood species groups     |                         |         |          |           |           |           |           |           |           |           |           |           |       |     |             |
| Select white oaks                   |                         |         |          |           |           |           |           |           |           |           |           |           |       |     |             |
| Bur oak                             | 5                       | 6       | 6        | 4         | 7         | 3         | 12        | 11        | 10        | 3         | --        | --        | --    | 67  |             |
| All species                         | 5                       | 6       | 6        | 4         | 7         | 3         | 12        | 11        | 10        | 3         | --        | --        | --    | 67  |             |
| Ash                                 |                         |         |          |           |           |           |           |           |           |           |           |           |       |     |             |
| Black ash                           | 0                       | --      | --       | --        | --        | --        | --        | --        | --        | --        | --        | --        | --    | 0   |             |
| Green ash                           | 5                       | 9       | 9        | 9         | 7         | 10        | 4         | --        | 4         | --        | --        | --        | --    | 58  |             |
| All species                         | 6                       | 9       | 9        | 9         | 7         | 10        | 4         | --        | 4         | --        | --        | --        | --    | 58  |             |
| Cottonwood and aspen                |                         |         |          |           |           |           |           |           |           |           |           |           |       |     |             |
| Balsam poplar                       | 1                       | 1       | 2        | --        | 1         | --        | --        | --        | --        | --        | --        | --        | --    | 4   |             |
| Eastern cottonwood                  | 0                       | 1       | 1        | 2         | 1         | 2         | --        | 3         | 3         | --        | --        | --        | --    | 13  |             |
| Plains cottonwood                   | 1                       | 2       | 4        | 7         | 3         | 9         | 10        | --        | 16        | 30        | 23        | --        | --    | 105 |             |
| Quaking aspen                       | 13                      | 13      | 13       | 9         | 9         | 3         | --        | --        | --        | --        | --        | --        | --    | 58  |             |
| All species                         | 14                      | 17      | 20       | 17        | 14        | 14        | 10        | 3         | 19        | 30        | 23        | --        | --    | 180 |             |
| <b>Basswood</b>                     |                         |         |          |           |           |           |           |           |           |           |           |           |       |     |             |
| American basswood                   | --                      | --      | --       | --        | 1         | 4         | 1         | --        | --        | --        | --        | --        | --    | 6   |             |
| All species                         | --                      | --      | --       | --        | 1         | 4         | 1         | --        | --        | --        | --        | --        | --    | 6   |             |
| <b>Other eastern soft hardwoods</b> |                         |         |          |           |           |           |           |           |           |           |           |           |       |     |             |
| Boxelder                            | 0                       | 1       | 1        | --        | --        | 2         | 3         | 2         | --        | --        | --        | --        | --    | 9   |             |
| Paper birch                         | 0                       | --      | --       | --        | --        | --        | --        | --        | --        | --        | --        | --        | --    | 0   |             |
| Black willow                        | --                      | --      | --       | --        | --        | --        | --        | --        | 3         | --        | --        | --        | --    | 3   |             |
| American elm                        | 1                       | 1       | 1        | 1         | 1         | 2         | --        | --        | 3         | 4         | --        | --        | --    | 15  |             |
| Siberian elm                        | --                      | 0       | 1        | 1         | --        | --        | --        | --        | --        | --        | --        | --        | --    | 2   |             |
| All species                         | 2                       | 2       | 3        | 2         | 1         | 4         | 3         | 2         | 5         | 4         | --        | --        | --    | 29  |             |
| <b>All hardwoods</b>                | 27                      | 33      | 38       | 32        | 30        | 36        | 31        | 16        | 38        | 38        | 23        | --        | --    | 340 |             |
| <b>All species groups</b>           | 27                      | 34      | 38       | 32        | 30        | 36        | 31        | 16        | 38        | 38        | 23        | --        | --    | 341 |             |

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 ND-18.—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, species, and ownership group, North Dakota, 2010

| Species group/Species                  | Ownership group |               |                            |                          | All owners |
|--|-----------------|---------------|----------------------------|--------------------------|------------|
|  | Forest Service  | Other Federal | State and local government | Undifferentiated private |            |
| <b>Softwood species groups</b>         |                 |               |                            |                          |            |
| <b>Eastern softwood species groups</b> |                 |               |                            |                          |            |
| Other eastern softwoods                |                 |               |                            |                          |            |
| Eastern redcedar                       | --              | --            | --                         | 0.1                      | 0.1        |
| Ponderosa pine                         | --              | --            | --                         | 0.3                      | 0.3        |
| All species                            | --              | --            | --                         | 0.5                      | 0.5        |
| <b>All softwoods</b>                   | --              | --            | --                         | 0.5                      | 0.5        |
| <b>Hardwood species groups</b>         |                 |               |                            |                          |            |
| <b>Eastern hardwood species groups</b> |                 |               |                            |                          |            |
| Select white oaks                      |                 |               |                            |                          |            |
| Bur oak                                | 4.5             | 2.0           | 2.0                        | 58.2                     | 66.7       |
| All species                            | 4.5             | 2.0           | 2.0                        | 58.2                     | 66.7       |
| Ash                                    |                 |               |                            |                          |            |
| Black ash                              | 0.1             | --            | --                         | --                       | 0.1        |
| Green ash                              | 1.8             | 8.4           | 1.0                        | 46.9                     | 58.0       |
| All species                            | 1.9             | 8.4           | 1.0                        | 46.9                     | 58.1       |
| Cottonwood and aspen                   |                 |               |                            |                          |            |
| Balsam poplar                          | --              | 0.2           | --                         | 3.4                      | 3.6        |
| Eastern cottonwood                     | --              | 3.1           | 8.2                        | 2.0                      | 13.3       |
| Plains cottonwood                      | --              | --            | 11.3                       | 93.8                     | 105.1      |
| Quaking aspen                          | --              | 2.5           | 1.6                        | 54.2                     | 58.4       |
| All species                            | --              | 5.8           | 21.2                       | 153.4                    | 180.3      |
| Basswood                               |                 |               |                            |                          |            |
| American basswood                      | 4.0             | --            | --                         | 2.3                      | 6.3        |
| All species                            | 4.0             | --            | --                         | 2.3                      | 6.3        |
| Other eastern soft hardwoods           |                 |               |                            |                          |            |
| Boxelder                               | --              | 0.1           | 0.0                        | 8.6                      | 8.7        |
| Paper birch                            | --              | --            | --                         | 0.1                      | 0.1        |
| Black willow                           | --              | --            | --                         | 2.7                      | 2.7        |
| American elm                           | --              | 0.8           | --                         | 14.6                     | 15.3       |
| Siberian elm                           | --              | --            | --                         | 2.2                      | 2.2        |
| All species                            | --              | 0.8           | 0.0                        | 28.1                     | 29.0       |
| <b>All hardwoods</b>                   | 10.4            | 17.0          | 24.2                       | 288.9                    | 340.5      |
| <b>All species groups</b>              | 10.4            | 17.0          | 24.2                       | 289.3                    | 341.0      |

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 ND-19.—Net volume of sawtimber trees, in million board feet, (International ¼-inch rule) on timberland by species group, species, and diameter class, North Dakota, 2010

| Species group/Species                  | 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+ |    |    |       |             |
| <b>Hardwood species groups</b>         |                         |           |           |           |           |           |           |           |           |           |       |    |    |       |             |
| <b>Eastern hardwood species groups</b> |                         |           |           |           |           |           |           |           |           |           |       |    |    |       |             |
| Select white oaks                      |                         |           |           |           |           |           |           |           |           |           |       |    |    |       |             |
| Bur oak                                | --                      | 17        | 32        | 13        | 60        | 55        | 48        | 18        | --        | --        | --    | -- | -- | 243   |             |
| All species                            | --                      | 17        | 32        | 13        | 60        | 55        | 48        | 18        | --        | --        | --    | -- | -- | 243   |             |
| Ash                                    |                         |           |           |           |           |           |           |           |           |           |       |    |    |       |             |
| Green ash                              | --                      | 39        | 33        | 47        | 17        | --        | 20        | --        | --        | --        | --    | -- | -- | 157   |             |
| All species                            | --                      | 39        | 33        | 47        | 17        | --        | 20        | --        | --        | --        | --    | -- | -- | 157   |             |
| Cottonwood and aspen                   |                         |           |           |           |           |           |           |           |           |           |       |    |    |       |             |
| Balsam poplar                          | --                      | --        | 3         | --        | --        | --        | --        | --        | --        | --        | --    | -- | -- | 3     |             |
| Eastern cottonwood                     | --                      | 7         | 4         | 12        | --        | 13        | 16        | --        | --        | --        | --    | -- | -- | 51    |             |
| Plains cottonwood                      | --                      | 30        | 16        | 45        | 49        | --        | 80        | 159       | 119       | --        | --    | -- | -- | 498   |             |
| Quaking aspen                          | --                      | 40        | 45        | 14        | --        | --        | --        | --        | --        | --        | --    | -- | -- | 98    |             |
| All species                            | --                      | 77        | 67        | 70        | 49        | 13        | 96        | 159       | 119       | --        | --    | -- | -- | 650   |             |
| Basswood                               |                         |           |           |           |           |           |           |           |           |           |       |    |    |       |             |
| American basswood                      | --                      | --        | 5         | 21        | 8         | --        | --        | --        | --        | --        | --    | -- | -- | 34    |             |
| All species                            | --                      | --        | 5         | 21        | 8         | --        | --        | --        | --        | --        | --    | -- | -- | 34    |             |
| Other eastern soft hardwoods           |                         |           |           |           |           |           |           |           |           |           |       |    |    |       |             |
| Boxelder                               | --                      | --        | --        | 8         | 15        | 9         | --        | --        | --        | --        | --    | -- | -- | 31    |             |
| Black willow                           | --                      | --        | --        | --        | --        | --        | 12        | --        | --        | --        | --    | -- | -- | 12    |             |
| American elm                           | --                      | 5         | 4         | 10        | --        | --        | 13        | 20        | --        | --        | --    | -- | -- | 51    |             |
| Siberian elm                           | --                      | 4         | --        | --        | --        | --        | --        | --        | --        | --        | --    | -- | -- | 4     |             |
| All species                            | --                      | 9         | 4         | 17        | 15        | 9         | 25        | 20        | --        | --        | --    | -- | -- | 99    |             |
| <b>All hardwoods</b>                   | --                      | 142       | 140       | 169       | 149       | 77        | 190       | 198       | 119       | --        | --    | -- | -- | 1,183 |             |
| <b>All species groups</b>              | --                      | 142       | 140       | 169       | 149       | 77        | 190       | 198       | 119       | --        | --    | -- | -- | 1,183 |             |

