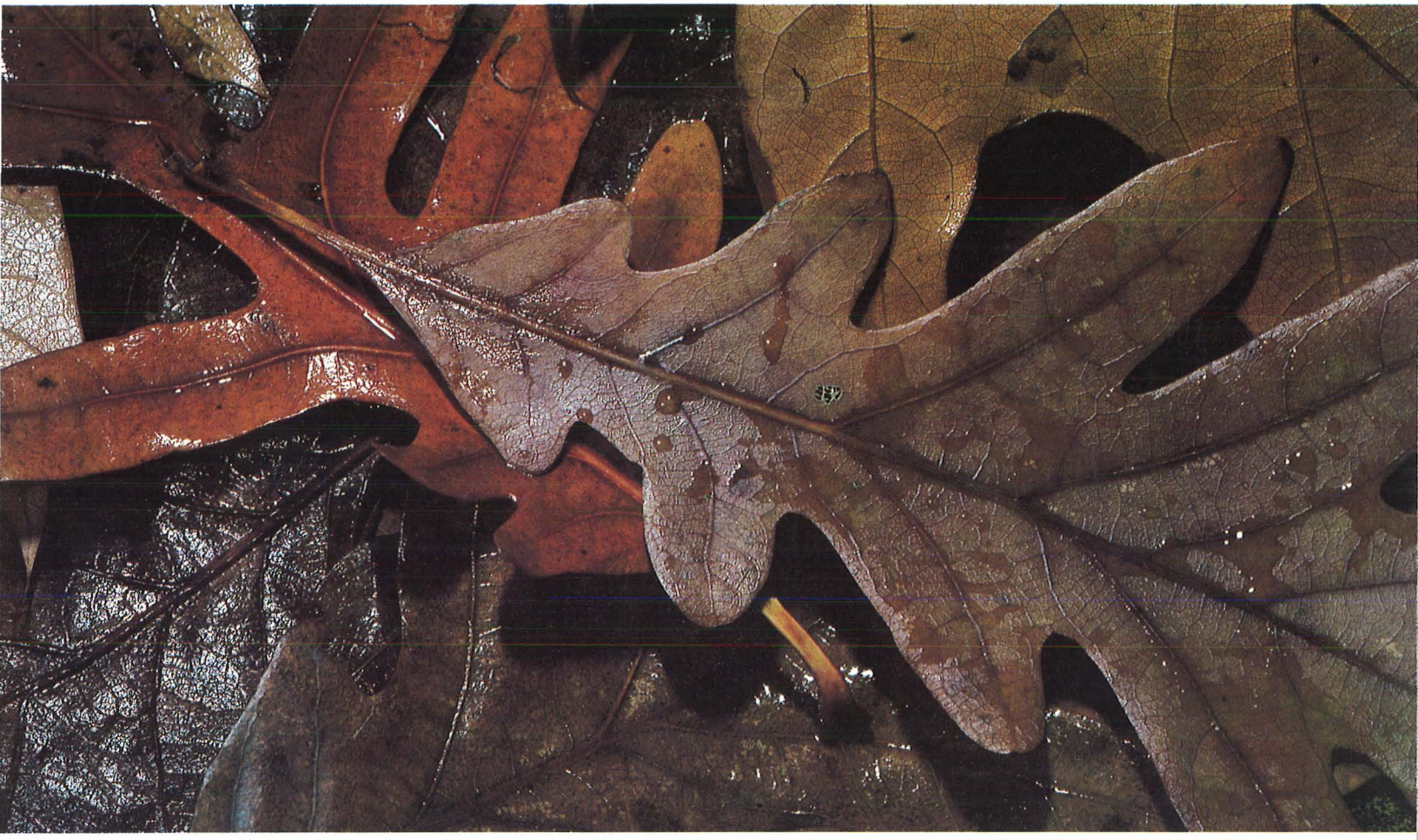
Forest Resources of Illinois:
An Atlas and Analysis of Spatial and Temporal Trends



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Illinois Natural History Survey Special Publication 11
Illinois Department of Energy and Natural Resources with the
Illinois Council on Forestry Development

Forest Resources of Illinois: An Atlas and Analysis of Spatial and Temporal Trends

Forestry Resource Analysis Committee of the Illinois Council on Forestry Development

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Introduction

The Illinois Council on Forestry Development, formerly the Illinois Commission on Forestry Development, was created by the Forestry Development Act of 1983. Although the Act included a number of specific charges, its general objective was to provide for an evaluation of the forest resources and forest industry of Illinois. Of particular importance to the Forest Resource Analysis Committee of the Council was its mandate to "determine the magnitude, nature, and extent of the State's forestry resources." This book summarizes the Committee's evaluation of the forest resources of Illinois.

As a basic working principle, the Committee acknowledged the need to assess the State's forest resources for purposes of management, development, and preservation. Given these diverse purposes, the Committee recognized the importance of collecting and summarizing existing data. Consequently, data were gathered from many sources, and a number of mathematical techniques were used in summarization. Throughout the project, attention was paid to the veracity of data and to reasonable boundaries for extrapolation. In addition, citations were included for all sources of data.

The book begins with a description of Illinois forests prior to European settlement. Thereafter, the presentation of existing forest resources relies on a variety of sources that range from ground surveys to satellite assessments. Trends are described using data from 1820, 1924, 1948, 1962, and 1985. Benefits of forests are often conveniently described in terms of timber production and wood products; however, forests have many other values. Among those included in this publication are recreation, wildlife habitat, scenic value, watershed protection, use as windbreaks, and opportunities for employment. Existing forests are also described in terms of size and ownership patterns. A discussion of the features and future of Shawnee National Forest, the State's only national forest, is followed by a projection of the future of Illinois forest resources and a case study of alternative management strategies under way in the Vermilion County Conservation District. The text concludes with the Committee's recommendations, including high-priority research and data collection needs.

A glossary of terms, a list of the 508 woody plants of Illinois (along with their natural community preferences, county distribution, and origin), and a list of high-quality forested natural areas are included among the five appendices. In addition to the references cited, Appendix V provides an extensive bibliography of research on the forests of Illinois—nearly 1,600 citations. More than sixty computer-generated maps depict forest resources on a county basis and by five regions within the State based on natural divisions. The accompanying forest reference map shows historic trends of forest cover in Illinois and provides considerable ancillary information on the forest resource.

This book is intended to provide a comprehensive summary of the forest resources of Illinois that will be useful to the Illinois Council on Forestry Development and to individuals and agencies interested in the forests of the State. It is not intended to replace the fine summaries of Illinois timberland produced by the U.S. Forest Service (Blyth et al. 1987; Hahn 1987; Raile and Leatherberry 1988) but to supplement them with data from sources in addition to the U.S. Forest Service. A new report on forest conditions in Illinois is long overdue, and more than sixty years have passed since the last report by the Illinois Natural History Survey (Hall and Ingall 1911; Miller 1923; Chapman and Miller 1924; Telford 1926).

A few comments about the placement of tables and maps may prove helpful to the reader. Tables for each chapter are presented at the end of the chapter in which they are first cited. In the interests of economy and accessibility, figures are grouped together in a single section. Figures and tables are of course cited in numerical order within the body of the text, but a list of tables and figures follows the contents page for readers who require more direct access to this information.

Acknowledgments

The Committee is indebted to many people for their cooperation in compiling the forest resource data and assembling this document. Special thanks go to Mark Hanson and other data managers of the U.S. Forest Service North

Central Experiment Station, St. Paul, Minnesota, for providing the inventory information for 1985. Thanks to John Oldenburg, presently of the Champaign County Forest Preserve District in Mahomet, Illinois, for early efforts, especially with ownership data, and to Raymond J. Herman of the U.S. Department of Agriculture Soil Conservation Service in Champaign, Illinois, for his early efforts on watershed protection. Thanks also to Elizabeth A. Cook of the Illinois Natural History Survey for her contribution in the area of remote sensing; to David M. Ketzner, also of the Survey, for his work with the Illinois Plant Information Network; to Tim Johnson, Illinois Department of Energy and Natural Resources, for assistance with the Dun & Bradstreet data files; and to John Buhnerkempe, Illinois Department of Conservation, for providing a list of high-quality forested natural areas. Thanks also to personnel from the Minnesota Land Management Information System of St. Paul for preparing the U.S. Forest Service data and compiling a state map depicting forest composition. Appreciation is extended to Dr. Gary L. Rolfe, Department of Forestry, University of Illinois at Urbana-Champaign, for his support as chairman of the Illinois Council of Forestry Development; to Allan S. Mickelson for his assistance as State Forester; and to Dr. Lorin I. Nevling, Jr., Chief of the Survey, and Dr. Anton Endress, Assistant Chief for Planning, for their encouragment throughout this project. Thanks to Sharon Baum, Monica Lusk, and Carla Heister for their efforts in acquiring and verifying bibliographic citations, to the many authors who sent their citations, and to Charlene Miles, Lisa Dimond, and Kelly Dunbar for their help in organizing and entering data. Special appreciation is due Mark Joselyn, with assistance from Rolf Wilson, Claudio Gratton, Dawn McWha, Albert Kraus, and Jill Blanchar, for help in preparing the color maps via computer. Thanks also to Gail Glende Rost, Aleta Holt, and Molly Scott for assistance in design and the production of graphics. Two individuals require special recognition for their exceptional efforts. Betty A. Nelson typed the original manuscript and its numerous revisions and assembled the many citations in a consistent format. Audrey S. Hodgins, with assistance from Eva Steger, provided remarkable editing and layout services. Finally, appreciation is due Margaret, Heather, and Aaron Iverson for their cheerful patience throughout the project.

