

USDA United States
Department of
Agriculture

Forest
Service

North Central
Research
Station

Resource Bulletin
NC - 211



Iowa's Forest Resources in 2000

Joseph T. Boykin, II



North Central Research Station
U.S. Department of Agriculture - Forest Service
1992 Folwell Avenue
Saint Paul, Minnesota 55108
2002
www.ncrs.fs.fed.us



CONTENTS

Results	1
Area	1
Volume	4
Biomass	5
Forest Health	6
Summary	6
Appendix	7
Inventory Methods	7
Sampling Phases	8
Phase 1	8
Phase 2	8
Literature Cited	10
Table Titles	11
Tables	13



Iowa's Forest Resources in 2000

The North Central Research Station's Forest Inventory and Analysis (NCFIA) program began fieldwork for the fourth forest inventory of Iowa's forest resources in 1999. This inventory initiated the 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 the data for all plots (or five panels). Once all panels have been measured, each will be remeasured approximately every 5 years. For example, in Iowa, the field plots measured in 2000 will be remeasured in 2005.

In 2000, NCFIA continued the annual inventory effort with the second panel of the fourth forest inventory. This fourth inventory of Iowa's forest resources will be completed in 2004. However, because each year's sample is a systematic sample of the entire State and because timely information is needed about Iowa's forest resources, estimates have been prepared from data gathered during the first 2 years of the inventory. Data presented in this report represent 40 percent of the field plots (or two panels) for a complete inventory and are a combination of the first year's panel from 1999 and the second year's panel from 2000. **Because of the limited number of field plots measured at this point, sampling errors are large and data in this report should be used with caution. Future**

estimates that incorporate data in this report are subject to change when ensuing annual inventories are completed and data compiled. Results presented are estimates based on sampling techniques. As additional annual inventories are completed, the precision of the estimates will increase and additional data will be released.

Reports of previous inventories of Iowa are dated 1954, 1974, and 1990. 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. As a result of our ongoing efforts to improve the efficiency and reliability of the inventory, several changes in procedures and definitions have been made since the last Iowa inventory in 1990 (Leatherberry *et al.* 1992) (see appendix). Some of these changes make it inappropriate to directly compare portions of the 2000 data with those published for 1990.

RESULTS

Area

In 2000, the forest land area estimate for Iowa was 2.5 million acres (table 1). Between 1990 and 2000, approximately 440 thousand acres of forest land were added to the State's land base. Ninety-four percent (2.3 million acres) of Iowa's forest land area is classified as timberland. Timberland, a subset of forest

About the Authors:

Joseph T. Boykin, II is a Forester with the Forest Inventory and Analysis Unit, North Central Research Station, St. Paul, MN.

land, is land that is producing, or is capable of producing, more than 20 cubic feet per acre per year of industrial wood crops, that is not withdrawn from timber use, and that is not associated with development. Forest land that is not timberland is mostly reserved forest land—forest land withdrawn from timber use through statute, administrative regulation, or designation.

Over the years, timberland area in Iowa has declined and then has increased. Before Euro-American settlement, forest in what is now Iowa was estimated at about 5.3 million acres (Smith *et al.* 2001). By 1954, timberland area in Iowa had declined by over 50 percent to 2.6 million acres as land was cleared for agricultural and other uses. Between 1954 and 1974, timberland declined by an estimated 1.1 million acres (fig. 1), as bottomlands and marginal agricultural lands, such as highly erodible lands, were used for agriculture as the farm economy boomed. When the farm economy declined in the 1970s and 1980s, timberland area in Iowa increased, reaching 2.1 million acres in 1990. Between 1990 and

2000, timberland area continued to increase to 2.3 million acres. The increase in timberland area since the 1970s is largely because of the reversion of pasturelands and marginal agriculture lands to timberland. Also, the establishment of trees along riparian areas and initiatives such as the Conservation Reserve Program contributed to the increase in Iowa's timberland area. The increase in timberland area between 1990 and 2000 should be viewed with the caveat that the 2000 estimate of timberland is based on a partial inventory and therefore has a higher sampling error than periodic inventories since 1954 (fig. 1).

In 2000, nearly 9 of every 10 acres of timberland in Iowa were privately owned (table 2). Between 1990 and 2000, the area of privately owned timberland increased by 19 percent—from 1.8 million acres to 2.1 million acres (fig. 2). Most private timberland is held in small parcels and is generally associated with farming. Nearly all of it—97 percent—is of natural origin. Only an estimated 32.4 thousand acres of timberland were planted. Planted acres are on privately owned land and