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 ND-19a.—Net volume of sawtimber trees, in million board feet, (Doyle rule) on timberland by species group, species, and diameter class, North Dakota, 2010**

| Species group/Species                  | 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+ |    |    |     |             |
| <b>Hardwood species groups</b>         |                         |           |           |           |           |           |           |           |           |           |       |    |    |     |             |
| <b>Eastern hardwood species groups</b> |                         |           |           |           |           |           |           |           |           |           |       |    |    |     |             |
| Select white oaks                      |                         |           |           |           |           |           |           |           |           |           |       |    |    |     |             |
| Bur oak                                | --                      | 7         | 16        | 8         | 39        | 40        | 38        | 17        | --        | --        | --    | -- | -- | 165 |             |
| All species                            | --                      | 7         | 16        | 8         | 39        | 40        | 38        | 17        | --        | --        | --    | -- | -- | 165 |             |
| Ash                                    |                         |           |           |           |           |           |           |           |           |           |       |    |    |     |             |
| Green ash                              | --                      | 16        | 17        | 28        | 11        | --        | 16        | --        | --        | --        | --    | -- | -- | 88  |             |
| All species                            | --                      | 16        | 17        | 28        | 11        | --        | 16        | --        | --        | --        | --    | -- | -- | 88  |             |
| Cottonwood and aspen                   |                         |           |           |           |           |           |           |           |           |           |       |    |    |     |             |
| Balsam poplar                          | --                      | --        | 1         | --        | --        | --        | --        | --        | --        | --        | --    | -- | -- | 1   |             |
| Eastern cottonwood                     | --                      | 3         | 2         | 7         | --        | 9         | 13        | --        | --        | --        | --    | -- | -- | 33  |             |
| Plains cottonwood                      | --                      | 12        | 8         | 26        | 32        | --        | 65        | 141       | 135       | --        | --    | -- | -- | 421 |             |
| Quaking aspen                          | --                      | 17        | 23        | 8         | --        | --        | --        | --        | --        | --        | --    | -- | -- | 48  |             |
| All species                            | --                      | 32        | 34        | 41        | 32        | 9         | 78        | 141       | 135       | --        | --    | -- | -- | 503 |             |
| Basswood                               |                         |           |           |           |           |           |           |           |           |           |       |    |    |     |             |
| American basswood                      | --                      | --        | 2         | 12        | 5         | --        | --        | --        | --        | --        | --    | -- | -- | 20  |             |
| All species                            | --                      | --        | 2         | 12        | 5         | --        | --        | --        | --        | --        | --    | -- | -- | 20  |             |
| Other eastern soft hardwoods           |                         |           |           |           |           |           |           |           |           |           |       |    |    |     |             |
| Boxelder                               | --                      | --        | --        | 4         | 10        | 6         | --        | --        | --        | --        | --    | -- | -- | 21  |             |
| Black willow                           | --                      | --        | --        | --        | --        | --        | 10        | --        | --        | --        | --    | -- | -- | 10  |             |
| American elm                           | --                      | 2         | 2         | 6         | --        | --        | 10        | 19        | --        | --        | --    | -- | -- | 39  |             |
| Siberian elm                           | --                      | 2         | --        | --        | --        | --        | --        | --        | --        | --        | --    | -- | -- | 2   |             |
| All species                            | --                      | 4         | 2         | 10        | 10        | 6         | 20        | 19        | --        | --        | --    | -- | -- | 72  |             |
| <b>All hardwoods</b>                   | --                      | 59        | 71        | 100       | 98        | 55        | 152       | 177       | 135       | --        | --    | -- | -- | 847 |             |
| <b>All species groups</b>              | --                      | 59        | 71        | 100       | 98        | 55        | 152       | 177       | 135       | --        | --    | -- | -- | 847 |             |

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 ND-20.—Net volume of sawtimber trees, in million cubic feet, on timberland by species group, species, and ownership group, North Dakota, 2010

| Species group/Species                  | Ownership group |               |                            |                          | All owners   |
|--|-----------------|---------------|----------------------------|--------------------------|--------------|
|  | Forest Service  | Other Federal | State and local government | Undifferentiated private |              |
| <b>Hardwood species groups</b>         |                 |               |                            |                          |              |
| <b>Eastern hardwood species groups</b> |                 |               |                            |                          |              |
| Select white oaks                      |                 |               |                            |                          |              |
| Bur oak                                | 2.5             | 0.6           | 0.5                        | 40.3                     | 43.9         |
| All species                            | 2.5             | 0.6           | 0.5                        | 40.3                     | 43.9         |
| Ash                                    |                 |               |                            |                          |              |
| Green ash                              | 0.4             | 4.9           | 0.3                        | 22.9                     | 28.5         |
| All species                            | 0.4             | 4.9           | 0.3                        | 22.9                     | 28.5         |
| Cottonwood and aspen                   |                 |               |                            |                          |              |
| Balsam poplar                          | --              | --            | --                         | 0.4                      | 0.4          |
| Eastern cottonwood                     | --              | 2.9           | 5.0                        | 1.5                      | 9.4          |
| Plains cottonwood                      | --              | --            | 10.8                       | 81.2                     | 92.0         |
| Quaking aspen                          | --              | 1.0           | 0.7                        | 13.8                     | 15.5         |
| All species                            | --              | 3.9           | 16.6                       | 97.0                     | 117.4        |
| Basswood                               |                 |               |                            |                          |              |
| American basswood                      | 3.5             | --            | --                         | 2.0                      | 5.5          |
| All species                            | 3.5             | --            | --                         | 2.0                      | 5.5          |
| <b>Other eastern soft hardwoods</b>    |                 |               |                            |                          |              |
| Boxelder                               | --              | --            | --                         | 6.2                      | 6.2          |
| Black willow                           | --              | --            | --                         | 2.5                      | 2.5          |
| American elm                           | --              | --            | --                         | 10.0                     | 10.0         |
| Siberian elm                           | --              | --            | --                         | 0.6                      | 0.6          |
| All species                            | --              | --            | --                         | 19.3                     | 19.3         |
| <b>All hardwoods</b>                   | <b>6.4</b>      | <b>9.4</b>    | <b>17.3</b>                | <b>181.6</b>             | <b>214.7</b> |
| <b>All species groups</b>              | <b>6.4</b>      | <b>9.4</b>    | <b>17.3</b>                | <b>181.6</b>             | <b>214.7</b> |

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 ND-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, North Dakota, 2005 to 2010**

| Owner class                       | Unreserved forests |              | Reserved forests |              | All forest land |
|-----------------------------------|--------------------|--------------|------------------|--------------|-----------------|
|                                   | Timberland         | Unproductive | Productive       | Unproductive |                 |
| <b>Forest Service</b>             |                    |              |                  |              |                 |
| National grassland                | 0.6                | 0.6          | 1.2              | --           | 1.2             |
| <b>Other Federal</b>              |                    |              |                  |              |                 |
| National Park Service             | --                 | --           | --               | -0.3         | -0.2            |
| Bureau of Land Management         | --                 | 0.1          | 0.1              | --           | 0.1             |
| Fish and Wildlife Service         | -1.2               | --           | -1.2             | 0.0          | -1.2            |
| Other Federal                     | 0.1                | 0.1          | 0.3              | --           | 0.3             |
| <b>State and local government</b> |                    |              |                  |              |                 |
| State                             | 2.0                | 0.2          | 2.2              | --           | 2.2             |
| Local (county, municipal, etc.)   | 0.0                | --           | 0.0              | --           | 0.0             |
| <b>Private</b>                    |                    |              |                  |              |                 |
| Undifferentiated private          | 8.7                | 2.4          | 11.1             | 0.1          | 11.2            |
| <b>All owners</b>                 | 10.2               | 3.5          | 13.6             | 0.2          | 13.5            |

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 ND-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, North Dakota, 2005 to 2010

| Forest-type group             | Stand-size class |                 |                |           | All size classes |
|-------------------------------|------------------|-----------------|----------------|-----------|------------------|
|                               | Large diameter   | Medium diameter | Small diameter | Chaparral |                  |
| Pinyon / juniper group        | 0.2              | 0.4             | 0.1            | --        | 0.6              |
| Ponderosa pine group          | --               | 0.7             | --             | --        | 0.7              |
| Oak / hickory group           | 2.7              | 3.8             | 0.5            | --        | 7.1              |
| Elm / ash / cottonwood group  | 3.1              | 1.4             | -0.1           | --        | 4.4              |
| Maple / beech / birch group   | -0.2             | --              | --             | --        | -0.2             |
| Aspen / birch group           | -0.6             | 0.1             | 0.4            | --        | 0.0              |
| Other hardwoods group         | --               | 0.1             | 0.6            | --        | 0.7              |
| Exotic hardwoods group        | --               | 0.1             | --             | --        | 0.1              |
| Nonstocked                    | --               | --              | --             | --        | 0.0              |
| <b>All forest-type groups</b> | <b>5.2</b>       | <b>6.7</b>      | <b>1.6</b>     | <b>--</b> | <b>13.5</b>      |

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 ND-23.—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 species group, species, and ownership group, North Dakota, 2005 to 2010

| Species group/Species                  | Ownership group |               |                            |                          | All owners |
|--|-----------------|---------------|----------------------------|--------------------------|------------|
|  | Forest Service  | Other Federal | State and local government | Undifferentiated private |            |
| <b>Softwood species groups</b>         |                 |               |                            |                          |            |
| <b>Eastern softwood species groups</b> |                 |               |                            |                          |            |
| Other eastern softwoods                |                 |               |                            |                          |            |
| Eastern redcedar                       | --              | --            | --                         | 0.0                      | 0.0        |
| Ponderosa pine                         | --              | --            | --                         | 0.7                      | 0.7        |
| All species                            | --              | --            | --                         | 0.7                      | 0.7        |
| <b>Other softwood species group</b>    |                 |               |                            |                          |            |
| Woodland softwoods                     |                 |               |                            |                          |            |
| Rocky Mountain juniper                 | 0.6             | -0.3          | 0.1                        | 0.5                      | 1.0        |
| All species                            | 0.6             | -0.3          | 0.1                        | 0.5                      | 1.0        |
| <b>All softwoods</b>                   | 0.6             | -0.3          | 0.1                        | 1.2                      | 1.7        |

(Table ND-23 continued on next page)