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Sources of Data

The extensive data on which this book is based necessarily come from a number of published and unpublished sources. Maps of historical vegetation from survey records of the General Land Office were used to estimate forest resources in the early 1800s. Areal estimates of forests at the county level were made during 1921–1924 by Telford (1926). The U.S. Forest Service conducted field inventories of Illinois forests in 1948 (U.S. Forest Service 1949), 1962 (Essex and Gansner 1965), and 1985 (Hahn 1987). Most data concerning present-day timberland are from the 1985 U.S. Forest Service inventory (Hahn 1987). An evaluation of the State's forestland was also obtained from the U.S. Geological Survey Land Use Data and Analysis (LUDA) program (Anderson et al. 1976) and from various satellite sensors. Numerous reports and publications provided other information, and large amounts of data were generated, synthesized, and summarized by the authors.

All of the above-mentioned spatial data and most of the numerical data were processed further after incorporation into the Illinois geographic information system—a state-of-the-art computer system capable of processing a large number of spatial data overlays, extracting thematic maps, and generating statistical summaries. Most graphic displays—including the fold-out map, the analysis of historic trends in forests and land use, and the image processing of satellite data—were generated by the Illinois geographic information system. Details on that system are available in Brigham et al. 1987, Iverson and Risser 1987, and Risser and Iverson 1988.

Because data describing the forests of Illinois came from a variety of sources, the Committee paid special attention to statistical reliability. Some data sets can be applied locally, but others are reliable only at regional or statewide levels. In addition, readers should be aware of differences in the definition of terms. Calculations by the U.S. Forest Service, for example, usually refer to timberland, defined to include only commercially available forests (see Glossary, Appendix I). When possible, data were presented at county, regional, and state levels. Five regions (Fig. 1) based on natural divisions (Schwegman 1973) and on convenient political boundaries were designated so that data analyses of past and current forests would be more meaningful. Data in Tables 1 and 2 and in many of the figures are summarized according to average county values for the State (S) and for the Northern (N), Grand Prairie (GP), Western (W), South Central (SC), and Southern Unglaciated (SU) regions.

General Land Office Data

In the early 1800s, surveyors in the General Land Office systematically surveyed and mapped the State of Illinois. In the process, they mapped all section and quarter-section points, measuring size, direction, and distance to witness trees; described the general vegetation along section lines; noted unusual land forms, trails, and the like; and recorded plat maps and field notes. These early records provide the only systematic evidence of the vegetation that existed prior to large-scale immigration and land clearing and can be used to approximate vegetation types, the species composition of forests, and sometimes even timber volume by species groups. Reconstructions in varying degrees have been made for several counties: Cook (Hanson 1981); DeKalb and DuPage (Moran 1980); Jo Daviess (Finney and Jackson 1976; Jackson 1977); Kane (Kilburn 1955; Moran 1980); and Williamson (Anderson and Anderson 1975). Additionally, some parts of eastern (Kaminski and Jackson 1978) and southern Illinois (Leitner 1976; Leitner and Jackson 1981) and portions of the central Sangamon Valley (King and Johnson 1977) have been semi-quantitatively mapped.

Anderson (1970) published a map of Illinois showing the distribution of forest and prairie around 1820 (Fig. 2). This map has been placed in the Illinois geographic information system, which allows the overlay and breakout of forest, prairie, and water acreages by county and by region. Although the map is very useful, it does not relay information about the species composition of forests nor is its resolution high enough to locate small (<500 acres) parcels, such as hill prairies or forest groves. An attempt to digitize prairies, forests, and wetlands for individual counties at high resolution was initiated in 1984 at the Illinois Natural History Survey (37 counties automated in a suspended effort at this writing; Iverson unpublished). These high-resolution data for selected counties have been

used to identify possible habitats for endangered plant species, to determine precise land-use change patterns, and to assess surveyor bias against wetlands in the original surveys (Iverson and Risser 1987). Other states in the Midwest already have maps of precolonization vegetation, including Indiana (Lindsay et al. 1965), Michigan (Veatch 1959), Minnesota (Marschner 1974), Missouri (Schroeder 1978), Ohio (Gordon 1969), and Wisconsin (Finley 1976). Illinois needs such a map to permit time-trend analyses and to plan for the conversion to permanent cover of substantial acreages of row crops.

Telford Data

During the period 1921–1924, Telford (1926) systematically surveyed 66 percent of the State by automobile, horseback, and foot. The 34 percent of unsurveyed acreage was in prairie counties, where the smallest amount of forest existed. In these cases, forest cover was estimated by other means (aerial photographs did not yet exist). From each surveyed section, estimates of forest coverage and annual growth per acre were recorded; tabulation of these data yielded total forested area and yield by counties.

U.S. Forest Service Data

A sampling procedure that relied on aerial photographs and ground inventories formed the basis of the U.S. Forest Service data from 1948, 1962, and 1985 (Doman et al. 1981; Hahn 1987). In 1985, a total of 194,815 randomly selected 1-acre points were evaluated statewide and placed into one of four land classes: forestland, woodland/reserved forestland, nonforestland, and water. Stereoscopy was used to evaluate 32,672 of these points to determine stand-size class and density. Finally, 10,847 points were evaluated on the ground to determine the accuracy of previous evaluations and to monitor land-use change.

At each ground observation on forestland (1,138 plots), monumented plots were established, and land use, volume, mortality, and cutting were estimated from variable-radius plots (basal area factor 37.5) at ten points uniformly placed over the sample acre. From these data, statistical calculations were made to estimate various forest characteristics. Because of the nature of the sample, statewide estimates of timberland area (0.94 percent sampling error) and volume (1.99 percent) and growth (3.36 percent) of growing stock are quite accurate; however, as the area of interest is reduced (for example, a county), accuracy is substantially lowered. A county of average size (353,000 acres), for instance, can be expected to have a sampling error of timberland area of approximately 4 percent; the average volume of growing stock per county (47 million cubic feet) will have a sampling error of about 20 percent. Readers should be aware of sampling errors such as these when considering the county-level figures and tables in this publication.

The U.S. Forest Service has divided Illinois into three units for presentation and analysis of data: Southern, Claypan, and Prairie. These units and the five forest regions we defined are shown in Figure 1. In most cases, data are presented by the five regions we designated, those based on natural divisions and convenient political boundaries. The U.S. Forest Service and the Illinois Department of Conservation also conducted a survey in 1983 to determine the output and use of timber products from Illinois (Blyth et al. 1987). All primary mills in Illinois were canvassed by foresters, and out-of-state mills that use Illinois roundwood were surveyed by mail and telephone. Estimates of fuelwood production were derived by statewide telephone sampling of selected households.

Satellite Data

Satellites capable of imaging the earth's land surface for civil purposes continually circle the globe, producing images of large portions of the planet on every cloudless day. Transmitted to computers at various locations on earth, these images are made available worldwide to researchers and land managers. In many cases, especially in remote, usually underdeveloped countries, satellite imagery provides the only feasible method of obtaining landscape information. In well-known areas like most of this continent, satellite imagery provides up-to-date information at high resolution—information that would be extremely costly to acquire by other means.

Currently, four major satellite sensors image the globe: France's Systeme Probatoire d'Observation de la Terre (SPOT) and the United States' Landsat Thematic Mapper (TM), Landsat Multispectral Scanner (MSS), and Advanced Very High Resolution Radiometer (AVHRR). Each sensor has its own spectral and spatial attributes, and each has three to seven channels of data collected across various bands of the electromagnetic spectrum (Fig. 3). These bands match certain reflectance patterns of the landscape, thereby giving vegetation and other land-cover classes unique spectral signatures. A vigorously growing deciduous forest, for example, reflects highly in the infrared band (SPOT Band 3, TM Band 4, MSS Band 4, and AVHRR Band 2). Water, however, absorbs light and therefore reflects little in the reflective bands. Because the spectral signatures are unique, maps showing vegetation and other land covers can be readily generated with computer algorithms. Forest cover, therefore, can be detected with good precision. Similar technologies enable us to detect subtle differences among forest classes and to relate these to differences in site quality, species composition, and forest biomass or productivity. Analyzing these subtle differences is the thrust of an ongoing project (Iverson et al. 1988).

The sensors vary widely in spatial resolution. The TM sensor can resolve features on the ground as small as 30 meters, with picture element (pixel) size of less than 0.25 acre; the SPOT satellite can have resolution as high as 10 meters on the ground (Fig. 3). The AVHRR sensor, on the other hand, has a resolution of 1.1 kilometers (306 acres) and images the entire globe each day.

In addition to satellite data, numerous other computerized geographic data sets were used in assessing Illinois forest characteristics alone and in combination with satellite data. These other data include soils, land forms, vegetation, and forest inventory plot data. The combination of biogeographical and satellite data increased the information content substantially.

Land-use Data.

The U.S. Geological Survey has undertaken the mapping of the nation's land use and land cover with its LUDA program (Anderson et al. 1976). These data have been automated in the format of a geographic information system and incorporated into the Illinois geographic information system. The LUDA data were digitized from 1:250,000-scale maps as interpreted from U2 photography and National High Altitude Program photography, which dates between 1972 and 1981. Although some of these data are out of date, they remain the best statewide land-use data available. Specific polygons are automated rather than based on a statistical sample, as is the case with the U.S. Forest Service sampling procedure. The LUDA data are used for the 1980 time interval in the 1:500,000-scale map of Illinois forests, 1820–1980 (see fold-out forest reference map).

