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Wisconsin's Forest Resources in 2003

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Wisconsin's Forest Resources in 2003

The North Central Research Station's Forest Inventory and Analysis (NCFIA) program, in partnership with the Wisconsin Department of Natural Resources (DNR), began fieldwork for the sixth inventory of Wisconsin's forest resources in 2000. This initiated a new annual inventory system in which one-fifth of the field plots (considered one panel) in the State are measured each year. A complete inventory consists of measuring and compiling data for five panels. Once all five panels have been measured, plots in each panel will be remeasured approximately every 5 years. For example, the plots measured in Wisconsin in 2000 will be remeasured in 2005.

In 2003, fieldwork continued with the measurement of the fourth panel of the sixth inventory. The sixth inventory of Wisconsin's forest resources will be complete in 2004. However, because each year's panel is a systematic sample of the State's forest and timely information is needed about Wisconsin's forest resources, estimates have been prepared from data gathered in the first 4 years of the sixth inventory. Data and statistics prepared for this report represent 80 percent of the field plots (or four panels) for the complete inventory and are a combination of the first, second, third, and fourth panels. Because of the limited number of field plots measured, the data in this report should be used with caution. The estimates contained in this report are subject to change when the data from the fifth annual panel are incorporated with the results from the first four panels. Results presented are estimates based on sampling techniques. The precision of the estimates will increase and additional data will be released when the final annual inventory is completed in the fifth year.

Reports of previous inventories of Wisconsin are dated 1936, 1956, 1968, 1983, and 1996. Data from new inventories are often compared with data from earlier inventories to determine trends in forest resources. However, for the comparison to be valid, the procedures used in the two inventories must be similar. As a result of our ongoing efforts to improve the efficiency and reliability of the inventory, several changes in procedures and definitions have occurred since the last inventory of Wisconsin in 1996 (Schmidt 1998). While these changes have little impact on statewide estimates of forest area, timber volume, and tree biomass, they may have significant impact on plot classification variables such as forest type and stand-size class. Some of these changes make it inappropriate to directly compare portions of the 2003 data with data published for 1996.

RESULTS

Area

The total land area of Wisconsin is 34.8 million acres. About 46 percent or 16.0 million acres were forested in the fifth inventory (Schmidt 1998). Forest land area has remained relatively stable at about 15.9 million acres since 1996. Timberland area, forest land that is capable of growing at least 20 cubic feet of industrial wood per acre at the culmination of mean annual increment and that is not reserved by statute from timber harvest, decreased slightly (fig. 1). The sampling errors associated with both the 1996 and 2003 estimates indicate that this decrease may not be statistically significant. In other words, the difference between these two estimates may be due to sampling variation rather than an actual physical change. As additional data are collected, the precision of estimates made from the annual inventories will increase.

About the Authors:

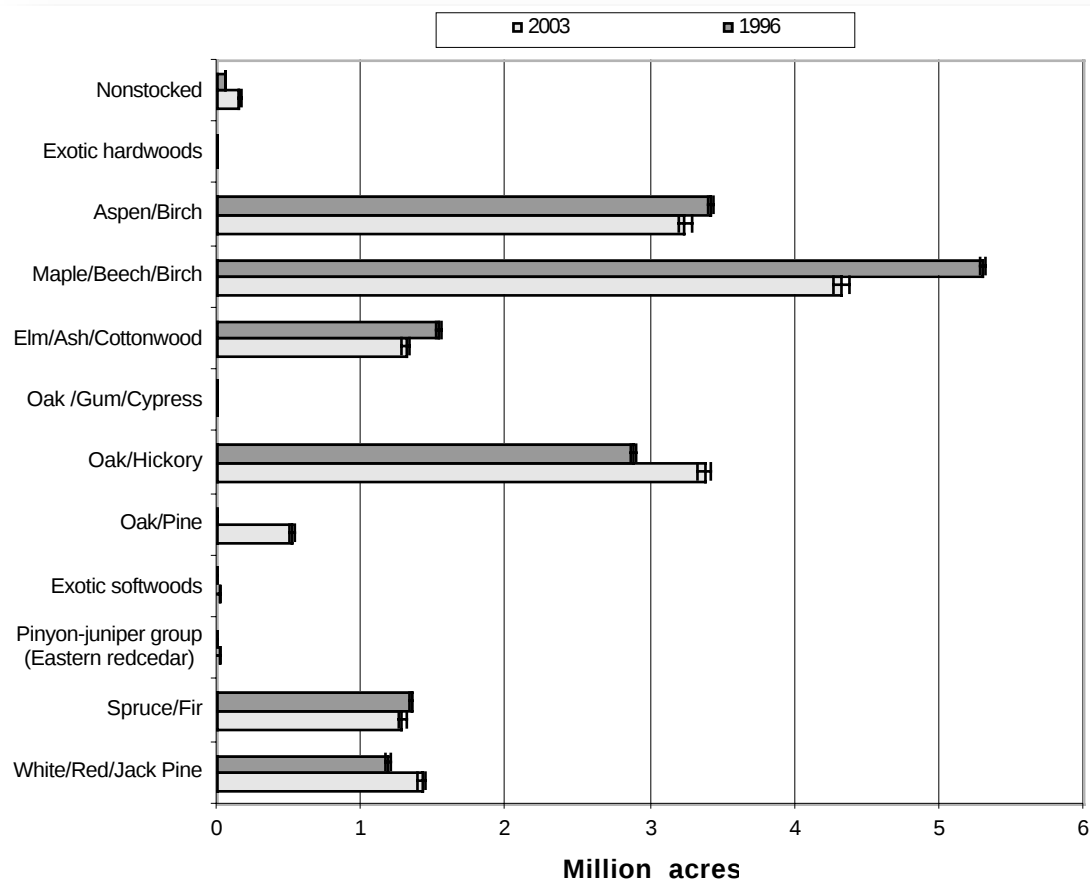
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Figure 1.—Area of timberland in Wisconsin by inventory year. The vertical line at the top of each bar represents the sample error associated with each inventory.



Figure 2.—Area of timberland in Wisconsin in 1996 and 2003 by forest type group. The vertical line at the end of each bar represents the sample error associated with each inventory.



Covering more than 4.3 million acres in 2003, the maple/beech/birch forest type group remains the dominant forest type group in the State (fig. 2). Together, hardwood forest types have decreased by about 373 thousand acres since the 1996 inventory. The timberland area of softwood forest types has increased by almost 208 thousand acres since 1996.

Since 1996, the area of timberland owned by private individuals and corporations has decreased by about 436 thousand acres while the area under public control has increased by about 366 thousand acres (fig. 3). Despite this change, about 69 percent of Wisconsin's timberland is privately owned.

The timberland area occupied by the seedling-sapling stand-size class has decreased by 32 percent since 1996 (fig. 4). The area occupied by the pole-timber stand-size class remained stable, while the area occupied by sawtimber increased by 31 percent.

While the changes in the timberland area occupied by the different stand-size classes and forest type groups seem dramatic, it is important to note that the procedures used to determine these important attributes have changed since the 1996 inventory. As additional panels of annual data are collected and current procedures are used to update the 1996 estimates, comparisons and trends will become clearer.

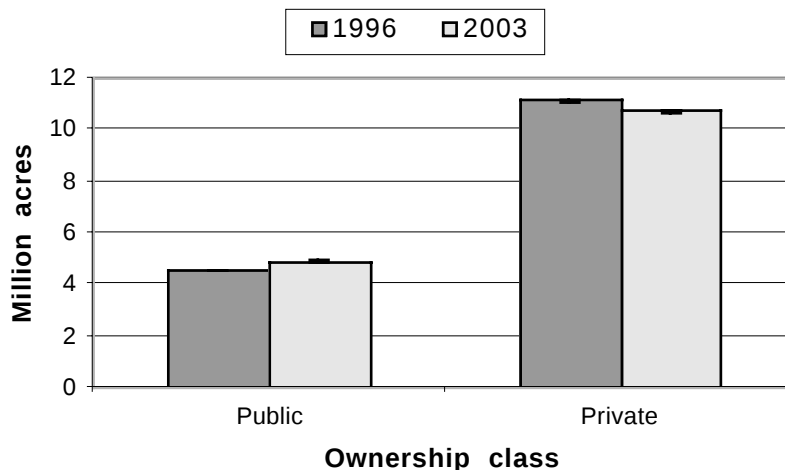
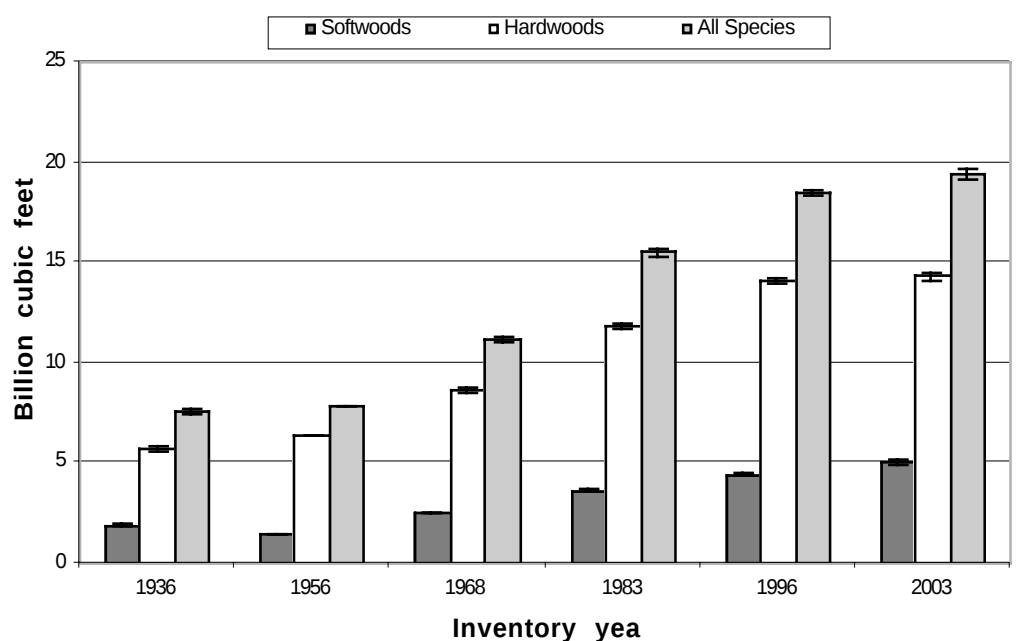


Figure 3.—Area of timberland in Wisconsin by owner category. The vertical line at the top of each bar represents the sample error associated with each inventory.



Figure 4.—Area of timberland in Wisconsin by stand-size class and inventory year. The vertical line at the top of each bar represents the sample error associated with each inventory.

Figure 5.—Growing-stock volume in Wisconsin by inventory year. The vertical line at the top of each bar represents the sample error associated with each inventory.