(Table ND-23 continued)

| Species group/Species                  | Ownership group |               |                            |                          |      | All owners |
|--|-----------------|---------------|----------------------------|--------------------------|------|------------|
|  | Forest Service  | Other Federal | State and local government | Undifferentiated private |      |            |
| <b>Hardwood species groups</b>         |                 |               |                            |                          |      |            |
| <b>Eastern hardwood species groups</b> |                 |               |                            |                          |      |            |
| Select white oaks                      |                 |               |                            |                          |      |            |
| Bur oak                                | 0.3             | -0.9          | 0.6                        | 2.3                      | 2.3  |            |
| All species                            | 0.3             | -0.9          | 0.6                        | 2.3                      | 2.3  |            |
| Ash                                    |                 |               |                            |                          |      |            |
| Black ash                              | 0.0             | --            | 0.0                        | --                       | 0.0  |            |
| Green ash                              | 0.1             | -0.2          | 0.2                        | 2.6                      | 2.8  |            |
| All species                            | 0.1             | -0.2          | 0.2                        | 2.6                      | 2.8  |            |
| Cottonwood and aspen                   |                 |               |                            |                          |      |            |
| Balsam poplar                          | --              | 0.0           | --                         | -0.5                     | -0.5 |            |
| Eastern cottonwood                     | --              | 0.1           | 0.3                        | 0.9                      | 1.2  |            |
| Plains cottonwood                      | --              | 0.1           | 0.6                        | 2.1                      | 2.8  |            |
| Quaking aspen                          | --              | 0.0           | 0.1                        | 0.0                      | 0.1  |            |
| All species                            | --              | 0.1           | 1.0                        | 2.5                      | 3.6  |            |
| Basswood                               |                 |               |                            |                          |      |            |
| American basswood                      | 0.2             | --            | --                         | 0.5                      | 0.7  |            |
| All species                            | 0.2             | --            | --                         | 0.5                      | 0.7  |            |
| Other eastern soft hardwoods           |                 |               |                            |                          |      |            |
| Boxelder                               | 0.0             | 0.2           | 0.1                        | 0.6                      | 1.0  |            |
| Paper birch                            | --              | --            | --                         | 0.0                      | 0.0  |            |
| Black cherry                           | --              | 0.0           | --                         | --                       | 0.0  |            |
| Black willow                           | --              | --            | --                         | 0.2                      | 0.2  |            |
| American elm                           | -0.1            | 0.1           | 0.0                        | 0.9                      | 0.8  |            |
| Siberian elm                           | --              | --            | --                         | 0.3                      | 0.3  |            |
| Slippery elm                           | --              | --            | --                         | 0.0                      | 0.0  |            |
| All species                            | -0.1            | 0.3           | 0.2                        | 2.0                      | 2.3  |            |

(Table ND-23 continued on next page)

(Table ND-23 continued)

| Species group/Species           | Ownership group |               |                            |                          |      | All owners |
|---------------------------------|-----------------|---------------|----------------------------|--------------------------|------|------------|
|                                 | Forest Service  | Other Federal | State and local government | Undifferentiated private |      |            |
| Eastern noncommercial hardwoods |                 |               |                            |                          |      |            |
| Apple spp.                      | --              | --            | --                         | 0.1                      | 0.1  | 0.1        |
| Eastern hophornbeam             | --              | --            | --                         | 0.0                      | 0.0  | 0.0        |
| Willow spp.                     | --              | --            | 0.1                        | --                       | 0.1  | 0.1        |
| Peachleaf willow                | --              | --            | 0.0                        | 0.0                      | 0.0  | 0.0        |
| Bebb willow                     | --              | --            | --                         | 0.0                      | 0.0  | 0.0        |
| Russian-olive                   | --              | --            | --                         | -0.1                     | -0.1 | -0.1       |
| All species                     | --              | --            | 0.1                        | 0.1                      | 0.2  | 0.2        |
| <b>All hardwoods</b>            | 0.6             | -0.8          | 2.1                        | 10.0                     | 11.9 | 11.9       |
| <b>All species groups</b>       | 1.2             | -1.1          | 2.2                        | 11.2                     | 13.5 | 13.5       |

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 ND-24.—Average annual net growth of growing-stock trees (at least 5 inches d.b.h.), in million cubic feet, on timberland by species group, species, and ownership group, North Dakota, 2005 to 2010**

| Species group/Species                  | Ownership group |               |                            |                          |      | All owners |
|--|-----------------|---------------|----------------------------|--------------------------|------|------------|
|  | Forest Service  | Other Federal | State and local government | Undifferentiated private |      |            |
| <b>Softwood species groups</b>         |                 |               |                            |                          |      |            |
| <b>Eastern softwood species groups</b> |                 |               |                            |                          |      |            |
| Other eastern softwoods                |                 |               |                            |                          |      |            |
| Eastern redcedar                       | --              | --            | --                         | 0.0                      | 0.0  | 0.0        |
| Ponderosa pine                         | --              | --            | --                         | 0.1                      | 0.1  | 0.1        |
| All Species                            | --              | --            | --                         | 0.1                      | 0.1  | 0.1        |
| <b>All softwoods</b>                   | --              | --            | --                         | 0.1                      | 0.1  | 0.1        |
| <b>Hardwood species groups</b>         |                 |               |                            |                          |      |            |
| <b>Eastern hardwood species groups</b> |                 |               |                            |                          |      |            |
| Select white oaks                      |                 |               |                            |                          |      |            |
| Bur oak                                | 0.2             | -1.2          | 0.2                        | 1.5                      | 0.7  | 0.7        |
| All Species                            | 0.2             | -1.2          | 0.2                        | 1.5                      | 0.7  | 0.7        |
| Ash                                    |                 |               |                            |                          |      |            |
| Black ash                              | 0.0             | --            | 0.0                        | --                       | 0.0  | 0.0        |
| Green ash                              | 0.0             | -0.3          | 0.1                        | 1.7                      | 1.4  | 1.4        |
| All Species                            | 0.0             | -0.3          | 0.1                        | 1.7                      | 1.4  | 1.4        |
| Cottonwood and aspen                   |                 |               |                            |                          |      |            |
| Balsam poplar                          | --              | 0.0           | --                         | -0.2                     | -0.2 | -0.2       |
| Eastern cottonwood                     | --              | 0.1           | 0.3                        | 0.1                      | 0.4  | 0.4        |
| Plains cottonwood                      | --              | 0.0           | 0.7                        | 1.9                      | 2.6  | 2.6        |
| Quaking aspen                          | --              | 0.1           | 0.1                        | 0.7                      | 1.0  | 1.0        |
| All Species                            | --              | 0.1           | 1.1                        | 2.5                      | 3.7  | 3.7        |
| Basswood                               |                 |               |                            |                          |      |            |
| American basswood                      | 0.1             | --            | --                         | --                       | 0.1  | 0.1        |
| All Species                            | 0.1             | --            | --                         | --                       | 0.1  | 0.1        |
| Other eastern soft hardwoods           |                 |               |                            |                          |      |            |
| Boxelder                               | --              | 0.0           | 0.0                        | 0.2                      | 0.3  | 0.3        |
| Paper birch                            | --              | --            | --                         | 0.0                      | 0.0  | 0.0        |
| Black willow                           | --              | --            | --                         | 0.1                      | 0.1  | 0.1        |
| American elm                           | --              | 0.0           | --                         | 0.3                      | 0.3  | 0.3        |
| Siberian elm                           | --              | --            | --                         | 0.1                      | 0.1  | 0.1        |
| All Species                            | --              | 0.0           | 0.0                        | 0.8                      | 0.8  | 0.8        |
| <b>All hardwoods</b>                   | 0.3             | -1.3          | 1.4                        | 6.4                      | 6.8  | 6.8        |
| <b>All species groups</b>              | 0.3             | -1.3          | 1.4                        | 6.5                      | 6.9  | 6.9        |

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 ND-25.—Average annual mortality of trees (at least 5 inches d.b.h./d.i.r.c.), in million cubic feet, by owner class and forest-land status North Dakota 2005 to 2010**

| Owner class                       | Unreserved forests |              | Reserved forests |              | All forest land |
|-----------------------------------|--------------------|--------------|------------------|--------------|-----------------|
|                                   | Timberland         | Unproductive | Productive       | Unproductive |                 |
| <b>Forest Service</b>             |                    |              |                  |              |                 |
| National grassland                | 0.2                | 0.0          | 0.2              | --           | 0.2             |
| <b>Other Federal</b>              |                    |              |                  |              |                 |
| National Park Service             | --                 | --           | --               | 0.2          | 0.2             |
| Fish and Wildlife Service         | 2.2                | --           | 2.2              | 0.1          | 2.3             |
| Other Federal                     | 0.5                | --           | 0.5              | --           | 0.5             |
| <b>State and local government</b> |                    |              |                  |              |                 |
| State                             | 0.1                | --           | 0.1              | --           | 0.1             |
| Local (county, municipal, etc.)   | 0.0                | --           | 0.0              | --           | 0.0             |
| <b>Private</b>                    |                    |              |                  |              |                 |
| Undifferentiated private          | 9.2                | 0.6          | 9.8              | --           | 9.8             |
| <b>All owners</b>                 | 12.2               | 0.6          | 12.8             | 0.1          | 13.0            |

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 ND-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, North Dakota, 2005 to 2010**

| Forest-type group             | Stand-size class |                 |                |            | All size classes |
|-------------------------------|------------------|-----------------|----------------|------------|------------------|
|                               | Large diameter   | Medium diameter | Small diameter | Nonstocked |                  |
| Pinyon / juniper group        | 0.2              | --              | --             | --         | 0.2              |
| Oak / hickory group           | 0.6              | 2.4             | 0.0            | --         | 3.1              |
| Elm / ash / cottonwood group  | 4.9              | 0.7             | 0.3            | --         | 5.9              |
| Maple / beech / birch group   | 0.3              | --              | --             | --         | 0.3              |
| Aspen / birch group           | 1.0              | 2.3             | 0.0            | --         | 3.4              |
| Other hardwoods group         | --               | --              | 0.0            | --         | 0.0              |
| Exotic hardwoods group        | --               | 0.0             | --             | --         | 0.0              |
| <b>All forest-type groups</b> | <b>7.1</b>       | <b>5.5</b>      | <b>0.4</b>     | <b>--</b>  | <b>13.0</b>      |