In the nationally standardized LUDA program, land-use categories for Illinois are given in two levels—a main category that includes urban, agricultural, forest, water, wetland, barren and rangeland use, and a more detailed category that includes deciduous, coniferous, and mixed forests, forested wetland, and herbaceous rangeland (Anderson et al. 1976). Because resolution for forests is to 40 acres, many small woodlots and linear riparian forests are not included.

Illinois Plant Information Network

All known vascular plant taxa (over 3,200) in Illinois are included in the Illinois Plant Information Network (ILPIN). This data base includes county distributions for each taxon and information on the taxonomy, ecology, biology, and ecodistribution of each (Iverson and Ketzner 1988). An example of the data for one Illinois species, the persimmon tree, is given in Appendix II. ILPIN data can be manipulated to generate information about the flora of the State at the county level. Had the data not been compiled and automated, this task would be extremely difficult. ILPIN is housed at the Illinois Natural History Survey and is part of the Survey's geographic information system.

Illinois Natural Areas Inventory

The late 1970s saw the beginning of the Illinois Natural Areas Inventory, a massive statewide effort to catalog and record all high-quality natural areas in Illinois (White 1978). Illinois is second only to Iowa in percentage of the State converted from its original (potential) vegetation (Küchler 1964); only 11 percent of the State remains in the original Küchler vegetation types (Klopatek et al. 1979). In undertaking a systematic search to determine which high-quality natural communities remain, researchers relied on aerial photographs, topographic maps, and other information to select areas for ground analysis. On-ground determinations of quality were made by producing detailed maps, listing species, and observing the ecology of an area. When certain criteria were met, the site was included in the Natural Areas data base, which presently contains 1,089 sites and can be queried to provide the location and quality of high-quality forested communities in Illinois. The data base is dynamic and can be expected to change as communities are destroyed, degraded, or newly identified.

Data from Dun & Bradstreet, Inc.

Over 270,000 business entities that were associated with the Dun & Bradstreet credit-rating service in 1984 make up the Dun & Bradstreet data base. It has information on nearly all of the State's manufacturing and service businesses and on a smaller proportion of wholesale and retail businesses, including business address, telephone number, and number of employees. For our purposes, forest-related industries were queried for number of businesses and number of employees at each facility. Zip codes from these addresses were linked to a spatial data base of Illinois zip codes so that maps could be prepared showing the distribution of the businesses in question. Businesses identified via Standard Industrial Classification codes were (1) sawmills and planing mills, (2) millwork, plywood, and structural members, (3) wood containers and pallets, (4) wood buildings and mobile homes, (5) miscellaneous wood products, including particleboard and wood preservation plants, (6) paper and allied products, including paper mills, paperboard containers, sanitary food containers, and stationery products, (7) household and office wood furniture, (8) wholesale sales of paper and paper products, and (9) wholesale sales of lumber and building materials. Categories 1 through 7 cover the manufacturing side of the forest products industry; categories 8 and 9 cover the wholesale side.

Other Data Sources

Numerous other sources provided data for this publication. Three are discussed here. The Soil Conservation Service of the U.S. Department of Agriculture collects data nationwide every five years through its National Resources Inventories (U.S. Department of Agriculture, Soil Conservation Service, 1987). In this sampling system, three Primary Land Units of 160 acres each are sampled per township, and point samples are taken within each unit. Data are collected on such factors as land use, estimated soil erosion, and cropping practice. Sampling is geared so that the Major Land Resource Area is the smallest unit of confidence. Because a major area is typically larger than an Illinois county, the resolution of the data was stretched somewhat by reporting to the county level as we have done in this document.

The soils of Illinois have been mapped to the association level (Fehrenbacher et al. 1984), and 50 associations have been aggregated from more than 600 map units. That 1:500,000-scale map was automated and used in our forest/soil analysis. With the help of the U.S. Department of Agriculture Soil Conservation Service and the Department of Agronomy at the University of Illinois at Urbana-Champaign, portions of the major soil series within each association were tabulated so that soil attributes could be calculated for each association. These data later proved useful in understanding the relationship between soil/landscape attributes and historic and present-day forests.

The landowner data base of the U.S. Department of Agriculture Cooperative Extension Service includes age and income level of landowners, landholding size, and land use. Because this data base focuses on owners of cropland, some data may be biased in that direction.

Forests of the Early Nineteenth Century

Using Anderson's (1970) map depicting the distribution of forest and prairie around 1820 (Fig. 2) and relying on the Illinois geographic information system software to calculate acreage by county, we determined forest, prairie, and water acreages in early forests for each of the five forest regions of Illinois. Throughout Illinois, an estimated 13.8 million acres of forest (38.2 percent of the State), 21.6 million acres of prairie (61.2 percent), and 0.2 million acres of water (0.6 percent) existed prior to European colonization (Table 1).

Except for the most southerly region, which was nearly entirely forested, and the Grand Prairie Region, which was only 15.5 percent forested, forest and prairie were fairly evenly distributed in Illinois, with several ecological factors (moisture regimes, topography, parent material, natural fire, animal grazing) and cultural pressures (fires set by early Americans) determining specific distributions (Table 1).

The Northern Region (12 counties) had a wide range of forest cover and types, from 79 percent forested in Jo Daviess County to less than 14 percent forested in Cook and DuPage counties (Table 1). However, the region was predominantly prairie (average 60 percent), with the exception of Jo Daviess and Carroll counties in the northwest and Lake County in the northeast.

The Grand Prairie Region (31 counties), essentially co-terminous with the Grand Prairie Natural Division of Illinois, was dominated by tall-grass prairie at the time of European settlement (84 percent); only 15.5 percent was forested (Table 1). Again, percent forest varied. Ford County had the lowest percentage of any county in the State (3.6 percent), while Putnam County had as much as 39 percent of its area forested. The combination of deep-rooted, fibrous tall-grass prairie plants growing on recently glaciated and loess-capped parent materials provides an excellent medium for crop production, and this region is now one of the largest food-producing areas in the world. Most forests existed as gallery or riverine forests.

The Western Region (21 counties) lies between the Illinois and Mississippi rivers. This land is more dissected than that in the Grand Prairie Region; the glacial till is also primarily Illinoian in age, much older than the Wisconsinan tills of the Grand Prairie Region. This region averaged 44 percent forest prior to European settlement (Table 1). Several counties (for example, Mason and Macoupin) are located partially in the Grand Prairie Natural Division, while others (for example, Knox, McDonough, Mercer, and Warren) are found in deep loess areas that were primarily occupied by prairie vegetation. On the other hand, counties with extensive river bottomlands were primarily forested prior to European settlement—Calhoun (85.6 percent), Brown (80.3 percent), Schuyler (71.7 percent), and Pike (69.1 percent).

The South Central Region (31 counties) occupies the portion of southern Illinois on Illinoian-aged till. The northern counties in this region (Effingham, Montgomery, and Shelby) grade from the Grand Prairie Region to the north and were primarily prairie counties (Table 1). The more southern counties (Gallatin, Jackson, Saline, and Williamson) were almost exclusively forested. Across the region, these two extremes averaged about 57 percent forested and 43 percent prairie at the time of the original land survey.

The Southern Unglaciated Region (7 counties) occupies the southern tip of Illinois. These seven counties lie within the Shawnee Hills Natural Division and were almost exclusively forested (Table 1); in fact, no prairie was recorded in the region. Unfortunately, the resolution of the data is not fine enough to include small hill prairies and barrens that undoubtedly were present at the time of the survey.

Table 1. Forest, prairie, and water by region and county in Illinois in the early 1800s, based on the original land survey of Illinois.

Region and county	Forest		Prairie		Water	
	Acres	Percent	Acres	Percent	Acres	Percent
Northern Region						
Boone	82,600	46.2	96,400	53.8	0	0.0
Carroll	152,300	51.7	130,500	44.3	11,800	4.0
Cook	82,200	13.6	521,900	86.2	1,400	0.2
DuPage	28,800	13.5	184,700	86.5	0	0.0
Jo Daviess	307,200	78.8	74,800	19.2	7,700	0.2
Kane	116,500	35.0	216,100	65.0	0	0.0
Lake	189,500	63.2	102,400	34.1	8,100	2.7
McHenry	165,700	42.7	220,900	57.0	1,200	0.3
Ogle	177,600	36.6	307,200	63.4	0	0.0
Stephenson	140,800	39.2	218,200	60.8	0	0.0
Whiteside	154,700	35.0	284,400	64.3	3,100	0.7
Winnebago	94,100	28.5	235,600	71.5	0	0.0
Total	1,692,100	39.2	2,593,000	60.0	33,200	0.8
Grand Prairie Region						
Bureau	116,100	21.0	435,600	78.7	2,100	0.4
Champaign	39,800	6.3	592,300	93.7	0	0.0
Christian	52,800	11.7	398,300	88.0	1,400	0.3
Coles	104,000	32.2	218,800	67.7	400	0.1
DeKalb	29,600	7.3	373,000	92.7	0	0.0
DeWitt	49,800	19.4	206,900	80.6	0	0.0
Douglas	41,000	15.5	223,100	84.5	0	0.0
Edgar	135,900	34.5	257,600	65.5	0	0.0
Ford	11,000	3.6	297,100	96.4	0	0.0
Grundy	23,500	8.6	248,700	91.1	800	0.3
Henry	94,400	18.0	428,700	82.0	0	0.0
Iroquois	56,100	8.0	651,000	92.1	0	0.0
Kankakee	24,300	5.6	406,700	94.4	0	0.0
Kendall	22,000	10.7	182,500	89.3	0	0.0
LaSalle	111,300	15.3	612,800	84.3	3,200	0.4
Lee	46,600	10.1	415,300	89.8	569	0.1
Livingston	29,800	4.5	633,400	95.5	0	0.0
Logan	54,000	14.5	336,500	86.2	0	0.0
Macon	48,300	13.0	322,700	87.0	0	0.0
Marshall	66,500	26.3	178,200	70.5	8,200	3.2
McLean	81,800	10.9	669,800	89.1	0	0.0
Menard	69,000	33.5	136,700	66.5	0	0.0

Continued

Table 1 continued.