Volume

In previous inventories, the volume of all live trees greater than 5.0 inches diameter at 4.5 feet above the ground (d.b.h.) on timberland was classified and reported as growing stock and cull. The board-foot volume of growing-stock trees exceeding minimum size requirements—9.0 inches d.b.h. for softwoods and 11.0 inches d.b.h. for hardwoods—was classified as sawtimber. Analyses focused on growing-stock and sawtimber volumes. The volume of all live trees on reserved and other forest land was not reported. With an increased interest in FIA data to address questions about wildlife habitat, soil and water protection, aesthetics, and other important forest values, greater importance has been placed on the live tree volume on all forested land. In 2003, the volume of all live trees on forest land in Wisconsin was 21.9 billion cubic feet. However, previous inventories focused on growing-stock and sawtimber volume on timberland. For this reason, trend comparisons for this report consider only growing-stock or sawtimber volume on timberland.

In 2003, the volume of growing stock on timberland in Wisconsin was 19.4 billion cubic feet (fig. 5). Hardwood species accounted for 74 percent of the growing-stock volume and 66 percent of the sawtimber volume (fig. 6). The cottonwood and aspen hardwood species group had the greatest growing-stock volume while the select red oak group had the largest sawtimber volume.

The growing-stock volume of softwood species totaled 5.1 billion cubic feet in 2003. Eastern white and red pines accounted for 51 percent of the softwood growing-stock volume and 61 percent of the softwood sawtimber volume.

Biomass

Biomass, the aboveground weight of live trees 1.0 inch d.b.h. and larger on timberland, is an important estimate used to address questions related to wildlife habitat, carbon sequestration, wood fiber availability for fuel, and other important values. The aboveground weight of tree biomass on timberland in Wisconsin was estimated at over 590 million dry tons.

Figure 6.—Sawtimber volume in Wisconsin by inventory year. The vertical line at the top of each bar represents the sample error associated with each inventory.

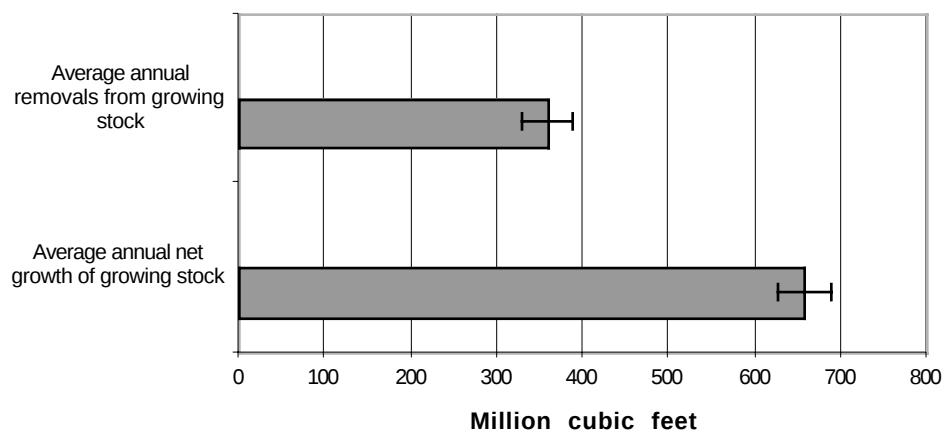
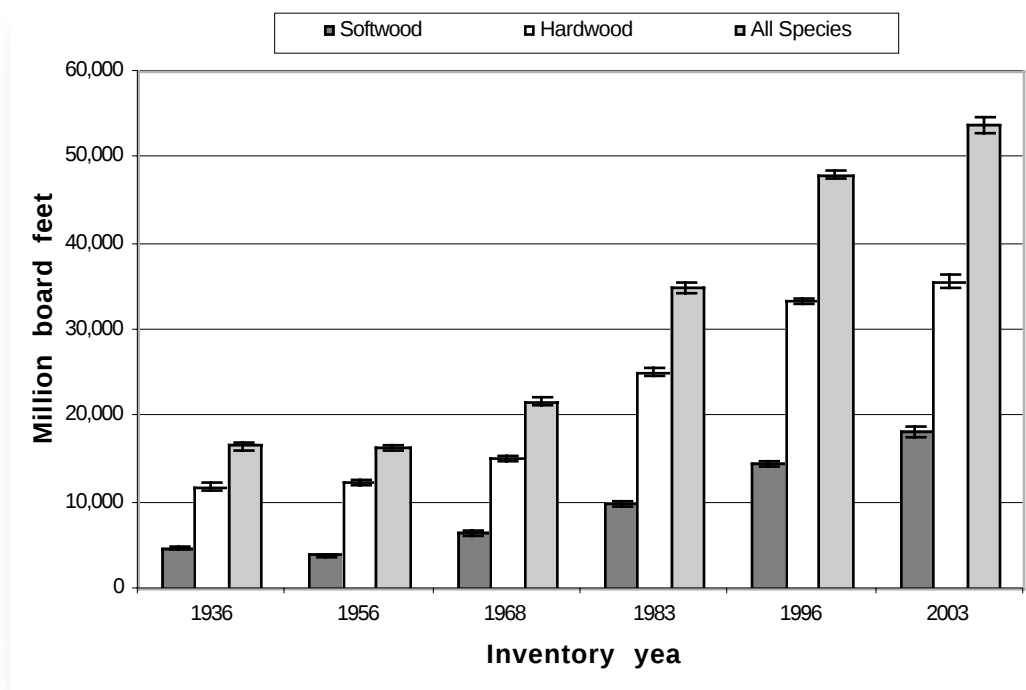


Figure 7.—Average annual net growth and average annual removals, Wisconsin, 1996–2002.

Eighty-two percent of the total biomass was in hardwood species while softwood species accounted for 18 percent. Fifty-seven percent of the total biomass was in the boles of growing-stock trees. Private lands accounted for 70 percent of the total biomass in Wisconsin while public lands contained 30 percent.

Growth, Removals, and Mortality

The three components of change (growth, removals, and mortality) provide trend information that helps describe forest changes between inventories (fig. 7). Insects, pathogens, weather, and fire damage Wisconsin's forests each year. The following are among the most serious threats.

Gypsy Moth

In 2003, gypsy moth populations in eastern and central Wisconsin continued the steady increase observed in these areas since 2000. Outbreaks caused moderate to heavy defoliation over 65,000 acres in 2003, up from 24,000 acres in 2002. The intensity and extent of defoliation were reduced in last year's hotspot, Marinette County (13,000 acres down from 33,000), in part due to poor egg survival. Populations were up dramatically in western Waupaca, eastern Portage, and adjoining areas of Waushara Counties and accounted for about 40,000 acres of defoliation during 2003. The acreage treated by the suppression program reflects the gypsy moth population increase. In 2003, 26,000 acres were treated compared to 6,000 acres in 2002. Spray treatments prevented defoliation in all but 2 of the 177 treatment blocks.

Results of the trapping program indicate that further increases in the caterpillar population and their defoliation are expected in the central counties of Shawano, Portage, Waupaca, and Waushara in 2004. Florence, Forest, and Langlade Counties may have pockets of defoliation. In Marinette and Oconto Counties, trap catch numbers are still high, and we can expect defoliation but probably in areas that previously had not been heavily defoliated. Populations of gypsy moth in Waushara and Washington Counties are uniformly high, and we can expect defoliation in many communities and wooded areas in 2004. The numbers in Milwaukee, Kenosha, and Racine have declined and may indicate that the populations there are beginning to collapse.

Forest Tent Caterpillar

The outbreak of the forest tent caterpillar in northern Wisconsin is finally over. There was virtually no defoliation in the northwest and only a few scattered pockets in northeastern Wisconsin. We did, however, have pockets with very high populations of friendly flies (*Sarcophaga aldrichi*). These flies, which parasitize cocoons of the forest tent caterpillar, stayed numerous in areas that had high caterpillar populations in 2002, especially in

parts of Douglas, Bayfield, and Florence Counties. Despite the current abundance, populations are down significantly from 2002. These populations will drop even further in 2004 as a result of the steep decline in the numbers of forest tent caterpillars in 2003.

Twolined Chestnut Borer

Despite the demise of the forest tent caterpillar, we continued to have associated damage to our oaks caused by the twolined chestnut borer. Larvae of this insect feed on trees' conductive tissues, causing top dieback and eventual mortality. Infested trees will show browning of leaves and top dieback, which progresses downward. Mortality was observed throughout northern Wisconsin, particularly in Bayfield, Douglas, Sawyer, and Vilas Counties. Damage was heaviest, however, in the Lake Nebagamon and Iron River areas.

This native woodborer is a secondary pest and usually attacks only stressed or weakened trees. Several years of heavy defoliation by the forest tent caterpillars and hot and dry summers have been major factors in recent outbreaks. Damage appeared to be most severe in areas where heavy defoliation by the forest tent caterpillar was observed in 2002. Given the dramatic recent decline in forest tent caterpillar numbers, we expect to see a respective drop in mortality caused by the twolined chestnut borer.

Oak Tip Flagging

Many black and pin oak trees had brown leaves at the tips of their branches during the summer of 2003. Though wilted and browned, the leaves were still attached to the tree. This tip flagging was observed scattered throughout the tree and usually within 12 inches of the tip of a twig.

There were two common causes of this leaf flagging: the fungus *Botryosphaeria quercuum* and one of several scale insects including Kermes species. Twigs infected with *Botryosphaeria quercuum* had blackened bark, were cracked, and had dark streaks underneath the bark. Damage caused by this fungus typically does not extend more than 6 inches

down the twig, and should not seriously harm the health of the tree. This problem occurs cyclically and usually lasts only a year or two.

Several different types of scale insects were found on affected twigs, but the Kermes scale was most common. Female Kermes scales are light brown and globular, immobile, and often clustered near buds of a twig or branch. These scales feed on sap, causing a loss of plant vigor and growth as well as twig dieback. While a heavy infestation may cause young trees to be stunted or deformed, natural enemies are usually plentiful and control is not necessary.

Bronze birch borer

Dieback and mortality of birch were also noticed in Lincoln, Oneida, and Vilas Counties. The bronze birch borer infested many of these trees. Adult beetles primarily attack birches that are weakened or stressed by drought, old age, insect defoliation, soil compaction, or a stem or root injury. Attacked birches in northern Wisconsin were weakened by repeated years of heavy defoliation by the forest tent caterpillar. As with the twolined chestnut borer, the drop in forest tent caterpillar populations after 2002 will probably mean increased survival of birches.

Oak Wilt

More oak wilt pockets were found during the summer of 2003 in Spread Eagle, Florence County. All of the new sites were located within 1 mile from the sites that were detected in 1999. The presence of oak wilt in Florence County was first confirmed in 1999. Barron County sustained its first confirmed report of oak wilt in 2002. Approximately 10 trees in a wooded residential lot on the west shore of Prairie Lake showed symptoms of oak wilt.