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 ND-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, species, and ownership group, North Dakota, 2005 to 2010

| Species group/Species                  | Ownership group |               |                            |                          |      | All owners |
|--|-----------------|---------------|----------------------------|--------------------------|------|------------|
|  | Forest Service  | Other Federal | State and local government | Undifferentiated private |      |            |
| <b>Softwood species groups</b>         |                 |               |                            |                          |      |            |
| <b>Other softwood species group</b>    |                 |               |                            |                          |      |            |
| Woodland softwoods                     |                 |               |                            |                          |      |            |
| Rocky Mountain juniper                 | 0.0             | 0.2           | --                         | --                       | 0.2  | 0.2        |
| All species                            | 0.0             | 0.2           | 0.0                        | 0.0                      | 0.2  | 0.2        |
| <b>All softwoods</b>                   | 0.0             | 0.2           | --                         | --                       | 0.2  | 0.2        |
| <b>Hardwood species groups</b>         |                 |               |                            |                          |      |            |
| <b>Eastern hardwood species groups</b> |                 |               |                            |                          |      |            |
| Select white oaks                      |                 |               |                            |                          |      |            |
| Bur oak                                | --              | 1.3           | --                         | 0.9                      | 2.2  | 2.2        |
| All species                            | --              | 1.3           | 0.0                        | 0.9                      | 2.2  | 2.2        |
| Ash                                    |                 |               |                            |                          |      |            |
| Black ash                              | --              | --            | 0.0                        | --                       | 0.0  | 0.0        |
| Green ash                              | 0.1             | 0.8           | 0.0                        | 1.1                      | 2.0  | 2.0        |
| All species                            | 0.1             | 0.8           | 0.0                        | 1.1                      | 2.1  | 2.1        |
| Cottonwood and aspen                   |                 |               |                            |                          |      |            |
| Balsam poplar                          | --              | --            | --                         | 0.8                      | 0.8  | 0.8        |
| Eastern cottonwood                     | --              | --            | --                         | 0.0                      | 0.0  | 0.0        |
| Plains cottonwood                      | --              | 0.0           | --                         | 0.7                      | 0.8  | 0.8        |
| Quaking aspen                          | --              | 0.4           | 0.0                        | 3.2                      | 3.6  | 3.6        |
| All species                            | --              | 0.4           | 0.0                        | 4.7                      | 5.2  | 5.2        |
| Other eastern soft hardwoods           |                 |               |                            |                          |      |            |
| Boxelder                               | --              | 0.1           | 0.0                        | 1.3                      | 1.4  | 1.4        |
| Black willow                           | --              | --            | --                         | 0.0                      | 0.0  | 0.0        |
| American elm                           | 0.1             | 0.1           | --                         | 1.6                      | 1.9  | 1.9        |
| Siberian elm                           | --              | --            | --                         | 0.0                      | 0.0  | 0.0        |
| All species                            | 0.1             | 0.2           | 0.0                        | 3.0                      | 3.3  | 3.3        |
| Eastern noncommercial hardwoods        |                 |               |                            |                          |      |            |
| Bebb willow                            | --              | --            | --                         | 0.0                      | 0.0  | 0.0        |
| Russian-olive                          | --              | --            | --                         | 0.1                      | 0.1  | 0.1        |
| All species                            | --              | 0.0           | 0.0                        | 0.1                      | 0.1  | 0.1        |
| <b>All hardwoods</b>                   | 0.2             | 2.8           | 0.1                        | 9.8                      | 12.8 | 12.8       |
| <b>All species groups</b>              | 0.2             | 2.9           | 0.1                        | 9.8                      | 13.0 | 13.0       |

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 ND-28.—Average annual mortality of growing-stock trees (at least 5 inches d.b.h.), in million cubic feet, on timberland by species group, species, and ownership group, North Dakota, 2005 to 2010**

| Species group/Species                  | Ownership group |               |                            |                          |     | All owners |
|--|-----------------|---------------|----------------------------|--------------------------|-----|------------|
|  | Forest Service  | Other Federal | State and local government | Undifferentiated private |     |            |
| <b>Hardwood species groups</b>         |                 |               |                            |                          |     |            |
| <b>Eastern hardwood species groups</b> |                 |               |                            |                          |     |            |
| Select white oaks                      |                 |               |                            |                          |     |            |
| Bur oak                                | --              | 1.3           | --                         | 0.2                      | 1.5 |            |
| All Species                            | --              | 1.3           | --                         | 0.2                      | 1.5 |            |
| Ash                                    |                 |               |                            |                          |     |            |
| Black ash                              | 0.0             | 0.0           | 0.0                        | 0.0                      | 0.0 |            |
| Green ash                              | 0.1             | 0.6           | 0.0                        | 0.3                      | 1.0 |            |
| All Species                            | 0.1             | 0.6           | 0.0                        | 0.3                      | 1.0 |            |
| Cottonwood and aspen                   |                 |               |                            |                          |     |            |
| Balsam poplar                          | --              | 0.0           | --                         | 0.3                      | 0.3 |            |
| Plains cottonwood                      | --              | 0.0           | --                         | 0.7                      | 0.7 |            |
| Quaking aspen                          | --              | 0.0           | --                         | 2.0                      | 2.0 |            |
| All Species                            | --              | 0.1           | --                         | 3.0                      | 3.1 |            |
| Other eastern soft hardwoods           |                 |               |                            |                          |     |            |
| Boxelder                               | --              | 0.0           | --                         | 0.1                      | 0.1 |            |
| American elm                           | --              | 0.1           | --                         | 0.9                      | 0.9 |            |
| All Species                            | --              | 0.1           | --                         | 0.9                      | 1.0 |            |
| <b>All hardwoods</b>                   | 0.1             | 2.1           | 0.0                        | 4.4                      | 6.5 |            |
| <b>All species groups</b>              | 0.1             | 2.1           | 0.0                        | 4.4                      | 6.5 |            |

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 ND-29.—Average annual removals of live trees (at least 5 inches d.b.h./d.i.c.), in million cubic feet, on forest land by species group, species, and ownership group, North Dakota, 2005 to 2010**

| Species group\Species                  | Ownership group |               |                            |                          |    | All owners |
|--|-----------------|---------------|----------------------------|--------------------------|----|------------|
|  | Forest Service  | Other Federal | State and local government | Undifferentiated private |    |            |
| <b>Softwood species groups</b>         |                 |               |                            |                          |    |            |
| <b>Eastern softwood species groups</b> |                 |               |                            |                          |    |            |
| Other eastern softwoods                | --              | --            | --                         | 0.0                      | -- | 0.0        |
| Eastern redcedar                       | --              | --            | --                         | 0.0                      | -- | 0.0        |
| All Species                            | --              | --            | --                         | 0.0                      | -- | 0.0        |
| <b>All softwoods</b>                   |                 |               |                            |                          |    |            |
| <b>Hardwood species groups</b>         |                 |               |                            |                          |    |            |
| <b>Eastern hardwood species groups</b> |                 |               |                            |                          |    |            |
| Select white oaks                      | --              | --            | 0.1                        | --                       | -- | 0.1        |
| Bur oak                                | --              | --            | 0.1                        | --                       | -- | 0.1        |
| All Species                            | --              | --            | 0.1                        | --                       | -- | 0.1        |
| Ash                                    | --              | --            | 0.7                        | 1.0                      | -- | 1.7        |
| Green ash                              | --              | --            | 0.7                        | 1.0                      | -- | 1.7        |
| All Species                            | --              | --            | 0.7                        | 1.0                      | -- | 1.7        |
| Cottonwood and aspen                   | --              | --            | --                         | 0.0                      | -- | 0.0        |
| Quaking aspen                          | --              | --            | --                         | 0.0                      | -- | 0.0        |
| All Species                            | --              | --            | --                         | 0.0                      | -- | 0.0        |
| <b>Other eastern soft hardwoods</b>    |                 |               |                            |                          |    |            |
| Boxelder                               | --              | --            | --                         | 0.0                      | -- | 0.0        |
| American elm                           | --              | --            | --                         | 0.3                      | -- | 0.3        |
| All Species                            | --              | --            | --                         | 0.3                      | -- | 0.3        |
| <b>Eastern noncommercial hardwoods</b> |                 |               |                            |                          |    |            |
| Willow spp.                            | --              | --            | 0.9                        | --                       | -- | 0.9        |
| All Species                            | --              | --            | 0.9                        | --                       | -- | 0.9        |
| <b>All hardwoods</b>                   |                 |               |                            |                          |    |            |
| All species groups                     | --              | --            | 1.7                        | 1.3                      | -- | 3.0        |
| All species groups                     | --              | --            | 1.7                        | 1.3                      | -- | 3.0        |

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 ND-30.—Average annual removals of growing-stock trees (at least 5 inches d.b.h.), in million cubic feet, on timberland by species group, species, and ownership group, North Dakota, 2005 to 2010**

| Species group/Species                  | Ownership group |               |                            |                          |     | All owners |
|--|-----------------|---------------|----------------------------|--------------------------|-----|------------|
|  | Forest Service  | Other Federal | State and local government | Undifferentiated private |     |            |
| <b>Hardwood species groups</b>         |                 |               |                            |                          |     |            |
| <b>Eastern hardwood species groups</b> |                 |               |                            |                          |     |            |
| Select white oaks                      |                 |               |                            |                          |     |            |
| Bur oak                                | --              | --            | 0.3                        | 0.6                      | 0.9 |            |
| All Species                            | --              | --            | 0.3                        | 0.6                      | 0.9 |            |
| Ash                                    |                 |               |                            |                          |     |            |
| Green ash                              | --              | --            | 0.4                        | 1.0                      | 1.4 |            |
| All Species                            | --              | --            | 0.4                        | 1.0                      | 1.4 |            |
| Cottonwood and aspen                   |                 |               |                            |                          |     |            |
| Quaking aspen                          | --              | --            | --                         | 0.0                      | 0.0 |            |
| All Species                            | --              | --            | --                         | 0.0                      | 0.0 |            |
| Other eastern soft hardwoods           |                 |               |                            |                          |     |            |
| American elm                           | --              | --            | --                         | 0.3                      | 0.3 |            |
| All Species                            | --              | --            | --                         | 0.3                      | 0.3 |            |
| <b>All hardwoods</b>                   | --              | --            | 0.7                        | 1.9                      | 2.6 |            |
| <b>All species groups</b>              | --              | --            | 0.7                        | 1.9                      | 2.6 |            |

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 ND-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, North Dakota, 2010

| Owner class                       | Unreserved forests |              | Reserved forests |              | All forest land |
|-----------------------------------|--------------------|--------------|------------------|--------------|-----------------|
|                                   | Timberland         | Unproductive | Productive       | Unproductive |                 |
| <b>Forest Service</b>             |                    |              |                  |              |                 |
| National grassland                | 681                | 451          | --               | --           | 1,132           |
| <b>Other Federal</b>              |                    |              |                  |              |                 |
| National Park Service             | --                 | --           | 81               | 124          | 206             |
| Bureau of Land Management         | --                 | 212          | --               | --           | 212             |
| Fish and Wildlife Service         | 845                | --           | --               | --           | 845             |
| Other Federal                     | 408                | 100          | --               | --           | 508             |
| <b>State and local government</b> |                    |              |                  |              |                 |
| State                             | 855                | 213          | --               | --           | 1,068           |
| Local (county, municipal, etc.)   | 383                | --           | --               | --           | 383             |
| <b>Private</b>                    |                    |              |                  |              |                 |
| Undifferentiated private          | 11,636             | 2,367        | --               | --           | 14,003          |
| <b>All owners</b>                 | 14,809             | 3,342        | 81               | 124          | 18,357          |

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 1,000 dry tons. Columns and rows may not add to their totals due to rounding.