Region and county	Forest		Prairie		Water	
	Acres	Percent	Acres	Percent	Acres	Percent
Moultrie	51,400	23.6	166,300	91.4	0	0.0
Piatt	24,000	8.6	254,000	91.4	0	0.0
Putnam	42,400	38.6	58,900	53.6	8,500	7.8
Sangamon	124,400	22.4	431,400	77.6	0	0.0
Stark	42,900	23.5	140,000	76.5	0	0.0
Tazewell	129,400	31.1	281,900	67.6	5,500	1.3
Vermilion	118,200	20.8	449,500	79.1	710	0.1
Will	67,400	12.5	469,500	87.3	1,500	1.2
Woodford	93,300	27.1	240,000	69.9	10,218	3.0
Total	2,001,000	15.5	10,717,200	84.2	42,600	0.3
Western Region						
Adams	292,200	53.2	249,100	45.3	8,300	1.5
Brown	156,500	80.3	37,700	19.3	800	0.4
Calhoun	141,100	85.6	18,900	11.5	4,800	2.9
Cass	90,900	37.4	149,500	61.4	2,900	1.2
Fulton	353,200	63.2	201,100	36.0	4,900	0.9
Green	173,100	50.1	170,700	49.3	2,000	0.6
Hancock	151,000	29.5	349,000	68.2	11,600	2.3
Henderson	64,400	26.0	174,200	70.1	9,800	3.9
Jersey	142,400	59.6	91,200	38.2	5,200	2.2
Knox	137,500	30.2	317,900	69.8	0	0.0
Macoupin	148,300	26.6	401,300	73.4	0	0.0
Mason	78,100	22.2	260,500	74.3	12,300	3.5
McDonough	111,800	30.0	262,100	70.1	0	0.0
Mercer	72,000	20.0	282,900	78.7	4,500	1.2
Morgan	126,300	34.8	235,100	64.8	1,400	0.4
Peoria	187,000	46.8	208,700	52.2	4,000	1.0
Pike	364,200	69.1	162,200	30.8	500	0.1
Rock Island	147,400	52.1	126,600	44.7	8,900	3.2
Schuyler	200,400	71.7	78,400	28.0	800	0.3
Scott	98,800	61.5	61,000	38.0	800	0.5
Warren	66,800	19.4	277,400	80.6	0	0.0
Total	3,303,500	44.0	4,115,700	54.9	83,400	1.1
South Central Region						
Bond	75,800	31.3	166,800	68.7	0	0.0
Clark	175,400	55.2	142,200	44.8	0	0.0
Clay	111,900	37.4	186,900	62.6	0	0.0
Clinton	96,600	30.3	222,500	69.7	0	0.0

Table 1 continued.

Region and county	Forest		Prairie		Water	
	Acres	Percent	Acres	Percent	Acres	Percent
Crawford	155,600	55.4	125,200	44.6	0	0.0
Cumberland	81,600	37.2	137,900	62.8	0	0.0
Edwards	76,900	54.5	64,200	45.5	0	0.0
Effingham	87,000	28.6	216,900	71.4	0	0.0
Fayette	218,300	47.5	240,900	52.5	0	0.0
Franklin	214,400	78.5	58,600	21.5	0	0.0
Gallatin	207,200	100.0	0	0.0	0	0.0
Hamilton	253,500	92.0	22,200	8.1	0	0.0
Jackson	360,900	94.2	19,900	5.2	2,300	0.6
Jasper	124,200	39.4	190,900	60.6	0	0.0
Jefferson	270,100	73.1	99,600	27.0	0	0.0
Lawrence	144,600	61.2	91,600	38.8	0	0.0
Madison	188,200	40.2	270,600	57.8	9,000	1.9
Marion	150,000	41.1	214,300	58.8	0	0.0
Monroe	218,000	87.0	26,100	10.4	6,300	2.5
Montgomery	96,500	21.5	350,700	78.1	1,700	0.4
Perry	178,100	63.1	104,300	37.0	0	0.0
Randolph	277,700	73.8	93,500	24.9	5,000	1.3
Richland	119,600	52.1	110,100	47.9	0	0.0
Saline	245,100	100.0	0	0.0	0	0.0
Shelby	142,900	29.4	343,600	70.6	0	0.0
St. Clair	210,700	49.4	214,700	50.3	1,400	0.3
Wabash	100,200	70.0	42,900	30.0	0	0.0
Washington	120,400	33.8	236,000	66.2	0	0.0
Wayne	290,900	64.5	160,100	35.5	0	0.0
White	295,100	93.4	20,900	6.6	0	0.0
Williamson	257,500	91.4	24,100	8.6	0	0.0
Total	5,544,900	56.7	4,198,200	43.0	25,800	0.3
Southern Unglaciated Region						
Alexander	147,900	92.4	0	0.0	12,100	7.6
Hardin	112,400	99.4	0	0.0	700	0.6
Johnson	220,800	100.0	0	0.0	0	0.0
Massac	153,800	99.0	0	0.0	800	1.0
Pope	236,300	99.8	0	0.0	500	0.2
Pulaski	128,500	99.8	0	0.0	300	0.2
Union	263,400	98.5	0	0.0	3,900	1.5
Total	1,263,100	98.0	0	0.0	18,300	2.0
State total	13,804,600	38.2	21,624,000	61.2	203,300	0.6

Source: Anderson 1970

Illinois Forests of Today

The majority of information on timber resource was taken from data published by the U.S. Forest Service as part of their 1984–1985 forest inventory. Readers are advised to consult Hahn (1987) or Raile and Leatherberry (1988) for more details on timber area, volume, growth, size class, age structure, and mortality. Here, the data are presented in graphic form and analyzed in ways that complement U.S. Forest Service publications.

Areal Extent

Estimates of total forestland from the 1985 U.S. Forest Service forest inventory are 4.26 million acres (Hahn 1987), about 12 percent of the land area of the State and an increase of about 392,000 acres (10 percent) over the 1962 estimate (Essex and Gansner 1965). Nevertheless, only 31 percent of the original forests of 13.8 million acres remain (Table 2). The extent of this forestland can be seen in four forms on the accompanying fold-out reference map (composition, percent forest by county, forest cover estimated via satellite, and forest cover of 1980), and in the county acreage map of commercial forestland (Fig. 4). These maps make clear that the major forest resources are found in the southern and western counties. The U.S. Forest Service data show an average commercial forest cover of 47.1 percent (an average of 70,200 acres per county) for the Southern Unglaciated Region, 16.4 percent (56,200 acres) for the Western Region, and 16.6 percent (50,900 acres) for the South Central Region, with less timberland in the Northern (7 percent and 20,100 acres) and Grand Prairie (4.6 percent and 17,300 acres) regions. Forestland data from 1985, including commercial and noncommercial forests, are presented tabularly (Table 2) and graphically in ascending order of areal extent (see large bar chart on the fold-out forest reference map). At one extreme is Ford County with only 3,000 acres of forestland; at the other is Pope County with 149,200 acres of forestland. In addition to the forestland noted above, about 900,000 acres are classified as nonforest with trees (see Glossary, Appendix I, for definitions). As a result, total acreages of land containing trees exceed 5 million acres (Table 3). In the category of nonforest with trees, nearly 250,000 acres are classified as urban forest or other built-up areas with trees; each of the following classifications is present in excess of 100,000 acres: natural wooded strips (usually riparian), windbreaks, wooded pasture, and improved pasture with trees. These wooded areas normally play an extremely valuable role in the ecosystem as wildlife habitat and soil protection because they usually exist in areas where forestland is lacking. These areas, however, are difficult to inventory accurately because they often occupy small, narrow, or diffuse areas that are overwhelmed by the surrounding land-cover types in sampling and photographic analyses.

The detailed LUDA data are also compiled for each county in Table 2 and graphically portrayed on the fold-out map. This estimate, achieved through aerial-photograph digitization and analysis, totaled 3,764,500 acres of forestland statewide. Because of definitional and methodological differences, LUDA estimates correlate to but are not the same as U.S. Forest Service estimates. Counties with the highest percent of forest currently include Pope (55.4 percent), Calhoun (47.9 percent), Hardin (44.5 percent), Alexander (39.1 percent), Union (35.1 percent), and Johnson (32.8 percent). With the exception of Calhoun, these counties are located in the Southern Unglaciated Region and were nearly entirely forested prior to European settlement (Table 1). Ford County, on the other hand, has the least forest, less than 1,000 acres (Table 2). In sparsely forested counties, urban forests hold great importance because nearly all trees may exist in urban settings. These trees are not classified as forests by the LUDA or U.S. Forest Service schemes.