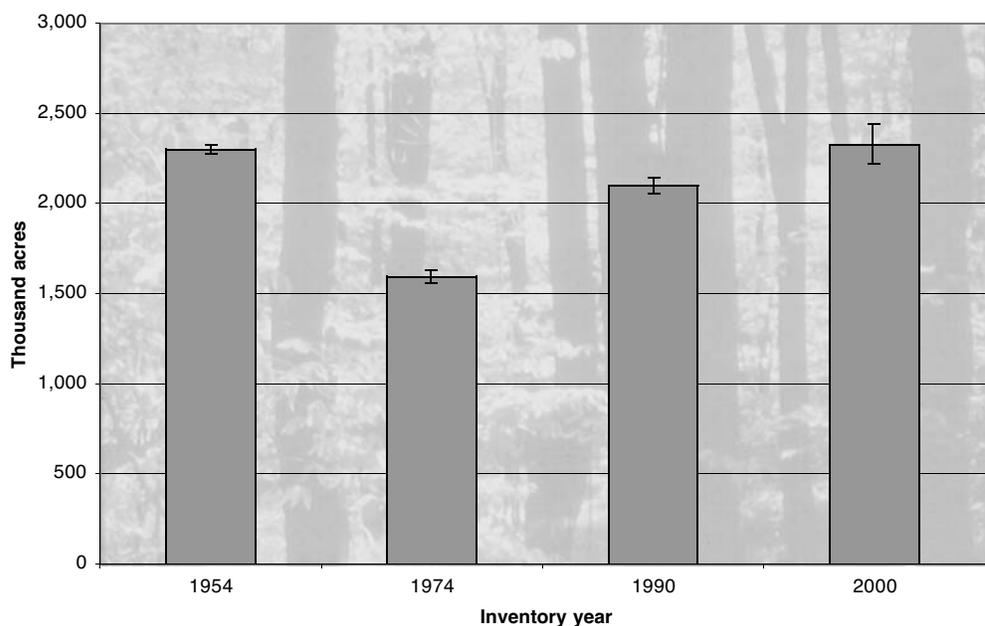


Figure 1. — Area of timberland, Iowa, 1954-2000. (Note: The sample error associated with an inventory is represented by the vertical line at the top of its bar.)

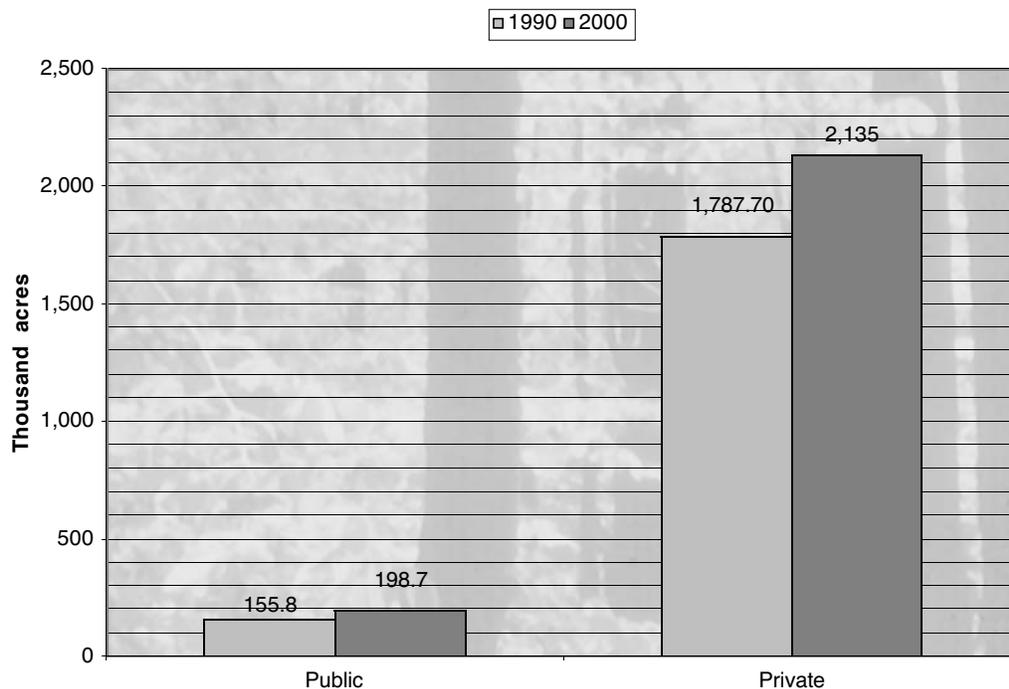


Figure 2. — Area of timberland by owner category, Iowa, 1990 and 2000.

support hardwood stands, most likely high valued species such as black walnut and oaks. Although only about 9 percent of timberland area is publicly owned, people use these lands for recreation, including hunting or observing wildlife, and they derive a wide array of social and environmental benefits from public timberland.

Hardwood stands are predominant in Iowa's forest. Three hardwood forest type groups—oak-hickory, maple-beech-birch, and elm-ash-cottonwood—cover 96 percent of Iowa's timberland area (fig. 3). Softwood stands are present on only an estimated 53 thousand acres of timberland in the pinyon/juniper forest type group. About 20 thousand acres of timberland are classified in the oak/pine forest

* In Iowa, the National Forest Type description "Elm-Ash-Cottonwood" does not effectively describe the bottomland forests. "American Elm" is not a dominant species in the canopy of the forests. The forest type used to locally describe these areas is "Silver Maple-Green Ash-Cottonwood."

** In Iowa, the National Forest Type description "Maple-Beech-Birch" does not effectively describe the hardwood forest. The forest type used to describe these forests locally is "Sugar Maple-American Basswood."

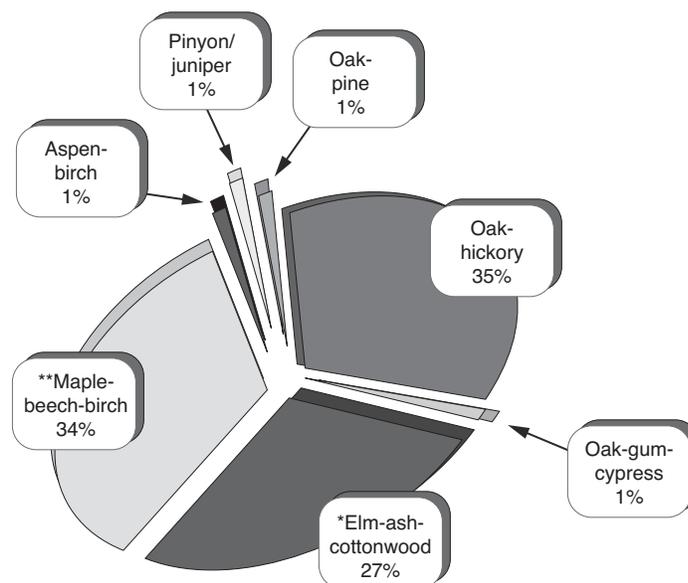


Figure 3. — Area of timberland by forest type, Iowa, 2000.

type group. Those stands are predominantly hardwoods, but have a significant softwood presence.