Table ND-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, species, and diameter class, North Dakota, 2010

| Species group/Species                  | Diameter class (inches) |             |             |             |              |               |               |               |               |               |               |               |               |               | All classes |                  |
|--|-------------------------|-------------|-------------|-------------|--------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|-------------|------------------|
|  | 1.0-<br>2.9             | 3.0-<br>4.9 | 5.0-<br>6.9 | 7.0-<br>8.9 | 9.0-<br>10.9 | 11.0-<br>12.9 | 13.0-<br>14.9 | 15.0-<br>16.9 | 17.0-<br>18.9 | 19.0-<br>20.9 | 21.0-<br>22.9 | 23.0-<br>24.9 | 25.0-<br>26.9 | 27.0-<br>28.9 |             | 29.0+<br>classes |
| <b>Softwood species groups</b>         |                         |             |             |             |              |               |               |               |               |               |               |               |               |               |             |                  |
| <b>Eastern softwood species groups</b> |                         |             |             |             |              |               |               |               |               |               |               |               |               |               |             |                  |
| Spruce and balsam fir                  |                         |             |             |             |              |               |               |               |               |               |               |               |               |               |             |                  |
| White spruce                           | 3.6                     | 10.6        | --          | --          | --           | --            | --            | --            | --            | --            | --            | --            | --            | --            | --          | 14.1             |
| All Species                            | 3.6                     | 10.6        | --          | --          | --           | --            | --            | --            | --            | --            | --            | --            | --            | --            | --          | 14.1             |
| <b>Other eastern softwoods</b>         |                         |             |             |             |              |               |               |               |               |               |               |               |               |               |             |                  |
| Eastern redcedar                       | --                      | --          | 1.2         | 2.9         | --           | 6.3           | --            | --            | --            | --            | --            | --            | --            | --            | --          | 10.4             |
| Ponderosa pine                         | 0.2                     | --          | 6.4         | 7.0         | --           | --            | --            | --            | --            | --            | --            | --            | --            | 47.3          | --          | 60.8             |
| All Species                            | 0.2                     | --          | 7.7         | 9.8         | --           | 6.3           | --            | --            | --            | --            | --            | --            | --            | 47.3          | --          | 71.2             |
| <b>Other softwood species group</b>    |                         |             |             |             |              |               |               |               |               |               |               |               |               |               |             |                  |
| <b>Woodland softwoods</b>              |                         |             |             |             |              |               |               |               |               |               |               |               |               |               |             |                  |
| Rocky Mountain juniper                 | 31.3                    | 63.6        | 57.0        | 106.6       | 109.8        | 124.1         | 54.9          | 23.9          | 39.4          | 23.0          | 12.5          | --            | --            | --            | 20.0        | 666.2            |
| All Species                            | 31.3                    | 63.6        | 57.0        | 106.6       | 109.8        | 124.1         | 54.9          | 23.9          | 39.4          | 23.0          | 12.5          | --            | --            | --            | 20.0        | 666.2            |
| <b>All softwoods</b>                   | 35                      | 74          | 65          | 116         | 110          | 130           | 55            | 24            | 39            | 23            | 12            | --            | --            | 47            | 20          | 752              |

(Table ND-32 continued on next page)



(Table ND-32 continued)

| Species group/Species                  | 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+ |         |             |
| <b>Hardwood species groups</b>         |                         |         |         |         |          |           |           |           |           |           |           |           |           |           |       |         |             |
| <b>Eastern hardwood species groups</b> |                         |         |         |         |          |           |           |           |           |           |           |           |           |           |       |         |             |
| <b>Select white oaks</b>               |                         |         |         |         |          |           |           |           |           |           |           |           |           |           |       |         |             |
| Blr oak                                | 69.2                    | 581.7   | 887.2   | 874.9   | 795.8    | 508.9     | 440.8     | 221.9     | 413.7     | 377.4     | 246.9     | 87.0      | --        | 88.5      | --    | 5,594.1 |             |
| All Species                            | 69.2                    | 581.7   | 887.2   | 874.9   | 795.8    | 508.9     | 440.8     | 221.9     | 413.7     | 377.4     | 246.9     | 87.0      | --        | 88.5      | --    | 5,594.1 |             |
| <b>Ash</b>                             |                         |         |         |         |          |           |           |           |           |           |           |           |           |           |       |         |             |
| Black ash                              | --                      | 26.1    | 2.8     | --      | --       | --        | --        | --        | --        | --        | --        | --        | --        | --        | --    | 29.0    |             |
| Green ash                              | 145.2                   | 539.7   | 670.1   | 794.9   | 628.2    | 467.8     | 364.4     | 419.3     | 122.6     | 30.5      | 138.4     | --        | --        | --        | --    | 4,321.1 |             |
| All Species                            | 145.2                   | 565.9   | 672.9   | 794.9   | 628.2    | 467.8     | 364.4     | 419.3     | 122.6     | 30.5      | 138.4     | --        | --        | --        | --    | 4,350.1 |             |
| <b>Cottonwood and aspen</b>            |                         |         |         |         |          |           |           |           |           |           |           |           |           |           |       |         |             |
| Balsam poplar                          | 0.3                     | --      | 19.9    | 31.6    | 30.6     | 7.6       | 9.8       | --        | --        | --        | --        | --        | --        | --        | --    | 99.8    |             |
| Eastern cottonwood                     | --                      | 9.2     | 13.0    | 25.6    | 28.5     | 32.4      | 31.9      | 44.4      | --        | 45.0      | 54.1      | --        | --        | --        | 477.9 | 762.0   |             |
| Plains cottonwood                      | 1.3                     | --      | 17.4    | 69.9    | 91.7     | 151.0     | 79.8      | 226.8     | 172.0     | --        | 144.9     | 164.4     | 494.4     | 78.8      | 516.9 | 2,209.3 |             |
| Quaking aspen                          | 150.7                   | 351.1   | 319.5   | 289.0   | 295.1    | 195.1     | 208.8     | 73.0      | 33.0      | --        | --        | --        | --        | --        | --    | 1,915.3 |             |
| All Species                            | 152.3                   | 360.3   | 369.8   | 416.2   | 445.8    | 386.1     | 330.3     | 344.3     | 205.0     | 45.0      | 199.1     | 164.4     | 494.4     | 78.8      | 994.7 | 4,986.5 |             |
| <b>Basswood</b>                        |                         |         |         |         |          |           |           |           |           |           |           |           |           |           |       |         |             |
| American basswood                      | 2.1                     | --      | 7.4     | 19.6    | 3.8      | 18.5      | 51.2      | 105.3     | 21.1      | --        | --        | --        | --        | 59.2      | --    | 288.2   |             |
| All Species                            | 2.1                     | --      | 7.4     | 19.6    | 3.8      | 18.5      | 51.2      | 105.3     | 21.1      | --        | --        | --        | --        | 59.2      | --    | 288.2   |             |
| <b>Other eastern soft hardwoods</b>    |                         |         |         |         |          |           |           |           |           |           |           |           |           |           |       |         |             |
| Boxelder                               | 28.6                    | 53.2    | 105.5   | 124.1   | 168.0    | 212.0     | 101.6     | 126.6     | 152.5     | 74.5      | --        | 29.8      | --        | --        | --    | 1,176.5 |             |
| Paper birch                            | --                      | --      | 8.7     | 6.5     | 7.2      | --        | --        | --        | --        | --        | --        | --        | --        | --        | --    | 22.4    |             |
| Black cherry                           | --                      | --      | 1.3     | --      | --       | --        | --        | --        | --        | --        | --        | --        | --        | --        | --    | 1.3     |             |
| Black willow                           | 2.0                     | --      | --      | --      | --       | 20.4      | --        | --        | --        | --        | 46.8      | --        | --        | --        | --    | 69.2    |             |
| American elm                           | 24.9                    | 73.4    | 132.0   | 109.3   | 128.5    | 72.4      | 33.9      | 67.6      | 30.6      | --        | --        | 55.0      | --        | 83.7      | --    | 811.1   |             |
| Siberian elm                           | 0.2                     | 10.6    | 6.4     | 13.0    | 33.4     | 33.7      | --        | 38.7      | --        | --        | --        | --        | --        | --        | --    | 136.0   |             |
| Slippery elm                           | --                      | --      | --      | 3.3     | --       | --        | --        | --        | --        | --        | --        | --        | --        | --        | --    | 3.3     |             |
| All Species                            | 55.8                    | 137.2   | 253.9   | 256.3   | 337.0    | 338.4     | 135.4     | 233.0     | 183.1     | 74.5      | 46.8      | 84.8      | --        | 83.7      | --    | 2,219.8 |             |
| <b>Eastern noncommercial hardwoods</b> |                         |         |         |         |          |           |           |           |           |           |           |           |           |           |       |         |             |
| Serviceberry spp.                      | 3.7                     | --      | --      | --      | --       | --        | --        | --        | --        | --        | --        | --        | --        | --        | --    | 3.7     |             |
| Hawthorn spp.                          | 10.0                    | --      | --      | --      | --       | --        | --        | --        | --        | --        | --        | --        | --        | --        | --    | 10.0    |             |
| Apple spp.                             | --                      | --      | 6.4     | 10.5    | --       | --        | --        | --        | --        | --        | --        | --        | --        | --        | --    | 16.9    |             |
| Eastern hophornbeam                    | 13.5                    | 6.5     | 2.5     | --      | --       | --        | --        | --        | --        | --        | --        | --        | --        | --        | --    | 22.5    |             |
| Pin cherry                             | 6.1                     | --      | --      | --      | --       | --        | --        | --        | --        | --        | --        | --        | --        | --        | --    | 6.1     |             |
| Chokecherry                            | 38.7                    | --      | --      | --      | --       | --        | --        | --        | --        | --        | --        | --        | --        | --        | --    | 38.7    |             |
| American plum                          | 34.2                    | --      | --      | --      | --       | --        | --        | --        | --        | --        | --        | --        | --        | --        | --    | 34.2    |             |
| Peachleaf willow                       | --                      | --      | 5.1     | 2.6     | 4.4      | --        | 12.9      | --        | --        | --        | --        | --        | --        | --        | --    | 24.9    |             |
| Bebb willow                            | --                      | --      | 5.2     | --      | --       | --        | --        | --        | --        | --        | --        | --        | --        | --        | --    | 5.2     |             |
| Russian-olive                          | --                      | --      | --      | 4.6     | --       | --        | --        | --        | --        | --        | --        | --        | --        | --        | --    | 4.6     |             |
| All Species                            | 106.1                   | 11.7    | 14.0    | 17.7    | 4.4      | --        | 12.9      | --        | --        | --        | --        | --        | --        | --        | --    | 166.8   |             |
| <b>All hardwoods</b>                   | 531                     | 1,657   | 2,205   | 2,380   | 2,215    | 1,720     | 1,335     | 1,324     | 946       | 527       | 631       | 336       | 494       | 310       | 995   | 17,605  |             |
| <b>All species groups</b>              | 566                     | 1,731   | 2,270   | 2,496   | 2,325    | 1,850     | 1,390     | 1,348     | 985       | 550       | 644       | 336       | 494       | 357       | 1,015 | 18,357  |             |

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 1,000 dry tons. Columns and rows may not add to their totals due to rounding.