Pope County not only has the highest proportion of forest according to the LUDA data but also the highest number of forested acres (131,350 acres, Table 2), mixed forest (11,450 acres), and coniferous forest (20,900 acres). The largest amounts of forested wetlands are found in Cass (14,660 acres) and Mason (12,130 acres) counties, which are located along the Illinois River with large numbers of backwater lakes and wetlands. Jo Daviess (9,710 acres), Henderson (8,810 acres), Lawrence (8,590 acres), and Jackson (7,440 acres) counties also contain large amounts of forested wetlands.

Composition

The composition of Illinois forests is highly diverse, ranging from pine plantations to oak–hickory to elm–ash–soft maple. Because of the diversity of hardwoods and the good growing conditions in Illinois, the timber product is highly valued, as are the wildlife and aesthetic properties of forests. According to the Illinois Plant Information Network data base (Iverson and Ketzner 1988), 508 woody taxa have been recorded in Illinois. They occupy a diversity of cover types as well as habitats. Appendix III lists the scientific and common names of these taxa, their natural community preferences, their prevalence in Illinois, whether they are native or introduced, whether they are trees, shrubs, or lianas, and the number of counties recording their presence. Tabulation across counties allows calculation of the number of tree (Fig. 5) or shrub (Fig. 6) taxa recorded per county. Tree-diversity data again show the exceptionally valuable role the southern counties play in Illinois forests (an average of 109 taxa per county for the Southern Unglaciated Region, Fig. 5). The number of shrub taxa per county, however, is highest in the northeastern part of the State, followed by the southern part (an average of 88 taxa per county in the Northern Region compared to 66 in the Southern Unglaciated Region, Fig. 6).

About one-half of the commercial forest acreage in the State (2.03 million acres) is in the oak–hickory forest type; maple–beech composes about one-fourth and elm–ash–soft maple (including cottonwood) about one-sixth (Table 4). Together, the remaining forest types (white–red–jack pine, loblolly–shortleaf pine, oak–pine, and oak–gum–cypress) account for an additional 216,800 acres of commercial forestland (Table 4).

The distribution of various commercial forest types is presented on the forest composition map (fold-out map), where all forest types have been combined into cells representing 640 acres each. The final coding of these cells was biased to the oak–hickory forest type because the most prevalent type within a cell (most often oak–hickory) determined its coding.

Individual estimates of forest-type acreages by county are presented in Figures 7 through 14. The Southern Unglaciated Region has the highest average county acreage for all forest types except maple–beech and white pine. The patterns for commercial oak–hickory (Fig. 7) and cottonwood (Fig. 8) roughly follow the overall pattern of commercial forestland (Fig. 4), with the maximum county acreage in the Southern Unglaciated Region, followed by the averages of the Western and then the South Central regions. The maple–beech type (Fig. 9) is more concentrated in the Western Region, averaging 17,100 acres per county. Relative to the amount of forest in the region, however, the Grand Prairie Region has the highest proportion of forest in maple–beech (35 percent compared to 30 percent for the Western Region). The elm–ash–soft maple type (Fig. 10) tends to be slightly more concentrated in the southern regions of the State, while stands of oak–pine (Fig. 11), oak–gum–cypress (Fig. 12), and shortleaf pine (Fig. 13) are confined to the southern counties, especially the Southern Unglaciated Region. White pine (Fig. 14), on the other hand, is predominately a western species.

Volume and Number of Trees

Net volume estimates from 1985 show the prominence of oak and hickory in Illinois commercial forests and high amounts of ash, black walnut, cottonwood, elm, maple, and sycamore (Table 5). Total net volume estimates of growing stock are 4.8 billion cubic feet, of which 43 percent is white and red oak, with nearly 98 percent in hardwood species.

Geographically, volume estimates follow trends similar to those shown by areal cover, with the majority of volume produced in the southern and western counties (Fig. 15). Taken by region, average county volume in 1985 was 90 million cubic feet (mcf) in the Southern Unglaciated Region, followed by 66 mcf in the Western and 63.2 in the South Central regions. Over the entire State, an average of 47.4 mcf of commercial timber was standing in each county in 1985. Calculated on the basis of volume per acre of commercial forest, the average total volume of growing stock was 1,200 cubic feet per acre statewide. Hard hardwoods (predominately oak, hickory, and ash with specific gravity more than 0.50) accounted for 68 percent of total volume (Fig. 16). Soft hardwoods (elm and soft maple, for example) made up another 30 percent of the volume, which was also distributed in proportion to the overall forest acreage (Fig. 17). Finally, pines were a relatively minor component and were confined primarily to southern and a few western counties (Fig. 18).

Net volume of sawtimber on commercial forestland was about 17.5 billion board feet, with about one-half of this volume in the 236 million red and white oak trees (Table 6). Statewide, an estimated 82.9 million select white oak trees and 24.7 million select red oak trees are found on commercial forestland. Over 1.5 billion board feet exist in 185 million hickory trees, followed by 1.2 billion board feet in 91 million soft maple trees.

The most abundant species group is the elm (344 million trees), but this group accounts for only 483 million board feet of volume (Table 6). The next most abundant group is the hard (mostly sugar) maple, with 117 million predominately small trees. Future surveys will undoubtedly demonstrate this group to have the greatest volume increase as these small trees grow.

Annual Growth

Total amount of growth was estimated at 96 million cubic feet per year in 1985 (Table 5). Of this amount, 92.8 million cubic feet were from hardwoods. If we consider net growth of sawtimber, over 437 million board feet accumulated in 1985 (Table 6). Net annual growth data establish good growth increments for all major species, with the exception of elm and black ash (Tables 5 and 6). Over 42 percent of net annual sawtimber growth is accounted for by oaks, with another 10 percent from soft maple, 6.3 percent from white and green ash, 3.7 percent from black cherry, 3.3 percent from hard maple, and 3.2 percent from black walnut (Table 6). The reduction in elm growth

illustrates the loss of bottomland forests as well as the effects of Dutch elm disease since 1962. White and red oak, hickory, and soft maple predominate in annual growth, with these four groups accounting for 57.3 percent of the total annual growth of growing stock (Table 5). The county distribution of total annual growth of growing stock once again shows the southern (Jackson, Johnson, Pope, Randolph, Union, and Williamson) and western (Fulton, Macoupin, and Pike) counties to be the largest producers (Fig. 19). At 1,873 thousand cubic feet per year (roughly equivalent to 4.7 million board feet), the county average in the Southern Unglaciated Region was four times that of the Grand Prairie and Northern regions. The average growth for the Western and South Central regions was 1,242 and 1,314 thousand cubic feet per county per year, respectively. The pattern generally holds for both hard (Fig. 20) and soft (Fig. 21) hardwoods. Pope County clearly produces more pine than all other counties (924,000 cubic feet per year). Pope and neighboring Hardin County together produce 44 percent of the State's annual pine growth (Fig. 22). Pine also has a higher growth rate (annual growth equivalent to 2.7 percent of current inventory) as a percent of total growing-stock volume than hardwoods (2 percent of inventory) (Hahn 1987).

Similar geographical patterns hold for annual growth of sawlogs. Pope, Pike, Fayette, and Macoupin counties each grows more than 10 million board feet annually (Fig. 23). For most species, annual growth far exceeds annual cut. Private lands, which contain 90.4 percent of the commercial forestland area, also contain precisely the same proportion of annual growth in Illinois.

Size Class

Statewide, 63.6 percent of commercial forests fall in the sawtimber size class (Table 7). Geographically, however, the percentage of sawtimber increases as one moves northward to Lake County, with 77 percent of its commercial forestland in the sawtimber size class (Fig. 24). This trend indicates generally older stands in the northern one-third of the State and probably less harvesting in recent decades. Acreages of each size class are presented according to county estimates for sawtimber (Fig. 25), poles (Fig. 26), and sapling-seedlings (Fig. 27). Counties with the highest acreages of standing sawtimber are Jackson (83,700 acres), Pope (80,000 acres), Fulton (74,100 acres), and Pike (73,800 acres). Statewide, the average county acreage for sawtimber was 25,100 acres, with an average of 40,900 for counties in the Southern Unglaciated Region (Fig. 25). Pope County, in the Southern Unglaciated Region, also has the most pole-sized timber (Fig. 26) and sapling-seedlings (Fig. 27).

Compared to publicly owned or forest industry timberland, other privately owned forests have more trees of sawtimber size and much more nonstocked (<16.7 percent stocked with growing-stock trees) timberland (Table 7). These data suggest that privately owned land is less well managed for timber, since a balance of age classes increases future timber supply. Further, educational efforts and incentives appear to be needed if more all-aged forests are to be developed. Oak–hickory (72 percent) and elm–ash–soft maple (67 percent) had above-average proportions in the sawtimber class. Maple–beech (47 percent) and the pines (32 percent) were more evenly distributed among size classes (Table 8).

Age Structure

Illinois forests, overall, are reasonably well distributed among age classes, with 61- to 80-year classes most prevalent (Fig. 28); however, certain trends appear when major forest types are assessed. Oak–hickory shows a very uneven age distribution, with the majority older than 60 years. A predominance of maple–beech is found in younger age classes (<30 years) relative to oak–hickory and elm–ash–soft maple. This pattern illustrates two important aspects of Illinois forestry today: maples are rapidly increasing in the younger age classes but the forest types dominated by oaks and elms are declining and have relatively fewer trees in early age classes. These trends are also readily apparent in the acreage trends by forest type that are discussed later. Among the other forest types, white and shortleaf–loblolly pine types peak in the 21- to 30-year class with very little estimated stand acreage under 10 years of age.