Tubakia Leaf Disease

A leaf disease caused by the fungus *Tubakia dryina* has recently been observed infecting bur and white oak throughout southern Wisconsin. Bur oaks are more commonly infected; white oaks are only occasionally infected. This disease has been observed on an annual basis for many decades but has increased in incidence and

severity since 1999. Infected bur oaks have been observed throughout southern Wisconsin and as far north as Portage County. Symptoms first appear in late July and consist of small, necrotic spots on leaves in the lower crown. Throughout August, spots expand, coalesce, and can eventually turn the whole leaf brown. Infected trees often have full crowns of shriveled, necrotic leaves in middle to late August. Bur oaks on a wide variety of sites and of all ages have been infected. Bur oaks that are already under stress from drought or compaction are showing signs of dieback. Samples collected from declining trees have revealed the presence of the twolined chestnut borer. If these high levels of infection continue, further pressure by the twolined chestnut borer is expected, which could lead to mortality.

Emerald Ash Borer

Forest health specialists from the Lake States are concerned about an exotic insect, the emerald ash borer (EAB). This insect has not been detected in Wisconsin but is present in Michigan. Discovered in Michigan in May 2002, EAB is native to Asia. It is suspected that EAB was initially introduced on material that came into the Detroit International Airport, although other introduction sites are possible. EAB was likely introduced at least 5 years prior to the actual discovery. Since the initial discovery in southwestern Michigan where 13 counties are now under quarantine, EAB has also been found across the border in Ohio and in Windsor, Ontario, Canada. There are some additional spot infestations at a few nurseries in Michigan, in Hicksville, Ohio, which is near the Indiana border, and at a nursery in Maryland where the trees came from Michigan.

All species of ash native to Wisconsin including black, green, and white are hosts for this insect. The adult is a small brilliant green beetle about the same size as a bronze birch borer. In Michigan the adults are present from the end of June to the first week in August. The emergence hole is obviously D-shaped, about 3–4 mm in diameter. Two D-shaped exit holes easily fit on

the top surface of a pencil eraser. Adults can lay up to 90 eggs and fly about 3 miles a day to find the perfect tree with the perfect spot for each separate egg. Upon hatching, the tiny larvae bore under the bark and begin feeding in the cambium of the tree.

The larvae feed in a winding serpentine pattern, eventually reaching 1 to 1½ inches in length. Adults may emerge after a single year of feeding but sometimes require 2 years to complete development. The mature larvae have segments that appear to be bell-shaped. The larvae will bore just into the sapwood to create a pupal chamber prior to emerging as adults.

Large numbers of larvae can be found in a relatively small area of cambium. Their feeding disrupts the water and food conducting ability of the tree, causing decline and death. At low population densities the larvae act like twolined chestnut borers or bronze birch borers, but at high population densities they can act like bark beetles, seeming to mass attack a tree and significantly damaging the cambial layer. Larvae will feed on all species of ash, but in Michigan they appear to be killing green ash and all green ash cultivars more easily than they are killing white ash. It is not known at this time whether white ash is showing some resistance, is less attractive to the beetle, or can tolerate more damage than green ash before showing decline. EAB in Michigan is infesting both urban trees and forest trees but shows a slight preference for open-grown sun-warmed trees.

In 2004, the forest health program will be conducting a survey of Wisconsin's State parks and forests. These areas are at a high risk for introduction of this insect because it is most likely to enter the State via infested firewood. A statewide coordinated effort is also underway to survey nurseries and communities at high risk. Other agencies involved include the Wisconsin Department of Agriculture, Trade and Consumer Protection, USDA Forest Service and Animal Plant Health Inspection Service, and the University of Wisconsin.

Ash Yellows (phytoplasma)

Ash yellows, a disease caused by a phytoplasma, was confirmed in 2003 in Jefferson and Dodge Counties. Confirmation of infection was based on the presence of brooms along the lower portion of the infected trees' stems. Ash yellows is now confirmed in 13 counties. This disease is typically more common in urban settings or in woodlots bordering agricultural fields.

Jack pine budworm

In the summer of 2003, moderate defoliation by the jack pine budworm was observed in northern Wisconsin. Approximately 1,500 acres were defoliated in Burnett and Washburn Counties, with small pockets of defoliation in Lincoln, Oneida, and Vilas Counties. Larval and pupal surveys also detected a rapid increase in the jack pine budworm population in these areas. Given favorable weather conditions, we should expect more widespread defoliation in 2004 and possibly a full-scale outbreak in 2005. Populations are also increasing in Adams, Clark, Eau Claire, Jackson, Juneau, and Monroe Counties. Based on egg mass counts, we expect to see light defoliation in Adams and Monroe Counties; light to moderate defoliation in Clark, Jackson, and Juneau Counties, and light to heavy defoliation in Eau Claire County in 2004. A small jack pine stand in Marathon County suffered heavy defoliation this past summer.

Jack pine budworm is native to North America and its population periodically reaches outbreak levels. The last major outbreak of budworm in Wisconsin occurred in the early 1990s. Larval feeding of needles can cause growth loss, top kill, and tree mortality. Stands older than 45 years growing on very sandy sites or under stressed conditions due to overstocking or drought are particularly vulnerable to damage. In general, 1 year of heavy defoliation can cause mortality in 5 percent of trees and top dieback in another 10 to 15 percent. With 2 consecutive years of heavy defoliation, mortality of up to 25 percent of trees and top dieback in another 50 percent may occur.

Annosus Root Rot

In 2003 one additional county, Dunn, was confirmed to have Annosum root disease. This brings the total number of counties with annosum to 11: Adams, Buffalo, Dunn, Green, Iowa, La Crosse, Marquette, Richland, Sauk, Trempealeau, and Walworth. In Wisconsin, Annosum root disease has been observed primarily in red pine plantations, occasionally in white pine, and once attacking an individual jack pine. The primary mode of infection for Annosum root disease is through freshly cut stumps. Spores land on the stump, germinate, and grow through the root system to adjacent healthy trees, causing a pocket of mortality.

Tamarack mortality

Thousands of acres of dead 80-year-old tamaracks were observed in the Sheboygan Marsh in northwest Sheboygan County. Eastern larch beetle was observed on the trees. Apparently healthy trees were found scattered among dead ones. There was no evidence of bark beetles, needle feeders (including larch sawfly, larch casebearer, or gypsy moth), or fungal infection. Earlier in the year, the water level in the marsh had been lowered to manage weeds. Given the large area of tamarack death and decline, this may have been a key factor in tree mortality.

Soil moisture deficit affects forest health

In 2003, the most significant factor affecting the health of Wisconsin's forests was the severe deficit of precipitation. Soil moisture levels affect whether or not numerous other injurious agents are successful in infesting and killing trees. Bark beetles, *Sphaeropsis* shoot blight, canker and collar rot, twolined chestnut borer, *Armerillia* root disease, and numerous canker-causing organisms are all favored by low soil moisture. For the past 3 years, parts of Wisconsin have suffered from very dry periods in July and August. This is particularly a problem for hardwoods that are attempting to re-foliate following defoliation by forest tent caterpillar or gypsy moth. In 2003, the most destructive impact of the lack of moisture

occured on oaks in northern Wisconsin, where low moisture levels resulted in elevated mortality caused by the twolined chestnut borer. Many of these trees had reduced levels of carbohydrates in their roots as a result of defoliation by the forest tent caterpillar. In addition to oak dieback and mortality, increased mortality in first year plantings and premature coloration and leaf drop by paper birch and basswood were observed.

It is premature to make widespread predictions of long-range effects on the forest. Many areas of the north received substantial rainfall in mid-September yet October turned dry once again. An average or above average snowfall coupled with an average to wet spring would aid in replenishing ground water levels. Land managers should be alert to the potential continued impacts on oak and birch. These species need average or above soil moisture to return to full health and fend off the twolined chestnut borer and bronze birch borer. There were no significant outbreaks of pine bark beetle reported in 2003. Mortality of seedling and sapling red and jack pine started to occur in late October and early November in western and northwestern Wisconsin. This mortality is related to the dry fall weather and infection by *Sphaeropsis sapinea* shoot blight and canker.

Summary

The forest resources in Wisconsin appear to be in good condition. As additional data become available from ensuing annual inventories, a clearer picture of the direction of Wisconsin forests will emerge. Additional data related to Wisconsin inventories in 1996 and 1983 are available at:

<http://www.ncrs2.fs.fed.us/4801/FIADB/index.htm>

APPENDIX

Inventory Methods

Wisconsin's Forest Resources in 2002 (Vissage 2002) provides a full description of the annualized inventory methods for Wisconsin. Since the 1996 inventory of Wisconsin, several changes have been made in the NCFIA inventory methods to improve the quality of the inventory as well as meet the increasing demands for timely forest resource information. The most significant change between the inventories has been the change from periodic to annual inventory systems. Historically, the NCFIA inventoried each State on a cycle that averaged about 15 years. However, the need for timely and consistent data across large regions, combined with national legislative mandates, resulted in NCFIA's implementation of an annual inventory system. The annual inventory system began in Wisconsin in 2000. With the NCFIA annual inventory system, approximately one-fifth of all field plots are measured in any single year. After 5 years, the entire inventory will be completed. After the initial 5-year period, NCFIA will report and analyze results as a moving 5-year average. For example, NCFIA will be able to generate inventory results for 2000 through 2005 or for 2001 through 2006. While there are great advantages for an annual inventory, one difficulty is reporting on results in the first 4 years. With the 2003 inventory, only 80 percent of all field plots have been measured. Sampling error estimates for the 2003 inventory are 0.65 percent for timberland area, 1.22 percent for growing-stock volume, 4.56 percent for average annual net growth of growing stock, 5.91 percent for average annual mortality of growing stock, and 8.35 percent for average annual removals from growing stock. Thus, caution should be used when drawing conclusions based on this limited data set. As ensuing measurements are completed, we will have additional confidence in our results

because of the increased number of field plots measured. As each measurement year is completed, the quantity and quality of the results will expand.

Other significant changes between inventories include new remote sensing technology, a new field plot configuration and sample design, and additional remotely sensed and field data. The use of new remote sensing technology since the previous inventory has allowed NCFIA to use computer-assisted classifications of Multi-Resolution Land Characterization (MRLC) data and other available remote sensing products to stratify the total area of the State and to improve estimates. Previous inventories used manual interpretation of aerial photographs to stratify the sample.

New algorithms were used in 2003 to assign forest type and stand-size class to each condition observed on a plot. These algorithms are being used nationwide by FIA to provide consistency from State to State and will be used to reassign the forest type and stand-size class of every plot in the 1996 inventory when it is updated. This will be done so that changes in forest type and stand-size class will reflect actual changes in the forest and not changes due to algorithms. The list of recognized forest types, groupings of these forest types for reporting purposes, models used to assign stocking values to individual trees, definition of nonstocked (stands with a stocking value of less than 10 percent for all live trees), and names given to the forest types changed with the new algorithms. As a result, comparisons between the published 2000-2003 results and those published for the 1996 inventory may not be valid. For additional details about algorithms used in both inventories, please contact NCFIA.