**Table ND-54.— Area of forest land, in thousand acres, by inventory unit, county, and forest-land status, North Dakota, 2010**

| Inventory unit and county | Unreserved forests |              | Reserved forests |              | All forest land |
|---------------------------|--------------------|--------------|------------------|--------------|-----------------|
|                           | Timberland         | Total        | Productive       | Unproductive |                 |
| <b>Eastern</b>            |                    |              |                  |              |                 |
| Red River                 | 163.3              | 41.8         | 205.1            | --           | 205.1           |
| Devils Lake & James River | 47.5               | 4.5          | 51.9             | --           | 51.9            |
| Souris River              | 143.0              | 19.9         | 162.9            | --           | 162.9           |
| Missouri River            | 180.1              | 151.6        | 331.7            | 12.1         | 352.5           |
| <b>Total</b>              | <b>533.8</b>       | <b>217.8</b> | <b>751.6</b>     | <b>12.1</b>  | <b>772.4</b>    |
| <b>All counties</b>       | <b>533.8</b>       | <b>217.8</b> | <b>751.6</b>     | <b>12.1</b>  | <b>772.4</b>    |

All table cells without observations in the inventory sample are indicated by --. Table value of 0.0 indicates the acres round to less than 100 acres. Columns and rows may not add to their totals due to rounding. (Table 54 continued on next page)

Devils Lake & James River = Benson, Dickey, Foster, LaMoure, Ramsey, Stutsman, Towner, and Wells counties  
 Missouri River = Adams, Billings, Bowman, Burleigh, Dunn, Emmons, Golden Valley, Grant, Hettinger, Kidder, Logan, McIntosh, McLean, McKenzie, Mercer, Morton, Mountrail, Oliver, Sheridan, Sioux, Slope, Stark, and Williams counties  
 Red River = Bames, Cass, Cavalier, Eddy, Grand Forks, Griggs, Nelson, Pembina, Ransom, Richland, Sargent, Steele, Traill, and Walsh counties  
 Souris River = Bottineau, Burke, Divide, McHenry, Pierce, Renville, Rolette, and Ward counties

Table ND-55.—Area of forest land, in thousand acres, by inventory unit, county, ownership group, and forest-land status, North Dakota, 2010

| 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 | Timber-land  |                 |
|                           |                |                   |               |                   |                            |                   |                          |                   |              |                 |
| Eastern                   |                |                   |               |                   |                            |                   |                          |                   |              |                 |
| Red River                 | 15.8           | --                | --            | --                | 6.2                        | 6.2               | 141.3                    | 35.6              | 205.1        |                 |
| Devils Lake & James River | --             | --                | 6.8           | 4.5               | 6.2                        | --                | 34.5                     | --                | 51.9         |                 |
| Souris River              | --             | --                | 41.1          | --                | 2.0                        | 2.7               | 99.9                     | 17.2              | 162.9        |                 |
| Missouri River            | 14.2           | 57.1              | 13.8          | 33.0              | 29.7                       | 6.0               | 122.4                    | 76.3              | 352.5        |                 |
| <b>Total</b>              | <b>30.0</b>    | <b>57.1</b>       | <b>61.6</b>   | <b>37.5</b>       | <b>44.1</b>                | <b>14.9</b>       | <b>398.1</b>             | <b>129.1</b>      | <b>772.4</b> |                 |
| <b>All counties</b>       | <b>30.0</b>    | <b>57.1</b>       | <b>61.6</b>   | <b>37.5</b>       | <b>44.1</b>                | <b>14.9</b>       | <b>398.1</b>             | <b>129.1</b>      | <b>772.4</b> |                 |

All table cells without observations in the inventory sample are indicated by --. Table value of 0.0 indicates the acres round to less than 100 acres. Columns and rows may not add to their totals due to rounding.

Devils Lake & James River = Benson, Dickey, Foster, LaMoure, Ramsey, Stutsman, Towner, and Wells counties  
 Missouri River = Adams, Billings, Bowman, Burleigh, Dunn, Emmons, Golden Valley, Grant, Hettinger, Kidder, Logan, McIntosh, McLean, McKenzie, Mercer, Morton, Mountrail, Oliver, Sheridan, Sioux, Slope, Stark, and Williams counties  
 Red River = Barnes, Cass, Cavalier, Eddy, Grand Forks, Griggs, Nelson, Pembina, Ransom, Richland, Sargent, Steele, Traill, and Walsh counties  
 Souris River = Bottineau, Burke, Divide, McHenry, Pierce, Renville, Rolette, and Ward counties

Table ND-56.—Area of forest land, in thousand acres, by inventory unit, county, and forest-type group, North Dakota, 2010

| Inventory unit and county | Forest-type group |                |                |             |                     |                   |             |                 |                  |             |       | All groups |
|---------------------------|-------------------|----------------|----------------|-------------|---------------------|-------------------|-------------|-----------------|------------------|-------------|-------|------------|
|                           | Spruce-fir        | Pinyon-juniper | Ponderosa pine | Oak-hickory | Elim-ash-cottonwood | Maple-beech-birch | Aspen-birch | Other hardwoods | Exotic hardwoods | Non-stocked |       |            |
| <b>Eastern</b>            |                   |                |                |             |                     |                   |             |                 |                  |             |       |            |
| Red River                 | 3.2               | --             | --             | 99.7        | 75.5                | --                | 20.3        | 3.6             | 1.5              | 1.5         | 205.1 |            |
| Devils Lake & James River | --                | --             | --             | 24.9        | 7.0                 | --                | 6.8         | 10.6            | 2.7              | --          | 51.9  |            |
| Souris River              | --                | --             | --             | 59.6        | 22.1                | --                | 74.9        | 4.9             | --               | 1.5         | 162.9 |            |
| Missouri River            | --                | 81.1           | 5.9            | 114.4       | 77.7                | --                | 3.0         | 68.9            | --               | 1.5         | 352.5 |            |
| <b>Total</b>              | 3.2               | 81.1           | 5.9            | 298.5       | 182.2               | --                | 104.9       | 88.0            | 4.1              | 4.5         | 772.4 |            |
| <b>All counties</b>       | 3.2               | 81.1           | 5.9            | 298.5       | 182.2               | --                | 104.9       | 88.0            | 4.1              | 4.5         | 772.4 |            |

All table cells without observations in the inventory sample are indicated by --. Table value of 0.0 indicates the acres round to less than 100 acres. Columns and rows may not add to their totals due to rounding.

Devils Lake & James River = Benson, Dickey, Foster, LaMoure, Ramsey, Stutsman, Towner, and Wells counties  
 Missouri River = Adams, Billings, Bowman, Burleigh, Dunn, Emmons, Golden Valley, Grant, Hettinger, Kidder, Logan, McIntosh, McLean, McKenzie, Mercer, Morton, Mountrail, Oliver, Sheridan, Sioux, Slope, Stark, and Williams counties  
 Red River = Barnes, Cass, Cavalier, Eddy, Grand Forks, Griggs, Nelson, Pembina, Ransom, Richland, Sargent, Steele, Traill, and Walsh counties  
 Souris River = Bottineau, Burke, Divide, McHenry, Pierce, Renville, Rolette, and Ward counties

**Table ND-57.—Area of timberland, in thousand acres, by inventory unit, county, and stand-size class, North Dakota, 2010**

| Inventory unit and county | Stand-size class |                 |                |           |            | All size classes |
|---------------------------|------------------|-----------------|----------------|-----------|------------|------------------|
|                           | Large diameter   | Medium diameter | Small diameter | Chaparral | Nonstocked |                  |
| <b>Eastern</b>            |                  |                 |                |           |            |                  |
| Red River                 | 97.8             | 37.4            | 26.7           | --        | 1.5        | 163.3            |
| Devils Lake & James River | 10.4             | 20.6            | 16.5           | --        | --         | 47.5             |
| Souris River              | 27.9             | 75.0            | 38.5           | --        | 1.5        | 143.0            |
| Missouri River            | 52.8             | 74.0            | 53.3           | --        | --         | 180.1            |
| <b>Total</b>              | <b>188.8</b>     | <b>207.0</b>    | <b>135.0</b>   | <b>--</b> | <b>3.0</b> | <b>533.8</b>     |
| <b>All counties</b>       | <b>188.8</b>     | <b>207.0</b>    | <b>135.0</b>   | <b>--</b> | <b>3.0</b> | <b>533.8</b>     |

All table cells without observations in the inventory sample are indicated by --. Table value of 0.0 indicates the acres round to less than 100 acres. Columns and rows may not add to their totals due to rounding.

Devils Lake & James River = Benson, Dickey, Foster, LaMoure, Ramsey, Stutsman, Towner, and Wells counties  
 Missouri River = Adams, Billings, Bowman, Burleigh, Dunn, Emmons, Golden Valley, Grant, Hettinger, Kidder, Logan, McIntosh, McLean, McKenzie, Mercer, Morton, Mountrail, Oliver, Sheridan, Sioux, Slope, Stark, and Williams counties  
 Red River = Barnes, Cass, Cavalier, Eddy, Grand Forks, Griggs, Nelson, Pembina, Ransom, Richland, Sargent, Steele, Traill, and Walsh counties  
 Souris River = Bottineau, Burke, Divide, McHenry, Pierce, Renville, Rolette, and Ward counties

**Table ND-58.—Area of timberland, in thousand acres, by inventory unit, county, and stocking class, North Dakota, 2010**

| Inventory unit and county | Stocking class of growing-stock trees |                |                    |               |             | All classes  |
|---------------------------|---------------------------------------|----------------|--------------------|---------------|-------------|--------------|
|                           | Nonstocked                            | Poorly stocked | Moderately stocked | Fully stocked | Overstocked |              |
| <b>Eastern</b>            |                                       |                |                    |               |             |              |
| Red River                 | 18.9                                  | 68.3           | 47.9               | 23.9          | 4.2         | 163.3        |
| Devils Lake & James River | 28.6                                  | 6.8            | 7.6                | --            | 4.5         | 47.5         |
| Souris River              | 11.2                                  | 46.1           | 60.0               | 18.5          | 7.1         | 143.0        |
| Missouri River            | 49.9                                  | 80.5           | 32.7               | 16.9          | --          | 180.1        |
| <b>Total</b>              | <b>108.7</b>                          | <b>201.8</b>   | <b>148.2</b>       | <b>59.3</b>   | <b>15.8</b> | <b>533.8</b> |
| <b>All counties</b>       | <b>108.7</b>                          | <b>201.8</b>   | <b>148.2</b>       | <b>59.3</b>   | <b>15.8</b> | <b>533.8</b> |

All table cells without observations in the inventory sample are indicated by --. Table value of 0.0 indicates the acres round to less than 100 acres. Columns and rows may not add to their totals due to rounding.