Site Index

Classifying forest stands according to site index provides a measure of the quality of a given site that is roughly equivalent to the height of the trees on that site after 50 years of growth. Site indices range from 0–100, with values near 100 indicating superior sites, although obvious variation is found among species in a given site index; cottonwood, for example, is a faster growing species. In Illinois, most (71 percent) site indices fall in the range of 61–90. The 61- to 70-foot class covers an estimated 968,000 acres (24 percent of the State's commercial forestland), the 71- to 80-foot class covers 1.05 million acres (26 percent), and the 81- to 90-foot class covers 832,000 acres (21 percent). In addition, 13 percent of the timberland has a site index of 91 or higher. Taken together, 84 percent of Illinois commercial forestland has site indices exceeding 60. Relative to much forestland in neighboring states, Illinois forests are located on very good soils for tree growth.

Woody Biomass

Because of the increasing interest in wood as an energy source, the U.S.Forest Service now includes estimates of woody biomass in its periodic statewide inventories. The 1985 U.S. Forest Service inventory of Illinois contains data on four components of woody biomass: boles, stumps, limbs, and total. Under contract with the Illinois Department of Energy and Natural Resources, the Illinois Natural History Survey has produced several types of maps that summarize the statewide distribution of total woody biomass (Burnett 1988). Figure 29 clearly shows that woody biomass is greatest in the southern and west-central portions of Illinois, with smaller but significant

concentrations in the northwestern and extreme east-central portions. If the matching graphs in Figure 29 were viewed through stereo glasses, the biomass pattern across the State could be seen in three dimensions. Quantitatively, the most common values for woody biomass are in the range of 0–5 green tons per acre. Some sites, however, have more than 30 green tons per acre of standing biomass. Overall, live-tree biomass for trees greater than 1 inch dbh was 292.9 million green tons, or 73 tons per acre of timberland. Of this total, 71 percent was in stumps and boles greater than 5 inches dbh, 19 percent in the tops and limbs of these trees, and 10 percent in smaller trees (Raile and Leatherberry 1988). A large biomass resource exists in Illinois, and an increasing number of biomass-utilization facilities and household fuelwood facilities are being placed within the State (Troxell 1988).

Mortality

Illinois had an annual mortality of over 200 million board feet of sawtimber (67 million cubic feet of growing stock) in 1985 (Table 9). This mortality is in contrast to 161 million board feet of timber cut in 1983 (Blyth et al. 1987); at present, more timber is dying than is being cut. In addition, this mortality represents an annual death of 1.36 percent of the total inventory and 69 percent of the annual growth of growing stock. Comparing mortality to net volume of growing stock provides another measure of the quality of timber management. Forest industry lands lost the least growing stock from mortality (0.95 percent of net volume) whereas miscellaneous federal lands showed the highest mortality (1.76 percent of net volume) (Table 9). Disease accounted for 38 percent of the mortality; weather, suppression, and unknown causes were also very important (Hahn 1987). Elms suffered the greatest mortality, accounting for 26 percent of the total mortality (17,244,000 cubic feet of growing stock annually). The high death rate for elms (6.5 percent of the elm inventory) largely explains the negative annual growth of this species (Table 5). Disease, especially the Dutch elm disease, accounted for 56 percent of elm mortality. In general, current mortality rates in Illinois forests are quite high. Central Wisconsin, for example, had an average mortality of only 0.8 percent of the total inventory (Hahn 1985), and mortality in Illinois during the 1962 inventory was only 0.9 percent (Raile and Leatherberry 1988).

Government-owned, Protected, or Managed Woodland

According to U.S. Forest Service data, about 235,600 acres of reserved timberland in Illinois are protected against harvesting by statute or administrative regulation (Hahn 1987). The State of Illinois is the largest holder of protected forests, with an estimated 123,400 acres under protection as State parks, nature preserves, conservation areas, State forests, State university land, or State-owned natural areas (Fig. 30). The distribution of forests protected or managed by State or federal agencies shows a very high concentration of sites in the southern counties, with the next highest density in the northern one-third of the State. Surprisingly, even the Grand Prairie Region has a higher density of protected or managed forests than the Western Region, which has a much higher forested component. Protected forests in the central Illinois counties are generally State parks containing riparian forests (Fig. 30). State conservation areas are concentrated along large rivers; State university lands fall reasonably close to major educational institutions at Carbondale in Jackson County and at Urbana-Champaign in Champaign County. The Shawnee National Forest also has an estimated 21,200 acres under protection; in addition, over 5 percent of the State's forestland is managed by Shawnee personnel (Hahn 1987). County and municipal governments protect another 83,400 acres of forest, primarily in forest preserve districts. Private organizations also protect sizeable amounts of forest area.

A disproportionally high percentage (75 percent) of protected woodland is oak–hickory forest, but only 3.5 percent is maple–beech. This distribution illustrates again the generally youthful age of maple–beech and its reduced economic, commercial, and ecological value relative to oak–hickory.

Forested Natural Areas of High Quality

Of the 1,089 natural areas in Illinois, 392 (36 percent) have forestland (White 1978); however, not all of these areas are high in quality. A total of 149 natural areas (11,593 acres) were classified as Grade A or B forest in the Illinois Natural Areas Inventory (White 1978). Caution is advised in accepting this as the current figure, however, because many areas were not assigned grades on the original inventory maps. Some of these would have been A or B, and new areas have been added to the inventory since the late 1970s. On the other hand, some areas have been destroyed or degraded in the past decade, and the 11,593-acre figure may well represent the current status. That acreage amounts to less than 0.3 percent of the forested acreage of Illinois. Of that, about one-third (3,573 acres) is Grade A (relatively undisturbed); the remaining two-thirds (8,019 acres) are Grade B (some disturbance). Locations of high-quality natural areas in forests are displayed in Figure 31. Although the southern and southwestern regions of the State, those with the most forests, are well represented, many high-quality forests are also found in the northeast and even in the less forested central regions of the State.

The distribution by acres of high-quality forested natural areas shows only 56 of the 102 counties with Grade A or B forests (Fig. 32). Adams County (Gardner Woods) has the highest acreage of high-quality forests (1,950 acres of Grade B). St. Clair County has the largest amount of Grade A forest (467 acres), and a total of 963 acres of grades A and B. Lake (635 acres) and Johnson (622 acres) counties have the next highest amounts of high-quality forests, with Cook, McLean, Pike, and Saline counties each having 400 to 500 acres (Fig. 32). Surprisingly, some of the most forested counties (for example, Gallatin, Jackson, Jersey, and Pope) had little or no Grade A or B forestland when the 1978 Natural Areas Inventory

was taken. Counties in the Southern Unglaciated Region had the highest average of high-quality forests (233 acres per county) followed by the Western (162 acres), and the Northern (129 acres). The South Central Region had the most counties (18) with no forested natural areas and would have had the lowest average acreage of grades A and B forest had it not been for St. Clair County. This finding is somewhat surprising because the South Central Region has much more forested area than the Northern and Grand Prairie regions.

Appendix IV lists high-quality forests in Illinois, including name, county, size, natural community, and grade range of each natural area (Illinois Department of Conservation, 1988 data base on natural areas). Represented are 157 forested natural areas from 62 counties, a net increase of 8 areas over the original survey data. Acreages in Appendix IV include all land in a natural area even if only a small portion of it is Grade A or B. As a result, total acreage value is much higher than the 11,593-acre figure given previously. Lake and St. Clair counties contain the largest number of forested natural areas (12 and 11 respectively), Peoria has 7, Washington and Mason 6, and Massac 5. Of the 157 forested areas, 68 contain Grade A forests; the remainder contain at least some Grade B forest.

Many high-quality forests in Illinois are in danger of degradation because of the invasion of exotic plants. In the northern one-half of the State, many forests are threatened by Amur (*Lonicera maackii*) and tatarian (*L. tatarica*) honeysuckle. In southern Illinois, the major exotic invader is Japanese honeysuckle (*L. japonicum*). These exotics are capable of decreasing the diversity of a forest and almost eliminating understory plants. Management strategies must be adopted for high-quality forests if they are to be protected from exotic invaders, including the use of volunteers for hand removals, the limited and cautious application of pesticides, and the implementation of biological control measures.

Soil Associations of Illinois Forests

Fifty soil associations have been defined in Illinois and mapped into two major categories (Fehrenbacher et al. 1984): dark-colored soils that developed under prairie and light-colored soils that developed under forests (Table 10). Soils are lighter beneath forests because organic matter accumulates primarily at the surface with leaf fall; in prairie situations, most of the organic accumulation occurs from the decay of massive amounts of fibrous root material, thereby producing a darkened topsoil. As one might expect, most present-day forests (85 percent) are located on soils that developed under forests. Overall, light-colored soils are now nearly 20 percent forested while dark-colored soils are only 2.4 percent forested (Table 10).