Sampling Phases

The 2003 Wisconsin survey was conducted in three phases. The first phase used satellite imagery to stratify the State and aerial photography to select plots for measurement. The second phase measured the traditional suite of mensurational variables, and the third phase focused on a suite of variables related to the health of the forest.

The only land that could not be sampled was private land where field personnel could not obtain permission to measure a phase 2 plot and plots that could not be accessed because of a hazard or danger to field personnel. The methods used in the preparation of this report made the necessary adjustments to account for sites where access was denied or hazardous.

Phase 1

The Wisconsin inventory used a computer-assisted classification of satellite imagery for stratification. FIA used the imagery to form two initial strata—forest and nonforest. Pixels within 60 m (2 pixel widths) of a forest/nonforest boundary formed two additional strata—forest edge and nonforest edge. Forest pixels within 60 m of the boundary on the forest side were classified as forest edge and pixels within 60 m of the boundary on the nonforest side were classified into the nonforest edge stratum. An overlay of all national forest land was used to identify all lands owned by the Chequamegon and Nicolet National Forests. These national forest lands were treated separately but were also stratified into the above four strata. Stratification and estimation were conducted at the State level for national forest lands and at the FIA Inventory Unit level for other lands. In the national forest stratum, forest and forest/nonforest strata were combined.

Phase 2

Phase 2 of the inventory consisted of the measurement of an annual sample of field plots in Wisconsin. Current FIA precision standards for annual inventories require a sampling intensity of one plot for approximately every 6,000 acres. FIA has established a grid that

divides the entire United States into nonoverlapping hexagons, each of which contains 5,937 acres (McRoberts 1999). A grid of field plots was established by selecting one plot from each hexagon based on the following rules: (1) if a Forest Health Monitoring (FHM) plot (Mangold 1998) fell within a hexagon, it was selected as the grid plot; (2) if no FHM plot fell within the hexagon, the existing NCFIA plot nearest the hexagon center was selected as the grid plot; and (3) if neither FHM nor existing NCFIA plots fell within the hexagon, a new NCFIA grid plot was established near the hexagon center (McRoberts 1999). This array of plots is designated the Federal base sample and is considered an equal probability sample; its measurement in Wisconsin is funded by the Federal government. In 2003, two additional plots were established and measured in each hexagon. In 2000–2002 a single additional plot was established and measured in each hexagon. The measurement of this intensified sample was funded by the State of Wisconsin.

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

Phase 3

NCFIA has two categories of field measurements—phase 3 (formally FHM plots) and phase 2 field plots. Both types of plots are systematically distributed both geographically and temporally. Phase 3 plots are measured with the full array of FHM vegetative and health variables as well as the full suite of measures associated with phase 2 plots. Phase 3 plots must be measured between June 1 and August 30 to accommodate measurement of nonwoody

understory vegetation, ground cover, soils, and other variables. We anticipate that in Wisconsin the complete 5-year annual inventory will include about 160 phase 3 plots. On the remaining plots, only variables that can be measured throughout the entire year are collected. In Wisconsin, the complete 5-year annual inventory is expected to include more than 6,500 phase 2 forested plots. In the 2002/2003 field season, inventory measurements were made on 1,657 timberland, 5 other forest land, 9 reserved forest land, and 2,272 nonforest plots.

The national FIA 4-point cluster plot configuration (fig. 8) was first used for data collection in Wisconsin in 2000 and will be used in subsequent years. The national plot configuration requires mapping of all forest conditions found at each plot. Due to the small sample size each year, precision associated with components of change such as mortality will be relatively low. Consequently, we will report estimates of components of change only after multiple annual panels have been measured. Even then, we anticipate that estimates of change will be limited in detail. When the complete annual inventory has been implemented in 2004, the full range of change estimates will be available.

The overall plot layout for the new configuration consists of four subplots. The centers of subplots 2, 3, and 4 are located 120 feet from the center of subplot 1. The azimuths to subplots 2, 3, and 4 are 0, 120, and 240 degrees, respectively. The center of the new plot is located at the same point as the center of the previous plot if a previous plot existed within the sample unit. Trees with diameter at breast height (d.b.h. or 4.5 feet above ground level) 5.0 inches and larger are measured on a 24-foot radius (1/24 acre) circular subplot. All trees less than 5.0 inches d.b.h. are measured on a 6.8-foot radius (1/300 acre) circular microplot located 12.0 feet due east of the center of each of the four subplots. Forest conditions that occur on any of the four subplots are recorded. Factors that differentiate forest conditions are

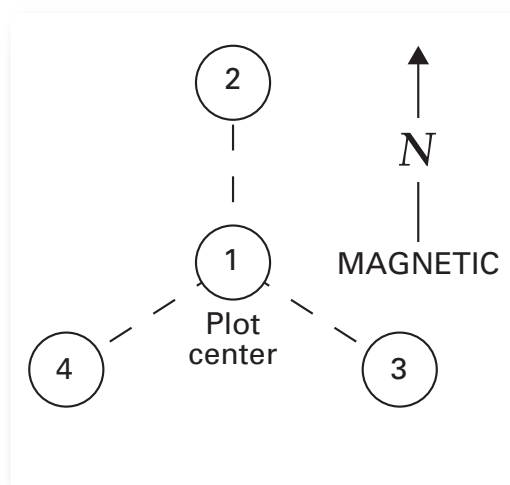


Figure 8.—Current NCFIA field plot design.

changes in forest type, stand-size class, land use, regeneration status, reserved status, ownership, and density. Each condition that occurs anywhere on one of the subplots is identified, described, and mapped if the area of the condition meets or exceeds 1 acre in size.

Field plot measurements are combined with phase 1 estimates in the compilation process and table production. The number of tables generated from a single year's data is limited. However, as additional annual inventories are completed, the number of tables will increase until year 5, when all statewide inventory summary tables will be available in both printed and electronic formats.

For additional information, contact:

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LITERATURE CITED

Mangold, R.D. 1998.

Forest health monitoring field methods guide (National 1998). Research Triangle Park, NC: U.S. Department of Agriculture, Forest Service, National Forest Health Monitoring Programs. 429 p. (Revision 0, April 1998).

McRoberts, R.E. 1999.

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

Schmidt, T.L. 1998.

Wisconsin's forest statistics, 1996. Resour. Bull. NC-183. St. Paul, MN: U.S. Department of Agriculture, Forest Service, North Central Forest Experiment Station. 150 p.

Vissage, J.S. 2002.

Wisconsin's forest resources in 2000. Res. Note NC-380. St. Paul, MN: U.S. Department of Agriculture, Forest Service, North Central Research Station. 8 p.

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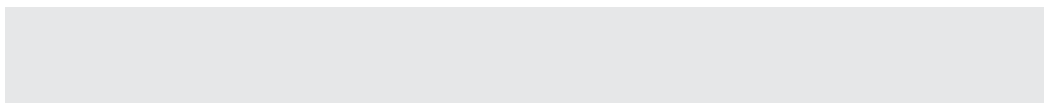
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Table 1. -- Area of forest land by forest type group, forest type, and owner category, Wisconsin, 2000-2003

(In thousand acres)

Forest type group/ forest type	Owner category			Unidentified owner
	All owners	Public	Private	
Softwood type groups				
White / red / Jack pine group				
Jack pine	359.7	139.0	220.7	--
Red pine	660.8	263.0	397.8	--
Eastern white pine	311.2	120.4	190.7	--
White pine / hemlock	18.7	5.6	13.1	--
Eastern hemlock	79.4	24.1	55.4	--
All forest types	1,429.7	552.1	877.6	--
Spruce / fir group				
Balsam fir	200.0	78.5	121.4	--
White spruce	59.8	24.1	35.8	--
Black spruce	343.6	201.8	141.8	--
Tamarack	321.2	118.7	202.4	--
Northern white-cedar	380.4	149.4	231.0	--
All forest types	1,305.0	572.6	732.4	--
Pinyon / juniper group				
Eastern redcedar	18.4	2.5	15.9	--
All forest types	18.4	2.5	15.9	--
Exotic softwoods group				
Exotic softwoods group	0.6	--	0.6	--
Scotch pine	17.5	1.6	15.8	--
Other exotic softwoods	4.4	1.8	2.6	--
All forest types	22.4	3.4	19.0	--
All softwood groups	2,775.5	1,130.6	1,644.9	--
Hardwood type groups				
Oak / pine group				
Oak / pine group	4.2	3.8	0.4	--
White pine / red oak / white ash	223.9	86.5	137.4	--
Eastern redcedar / hardwood	11.4	0.9	10.5	--
Other pine / hardwood	286.0	104.0	182.0	--
All forest types	525.5	195.2	330.3	--
Oak / hickory group				
Oak / hickory group	11.0	0.8	10.1	--
Post oak / blackjack oak	424.4	111.3	313.2	--
White oak / red oak / hickory	1,614.9	172.0	1,442.9	--
White oak	188.8	13.6	175.2	--
Northern red oak	558.2	172.5	385.7	--
Bur oak	55.7	10.9	44.8	--
Black walnut	42.1	2.2	40.0	--
Black locust	9.6	--	9.6	--
Chestnut oak / black oak / scarlet oak	137.9	36.8	101.1	--
Red maple / oak	140.2	47.8	92.4	--
Mixed upland hardwoods	256.7	24.1	232.6	--
All forest types	3,439.4	591.8	2,847.7	--
Oak / gum / cypress group				
Sweetbay / swamp tupelo / red maple	1.4	--	1.4	--
All forest types	1.4	--	1.4	--

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(Table 1 continued)

Forest type group/ forest type	Owner category			
	All owners	Public	Private	Unidentified owner
Hardwood type groups				
Elm / ash / cottonwood group				
Elm / ash / cottonwood group	8.3	4.3	4.0	--
Black ash / American elm / red maple	691.7	202.6	489.1	--
River birch / sycamore	22.0	1.5	20.5	--
Cottonwood	21.5	10.0	11.5	--
Willow	20.3	2.0	18.3	--
Sycamore / pecan / American elm	50.1	8.7	41.5	--
Sugarberry / hackberry / elm / green ash	297.6	45.8	251.8	--
Silver maple / American elm	96.6	46.1	50.6	--
Red maple / lowland	123.4	26.8	96.7	--
Cottonwood / willow	10.4	--	10.4	--
All forest types	1,342.0	347.8	994.2	--
Maple / beech / birch group				
Maple / beech / birch group	19.5	2.0	17.5	--
Sugar maple / beech / yellow birch	2,204.0	766.5	1,437.5	--
Black cherry	50.0	12.6	37.4	--
Cherry / ash / yellow-poplar	90.1	28.6	61.5	--
Hard maple / basswood	1,390.8	429.7	961.1	--
Elm / ash / locust	137.9	7.5	130.5	--
Red maple / upland	484.9	147.0	338.0	--
All forest types	4,377.2	1,393.9	2,983.3	--
Aspen / birch group				
Aspen / birch group	7.3	0.3	6.9	--
Aspen	2,779.1	1,207.2	1,571.9	--
Paper birch	428.2	152.5	275.7	--
Balsam poplar	50.3	7.5	42.7	--
All forest types	3,264.9	1,367.6	1,897.3	--
Exotic hardwoods group				
Other exotic hardwoods	5.6	--	5.6	--
All forest types	5.6	--	5.6	--
All hardwood groups	12,956.0	3,896.2	9,059.7	--
Nonstocked	153.5	39.2	114.2	--
All forest groups	15,885.0	5,066.1	10,818.9	--