Devils Lake & James River = Benson, Dickey, Foster, LaMoure, Ramsey, Stutsman, Towner, and Wells counties  
 Missouri River = Adams, Billings, Bowman, Burleigh, Dunn, Emmons, Golden Valley, Grant, Hettinger, Kidder, Logan, McIntosh, McLean, McKenzie, Mercer, Morton, Mountrail, Oliver, Sheridan, Sioux, Slope, Stark, and Williams counties  
 Red River = Barnes, Cass, Cavalier, Eddy, Grand Forks, Griggs, Nelson, Pembina, Ransom, Richland, Sargent, Steele, Traill, and Walsh counties  
 Souris River = Bottineau, Burke, Divide, McHenry, Pierce, Renville, Rolette, and Ward counties

Table ND-59.—Net volume of growing-stock trees (at least 5 inches d.b.h.), in million cubic feet, and sawtimber trees, in million board feet (International 1/4-inch rule), trees on timberland by inventory unit, county, and major species group, North Dakota, 2010

| Inventory unit and county | Growing stock       |                 |                |                |              |                      | Sawtimber           |                 |                |                |             |                      |
|---------------------------|---------------------|-----------------|----------------|----------------|--------------|----------------------|---------------------|-----------------|----------------|----------------|-------------|----------------------|
|                           | Major species group |                 |                |                |              |                      | Major species group |                 |                |                |             |                      |
|                           | Pine                | Other softwoods | Soft hardwoods | Hard hardwoods | All species  | (million cubic feet) | Pine                | Other softwoods | Soft hardwoods | Hard hardwoods | All species | (million board feet) |
| <b>Eastern</b>            |                     |                 |                |                |              |                      |                     |                 |                |                |             |                      |
| Red River                 | --                  | --              | 55.3           | 79.8           | 135.1        | --                   | --                  | 208.3           | 309.3          | 517.6          |             |                      |
| Devils Lake & James River | --                  | 0.1             | 31.6           | 4.5            | 36.3         | --                   | --                  | 152.1           | 1.8            | 153.8          |             |                      |
| Souris River              | --                  | --              | 50.2           | 18.6           | 68.9         | --                   | --                  | 84.6            | 46.0           | 130.6          |             |                      |
| Missouri River            | 0.3                 | --              | 78.6           | 21.8           | 100.8        | --                   | --                  | 338.1           | 42.4           | 380.5          |             |                      |
| <b>Total</b>              | <b>0.3</b>          | <b>0.1</b>      | <b>215.8</b>   | <b>124.7</b>   | <b>341.0</b> | <b>--</b>            | <b>--</b>           | <b>783.0</b>    | <b>399.5</b>   | <b>1,182.5</b> |             |                      |
| <b>All counties</b>       | <b>0.3</b>          | <b>0.1</b>      | <b>215.8</b>   | <b>124.7</b>   | <b>341.0</b> | <b>--</b>            | <b>--</b>           | <b>783.0</b>    | <b>399.5</b>   | <b>1,182.5</b> |             |                      |

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.

Devils Lake & James River = Benson, Dickey, Foster, LaMoure, Ramsey, Stutsman, Towner, and Wells counties  
 Missouri River = Adams, Billings, Bowman, Burleigh, Dunn, Emmons, Golden Valley, Grant, Hettinger, Kidder, Logan, McIntosh, McLean, McKenzie, Mercer, Morton, Mountrail, Oliver, Sheridan, Sioux, Slope, Stark, and Williams counties

Red River = Barnes, Cass, Cavalier, Eddy, Grand Forks, Griggs, Nelson, Pembina, Ransom, Richland, Sargent, Steele, Traill, and Walsh counties  
 Souris River = Bottineau, Burke, Divide, McHenry, Pierce, Renville, Rolette, and Ward counties

Table ND-59a.—Net volume of growing-stock trees (at least 5 inches d.b.h.), in million cubic feet, and sawtimber trees, in million board feet (Doyle rule), on timberland by inventory unit, county, and major species group, North Dakota, 2010

| Inventory unit and county                                   | Growing stock       |                 |                |                |         |      | Sawtimber           |                |                |             |      |                 |                |                |         |
|---|---------------------|-----------------|----------------|----------------|---------|------|---------------------|----------------|----------------|-------------|------|-----------------|----------------|----------------|---------|
|   | Major species group |                 |                | All species    |         |      | Major species group |                |                | All species |      |                 |                |                |         |
|   | Pine                | Other softwoods | Soft hardwoods | Hard hardwoods | species | Pine | Other softwoods     | Soft hardwoods | Hard hardwoods | species     | Pine | Other softwoods | Soft hardwoods | Hard hardwoods | species |
| ----- (million cubic feet) ----- (million board feet) ----- |                     |                 |                |                |         |      |                     |                |                |             |      |                 |                |                |         |
| <b>Eastern</b>  |                     |                 |                |                |         |      |                     |                |                |             |      |                 |                |                |         |
| Red River   | --                  | --              | 55.3           | 79.8           | 135.1   | --   | --                  | 160.4          | 205.2          | 365.6       |      |                 |                |                |         |
| Devils Lake & James River                                   | --                  | 0.1             | 31.6           | 4.5            | 36.3    | --   | --                  | 122.9          | 0.7            | 123.7       |      |                 |                |                |         |
| Souris River  | --                  | --              | 50.2           | 18.6           | 68.9    | --   | --                  | 41.0           | 25.3           | 66.3        |      |                 |                |                |         |
| Missouri River  | 0.3                 | --              | 78.6           | 21.8           | 100.8   | --   | --                  | 270.1          | 21.5           | 291.6       |      |                 |                |                |         |
| <b>Total</b>  | 0.3                 | 0.1             | 215.8          | 124.7          | 341.0   | --   | --                  | 594.4          | 252.7          | 847.1       |      |                 |                |                |         |
| <b>All counties</b>   | 0.3                 | 0.1             | 215.8          | 124.7          | 341.0   | --   | --                  | 594.4          | 252.7          | 847.1       |      |                 |                |                |         |

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.

Devils Lake & James River = Benson, Dickey, Foster, LaMoure, Ramsey, Stutsman, Towner, and Wells counties

Missouri River = Adams, Billings, Bowman, Burleigh, Dunn, Emmons, Golden Valley, Grant, Hettinger, Kidder, Logan, McIntosh, McLean, McKenzie, Mercer, Morton, Mountrail, Oliver, Sheridan, Sioux, Slope, Stark, and Williams counties

Red River = Barnes, Cass, Cavalier, Eddy, Grand Forks, Griggs, Nelson, Pembina, Ransom, Richland, Sargent, Steele, Traill, and Walsh counties

Souris River = Bottineau, Burke, Divide, McHenry, Pierce, Renville, Rolette, and Ward counties



**Table ND-60.—Average annual net growth of growing-stock trees (at least 5 inches d.b.h.), in million cubic feet, and sawtimber trees, in million board feet (International 1/4-inch rule), on timberland by inventory unit, county, and major species group, North Dakota, 2010**

| Inventory unit and county                                   | Growing stock       |                 |                |                |         |    | Sawtimber           |                 |                |                |         |  |
|---|---------------------|-----------------|----------------|----------------|---------|----|---------------------|-----------------|----------------|----------------|---------|--|
|   | Major species group |                 |                | All species    |         |    | Major species group |                 |                | All species    |         |  |
|   | Pine                | Other softwoods | Soft hardwoods | Hard hardwoods | species |    | Pine                | Other softwoods | Soft hardwoods | Hard hardwoods | species |  |
| ----- (million cubic feet) ----- (million board feet) ----- |                     |                 |                |                |         |    |                     |                 |                |                |         |  |
| <b>Eastern</b>  |                     |                 |                |                |         |    |                     |                 |                |                |         |  |
| Red River   | --                  | --              | 1.8            | 2.5            | 4.4     | -- | --                  | 7.4             | 9.9            | 17.2           |         |  |
| Devils Lake & James River                                   | --                  | 0.0             | 0.1            | 0.2            | 0.3     | -- | --                  | 3.6             | 0.5            | 4.1            |         |  |
| Souris River  | --                  | --              | 0.4            | -1.4           | -1.0    | -- | --                  | 0.2             | -6.9           | -6.7           |         |  |
| Missouri River  | 0.1                 | --              | 2.3            | 0.8            | 3.2     | -- | --                  | 12.0            | 2.9            | 14.9           |         |  |
| <b>Total</b>  | 0.1                 | 0.0             | 4.6            | 2.2            | 6.9     | -- | --                  | 23.1            | 6.4            | 29.5           |         |  |
| <b>All counties</b>   | 0.1                 | 0.0             | 4.6            | 2.2            | 6.9     | -- | --                  | 23.1            | 6.4            | 29.5           |         |  |

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 or board feet. Columns and rows may not add to their totals due to rounding.

Devils Lake & James River = Benson, Dickey, Foster, LaMoure, Ramsey, Sittsman, Towner, and Wells counties  
 Missouri River = Adams, Billings, Bowman, Burleigh, Dunn, Emmons, Golden Valley, Grant, Hettinger, Kidder, Logan, McIntosh, McLean, McKenzie, Mercer, Morton, Mountrail, Oliver, Sheridan, Sioux, Slope, Stark, and Williams counties

Red River = Barnes, Cass, Cavalier, Eddy, Grand Forks, Griggs, Nelson, Pembina, Ransom, Richland, Sargent, Steele, Traill, and Walsh counties  
 Souris River = Bottineau, Burke, Divide, McHenry, Pierce, Renville, Rolette, and Ward counties

**Table ND-60a.—Average annual net growth of growing-stock trees (at least 5 inches d.b.h.), in million cubic feet, and sawtimber, in million board feet (Doyle rule), on timberland by inventory unit, county, and major species group, North Dakota, 2005 to 2010**

| 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 |
| ----- (million cubic feet) ----- (million board feet) ----- |                     |                 |                |                |             |                     |                 |                |                |             |
| <b>Eastern</b>  |                     |                 |                |                |             |                     |                 |                |                |             |
| Red River   | --                  | --              | 1.8            | 2.5            | 4.4         | --                  | --              | 4.8            | 5.2            | 10.0        |
| Devils Lake & James River                                   | --                  | 0.0             | 0.1            | 0.2            | 0.3         | --                  | --              | 2.9            | 0.2            | 3.1         |
| Souris River  | --                  | --              | 0.4            | -1.4           | -1.0        | --                  | --              | 0.0            | -7.5           | -7.5        |
| Missouri River  | 0.1                 | --              | 2.3            | 0.8            | 3.2         | --                  | --              | 8.0            | 1.4            | 9.4         |
| <b>Total</b>  | 0.1                 | 0.0             | 4.6            | 2.2            | 6.9         | --                  | --              | 15.7           | -0.7           | 15.0        |
| <b>All counties</b>   | 0.1                 | 0.0             | 4.6            | 2.2            | 6.9         | --                  | --              | 15.7           | -0.7           | 15.0        |

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.