Of the dark-colored soils, soil association 24 (Lawson-Sawmill-Darwin), a common and widespread bottomland soil, has a sizeable amount of forest (294,630 acres) (Table 10). Most soils in this association probably developed under forests, however, and are dark in color primarily because they received depositional material from relatively recent erosion from surrounding dark-colored soils. With the exception of soil association 24, only 6.7 percent of Illinois forests are found on prairie soils. Eleven prairie soil associations have essentially no (<1.0 percent) forests growing on them.

The Illinois soil associations with the most forestland (over 10 percent) are 32 (Fayette-Rozetta-Stronghurst, 12.65 percent of Illinois forests), 34 (Clinton-Keomah-Rushville, 12.41 percent), 36 (Ava-Bluford-Wynoose, 11.92 percent), and 57 (Haymond-Petrolia-Karnak, 13.84 percent) (Table 10).

Soil association 32 occurs in northwestern and western Illinois along the Mississippi and Illinois river valleys in the thick loess, upland areas and occupies 6.3 percent of the State. The soil can be quite level (<5.0 percent) to deeply dissected (>25.0 percent). In general, the level areas are presently in productive cropland, and the steeper areas are in pasture or forest. Because of the deep, easily erodible loess material, these soils are prone to erosion when they are somewhat sloping and not under permanent cover. Currently 3.3 pounds of Illinois soil are lost for each pound of crop produced (Iverson 1987), and some of soil association 32 should be targeted for return to its original forest vegetation (only 20.81 percent is now in forest; Table 10).

Soil association 34 (Clinton-Keomah-Rushville) also developed in deep loess and occupies 7.9 percent of the State. It occurs primarily on hilly land along the Illinois River valley and its tributaries and is usually adjacent to soil association 32 but farther out from the river and in fairly dissected topography. As with association 32, association 34 also has serious erosion problems, and more than the current 17 percent (Table 10) of this association should be in forest vegetation. Associations such as 32 and 34, which developed in fertile, deep loess material, tend to be quite productive even when much of the topsoil has eroded. The erosion problem can, therefore, be tolerated to a higher degree, but the soil resource is not limitless and conservation should be practiced to ensure a productive resource in the future and to improve water quality in adjacent water courses.

Soil association 36 (Ava-Bluford-Wynoose) occurs in the central part of southern Illinois. It is 18.3 percent forested, occupies 6.7 percent of the State, and occurs on loess (30 to 55 inches thick) over a very slowly permeable Sangamon palesol. As such, this association tends to be less productive for crops and highly susceptible to erosion on sloping areas.

Soil association 57 (Haymond-Petrolia-Karnak) is made up of floodplain soils in the southern one-half of Illinois. Because these soils drained regions previously occupied by soils that had developed under forest vegetation, the depositional material is light-colored (in contrast to soil association 24). This association, which occupies 4.9 percent of the State, currently holds more forest than any other soil association in Illinois (nearly 0.5 million acres or 13.8 percent of Illinois forests); however, it is probably losing forest at the fastest rate because of the conversion of bottomland forests to cropland.

Of the prairie soils, all but soil association 24 are less than 10 percent forested and 11 are less than 1 percent forested (Table 10). Prairie soils are the major crop-producing soils of Illinois and are nearly ideal for that purpose. An average of 20 percent of the forest soil associations are forested. Associations 52 (Alford-Goss-Baxter) and 53 (Alford-Wellston) are the only associations that are more than 50 percent forested. Both of these associations occur in southern Illinois along the Mississippi and Ohio rivers and account for less than 0.8 percent of Illinois. These soils are generally shallow and heavily influenced by the underlying limestone (52) and sandstone (53) bedrock. They usually remain in a forested condition because they are unfit for cultivation. Association 55 (Grantsburg-Zanesville-Wellston) has the most coniferous (5.3 percent) and mixed (3.9 percent) forest of all the associations. These two soils occur in southern Illinois and occupy dissected and sloping uplands in which a thin layer of loess-covered bedrock is present. At the crest of ridges, the loess was thicker and the areas were cultivated early in the twentieth century. Because of the shallow nature of these soils, however, the land quickly lost its fertility. Agriculture was abandoned and the area planted to pines between 1930 and 1950. These are now the primary locations of conifer and mixed forests in Illinois.

Table 2. Illinois forestland (in thousands of acres) by region and county, as estimated by various organizations between 1820 and 1985.

Region and county	NRI[1] 1982	LUDA[2] 1978	USFS[3] 1985	USFS[4] 1962	USFS[5] 1948	Telford[6] 1924	GLO[7] 1820
Northern Region							
Boone	1.9	4.2	8.8	3.4	6.0	5.3	82.6
Carroll	31.5	25.1	32.1	23.1	22.0	24.9	152.3
Cook	28.5	47.2	47.9	31.2	30.0	23.9	82.2
DuPage	7.7	10.4	6.7	11.5	11.0	9.8	28.8
Jo Daviess	75.5	57.1	73.0	65.6	60.0	60.0	307.2
Kane	12.0	12.0	17.0	9.8	10.0	8.7	116.5
Lake	13.4	21.4	4.6	15.3	20.0	19.3	189.5
McHenry	23.0	28.9	21.9	15.3	16.0	6.7	165.7
Ogle	30.7	27.1	32.2	25.3	29.0	27.8	177.6
Stephenson	10.0	8.2	17.8	12.8	16.0	12.0	140.8
Whiteside	13.7	13.3	19.8	15.7	16.0	16.7	154.7
Winnebago	26.2	19.9	22.5	17.0	22.0	17.9	94.1
Total	274.1	274.8	304.3	246.0	258.0	233.0	1,692.1
	Percent of 1820		18	15	15	14	100
	Percent of 1924		131	106	111	100	726
	Percent of 1948		118	95	100	90	656
	Percent of 1962		136	100	115	104	756
	Percent of 1985		100	81	85	77	556

Continued

Table 2 continued.

Region and county	NRI[1] 1982	LUDA[2] 1978	USFS[3] 1985	USFS[4] 1962	USFS[5] 1948	Telford[6] 1924	GLO[7] 1820
Grand Prairie Region							
Bureau	32.4	32.4	38.7	28.1	35.0	34.0	116.1
Champaign	6.3	3.8	9.0	5.6	7.0	6.4	39.8
Christian	21.1	10.4	21.3	15.9	13.0	4.3	52.8
Coles	39.3	27.6	27.7	23.3	23.0	32.6	104.0
DeKalb	5.9	5.7	5.3	6.3	5.0	5.6	29.6
DeWitt	6.5	8.3	14.1	10.1	11.0	2.5	49.8
Douglas	9.5	3.8	7.6	5.2	5.0	2.6	41.0
Edgar	25.2	15.7	23.9	20.7	23.0	38.7	135.9
Ford	1.2	0.4	3.0	1.3	1.0	3.1	11.0
Grundy	—[8]	12.9	17.8	12.3	10.0	8.8	23.5
Henry	10.8	20.4	23.1	17.3	17.0	14.2	94.4
Iroquois	17.4	11.7	21.3	15.0	13.0	6.9	56.1
Kankakee	16.6	18.9	17.7	14.4	16.0	4.1	24.3
Kendall	4.6	4.9	7.1	4.9	8.0	8.8	22.0
LaSalle	36.5	39.4	39.1	34.8	26.0	28.9	111.3
Lee	23.6	12.8	15.2	11.0	9.0	11.0	46.6
Livingston	12.6	3.8	10.8	5.8	9.0	6.4	29.8
Logan		4.6	9.8	10.3	11.0	3.8	54.0
Macon	15.6	11.8	8.6	11.8	12.0	3.6	48.3
Marshall	23.8	29.8	25.8	25.7	28.0	26.6	66.5
McLean	9.5	7.0	17.6	9.6	18.0	7.3	81.8
Menard	6.7	11.1	21.8	15.8	15.0	22.0	69.0
Moultrie	2.6	5.4	12.7	11.1	8.0	2.1	51.4
Piatt	7.2	5.9	6.7	5.4	7.0	2.8	24.0
Putnam	13.4	15.4	16.8	14.1	18.0	19.2	42.4
Sangamon	30.2	17.1	29.1	25.5	24.0	60.9	124.4
Stark	2.6	2.4	5.1	5.5	6.0	6.7	42.9
Tazewell	28.7	24.2	28.4	25.7	38.0	45.0	129.4
Vermilion	20.1	27.0	36.5	28.0	29.0	5.7	118.2
Wabash	11.2	29.2	34.3	22.3	23.0	19.9	67.4
Woodford	20.7	2.0	30.1	22.6	30.0	36.7	93.3
Total	461.8	426.2	586.0	465.4	498.0	481.2	2,001.0
	Percent of 1820		29	23	25	24	100
	Percent of 1924		122	97	103	100	416
	Percent of 1948		118	93	100	97	402
	Percent of 1962		138	100	118	114	472
	Percent of 1985		100	79	85	82	341

Table 2 continued.