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

Table 2. -- Area of timberland by major forest type group, stand origin, and owner category, Wisconsin, 2000-2003

(In thousand acres)

Major forest type group and stand origin	Owner category			Unidentified owner
	All owners	Public	Private	
Softwood type groups				
Natural	2,027.9	836.7	1,191.2	--
Planted	703.4	266.8	436.6	--
All softwood types	2,731.3	1,103.5	1,627.8	--
Hardwood type groups				
Natural	12,576.7	3,690.9	8,885.8	--
Planted	172.4	80.2	92.2	--
All hardwood types	12,749.1	3,771.2	8,978.0	--
Nonstocked	151.7	38.3	113.3	--
All groups	15,632.1	4,913.0	10,719.1	--

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

Table 3. -- Area of timberland by forest type group, forest type, and stand-size class, Wisconsin, 2000-2003

(In thousand acres)

Forest type group/ forest type	Stand-size class			
	All stands	Sawtimber	Poletimber	Sapling- seedling
Non- stocked				
Softwood type groups				
White / red / jack pine group				
Jack pine	351.2	74.5	161.1	115.7
Red pine	660.8	384.7	201.3	74.8
Eastern white pine	304.8	222.5	45.0	37.2
White pine / hemlock	18.7	14.6	4.0	--
Eastern hemlock	79.4	78.3	1.1	--
All forest types	1,414.9	774.7	412.5	227.7
Spruce / fir group				
Balsam fir	192.6	12.0	69.5	111.2
White spruce	59.8	18.7	24.2	16.9
Black spruce	333.5	15.0	87.0	231.6
Tamarack	316.2	15.7	140.8	159.7
Northern white-cedar	377.3	164.1	194.4	18.8
All forest types	1,279.5	225.5	515.8	538.2
Pinyon / juniper group				
Eastern redcedar	14.4	1.5	5.1	7.9
All forest types	14.4	1.5	5.1	7.9
Exotic softwoods group				
Exotic softwoods group	0.6	--	0.6	--
Scotch pine	17.5	7.0	3.5	7.0
Other exotic softwoods	4.4	--	4.4	--
All forest types	22.4	7.0	8.4	7.0
All softwood groups	2,731.3	1,008.7	941.8	780.8
Hardwood type groups				
Oak / pine group				
Oak / pine group	3.7	0.4	2.6	0.7
White pine / red oak / white ash	219.2	111.4	75.3	32.5
Eastern redcedar / hardwood	11.4	7.8	3.6	--
Other pine / hardwood	280.8	93.9	79.4	107.5
All forest types	515.0	213.5	160.8	140.7
Oak / hickory group				
Oak / hickory group	11.0	2.6	7.5	0.8
Post oak / blackjack oak	409.2	168.0	162.4	78.8
White oak / red oak / hickory	1,601.6	941.8	527.1	132.7
White oak	174.4	142.8	24.7	6.9
Northern red oak	546.9	403.2	110.6	33.1
Bur oak	51.3	37.1	4.2	10.1
Black walnut	42.1	28.3	7.2	6.6
Black locust	9.6	--	7.5	2.1
Chestnut oak / black oak / scarlet oak	137.9	72.5	39.7	25.7
Red maple / oak	140.2	48.5	72.3	19.4
Mixed upland hardwoods	250.7	95.8	79.2	75.7
All forest types	3,375.0	1,940.7	1,042.4	391.9
Oak / gum / cypress group				
Sweetbay / swamp tupelo / red maple	1.4	1.4	--	--
All forest types	1.4	1.4	--	--

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(Table 3 continued)

Forest type group/ forest type	Stand-size class				Non- stocked
	All stands	Sawtimber	Poletimber	Sapling- seedling	
Hardwood type groups					
Elm / ash / cottonwood group					
Elm / ash / cottonwood group	8.3	0.7	2.6	5.1	--
Black ash / American elm / red maple	665.9	94.5	450.7	120.7	--
River birch / sycamore	19.5	7.2	8.8	3.5	--
Cottonwood	21.5	16.7	--	4.7	--
Willow	20.3	4.1	5.7	10.6	--
Sycamore / pecan / American elm	50.1	10.4	30.1	9.6	--
Sugarberry / hackberry / elm / green ash	296.8	89.7	145.0	62.1	--
Silver maple / American elm	92.4	74.7	16.7	0.9	--
Red maple / lowland	116.7	15.6	50.3	50.7	--
Cottonwood / willow	10.4	8.9	1.4	--	--
All forest types	1,301.8	322.5	711.3	267.9	--
Maple / beech / birch group					
Maple / beech / birch group	18.8	8.4	9.8	0.5	--
Sugar maple / beech / yellow birch	2,166.2	1,022.3	998.3	145.6	--
Black cherry	50.0	0.6	11.6	37.7	--
Cherry / ash / yellow-poplar	90.1	13.7	21.6	54.8	--
Hard maple / basswood	1,371.8	771.9	559.1	40.8	--
Elm / ash / locust	136.2	20.6	69.5	46.1	--
Red maple / upland	480.1	117.8	312.9	49.5	--
All forest types	4,313.2	1,955.3	1,982.7	375.1	--
Aspen / birch group					
Aspen / birch group	7.3	0.7	5.7	0.9	--
Aspen	2,762.2	344.6	1,206.7	1,210.9	--
Paper birch	420.8	59.5	288.2	73.1	--
Balsam poplar	47.0	9.5	20.3	17.2	--
All forest types	3,237.2	414.2	1,521.0	1,302.0	--
Exotic hardwoods group					
Other exotic hardwoods	5.6	--	--	5.6	--
All forest types	5.6	--	--	5.6	--
All hardwood groups	12,749.1	4,847.6	5,418.2	2,483.3	--
Nonstocked	151.7	--	--	--	151.7
All forest groups	15,632.1	5,856.3	6,360.1	3,264.1	151.7

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

Table 4. -- Net volume of all live trees on forest land by species group, species, and owner category, Wisconsin, 2000-2003

(In thousand cubic feet)

Species group/ species	Owner category			Unidentified owner
	All owners	Public	Private	
Softwoods				
Other yellow pines				--
Scotch pine	14,897	1,905	12,992	--
All species	14,897	1,905	12,992	--
Eastern white and red pines				--
Red pine	1,394,085	594,383	799,702	--
Eastern white pine	1,281,464	433,972	847,492	--
All species	2,675,549	1,028,355	1,647,194	--
Jack pine				--
Jack pine	313,447	112,291	201,156	--
All species	313,447	112,291	201,156	--
Spruce and balsam fir				--
Balsam fir	419,211	164,073	255,138	--
White spruce	263,584	148,333	115,252	--
Black spruce	188,200	98,627	89,573	--
All species	870,995	411,033	459,963	--
Eastern hemlock				--
Eastern hemlock	434,997	156,234	278,764	--
All species	434,997	156,234	278,764	--
Other eastern softwoods				--
Eastern redcedar	27,077	1,598	25,478	--
Larch spp.	1,179	48	1,131	--
Tamarack (native)	256,904	86,811	170,093	--
Norway spruce	14,081	6,089	7,992	--
Austrian pine	68	--	68	--
Douglas-fir	131	--	131	--
Northern white-cedar	732,429	284,034	448,394	--
All species	1,031,869	378,581	653,288	--
True fir				--
White fir	165	--	165	--
All species	165	--	165	--
Total softwoods	5,341,920	2,088,398	3,253,522	--
Hardwoods				
Select white oaks				--
White oak	824,514	83,370	741,144	--
Swamp white oak	33,104	14,977	18,127	--
Bur oak	373,648	31,633	342,016	--
Chinkapin oak	4,215	531	3,685	--
All species	1,235,482	130,510	1,104,972	--
Select red oaks				--
Northern red oak	1,825,453	452,558	1,372,894	--
All species	1,825,453	452,558	1,372,894	--
Other red oaks				--
Northern pin oak	493,042	112,292	380,750	--
Black oak	511,792	75,169	436,624	--
All species	1,004,834	187,460	817,374	--

(Table 4 continued on next page)

(Table 4 continued)

Species group/ species	Owner category			Unidentified owner
	All owners	Public	Private	
Hardwoods				
Hickory				
Bitternut hickory	103,724	7,466	96,258	--
Shagbark hickory	164,866	4,441	160,425	--
All species	268,590	11,907	256,683	--
Yellow birch				
Yellow birch	330,368	127,215	203,153	--
All species	330,368	127,215	203,153	--
Hard maple				
Black maple	1,888	1,681	207	--
Sugar maple	2,449,282	921,584	1,527,698	--
All species	2,451,170	923,266	1,527,904	--
Soft maple				
Red maple	2,235,135	723,064	1,512,071	--
Silver maple	318,821	178,420	140,401	--
All species	2,553,956	901,485	1,652,472	--
Beech				
American beech	39,688	6,392	33,296	--
All species	39,688	6,392	33,296	--
Ash				
White ash	391,036	94,550	296,486	--
Black ash	560,591	196,277	364,314	--
Green ash	299,369	54,687	244,683	--
Blue ash	--	--	--	--
All species	1,250,996	345,514	905,482	--
Cottonwood and aspen				
Balsam poplar	46,823	12,658	34,165	--
Eastern cottonwood	60,207	10,846	49,361	--
Bigtooth aspen	737,573	219,928	517,646	--
Quaking aspen	1,865,770	782,341	1,083,429	--
All species	2,710,374	1,025,773	1,684,602	--
Basswood				
American basswood	1,132,885	360,060	772,825	--
All species	1,132,885	360,060	772,825	--
Black walnut				
Black walnut	97,139	6,592	90,547	--
All species	97,139	6,592	90,547	--

(Table 4 continued on next page)

(Table 4 continued)