Devils Lake & James River = Benson, Dickey, Foster, LaMoure, Ramsey, Stutsman, Towner, and Wells counties  
 Missouri River = Adams, Billings, Bowman, Burleigh, Dunn, Emmons, Golden Valley, Grant, Hettinger, Kidder, Logan, McIntosh, McLean, McKenzie, Mercer, Morton, Mountrail, Oliver, Sheridan, Sioux, Slope, Stark, and Williams counties

Red River = Barnes, Cass, Cavalier, Eddy, Grand Forks, Griggs, Nelson, Pembina, Ransom, Richland, Sargent, Steele, Traill, and Walsh counties  
 Souris River = Bottineau, Burke, Divide, McHenry, Pierce, Renville, Rolette, and Ward counties

**Table ND-61.—Average annual removals of growing-stock trees (at least 5 inches d.b.h.) in million cubic feet, and sawtimber trees, in million board feet (International 1/4-inch rule), on timberland by inventory unit, county, and major species group, North Dakota, 2005 to 2010**

| Inventory unit and county        | Growing stock       |                 |                |                |             |      | Sawtimber           |                |                |             |  |                                  |  |  |
|----------------------------------|---------------------|-----------------|----------------|----------------|-------------|------|---------------------|----------------|----------------|-------------|--|----------------------------------|--|--|
|                                  | Major species group |                 |                | All species    |             |      | Major species group |                |                | All species |  |                                  |  |  |
|                                  | Pine                | Other softwoods | Soft hardwoods | Hard hardwoods | All species | Pine | Other softwoods     | Soft hardwoods | Hard hardwoods | All species |  |                                  |  |  |
| ----- (million cubic feet) ----- |                     |                 |                |                |             |      |                     |                |                |             |  | ----- (million board feet) ----- |  |  |
| <b>Eastern</b>                   |                     |                 |                |                |             |      |                     |                |                |             |  |                                  |  |  |
| Red River                        | --                  | --              | 0.3            | 1.4            | 1.6         | --   | --                  | 0.9            | 4.5            | 5.4         |  |                                  |  |  |
| Devils Lake & James River        | --                  | --              | --             | 0.5            | 0.5         | --   | --                  | --             | 1.5            | 1.5         |  |                                  |  |  |
| Souris River                     | --                  | --              | 0.0            | 0.3            | 0.3         | --   | --                  | --             | --             | --          |  |                                  |  |  |
| Missouri River                   | --                  | --              | --             | 0.2            | 0.2         | --   | --                  | --             | 0.7            | 0.7         |  |                                  |  |  |
| <b>Total</b>                     | --                  | --              | 0.3            | 2.3            | 2.6         | --   | --                  | 0.9            | 6.6            | 7.5         |  |                                  |  |  |
| <b>All counties</b>              |                     |                 |                |                |             |      |                     |                |                |             |  |                                  |  |  |
|                                  | --                  | --              | 0.3            | 2.3            | 2.6         | --   | --                  | 0.9            | 6.6            | 7.5         |  |                                  |  |  |

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 or board feet. Columns and rows may not add to their totals due to rounding.  
 Devils Lake & James River = Benson, Dickey, Foster, LaMoure, Ramsey, Stutsman, Towner, and Wells counties  
 Missouri River = Adams, Billings, Bowman, Burleigh, Dunn, Emmons, Golden Valley, Grant, Hettinger, Kidder, Logan, McIntosh, McLean, McKenzie, Mercer, Morton, Mountrail, Oliver, Sheridan, Sioux, Slope, Stark, and Williams counties  
 Red River = Barnes, Cass, Cavalier, Eddy, Grand Forks, Griggs, Nelson, Pembina, Ransom, Richland, Sargent, Steele, Traill, and Walsh counties  
 Souris River = Bottineau, Burke, Divide, McHenry, Pierce, Renville, Rolette, and Ward counties

**Table ND-61a.—Average annual removals of growing-stock trees (at least 5 inches d.b.h.) in million cubic feet, and sawtimber trees, in million board feet (Doyle rule) on timberland by inventory unit, county, and major species group, North Dakota, 2005 to 2010**

| 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 |
| ----- (million cubic feet) ----- (million board feet) ----- |                     |                 |                |                |             |                     |                 |                |                |             |
| <b>Eastern</b>  |                     |                 |                |                |             |                     |                 |                |                |             |
| Red River   | --                  | --              | 0.3            | 1.4            | 1.6         | --                  | --              | 0.2            | 2.0            | 2.2         |
| Devils Lake & James River                                   | --                  | --              | --             | 0.5            | 0.5         | --                  | --              | --             | 0.6            | 0.6         |
| Souris River  | --                  | --              | 0.0            | 0.3            | 0.3         | --                  | --              | --             | --             | --          |
| Missouri River  | --                  | --              | --             | 0.2            | 0.2         | --                  | --              | --             | 0.3            | 0.3         |
| <b>Total</b>  | --                  | --              | 0.3            | 2.3            | 2.6         | --                  | --              | 0.2            | 2.9            | 3.1         |
| <b>All counties</b>   | --                  | --              | 0.3            | 2.3            | 2.6         | --                  | --              | 0.2            | 2.9            | 3.1         |

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.

Devils Lake & James River = Benson, Dickey, Foster, LaMoure, Ramsey, Stutsman, Towner, and Wells counties  
 Missouri River = Adams, Billings, Bowman, Burleigh, Dunn, Emmons, Golden Valley, Grant, Hettinger, Kidder, Logan, McIntosh, McLean, McKenzie, Mercer, Morton, Mountrail, Oliver, Sheridan, Sioux, Slope, Stark, and Williams counties

Red River = Barnes, Cass, Cavalier, Eddy, Grand Forks, Griggs, Nelson, Pembina, Ransom, Richland, Sargent, Steele, Traill, and Walsh counties  
 Souris River = Bottineau, Burke, Divide, McHenry, Pierce, Renville, and Ward counties

**Table ND-65.—Sampling errors, in percent, for area, volume, average annual net growth, average annual removals, and average annual mortality on timberland by inventory unit and county, North Dakota, 2010**

| 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 |
| <b>Eastern</b>            |             |                 |               |                           |                         |                          |        |                           |                         |                          |
| Red River                 | 13.68       | 16.06           | 24.69         | 28.04                     | 81.45                   | 42.31                    | 28.66  | 26.49                     | 90.72                   | 86.12                    |
| Devils Lake & James River | 30.56       | 32.08           | 78.39         | 100.00                    | 97.91                   | 81.46                    | 95.04  | 81.34                     | 97.91                   | 100.00                   |
| Souris River              | 15.16       | 15.92           | 25.94         | 100.00                    | 97.35                   | 52.54                    | 34.44  | 100.00                    | --                      | 77.25                    |
| Missouri River            | 11.18       | 16.22           | 38.16         | 39.65                     | 98.67                   | 55.08                    | 46.66  | 39.04                     | 98.67                   | 79.37                    |
| <b>Total</b>              | 6.09        | 7.80            | 16.70         | 38.05                     | 60.52                   | 34.26                    | 22.62  | 38.08                     | 68.25                   | 57.35                    |
| <b>All counties</b>       | 6.09        | 7.80            | 16.70         | 38.05                     | 60.52                   | 34.26                    | 22.62  | 38.08                     | 68.25                   | 57.35                    |

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

Devils Lake & James River = Benson, Dickey, Foster, LaMoure, Ramsey, Stutsman, Towner, and Wells counties

Missouri River = Adams, Billings, Bowman, Burleigh, Dunn, Emmons, Golden Valley, Grant, Hettinger, Kidder, Logan, McIntosh, McLean, McKenzie, Mercer, Morton, Mountrail, Oliver, Sheridan, Sioux, Slope, Stark, and Williams counties

Red River = Barnes, Cass, Cavalier, Eddy, Grand Forks, Griggs, Nelson, Pembina, Ransom, Richland, Sargent, Steele, Traill, and Walsh counties

Souris River = Bottineau, Burke, Divide, McHenry, Pierce, Renville, Rolette, and Ward counties

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## Appendix A. Tree Species in North Dakota (2010)

Tree species measured on field plots in North Dakota's 2010 inventory.

| <b>Common Name</b>     | <b>Genus</b>       | <b>Species</b>                            |
|------------------------|--------------------|---|
| Rocky Mountain juniper | <i>Juniperus</i>   | <i>scopulorum</i>                         |
| Eastern redcedar       | <i>Juniperus</i>   | <i>virginiana</i>                         |
| White spruce           | <i>Picea</i>       | <i>glauca</i>                             |
| Ponderosa pine         | <i>Pinus</i>       | <i>ponderosa</i>                          |
| Boxelder               | <i>Acer</i>        | <i>negundo</i>                            |
| Serviceberry spp.      | <i>Amelanchier</i> | spp.                                      |
| Paper birch            | <i>Betula</i>      | <i>papyrifera</i>                         |
| Hawthorn spp.          | <i>Crataegus</i>   | spp.                                      |
| Black ash              | <i>Fraxinus</i>    | <i>nigra</i>                              |
| Green ash              | <i>Fraxinus</i>    | <i>pennsylvanica</i>                      |
| Apple spp.             | <i>Malus</i>       | spp.                                      |
| Balsam poplar          | <i>Populus</i>     | <i>balsamifera</i>                        |
| Plains cottonwood      | <i>Populus</i>     | <i>deltoides</i> var. <i>occidentalis</i> |
| Eastern cottonwood     | <i>Populus</i>     | <i>deltoides</i> var. <i>deltoides</i>    |
| Quaking aspen          | <i>Populus</i>     | <i>tremuloides</i>                        |
| Pin cherry             | <i>Prunus</i>      | <i>pensylvanica</i>                       |
| Black cherry           | <i>Prunus</i>      | <i>serotina</i>                           |
| Chokecherry            | <i>Prunus</i>      | <i>virginiana</i>                         |
| American plum          | <i>Prunus</i>      | <i>americana</i>                          |
| Eastern hophornbeam    | <i>Ostrya</i>      | <i>virginiana</i>                         |
| Bur oak                | <i>Quercus</i>     | <i>macrocarpa</i>                         |
| Peachleaf willow       | <i>Salix</i>       | <i>amygdaloides</i>                       |
| Black willow           | <i>Salix</i>       | <i>nigra</i>                              |
| Bebb willow            | <i>Salix</i>       | <i>bebbiana</i>                           |
| American basswood      | <i>Tilia</i>       | <i>americana</i>                          |
| American elm           | <i>Ulmus</i>       | <i>americana</i>                          |
| Siberian elm           | <i>Ulmus</i>       | <i>pumila</i>                             |
| Slippery elm           | <i>Ulmus</i>       | <i>rubra</i>                              |
| Russian olive          | <i>Elaeagnus</i>   | <i>angustifolia</i>                       |



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