Iowa's timberland stands are generally mature and include 1.4 million acres of sawtimber stands (table 3). However, the distribution of timberland area by stand-size class changed slightly between 1990 and 2000. In 1990, sawtimber stands amounted to 65 percent of the State's timberland area (fig. 4). By 2000, the proportion of timberland area in sawtimber stands had declined to 60 percent of timberland area. During the same time, the proportion of timberland in poletimber stands increased from 20 to 24 percent of total timberland area. The proportion of area in seedling-sapling stands stayed about the same at around 15 percent. The slight shift in stand size may be due, in large part, to the harvesting of mature trees. In Iowa, harvesting methods focus on individual tree selection (individual trees are selected for harvest, but the entire stand is not removed).

The harvesting of individual mature trees generally does not result in a change in stand-size class classification. As a result, it is likely that Iowa's future forest will continue to be dominated by sawtimber- and poletimber-size stands.

Volume

Wood volume has traditionally been reported as growing-stock or sawtimber volume. However, this does not fully represent the complete volume in forest stands. There is volume in noncommercial trees and in rotten and rough trees that do not qualify as growing stock but that are utilized for wood fiber and/or fuelwood. In addition, rotten and rough trees, along with salvable dead trees, make important ecological contributions by providing wildlife habitat, carbon cycling, and soil and water protection. With the annualized inventory system and increased interest in FIA data from an ecological perspective, a greater focus has been placed on all live volume. In 2000, there were 3.2 billion cubic feet of all

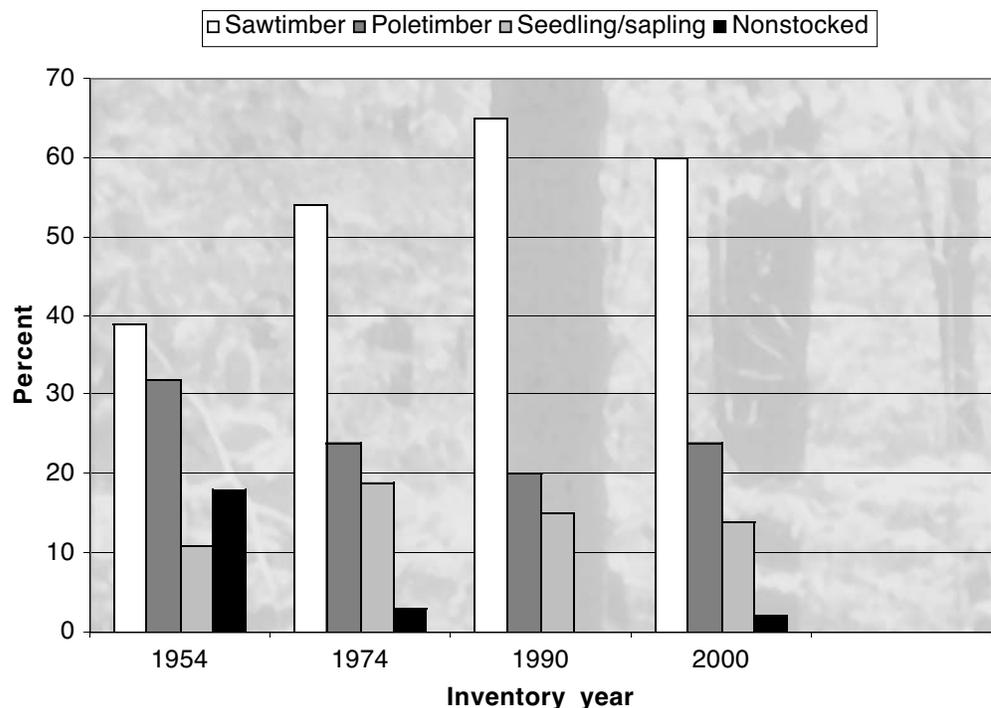


Figure 4. — Area of timberland by stand-size class, Iowa, 1954-2000.

live volume on Iowa's forest land (table 4). On average, each acre of forest land in Iowa has about 1,296 cubic feet of all live volume. Oaks make up 31 percent of net volume of all live trees on forest land.

Twenty-eight percent of net volume of all live trees on timberland in Iowa is non-growing-stock volume (table 5). This volume is contained in live cull trees (rough and rotten) and salvable dead trees. Net volume of growing stock on timberland was estimated at 2.3 billion cubic feet in 2000, which equates to about 970 cubic feet of growing-stock volume per acre of timberland. Seventy-five percent of growing-stock volume is contained in sawtimber-size trees. Hardwoods account for virtually all of the growing-stock volume in Iowa (table 6). The oak-hickory group accounted for 40 percent of all growing-stock volume. Two forest type groups—the elm-ash-cottonwood group, and the maple-beech-birch group—each account for about 28 percent of the hardwood growing-stock

volume. When combined, the three hardwood type groups account for over 97 percent of Iowa's growing-stock volume.

Seventy-four percent of all growing-stock volume is in trees that are more than 11 inches d.b.h. (table 7). Select white oaks account for nearly one-fourth of total growing-stock volume. Twenty-two percent of total growing-stock volume is in trees larger than 21 inches d.b.h., and 27 percent of select white oak volume is in trees larger than 21 inches d.b.h. Cottonwood volume is also concentrated in the large-diameter trees—57 percent is in trees 21 inches d.b.h. and larger. Table 8 presents statistics for net volume of sawtimber on timberland by species group and diameter class.

Since 1974, growing-stock volume in Iowa has increased with each succeeding inventory (fig. 5). The increase in growing-stock volume is related to the expansion of timberland area and to a forest that is maturing.