Species group/ species	Owner category			
	All owners	Public	Private	Unidentified owner
Hardwoods				
Other eastern soft hardwoods				
Boxelder	120,023	9,862	110,162	--
River birch	20,519	7,609	12,910	--
Paper birch	734,733	261,576	473,157	--
Hackberry	13,972	1,811	12,161	--
Butternut	17,614	1,106	16,508	--
Black cherry	276,802	48,360	228,442	--
Black willow	29,638	7,021	22,616	--
White willow	1,522	--	1,522	--
American elm	352,428	32,746	319,682	--
Siberian elm	2,360	232	2,128	--
Slippery elm	81,533	6,553	74,980	--
All species	1,651,145	376,877	1,274,268	--
Other eastern hard hardwoods				
Honeylocust	1,084	--	1,084	--
Red mulberry	3,421	610	2,811	--
Black locust	16,851	1,459	15,391	--
Rock elm	5,531	743	4,787	--
All species	26,886	2,812	24,074	--
Eastern noncommercial hardwoods				
Mountain maple	--	--	--	--
Serviceberry spp.	318	108	210	--
American hornbeam, musclewood	418	--	418	--
Hawthorn spp.	3,872	239	3,633	--
Cockspur hawthorn	387	--	387	--
Downy hawthorn	54	--	54	--
Apple spp.	6,112	--	6,112	--
Eastern hophornbeam	46,766	5,379	41,388	--
Cherry and plum spp.	54	--	54	--
Pin cherry	875	131	744	--
Chokecherry	316	--	316	--
Canada plum	103	103	--	--
American plum	269	--	269	--
Willow spp.	1,492	--	1,492	--
Peachleaf willow	802	96	705	--
American mountain-ash	--	--	--	--
All species	61,839	6,055	55,783	--
Total hardwoods				
	16,640,804	4,864,477	11,776,327	--
All species groups				
	21,982,724	6,952,874	15,029,850	--

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

Table 5. -- Net volume of all live trees and salvageable dead trees on timberland by class of timber and softwood/hardwood species category, Wisconsin, 2000-2003

(In thousand cubic feet)

Class of timber	All species	Softwood species	Hardwood species
Live trees			
Growing-stock trees			
Sawtimber			
Saw log portion	8,728,056	3,055,314	5,672,742
Upper stem portion	2,624,638	428,264	2,196,373
Total	11,352,693	3,483,578	7,869,115
Poletimber	8,081,108	1,605,964	6,475,144
All growing-stock trees	19,433,802	5,089,542	14,344,260
Cull trees			
Rough trees ¹			
Sawtimber size	1,416,720	116,383	1,300,336
Poletimber size	649,766	49,555	600,211
Total	2,066,486	165,938	1,900,548
Rotten trees ¹			
Sawtimber size	132,574	18,049	114,525
Poletimber size	36,883	4,428	32,456
Total	169,457	22,476	146,981
All live cull trees	2,235,943	188,414	2,047,529
All live trees	21,669,745	5,277,957	16,391,789
Salvageable dead trees			
Sawtimber size	193,421	57,710	135,711
Poletimber size	208,761	49,999	158,762
All salvageable dead trees	402,182	107,709	294,473
All classes	22,071,927	5,385,665	16,686,262

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

¹ Includes noncommercial species.

Table 6. -- Net volume of growing stock on timberland by forest type group, forest type, and softwood/hardwood species category, Wisconsin, 2000-2003

(In thousand cubic feet)

Forest type group/ forest type	All species	Softwood species	Hardwood species
Softwood type groups			
White / red / jack pine group			
Jack pine	241,476	214,208	27,269
Red pine	1,316,616	1,240,898	75,718
Eastern white pine	710,869	632,311	78,558
White pine / hemlock	60,084	48,677	11,407
Eastern hemlock	210,119	162,627	47,491
All forest types	2,539,164	2,298,721	240,443
Spruce / fir group			
Balsam fir	127,580	99,474	28,105
White spruce	73,876	63,265	10,611
Black spruce	166,098	156,595	9,502
Tamarack	212,130	198,433	13,697
Northern white-cedar	627,618	543,142	84,476
All forest types	1,207,302	1,060,910	146,392
Pinyon / juniper group			
Eastern redcedar	6,240	5,354	887
All forest types	6,240	5,354	887
Exotic softwoods group			
Exotic softwoods group	604	604	--
Scotch pine	11,718	8,550	3,168
Other exotic softwoods	6,425	6,043	382
All forest types	18,748	15,198	3,550
All softwood groups	3,771,454	3,380,182	391,272
Hardwood type groups			
Oak / pine group			
Oak / pine group	3,767	1,430	2,337
White pine / red oak / white ash	369,851	219,101	150,751
Eastern redcedar / hardwood	13,137	3,663	9,474
Other pine / hardwood	238,417	136,270	102,147
All forest types	625,172	360,463	264,709

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(Table 6 continued)

Forest type group/ forest type	All species	Softwood species	Hardwood species
Hardwood type groups			
Oak / hickory group			
Oak / hickory group	12,551	243	12,309
Post oak / blackjack oak	404,857	37,008	367,849
White oak / red oak / hickory	2,025,443	93,024	1,932,419
White oak	258,274	8,932	249,342
Northern red oak	1,042,164	24,359	1,017,805
Bur oak	79,763	864	78,899
Black walnut	52,099	865	51,234
Black locust	7,978	- -	7,978
Chestnut oak / black oak / scarlet oak	118,068	19,389	98,679
Red maple / oak	169,021	6,702	162,319
Mixed upland hardwoods	193,233	9,527	183,706
All forest types	4,363,451	200,911	4,162,540
Oak / gum / cypress group			
Sweetbay / swamp tupelo / red maple	3,857	2,098	1,759
All forest types	3,857	2,098	1,759
Elm / ash / cottonwood group			
Elm / ash / cottonwood group	5,317	56	5,261
Black ash / American elm / red maple	661,438	144,053	517,385
River birch / sycamore	15,796	- -	15,796
Cottonwood	32,982	- -	32,982
Willow	8,167	2,010	6,157
Sycamore / pecan / American elm	31,212	6,111	25,101
Sugarberry / hackberry / elm / green ash	207,854	9,961	197,893
Silver maple / American elm	237,373	229	237,144
Red maple / lowland	76,679	11,417	65,262
Cottonwood / willow	15,414	- -	15,414
All forest types	1,292,233	173,837	1,118,396
Maple / beech / birch group			
Maple / beech / birch group	25,006	7,569	17,437
Sugar maple / beech / yellow birch	3,213,723	372,267	2,841,455
Black cherry	13,918	1,021	12,897
Cherry / ash / yellow-poplar	48,700	4,305	44,395
Hard maple / basswood	2,456,397	55,457	2,400,939
Elm / ash / locust	76,356	1,841	74,515
Red maple / upland	618,182	54,471	563,711
All forest types	6,452,282	496,932	5,955,350

(Table 6 continued on next page)

(Table 6 continued)

Forest type group/ forest type	All species	Softwood species	Hardwood species
Hardwood type groups			
Aspen / birch group			
Aspen / birch group	13,528	6,922	6,605
Aspen	2,397,666	380,189	2,017,477
Paper birch	459,577	73,856	385,721
Balsam poplar	44,871	9,177	35,694
All forest types	2,915,642	470,144	2,445,497
All hardwood groups	15,652,635	1,704,385	13,948,250
Nonstocked	9,713	4,975	4,737
All forest groups	19,433,802	5,089,542	14,344,260

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

Table 7. -- Net volume of growing stock on timberland by species group, species, and diameter class, Wisconsin, 2000-2003

(in thousand cubic feet)

Species group/ species	All classes	Diameter class (inches at breast height)										29.0+
		5.0-6.9	7.0-8.9	9.0-10.9	11.0-12.9	13.0-14.9	15.0-16.9	17.0-18.9	19.0-20.9	21.0-28.9		
Softwoods												
Other yellow pines												
Scotch pine	13,167	1,479	1,830	1,925	1,607	2,664	1,429	900	1,333	--	--	
All species	13,167	1,479	1,830	1,925	1,607	2,664	1,429	900	1,333	--	--	
Eastern white and red pines												
Red pine	1,382,045	123,062	232,034	296,370	250,909	169,330	116,878	88,561	52,288	52,633	--	
Eastern white pine	1,218,096	47,371	80,840	102,208	120,176	125,675	137,817	113,493	106,699	314,104	69,712	
All species	2,600,141	170,433	312,875	398,578	371,085	295,006	254,694	202,054	158,967	366,737	69,712	
Jack pine												
Jack pine	298,851	51,820	89,362	78,326	49,517	20,072	9,754	--	--	--	--	
All species	298,851	51,820	89,362	78,326	49,517	20,072	9,754	--	--	--	--	
Spruce and balsam fir												
Balsam fir	407,868	145,469	135,041	78,641	27,894	13,964	4,487	--	981	1,391	--	
White spruce	257,950	29,686	41,861	43,481	35,826	41,300	34,147	15,883	11,160	4,606	--	
Black spruce	184,888	81,945	59,728	25,914	11,875	1,506	1,380	1,014	--	1,526	--	
All species	850,707	257,100	236,631	148,037	75,595	56,770	40,014	16,897	12,140	7,524	--	
Eastern hemlock												
Eastern hemlock	411,650	14,921	27,634	36,134	56,937	45,993	53,267	58,356	40,218	72,948	5,242	
All species	411,650	14,921	27,634	36,134	56,937	45,993	53,267	58,356	40,218	72,948	5,242	
Other eastern softwoods												
Eastern redcedar	20,956	6,525	5,115	4,916	316	3,458	627	--	--	--	--	
Larch spp.	1,179	291	700	188	--	--	--	--	--	--	--	
Tamarack (native)	247,346	77,749	78,963	46,312	27,996	9,181	4,859	893	1,393	--	--	
Norway spruce	14,081	2,530	5,149	3,176	1,674	946	607	--	--	--	--	
Douglas-fir	131	--	131	--	--	--	--	--	--	--	--	
Northern white-cedar	631,169	107,663	156,900	137,821	107,960	59,562	31,426	12,972	11,889	4,975	--	
All species	914,863	194,757	246,959	192,412	137,947	73,147	37,518	13,865	13,283	4,975	--	
True fir												
White fir	165	--	165	--	--	--	--	--	--	--	--	
All species	165	--	165	--	--	--	--	--	--	--	--	
Total softwoods												
	5,089,542	690,510	915,454	855,411	692,688	493,651	396,677	292,071	225,941	452,185	74,953	
Hardwoods												
Select white oaks												
White oak	681,872	26,634	51,835	73,686	96,285	113,726	92,867	71,746	45,552	94,749	14,792	
Swamp white oak	31,237	1,898	3,924	4,342	4,640	5,005	3,949	947	5,470	1,063	--	
Bur oak	278,200	13,680	20,280	31,223	37,434	33,834	24,761	27,715	16,792	56,299	16,182	
Chinkapin oak	2,985	30	209	348	--	--	--	966	--	1,433	--	
All species	994,294	42,242	76,248	109,599	138,359	152,565	121,577	101,374	67,814	153,543	30,974	

(Table 7 continued on next page)

(Table 7 continued)

Species group/ species	All classes	Diameter class (inches at breast height)											29.0+
		5.0-6.9	7.0-8.9	9.0-10.9	11.0-12.9	13.0-14.9	15.0-16.9	17.0-18.9	19.0-20.9	21.0-28.9			
Hardwoods													
Select red oaks													
Northern red oak	1,642,526	42,453	97,522	170,550	248,125	279,537	232,463	173,521	134,734	219,041	44,579		
All species	1,642,526	42,453	97,522	170,550	248,125	279,537	232,463	173,521	134,734	219,041	44,579		
Other red oaks													
Northern pin oak	376,899	21,756	47,138	64,915	66,143	58,324	43,204	24,928	25,159	25,330	--		
Black oak	391,844	16,971	39,489	59,402	62,765	57,376	51,545	46,967	18,627	36,398	2,304		
All species	768,743	38,728	86,627	124,317	128,909	115,700	94,749	71,895	43,786	61,728	2,304		
Hickory													
Bitternut hickory	92,872	15,226	20,900	21,592	13,673	11,833	6,815	--	1,339	1,494	--		
Shagbark hickory	149,942	14,578	20,969	32,877	27,605	24,987	9,079	8,337	8,849	2,662	--		
All species	242,814	29,805	41,869	54,469	41,278	36,820	15,893	8,337	10,188	4,156	--		
Yellow birch													
Yellow birch	255,567	30,349	37,304	47,205	38,751	36,380	21,551	12,704	10,050	18,714	2,561		
All species	255,567	30,349	37,304	47,205	38,751	36,380	21,551	12,704	10,050	18,714	2,561		
Hard maple													
Black maple	1,888	84	--	207	400	--	--	1,198	--	--	--		
Sugar maple	2,143,556	230,169	364,118	440,181	350,269	237,108	168,090	120,288	91,372	136,195	5,765		
All species	2,145,444	230,253	364,118	440,388	350,669	237,108	168,090	121,486	91,372	136,195	5,765		
Soft maple													
Red maple	1,918,728	312,368	427,815	409,532	301,332	215,730	113,947	64,398	31,842	39,093	2,670		
Silver maple	264,863	5,455	13,312	25,369	21,785	28,971	25,326	28,504	21,026	68,951	26,164		
All species	2,183,590	317,824	441,126	434,902	323,117	244,700	139,273	92,902	52,869	108,044	28,833		
Beech													
American beech	34,693	2,815	4,574	3,834	3,002	5,298	2,744	603	2,291	6,470	3,063		
All species	34,693	2,815	4,574	3,834	3,002	5,298	2,744	603	2,291	6,470	3,063		
Ash													
White ash	362,699	22,613	37,692	58,201	73,480	53,852	54,414	24,966	18,628	18,852	--		
Black ash	511,806	114,948	139,805	117,946	70,710	39,238	15,224	10,232	2,310	1,392	--		
Green ash	271,918	33,554	46,119	55,214	45,998	37,817	18,052	9,087	11,435	14,641	--		
All species	1,146,422	171,116	223,617	231,362	190,188	130,906	87,689	44,286	32,374	34,885	--		
Cottonwood and aspen													
Balsam poplar	44,733	6,380	9,398	7,363	11,810	6,313	718	2,750	--	--	--		
Eastern cottonwood	54,360	326	554	1,543	1,268	4,343	6,320	4,548	6,534	20,934	7,990		
Bigtooth aspen	705,684	66,130	90,272	116,211	137,989	149,290	84,016	34,656	16,893	10,227	--		
Quaking aspen	1,678,064	300,253	335,572	358,868	282,764	201,238	117,111	53,864	12,416	15,978	--		
All species	2,482,841	373,089	435,797	483,985	433,832	361,184	208,165	95,817	35,842	47,139	7,990		
Basswood													
American basswood	1,031,765	61,124	127,712	195,574	209,410	177,411	102,285	73,965	36,268	48,016	--		
All species	1,031,765	61,124	127,712	195,574	209,410	177,411	102,285	73,965	36,268	48,016	--		

(Table 7 continued on next page)

(Table 7 continued on next page)

(Table 7 continued)

Species group/ species	All classes	Diameter class (inches at breast height)										29.0+
		5.0-6.9	7.0-8.9	9.0-10.9	11.0-12.9	13.0-14.9	15.0-16.9	17.0-18.9	19.0-20.9	21.0-28.9		
Hardwoods												
Black walnut												
	89,694	5,434	8,297	11,799	12,193	13,202	10,863	15,110	4,259	8,537	--	--
All species	89,694	5,434	8,297	11,799	12,193	13,202	10,863	15,110	4,259	8,537	--	--
Other eastern soft hardwoods												
Boxelder	41,966	8,885	10,456	8,761	3,452	3,086	1,696	2,190	935	2,504	--	--
River birch	14,961	1,218	2,151	2,596	2,289	1,787	1,874	1,919	1,129	--	--	--
Paper birch	651,283	115,541	182,865	179,067	102,882	44,513	18,164	8,252	--	--	--	--
Hackberry	13,697	2,432	2,692	2,209	2,553	1,596	1,337	877	--	--	--	--
Butternut	9,174	1,506	1,990	1,340	1,891	--	1,368	--	1,079	--	--	--
Black cherry	211,646	35,209	47,444	38,261	28,013	29,184	18,100	8,224	4,986	2,224	--	--
Black willow	12,075	282	518	2,524	2,111	1,325	1,845	1,875	--	1,594	--	--
White willow	--	--	--	--	--	--	--	--	--	--	--	--
American elm	279,032	57,586	64,382	58,312	33,048	27,094	18,692	7,201	8,110	4,608	--	--
Siberian elm	912	504	200	208	--	--	--	--	--	--	--	--
Slippery elm	71,272	8,068	11,122	14,120	8,239	9,971	5,625	3,855	4,565	5,707	--	--
All species	1,306,018	231,231	323,820	307,399	184,478	118,557	68,700	34,392	20,804	16,637	--	--
Other eastern hard hardwoods												
Honeylocust	1,046	59	--	556	--	431	--	--	--	--	--	--
Red mulberry	602	95	116	392	--	--	--	--	--	--	--	--
Black locust	13,644	3,088	3,911	2,716	282	1,065	967	1,635	--	--	--	--
Rock elm	4,556	1,189	1,257	1,290	255	566	--	--	--	--	--	--
All species	19,848	4,431	5,284	4,954	517	2,061	967	1,635	--	--	--	--
Total hardwoods												
	14,344,260	1,580,893	2,273,915	2,620,336	2,302,826	1,911,429	1,275,010	848,027	542,650	863,106	126,068	--
All species groups												
	19,433,802	2,271,403	3,189,369	3,475,748	2,995,514	2,405,080	1,671,687	1,140,098	768,591	1,315,291	201,021	--

All table cells without observations in the inventory sample are indicated by --. Table value of 0 indicates

that the volume rounds to less than 1 thousand cubic feet. Columns and rows may not add to their totals due to rounding.

Table 8. -- Net volume of sawtimber on timberland by species group, species, and diameter class, Wisconsin, 2000-2003

(In thousand board feet)¹

Species group/ species	All classes	Diameter class (inches at breast height)							
		9.0-10.9	11.0-12.9	13.0-14.9	15.0-16.9	17.0-18.9	19.0-20.9	21.0-28.9	29.0+
Softwoods									
Other yellow pines									
Scotch pine	51,134	9,222	7,980	13,743	7,675	4,920	7,594	--	--
All species	51,134	9,222	7,980	13,743	7,675	4,920	7,594	--	--
Eastern white and red pines									
Red pine	5,412,257	1,492,752	1,288,849	894,354	635,495	494,011	298,312	308,484	--
Eastern white pine	5,733,179	466,208	566,219	617,108	703,505	598,732	578,767	1,782,789	419,852
All species	11,145,436	1,958,960	1,855,067	1,511,462	1,339,000	1,092,743	877,079	2,091,272	419,852
Jack pine									
Jack pine	771,965	373,934	243,250	102,622	52,159	--	--	--	--
All species	771,965	373,934	243,250	102,622	52,159	--	--	--	--
Spruce and balsam fir									
Balsam fir	622,022	375,599	137,701	71,548	23,781	--	5,460	7,933	--
White spruce	1,002,694	220,748	186,541	222,618	189,686	90,591	65,068	27,442	--
Black spruce	229,178	134,466	63,394	8,291	7,803	5,971	--	9,253	--
All species	1,853,893	730,813	387,636	302,457	221,270	96,562	70,528	44,628	--
Eastern hemlock									
Eastern hemlock	1,939,595	174,221	274,541	229,671	275,860	312,907	221,879	418,901	31,616
All species	1,939,595	174,221	274,541	229,671	275,860	312,907	221,879	418,901	31,616
Other eastern softwoods									
Eastern redcedar	49,097	25,086	1,639	18,836	3,535	--	--	--	--
Larch spp.	866	866	--	--	--	--	--	--	--
Tamarack (native)	463,729	230,000	144,725	49,020	26,801	5,048	8,134	--	--
Norway spruce	31,013	14,910	8,131	4,776	3,197	--	--	--	--
Northern white-cedar	1,873,312	685,219	545,899	308,795	167,446	70,935	66,336	28,682	--
All species	2,418,017	956,081	700,395	381,427	200,978	75,983	74,471	28,682	--
Total softwoods	18,180,040	4,203,230	3,468,870	2,541,382	2,096,941	1,583,115	1,251,550	2,583,484	451,468
Hardwoods									
Select white oaks									
White oak	2,417,761	--	390,219	494,301	421,545	337,047	219,243	476,710	78,694
Swamp white oak	95,157	--	18,912	21,947	17,929	4,486	26,572	5,312	--
Bur oak	992,758	--	152,424	147,898	112,202	130,401	80,958	283,478	85,397
Chinkapin oak	11,691	--	--	--	--	4,595	--	7,095	--
All species	3,517,367	--	561,556	684,147	551,676	476,530	326,772	772,596	164,091
Select red oaks									
Northern red oak	6,101,480	--	1,001,485	1,216,155	1,060,317	819,172	654,391	1,109,330	240,630
All species	6,101,480	--	1,001,485	1,216,155	1,060,317	819,172	654,391	1,109,330	240,630

(Table 8 continued on next page)

(Table 8 continued on next page)

(Table 8 continued)