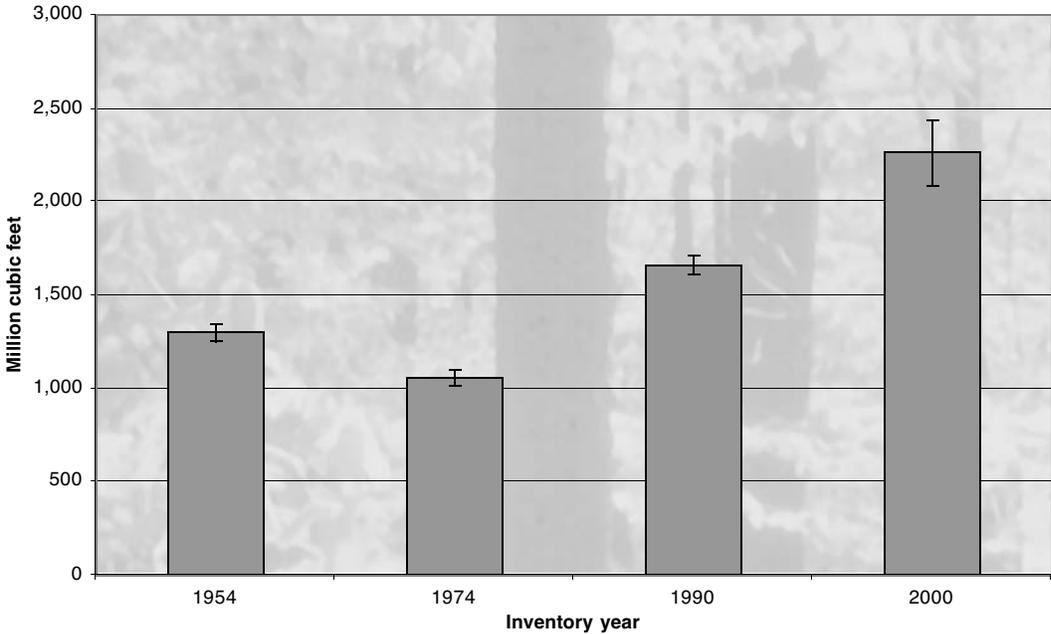


Figure 5. — Growing-stock volume on timberland, Iowa, 1954-2000. (Note: The sample error associated with an inventory is represented by the vertical line at the top of its bar.)

Biomass

Biomass, measured for the aboveground volume of all live trees (including bark but excluding foliage), was estimated at 87 million dry tons in 2000 (table 9). More than 65 percent of the total tree biomass was in growing-stock trees. Non-growing-stock trees accounted for 29 percent of total tree biomass. The remaining 6 percent of total tree biomass was in live trees 1 to 5 inches d.b.h. Virtually all (99 percent) tree biomass components were in the hardwood category. The majority of the total biomass, 91 percent, was on private lands. In 2000, private lands held the majority of the hardwood and softwood biomass—89 and 92 percent, respectively.

Forest Health

In 2000, Iowa's forest suffered damages from insects, disease, and severe weather. The gypsy moth (*Lymantria dispar*), an exotic species that defoliates trees and shrubs, is making its presence felt in Iowa (fig. 6). In an attempt to eradicate the moth, 7,000 pheromone traps were set across the State.

Oak wilt has become the most serious tree disease in Iowa. Brandrup (2000) reported that oak wilt caused by the fungus *Ceratocystis fagacearum* invades the water-conducting tissues (xylem) of oak trees and causes the foliage to wilt and die. In 2000, 388 new acres of oak wilt-infected forest land were reported. All species of oak are susceptible to oak wilt, but northern red oaks usually die within a few weeks after receiving the infection.

Summary

In summary, Iowa's forest resource of mostly hardwoods is increasing in both area and volume. Iowa's forest is generally healthy, but there is increasing concern about the impending invasion of the gypsy moth. Also, oak wilt is a continuing threat to the oak resource of the State. As additional data become available from ensuing annual inventories, a clearer picture of the direction of Iowa's forests will emerge. Additional data related to the most recent inventory of Iowa (1990) are available at:

<http://www.ncrs.fs.fed.us/4801/fiadb/index.htm>

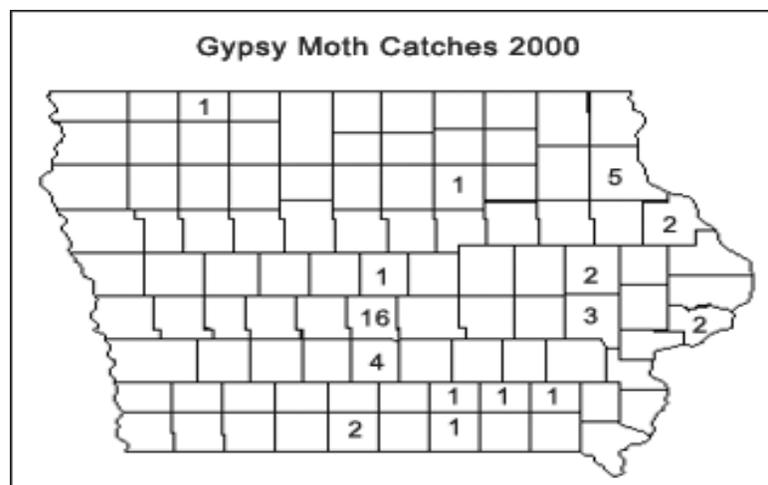


Figure 6. — Number of gypsy moth catches, Iowa, 2000. (Source: USDA Forest Service, State and Private Forestry Forest Health Protection Program.)