Species group/ species	All classes	Diameter class (inches at breast height)								29.0+
		9.0-10.9	11.0-12.9	13.0-14.9	15.0-16.9	17.0-18.9	19.0-20.9	21.0-28.9		
Hardwoods										
Other red oaks										
Northern pin oak	1,097,255	--	270,824	256,153	199,064	118,555	123,252	129,408	--	--
Black oak	1,262,128	--	258,565	253,387	237,652	224,596	90,623	185,023	12,281	--
All species	2,359,382	--	529,389	509,540	436,716	343,151	213,875	314,431	12,281	--
Hickory										
Bitternut hickory	141,251	--	50,605	47,763	29,329	--	6,392	7,162	--	--
Shagbark hickory	338,892	--	103,303	102,983	39,999	38,047	41,628	12,932	--	--
All species	480,142	--	153,908	150,746	69,327	38,047	48,020	20,094	--	--
Yellow birch										
Yellow birch	673,079	--	168,303	170,415	105,119	64,086	51,790	99,105	14,260	--
All species	673,079	--	168,303	170,415	105,119	64,086	51,790	99,105	14,260	--
Hard maple										
Black maple	7,419	--	1,728	--	--	5,691	--	--	--	--
Sugar maple	5,053,340	--	1,447,727	1,060,297	786,120	580,112	451,477	696,618	30,991	--
All species	5,060,759	--	1,449,454	1,060,297	786,120	585,803	451,477	696,618	30,991	--
Soft maple										
Red maple	3,379,177	--	1,229,042	950,786	525,582	306,110	155,338	198,209	14,110	--
Silver maple	1,057,502	--	86,894	126,880	115,557	134,388	101,571	349,801	142,411	--
All species	4,436,679	--	1,315,936	1,077,666	641,139	440,498	256,909	548,010	156,521	--
Beech										
American beech	118,166	--	13,127	25,017	13,560	3,090	11,720	34,301	17,351	--
All species	118,166	--	13,127	25,017	13,560	3,090	11,720	34,301	17,351	--
Ash										
White ash	1,097,452	--	302,501	238,138	251,427	119,320	91,228	94,839	--	--
Black ash	630,558	--	306,311	182,170	72,766	50,552	11,628	7,130	--	--
Green ash	611,486	--	188,348	166,656	82,969	43,422	55,919	74,173	--	--
All species	2,339,496	--	797,160	586,964	407,162	213,294	158,775	176,141	--	--
Cottonwood and aspen										
Balsam poplar	94,541	--	49,804	28,172	3,360	13,205	--	--	--	--
Eastern cottonwood	244,749	--	4,742	17,605	27,259	20,454	30,220	102,653	41,815	--
Bigtooth aspen	1,973,057	--	588,478	680,784	398,164	168,817	84,332	52,481	--	--
Quaking aspen	3,067,203	--	1,196,302	912,602	552,590	262,153	61,681	81,874	--	--
All species	5,379,550	--	1,839,326	1,639,164	981,374	484,629	176,234	237,008	41,815	--
Basswood										
American basswood	2,949,987	--	884,804	801,840	480,927	357,770	179,548	245,097	--	--
All species	2,949,987	--	884,804	801,840	480,927	357,770	179,548	245,097	--	--
Black walnut										
Black walnut	306,281	--	52,556	61,158	52,301	74,429	21,459	44,378	--	--
All species	306,281	--	52,556	61,158	52,301	74,429	21,459	44,378	--	--

(Table 8 continued on next page)

(Table 8 continued)

Species group/ species	All classes	Diameter class (inches at breast height)							
		9.0-10.9	11.0-12.9	13.0-14.9	15.0-16.9	17.0-18.9	19.0-20.9	21.0-28.9	29.0+
Hardwoods									
Other eastern soft hardwoods									
Boxelder	63,778	--	14,332	13,843	7,970	10,493	4,597	12,542	--
River birch	42,505	--	9,915	8,211	9,072	9,467	5,839	--	--
Paper birch	734,546	--	417,835	195,040	82,983	38,688	--	--	--
Hackberry	27,107	--	10,202	6,853	6,024	4,029	--	--	--
Butternut	20,129	--	8,100	--	6,641	--	5,388	--	--
Black cherry	403,291	--	115,416	129,402	83,665	39,087	24,264	11,456	--
Black willow	36,504	--	7,612	5,250	7,833	8,354	--	7,455	--
American elm	421,512	--	129,909	114,725	82,689	33,117	38,428	22,644	--
Slippery elm	166,473	--	31,863	42,140	25,098	17,647	21,600	28,125	--
All species	1,915,845	--	745,185	515,465	311,975	160,881	100,116	82,223	--
Other eastern hard hardwoods									
Honeylocust	1,949	--	--	1,949	--	--	--	--	--
Black locust	18,336	--	1,065	4,741	4,622	7,908	--	--	--
Rock elm	3,413	--	985	2,428	--	--	--	--	--
All species	23,699	--	2,050	9,118	4,622	7,908	--	--	--
Total hardwoods	35,661,911	--	9,514,239	8,487,693	5,902,335	4,049,287	2,651,085	4,379,330	677,940
All species groups	53,841,951	4,203,230	12,983,109	11,029,076	7,999,276	5,632,402	3,902,636	6,962,814	1,129,408

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

¹ International 1/4-inch rule.

Table 9. -- All live aboveground tree biomass on timberland by owner category, softwood/hardwood species category, and tree biomass component, Wisconsin, 2000-2003

(In dry tons)

Owner category and softwood/hardwood category	All components	All live 1-5 inch trees	Tree biomass component					
			Growing-stock trees			Non-growing-stock trees		
			Total	Boles	Stumps, tops, and limbs	Total	Boles	Stumps, tops, and limbs
Public								
Softwoods	40,513,001	4,887,963	33,835,168	27,004,098	6,831,069	1,789,871	1,356,445	433,426
Hardwoods	138,568,808	16,338,283	106,173,817	76,453,679	29,720,137	16,056,708	11,755,402	4,301,306
Total	179,081,810	21,226,246	140,008,984	103,457,778	36,551,206	17,846,579	13,111,847	4,734,732
Private								
Softwoods	64,154,620	6,964,923	54,817,837	43,801,698	11,016,139	2,371,860	1,810,646	561,214
Hardwoods	347,495,504	31,596,146	266,748,440	192,859,690	73,888,750	49,150,918	36,009,414	13,141,504
Total	411,650,124	38,561,069	321,566,277	236,661,388	84,904,889	51,522,779	37,820,060	13,702,718
All ownerships								
Softwoods	104,667,622	11,852,886	88,653,004	70,805,796	17,847,208	4,161,732	3,167,091	994,641
Hardwoods	486,064,312	47,934,429	372,922,257	269,313,370	103,608,887	65,207,626	47,764,816	17,442,810
Total	590,731,934	59,787,315	461,575,261	340,119,166	121,456,096	69,369,358	50,931,907	18,437,451

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 dry ton. Columns and rows may not add to their totals due to rounding.

Table 10. -- Average annual net growth of growing stock on timberland by species group and owner category, Wisconsin, 1996 to 2000-2003

(In thousand cubic feet per year)

Species group	Owner category		
	All owners	Public	Unidentified owner
Softwoods			
Other yellow pines	91	79	12
Eastern white and red pines	91,586	26,046	65,539
Jack pine	6,111	3,168	2,943
Spruce and balsam fir	20,240	6,871	13,369
Eastern hemlock	10,116	2,118	7,998
Other eastern softwoods	36,521	12,851	23,670
Total softwoods	164,666	51,133	113,533
Hardwoods			
Select white oaks	29,310	1,761	27,549
Select red oaks	44,643	9,007	35,636
Other red oaks	24,741	5,611	19,130
Hickory	9,864	341	9,523
Yellow birch	4,927	1,370	3,557
Hard maple	52,639	18,353	34,286
Soft maple	87,585	35,288	52,298
Beech	829	--	829
Ash	42,395	9,297	33,097
Cottonwood and aspen	121,911	48,905	73,006
Basswood	21,912	4,545	17,366
Black walnut	4,019	--	4,019
Other eastern soft hardwoods	47,006	5,112	41,895
Other eastern hard hardwoods	1,244	-271	1,515
Total hardwoods	493,026	139,318	353,707
All species groups	657,691	190,451	467,240

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

Table 11. -- Average annual removals of growing stock on timberland by species group and owner category, Wisconsin, 1996 to 2000-2003

(In thousand cubic feet per year)

Species group	Owner category		
	All owners	Public	Unidentified owner
Softwoods			
Eastern white and red pines	44,060	12,348	31,712
Jack pine	16,404	9,122	7,282
Spruce and balsam fir	6,403	2,799	3,604
Eastern hemlock	5,594	283	5,310
Other eastern softwoods	6,498	332	6,167
Total softwoods	78,959	24,884	54,075
Hardwoods			
Select white oaks	17,079	3,213	13,866
Select red oaks	25,711	3,346	22,365
Other red oaks	11,365	3,777	7,589
Hickory	2,494	--	2,494
Yellow birch	2,883	442	2,442
Hard maple	30,774	7,251	23,523
Soft maple	32,824	11,382	21,442
Beech	297	--	297
Ash	15,291	6,774	8,517
Cottonwood and aspen	96,749	24,325	72,424
Basswood	10,404	2,087	8,318
Black walnut	--	--	--
Other eastern soft hardwoods	33,740	3,257	30,482
Other eastern hard hardwoods	139	--	139
Total hardwoods	279,751	65,854	213,897
All species groups	358,710	90,738	267,972

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

Table 12. --- Average annual mortality of growing stock on timberland by species group and owner category, Wisconsin, 1996 to 2000-2003

(In thousand cubic feet per year)

Species group	Owner category			
	All owners	Public	Private	Unidentified owner
Softwoods				
Eastern white and red pines	10,824	3,898	6,926	--
Jack pine	9,575	1,901	7,674	--
Spruce and balsam fir	21,346	12,551	8,795	--
Eastern hemlock	2,239	1,122	1,116	--
Other eastern softwoods	2,499	852	1,647	--
Total softwoods	46,482	20,324	26,158	--
Hardwoods				
Select white oaks	3,128	806	2,323	--
Select red oaks	9,381	2,281	7,100	--
Other red oaks	9,448	2,122	7,326	--
Hickory	2,334	--	2,334	--
Yellow birch	1,276	883	392	--
Hard maple	9,770	2,689	7,081	--
Soft maple	13,026	2,742	10,284	--
Ash	7,784	1,655	6,129	--
Cottonwood and aspen	46,453	11,657	34,796	--
Basswood	6,356	1,945	4,411	--
Black walnut	1,427	--	1,427	--
Other eastern soft hardwoods	33,938	4,427	29,511	--
Other eastern hard hardwoods	157	157	--	--
Total hardwoods	144,477	31,363	113,114	--
All species groups	190,960	51,687	139,272	--

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

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Results of the 2003 annual inventory of Wisconsin show about 15.9 million acres of forest land, over 21.9 billion cubic feet of live volume on forest land, and nearly 591 million dry tons of all live aboveground tree biomass on timberland. Gypsy moth, forest tent caterpillar, twolined chestnut borer, bronze birch borer, ash yellows, and oak wilt were among the pests of Wisconsin forests.

KEY WORDS: Annual inventory, forest area, forest type, volume, biomass, Wisconsin

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