APPENDIX

Inventory Methods

Boykin (2001) provides a full description of the NCFIA annualized inventory methods for Iowa. Since the 1990 inventory of Iowa, several changes have been made in NCFIA inventory methods to improve the quality of the inventory as well as meet increasing demands for timely forest resource information. The most significant difference between inventories was the change from periodic inventories to annual inventories. Historically, NCFIA periodically inventoried each State on a cycle that averaged about 15 years. However, the need for timely and consistent data across large geographical regions, combined with national legislative mandates, resulted in NCFIA's implementation of an annual inventory system. Iowa was one of the first States in the North Central region, and one of the first States in the Nation, to be inventoried with this new system, beginning with the 1999 inventory.

With an annual inventory system, about one-fifth of all field plots are measured in any one year. After 5 years, an entire inventory cycle will be completed. After the first 5 years, NCFIA will report and analyze results as a moving 5-year average. For example, NCFIA will be able to generate a report based on inventory results for 1999 through 2004 or for 2000 through 2005. While there are great advantages for an annual inventory, one difficulty is reporting on results in the first 4 years. With the 2000 inventory, only 40 percent of all field plots have been measured. Sampling error estimates for the 2000 inventory results are area of forest land (4.32 percent), area of timberland (4.72 percent), number of growing-stock trees on timberland (8.35 percent), volume of growing stock on timberland (7.78 percent), and volume of sawtimber on timberland (9.20 percent). These sampling error estimates are considerably higher than those for the last periodic inventory completed in 1990

(i.e., 1.9 percent for timberland area and 3.2 percent for growing-stock volume) because of the smaller sample sizes. Thus, caution should be used when drawing conclusions based on this limited data set. As we complete ensuing measurements, we will have additional confidence in our results due to the increased number of field plots measured. As each measurement year is completed, the precision of estimates will improve.

Other significant changes between inventories include the implementation of new remote sensing technology, the implementation of a new field plot design, and the gathering of additional remotely sensed and field data. The advent of remote sensing technology since the previous inventory in 1990 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. Inventories in Iowa before 1999 used manual interpretation of aerial photos to stratify the sample (1954, 1974, and 1990).

New algorithms were used in 2000 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 among States and will be used to reassign the forest type and stand-size class of every plot measured in the 1990 inventory when it is updated. This will be done so that changes in forest type and stand-size class will more accurately reflect actual changes in the forest and not changes in how values are computed. The list of recognized forest types, grouping of these forest types for reporting purposes, equations used to assign stocking values to individual trees, definition of non-stocked, and names given to the forest types changed with the new algorithms. As a result, comparisons between the published 2000 inventory results and those published for the

1990 inventory may not be valid. For additional details about algorithms used in both inventories, please contact NCFIA.

Sampling Phases

The 2000 Iowa survey used a two-phase sample for stratification that included remeasuring inventory plots from the 1990 inventory and measuring new field plots. Two-phase sampling, also called double sampling, consists of a phase 1 sample used to estimate area by strata and a phase 2 sample to estimate the average value of parameters of interest within the strata. The estimated population total for a parameter is the sum across all strata of the product of each stratum's estimated area and the parameter's mean per unit area.

The only land that could not be sampled was private land where field personnel could not obtain permission from the owner to measure the 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. Fortunately, there were only nine denied access plots in 2000 and three denied access plots in 1999.

Phase 1

The 2000 inventory used a computer-assisted classification of satellite imagery. FIA used the imagery to form two initial strata—forest and nonforest. Pixels within 60 m (2 pixel widths) of a forest/nonforest edge formed two additional strata—forest/nonforest and nonforest/forest. Forest pixels within 60 m on the forest side of a forest/nonforest boundary were classified into forest/nonforest strata. Pixels within 60 m of the boundary on the nonforest side were classified into nonforest/forest strata.

Phase 2

Phase 2 of the inventory consisted of the measurement of the first annual sample of field plots in Iowa. 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 area of the United States into non-overlapping hexagons, each of which contains approximately 5,937 acres (McRoberts 1999). A grid of field plots was established by selecting one plot from each hexagon based on the following rules: (1) if a Forest Health Monitoring (FHM) plot (Mangold 1998) fell within a hexagon, it was selected as the grid plot; (2) if no FHM plot fell within a hexagon, the existing NCFIA plot from the 1998 inventory 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 plot established at the hexagon center was selected as the grid plot (McRoberts 1999). This grid of plots is designated the Federal base sample and is considered an equal probability sample; its measurement in Iowa is funded by the Federal government.

The total Federal base sample of hexagonal grid plots 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 measure vegetation on plots forested at the time of the last inventory and on plots currently classified as forest by trained photointerpreters using aerial photos or digital orthoquads.

NCFIA has two categories of field plot measurements—phase 3 plots (FHM plots) and phase 2 field plots—to optimize our ability to collect data when available for measurement.

Both types of plot are uniformly distributed both geographically and temporally. Phase 3 plots are measured with the full array of FHM vegetative and health variables collected as well as the full suite of measures associated with phase 2 plots. Phase 3 plots must be measured between June 1 and August 30 to accommodate the additional measurement of non-woody understory vegetation, ground cover, soils, and other variables. We anticipate that in Iowa the complete 5-year annual inventory will involve about 35 phase 3 plots. On the remaining plots, referred to as phase 2 plots, only variables that can be measured throughout the entire year are collected. In Iowa, the complete 5-year annual inventory is expected to involve about 335 phase 2 forested plots. The 1999/2000 annual inventory results represent field measures on 214 timberland, 11 other forest land, and 86 non-forested plots.

The new national FIA 4-point cluster plot design (fig. 7) was first used for data collection during the 1999 inventory of Iowa. This design was also used in the 2000 inventory and will be used in subsequent years. The national plot design requires mapping forest conditions on each plot. Due to the small sample size (20 percent) each year, precision associated with change factors such as mortality will be relatively low. Consequently, we will not report change estimates until at least three annual panels have been measured, and 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 variables will be available.

The overall plot layout for the new design 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,

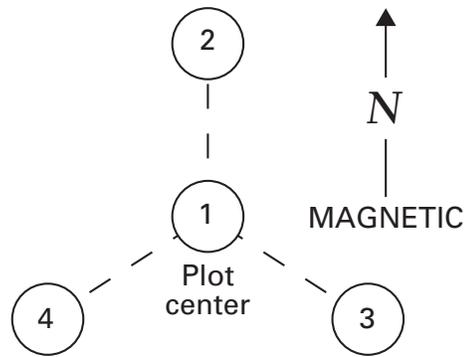


Figure 7. — Current NCFIA field plot design.

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 inches and larger are measured on a 24-foot-radius (1/24 acre) circular subplot. All trees less than 5 inches d.b.h. are measured on a 6.8-foot-radius (1/300 acre) circular microplot located at the center of each of the four subplots. Forest conditions that occur on any of the four subplots are recorded. Factors that differentiate forest conditions are changes in forest type, stand-size class, land use, ownership, and density. Each condition that occurs anywhere on any of the subplots is identified, described, and mapped 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:

Program Manager
Forest Inventory and Analysis
North Central Research Station
1992 Folwell Ave.
St. Paul, MN 55108

or

State Forester
Iowa Department of Natural Resources
Division of Forests and Prairies
Wallace State Office Building
502 East 9th Street
Des Moines, IA 50319-0034
Web site: <http://www.state.ia.us/forestry>

LITERATURE CITED

Boykin, J.T. 2001.

Iowa's forest resources in 1999. Res. Note NC-378.
St. Paul, MN: U.S. Department of Agriculture, Forest
Service, North Central Research Station. 7 p.

Brandrup, M. 2000.

Forest health highlights Iowa.
http://www.na.fs.fed.us/spfo/fhm/fhh/fhh-00/ia/ia_00.htm

**Leatherberry, E.C.; Roussopoulos, S.M.;
Spencer, J.S., Jr. 1992.**

An analysis of Iowa's forest resources, 1990.
Resour. Bull. NC-142. St. Paul, MN: U.S. Department of
Agriculture, Forest Service, North Central Forest
Experiment Station. 67 p.

Mangold, R.D. 1998.

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

**Smith, W.B.; Vissage, J.S.; Darr D.R.;
Sheffield, R.M. 2001.**

Forest resources of the United States, 1997.
Gen. Tech. Rep. NC-219. St. Paul, MN: U.S. Department of
Agriculture, Forest Service, North Central Research
Station. 190 p.

TABLE TITLES

Table 1.—*Area of forest land by forest type group and owner category, Iowa, 1999-2000*

Table 2.—*Area of timberland by major forest type group, stand origin, and owner category, Iowa, 1999-2000*

Table 3.—*Area of timberland by forest type group and stand-size class, Iowa, 1999-2000*

Table 4.—*Net volume of all live trees on forest land by species group and owner category, Iowa, 1999-2000*

Table 5.—*Net volume of all live trees and salvageable dead trees on timberland by class of timber and softwood/hardwood categories, Iowa, 1999-2000*

Table 6.—*Net volume of growing stock on timberland by forest group and softwood/hardwood species categories, Iowa, 1999-2000*

Table 7.—*Net volume of growing stock on timberland by species group and diameter class, Iowa, 1999-2000*

Table 8.—*Net volume of sawtimer on timberland by species group and diameter class, Iowa, 1999-2000*

Table 9.—*All live aboveground tree biomass on timberland by owner category, softwood/hardwood species category, and tree biomass component, Iowa, 1999-2000*



TABLES

Table 1. -- Area of forest land by forest type group and owner category, Iowa, 1999 - 2000

(In thousand acres)

Forest type group	Owner category			
	All owners	Public	Private	Unidentified owner
Softwood type groups				
Pinyon / juniper group	21.8	--	21.8	--
All softwood types	21.8	--	21.8	--
Hardwood type groups				
Oak / pine group	13.1	--	13.1	--
Oak / hickory group	620.9	109.4	511.5	--
Oak / gum / cypress group	9.5	--	9.5	--
Elm / ash / cottonwood group	448.3	40.6	407.7	--
Maple / beech / birch group	543.2	63.6	479.6	--
Aspen / birch group	11.7	--	11.7	--
All hardwood types	1,646.8	213.6	1,433.1	--
Nonstocked	37.8	11.7	26.1	--
All forest types	1,706.4	225.4	1,481.0	--

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

Table 2. -- Area of timberland by major forest type group, stand origin, and owner category, Iowa, 1999 - 2000

(In thousand acres)

Major forest type group and stand origin	Owner category			
	All owners	Public	Private	Unidentified owner
Softwood type groups				
Natural	21.8	--	21.8	--
All softwood types	21.8	--	21.8	--
Hardwood type groups				
Natural	1,526.1	134.5	1,391.7	--
Planted	22.5	--	22.5	--
All hardwood types	1,548.7	134.5	1,414.2	--
Nonstocked	26.1	--	26.1	--
All groups	1,596.6	134.5	1,462.1	--

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 and stand-size class, Iowa, 1999 - 2000

(In thousand acres)

Forest type group	Stand-size class				
	All stands	Sawtimber	Poletimber	Sapling-seedling	Non-stocked
Softwood type groups					
Pinyon / juniper group	21.8	11.7	7.9	2.2	--
All softwood types	21.8	11.7	7.9	2.2	--
Hardwood type groups					
Oak / pine group	13.1	--	9.1	4.0	--
Oak / hickory group	564.5	388.6	157.3	18.7	--
Oak / gum / cypress group	9.5	9.5	--	--	--
Elm / ash / cottonwood group	423.5	295.4	81.2	46.9	--
Maple / beech / birch group	526.3	255.1	120.3	150.9	--
Aspen / birch group	11.7	--	11.7	--	--
All hardwood types	1,548.7	948.5	379.8	220.4	--
Nonstocked	26.1	--	--	--	26.1
All forest types	1,596.6	960.2	387.7	222.6	26.1

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

Table 4. -- Net volume of all live trees on forest land by species group and owner category, Iowa, 1999 - 2000

(In thousand cubic feet)

Species group	Owner category			
	All owners	Public	Private	Unidentified owner
Softwoods				
Other yellow pines	96	--	96	--
Other eastern softwoods	34,769	2,567	32,202	--
Total softwoods	34,866	2,567	32,298	--
Hardwoods				
Select white oaks	462,188	62,051	400,137	--
Select red oaks	187,899	39,347	148,552	--
Other red oaks	76,481	6,216	70,265	--
Hickory	155,738	29,319	126,419	--
Yellow birch	--	--	--	--
Hard maple	75,016	5,741	69,275	--
Soft maple	128,171	14,016	114,154	--
Ash	67,933	12,235	55,698	--
Cottonwood and aspen	166,773	28,459	138,314	--
Basswood	126,232	23,793	102,439	--
Black walnut	141,297	12,008	129,289	--
Other eastern soft hardwoods	438,689	27,460	411,229	--
Other eastern hard hardwoods	127,506	11,103	116,402	--
Eastern noncommercial hardwoods	30,073	2,964	27,109	--
Total hardwoods	2,183,997	274,714	1,909,283	--
All species groups	2,218,862	277,281	1,941,581	--

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 salvable dead trees on timberland by class of timber and softwood/hardwood categories, Iowa, 1999 - 2000

(In thousand cubic feet)

Class of timber	All species	Softwood species	Hardwood species
Live trees			
Growing-stock trees			
Sawtimber			
Saw log portion	1,014,201	14,256	999,945
Upper stem portion	147,820	2,222	145,598
Total	1,162,020	16,478	1,145,543
Poletimber	391,138	10,944	380,194
All growing-stock trees	1,553,158	27,422	1,525,737
Cull trees			
Rough trees ¹			
Sawtimber size	377,905	4,020	373,885
Poletimber size	133,720	2,289	131,431
Total	511,624	6,308	505,316
Rotten trees ¹			
Sawtimber size	39,191	--	39,191
Poletimber size	4,543	--	4,543
Total	43,734	--	43,734
All live cull trees	555,358	6,308	549,050
All live trees	2,108,516	33,730	2,074,786
Salvable dead trees			
Sawtimber size	40,519	672	39,847
Poletimber size	18,795	1,008	17,787
All salvable dead trees	59,314	1,680	57,634
All classes	2,167,830	35,410	2,132,420

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 group and softwood/hardwood species categories, Iowa, 1999 - 2000

(In thousand cubic feet)

Forest type group	All species	Softwood species	Hardwood species
Softwood type groups			
Pinyon / juniper group	9,871	8,214	1,658
All softwood types	9,871	8,214	1,658
Hardwood type groups			
Oak / pine group	5,214	4,143	1,071
Oak / hickory group	617,060	7,027	610,034
Oak / gum / cypress group	13,285	--	13,285
Elm / ash / cottonwood group	439,843	437	439,405
Maple / beech / birch group	454,414	7,600	446,813
Aspen / birch group	10,934	--	10,934
All hardwood types	1,540,750	19,208	1,521,542
Nonstocked	2,537	--	2,537
All forest types	1,553,158	27,422	1,525,737

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 and diameter class, Iowa, 1999 - 2000

(In thousand cubic feet)

Species group	Diameter class (inches at breast height)										
	All classes	5.0-6.9	7.0-8.9	9.0-10.9	11.0-12.9	13.0-14.9	15.0-16.9	17.0-18.9	19.0-20.9	21.0-28.9	29.0+
Softwoods											
Other yellow pines	96	96	--	--	--	--	--	--	--	--	--
Other eastern softwoods	27,325	5,522	5,325	6,927	5,724	2,040	1,787	--	--	--	--
Total softwoods	27,422	5,619	5,325	6,927	5,724	2,040	1,787	--	--	--	--
Hardwoods											
Select white oaks	301,543	6,866	19,798	39,176	32,221	33,051	18,388	37,927	31,646	71,979	10,490
Select red oaks	150,780	1,567	3,965	11,890	21,145	19,198	15,968	23,857	14,742	38,449	--
Other red oaks	65,137	3,773	5,826	4,759	6,056	11,762	5,672	6,619	3,537	4,650	12,483
Hickory	120,133	13,634	19,221	24,215	22,243	11,040	8,069	6,223	--	15,488	--
Yellow birch	--	--	--	--	--	--	--	--	--	--	--
Hard maple	67,391	4,291	6,849	13,536	12,486	7,789	7,356	6,200	8,884	--	--
Soft maple	67,308	1,973	4,405	5,055	10,392	11,572	12,928	9,736	7,236	4,012	--
Ash	52,697	3,683	8,227	8,833	3,869	12,356	9,464	3,049	3,215	--	--
Cottonwood and aspen	165,818	1,419	6,549	7,272	5,619	15,753	10,109	13,921	7,725	67,082	30,369
Basswood	90,756	2,103	3,824	3,724	6,545	5,762	10,474	--	11,266	47,058	--
Black walnut	116,578	3,987	5,486	12,184	15,187	16,590	20,590	14,473	6,578	21,504	--
Other eastern soft hardwoods	254,605	28,382	39,526	37,772	39,915	28,064	32,083	21,096	9,923	17,845	--
Other eastern hard hardwoods	72,990	2,605	4,563	9,257	7,638	14,224	17,236	5,982	6,989	4,496	--
Total hardwoods	1,525,737	74,282	128,238	177,674	183,317	187,161	168,335	149,084	111,739	292,565	53,342
All species	1,553,158	79,900	133,564	184,600	189,040	189,202	170,122	149,084	111,739	292,565	53,342

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 and diameter class, Iowa, 1999 - 2000

(In thousand board feet)¹

Species group	Diameter class (inches at breast height)									
	All classes	9.0-10.9	11.0-12.9	13.0-14.9	15.0-16.9	17.0-18.9	19.0-20.9	21.0-28.9	29.0+	
Softwoods										
Other eastern softwoods	85,827	38,394	29,329	9,842	8,262	--	--	--	--	--
Total softwoods	85,827	38,394	29,329	9,842	8,262	--	--	--	--	--
Hardwoods										
Select white oaks	1,071,034	--	157,756	159,200	86,920	176,482	143,436	308,568	38,672	
Select red oaks	658,137	--	104,788	95,776	79,980	119,244	72,923	185,427	--	
Other red oaks	237,602	--	30,178	58,638	28,043	32,124	17,063	22,277	49,279	
Hickory	307,694	--	108,369	53,747	39,115	30,490	--	75,973	--	
Hard maple	202,244	--	59,411	36,812	34,799	29,561	41,662	--	--	
Soft maple	244,476	--	45,117	50,694	56,805	42,743	31,665	17,453	--	
Ash	149,071	--	17,570	57,184	44,502	14,477	15,338	--	--	
Cottonwood and aspen	741,362	--	25,711	75,387	50,259	69,730	39,287	333,374	147,614	
Basswood	395,783	--	33,118	29,011	52,405	--	55,218	226,030	--	
Black walnut	444,470	--	73,082	80,396	97,305	67,794	30,493	95,400	--	
Other eastern soft hardwoods	671,658	--	185,856	129,274	145,648	94,182	42,318	74,379	--	
Other eastern hard hardwoods	257,639	--	35,135	65,156	78,830	27,051	31,580	19,887	--	
Total hardwoods	5,381,170	--	876,091	891,275	794,610	703,879	520,982	1,358,768	235,565	
All species	5,466,998	38,394	905,420	901,117	802,872	703,879	520,982	1,358,768	235,565	

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

¹International 1/4-inch rule.

Table 9. -- All live aboveground tree biomass on timberland by owner category, softwood/hardwood species category, and tree biomass component, Iowa, 1999 - 2000
(In dry tons)

Owner category and softwood/hardwood category	Tree biomass component											
	All components			All live 1-5 inch trees			Growing-stock trees			Non-growing-stock trees		
				Total	Boles	Stumps, tops, and limbs	Total	Boles	Stumps, tops, and limbs	Total	Boles	Stumps, tops, and limbs
Public												
Softwoods	66,208	34,248	20,855	14,664	6,191	11,105	7,768	3,337				
Hardwoods	5,476,452	455,366	4,005,197	2,915,137	1,090,060	1,015,890	743,256	272,634				
Total	5,542,661	489,614	4,026,052	2,929,801	1,096,250	1,026,995	751,024	275,971				
Private												
Softwoods	776,576	71,574	566,943	403,486	163,457	138,060	97,541	40,519				
Hardwoods	53,599,995	3,144,831	34,406,933	25,087,912	9,319,021	16,048,231	11,797,393	4,250,838				
Total	54,376,571	3,216,405	34,973,875	25,491,397	9,482,478	16,186,291	11,894,934	4,291,357				
All ownerships												
Softwoods	842,784	105,822	587,797	418,150	169,648	149,165	105,309	43,855				
Hardwoods	59,076,447	3,600,197	38,412,129	28,003,049	10,409,081	17,064,121	12,540,649	4,523,472				
Total	59,919,231	3,706,019	38,999,927	28,421,198	10,578,728	17,213,286	12,645,958	4,567,328				

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.

Boykin, Joseph T., II

2003. **Iowa's forest resources in 2000**. Resour. Bull. NC-211. St. Paul, MN: U.S. Department of Agriculture, Forest Service, North Central Research Station. 21 p.

Results of the 2000 annual inventory of Iowa show that there are an estimated 2.5 million acres of forest land; 3.2 billion cubic feet of all live volume on timberland; and 87 million dry tons of all live aboveground tree biomass on timberland. Known pathogens and pests in Iowa's forests include oak wilt and gypsy moth.

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

The U.S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, gender, religion, age, disability, political beliefs, sexual orientation, and marital or family status. (Not all prohibited bases apply to all programs.) Persons with disabilities who require alternative means for communication of program information (Braille, large print, audiotape, etc.) should contact USDA's TARGET Center at (202) 720-2600 (voice and TDD).

To file a complaint of discrimination, write USDA, Director, Office of Civil Rights, Room 326-W, Whitten Building, 14th and Independence Avenue, SW, Washington, DC 20250-9410, or call (202) 720-5964 (voice or TDD). USDA is an equal opportunity provider and employer.

MISSION STATEMENT

We believe the good life has its roots in clean air, sparkling water, rich soil, healthy economies and a diverse living landscape. Maintaining the good life for generations to come begins with everyday choices about natural resources. The North Central Research Station provides the knowledge and the tools to help people make informed choices. That's how the science we do enhances the quality of people's lives.

For further information contact:



North Central
Research Station
USDA Forest Service

1992 Folwell Ave., St. Paul, MN 55108

Or visit our web site:

www.ncrs.fs.fed.us

The Forest inventory and Analysis web site is:
www.fia.fs.fed.us