Region and county	NRI[1] 1982	LUDA[2] 1978	USFS[3] 1985	USFS[4] 1962	USFS[5] 1948	Telford[6] 1924	GLO[7] 1820
Western Region							
Adams	53.8	72.6	88.7	75.7	93.0	37.9	292.2
Brown	42.2	50.2	54.5	42.0	42.0	15.0	156.5
Calhoun	59.7	86.0	65.5	66.7	72.0	39.4	141.1
Cass	47.3	40.1	43.5	35.2	46.0	32.7	90.9
Fulton	115.4	94.3	108.8	97.4	96.0	70.4	353.2
Greene	45.4	41.2	50.6	55.9	54.0	33.9	173.1
Hancock	69.3	53.4	66.3	54.3	46.0	34.0	151.0
Henderson	30.6	33.0	36.6	31.4	35.0	23.3	64.4
Jersey	49.3	63.8	63.2	56.8	66.0	47.1	142.4
Knox	39.0	37.8	50.6	51.1	44.0	36.3	137.5
Macoupin	58.2	75.3	84.8	84.8	95.0	60.9	148.3
Mason	37.7	40.7	43.0	38.5	44.0	38.6	78.1
McDonough	24.1	27.9	36.5	28.8	40.0	22.5	111.8
Mercer	16.6	34.5	34.3	26.7	28.0	27.1	72.0
Morgan	20.7	26.1	41.3	28.7	30.0	14.7	126.3
Peoria	47.8	46.3	63.3	43.1	52.0	50.1	187.0
Pike	87.9	92.5	122.5	80.0	97.0	33.5	364.2
Rock Island	25.9	46.3	44.9	32.4	34.0	35.5	147.4
Schuyler	66.0	73.5	84.4	64.4	69.0	37.6	200.4
Scott	22.5	13.2	24.0	21.0	21.0	10.8	98.8
Warren	19.0	12.9	22.6	21.5	25.0	17.3	66.8
Total	978.4	1,071.6	1,230.9	1,036.4	1,129.0	718.6	3,303.5
	Percent of 1820		37	31	34	22	100
	Percent of 1924		171	144	157	100	460
	Percent of 1948		107	92	100	64	293
	Percent of 1962		129	100	118	75	345
	Percent of 1985		100	84	92	58	268
South Central Region							
Bond	33.2	42.5	29.6	36.4	37.0	18.8	75.8
Clark	66.9	58.7	62.4	69.9	58.0	30.6	175.4
Clay	53.0	53.0	48.3	48.1	46.0	33.5	111.9
Clinton	43.6	48.2	43.2	53.2	62.0	56.0	96.6
Crawford	46.7	39.7	49.8	48.4	40.0	27.1	155.6
Cumberland	36.4	28.5	33.7	38.6	30.0	21.9	81.6
Edwards	12.8	12.6	16.6	20.1	20.0	13.9	76.9
Effingham	36.4	49.0	51.1	55.6	47.0	29.7	87.0

Continued

Table 2 continued.

Region and county	NRI[1] 1982	LUDA[2] 1978	USFS[3] 1985	USFS[4] 1962	USFS[5] 1948	Telford[6] 1924	GLO[7] 1820
Fayette	46.9	88.4	86.8	96.5	84.0	48.3	218.3
Franklin	32.5	38.4	47.4	55.0	62.0	40.8	214.4
Gallatin	24.6	40.9	44.0	54.9	55.0	52.8	207.2
Hamilton	36.7	30.3	40.4	54.4	53.0	34.8	253.5
Jackson	102.3	118.6	134.5	134.7	123.0	92.1	360.9
Jasper	39.4	37.6	33.8	45.0	36.0	29.8	124.2
Jefferson	45.2	72.6	69.2	67.0	61.0	37.5	270.1
Lawrence	24.5	22.3	32.4	44.4	34.0	24.5	144.6
Madison	58.2	63.2	54.0	55.3	57.0	29.5	188.2
Marion	50.7	88.2	67.4	74.2	62.0	42.3	150.0
Monroe	62.5	54.6	51.4	53.1	58.0	57.9	218.0
Montgomery	48.7	38.6	39.4	49.1	46.0	46.5	96.5
Perry	44.3	54.9	52.7	61.1	61.0	60.8	178.1
Randolph	6.7	77.0	80.7	74.6	85.0	80.2	277.7
Richland	16.7	28.3	30.5	38.4	30.0	22.5	119.6
Saline	47.4	39.8	54.4	51.0	43.0	34.5	245.1
Shelby	39.9	44.9	54.9	64.1	55.0	47.9	142.9
St. Clair	40.0	63.3	51.3	59.5	55.0	47.9	210.7
Wabash	13.9	10.0	12.6	19.6	14.0	10.1	100.2
Washington	41.9	51.6	51.3	52.8	63.0	51.2	120.4
Wayne	49.4	55.4	61.9	73.0	74.0	69.9	290.9
White	34.9	26.6	40.3	36.7	30.0	19.2	295.1
Williamson	67.8	60.0	85.3	82.9	60.0	39.9	257.5
Total	1,364.1	1,537.7	1,611.3	1,767.6	1,641.0	1,252.4	5,544.9
	Percent of 1820		29	32	30	23	100
	Percent of 1924		129	141	131	100	443
	Percent of 1948		98	108	100	76	338
	Percent of 1962		92	100	94	72	318
	Percent of 1985		100	110	102	78	344

Table 2 continued.

Region and county	NRI[1] 1982	LUDA[2] 1978	USFS[3] 1985	USFS[4] 1962	USFS[5] 1948	Telford[6] 1924	GLO[7] 1820
Southern Unglaciated Region							
Alexander	37.5	62.8	58.2	67.6	67.0	43.8	147.9
Hardin	41.6	50.8	64.6	55.3	45.0	35.1	112.4
Johnson	88.4	72.5	89.8	84.0	79.0	64.8	220.8
Massac	27.5	23.6	34.5	42.1	44.0	31.6	153.8
Pope	62.5	131.3	149.2	146.5	100.0	65.3	236.3
Pulaski	22.7	19.3	29.7	30.6	34.0	23.5	128.5
Union	70.8	93.9	104.6	97.2	101.0	72.7	263.4
Total	351.0	454.2	530.6	523.3	470.0	336.8	1,263.1
	Percent of 1820		42	41	37	27	100
	Percent of 1924		158	155	140	100	375
	Percent of 1948		113	111	100	72	242
	Percent of 1962		101	100	90	64	217
	Percent of 1985		100	99	89	63	238
State total	3,429.4	3,764.5	4,263.1	3,871.3	3,996.0	3,021.7	13,804.6
	Percent of 1820		31	28	29	22	100
	Percent of 1924		141	128	132	100	457
	Percent of 1948		107	97	100	76	345
	Percent of 1962		110	100	103	78	357
	Percent of 1985		100	91	94	71	324

[1]U.S. Department of Agriculture, Soil Conservation Service, Natural Resource Inventory of 1982; the data base was generated primarily for soil erosion estimates and only nonfederal lands were inventoried. Estimates of percent change were not made because of the different methodologies involved.
[2]U.S. Geological Survey Land Use Data and Analysis, taken from aerial photography, 1972–1981 (Anderson et al. 1976). Estimates of percent change were not made because of the different methodologies involved.
[3]U.S. Forest Service Continuous Forest Inventory of 1948 (U.S. Forest Service 1949), includes commercial and noncommercial forestland.
[4]U.S. Forest Service Continuous Forest Inventory of 1962 (Essex and Gansner 1965), includes commercial and noncommercial forestland.
[5]U.S. Forest Service Continuous Forest Inventory of 1985 (Hahn 1987), includes commercial and noncommercial forestland.
[6]Telford inventory of 1924 (Telford 1926).
[7]General Land Office original survey maps (Anderson 1970).
[8]No data available.

Table 3. Major land uses in Illinois with special emphasis on land containing trees.

Land-use classes	Thousands of acres
Forestland	
Timberland	4,029.9
Reserved timberland	235.6
Subtotal	4,265.5
Nonforestland with trees	
Cropland	53.5
Improved pastureland	103.6
Wooded strips	178.5
Idle farmland	8.1
Marsh	19.3
Urban forest	102.8
Urban and other built-up areas	139.5
Windbreaks	133.1
Wooded pastureland	162.4
Subtotal	900.8
Total	5,166.3
Other nonforest without trees	
Cropland	24,701.5
Improved pastureland	2,400.8
Idle farmland	22.4
Other farm and farmstead	574.7
Marsh	60.1
Urban	2,621.6
Water	513.4
Total	30,894.5
Total land and water	36,060.8

Source: Hahn 1987

Table 4. Commercial forestland in Illinois (in thousands of acres) by forest type, 1962 and 1985.

Forest type	1962[1]	1985	Percent change
White–red–jack pine	0.5	20.2	+3,900
Loblolly–shortleaf pine	36.9	45.5	+23
Oak–pine	12.8	13.3	+4
Oak–hickory	2,361.7	2,025.0	–14
Oak–gum–cypress	17.8	137.8	+674
Elm–ash–soft maple[2]	1,526.1	720.6	–53
Maple–beech[3]	24.8	1,046.4	+4,119
Nonstocked	—[4]	21.1	—
Total	3,980.5	4,029.9	+1

[1]Adjusted from published 1962 data to account for changes in U.S. Forest Service definitions.
[2]Includes cottonwood type in 1962 and 1985.
[3]Includes aspen–birch type in 1962.
[4]No data available.
Source: Hahn 1987

Table 5. Net volume of growing stock on commercial forestland in Illinois by species group for 1962 and 1985, percent change between those dates, and net annual growth estimated from 1985 data.

Species group	1962 (thousand cubic feet)	1985 (thousand cubic feet)	Percent change	Net annual growth (thousand cubic feet)
Softwoods				
Loblolly–shortleaf pine	15,200	64,700	+327	1,891
White pine[1]	—	16,800	—	393
Red pine[1]	—	12,000	—	310
Eastern red cedar	2,400	11,400	+375	445
Bald cypress	6,800	8,900	+31	13
Jack pine[1]	—	700	—	36
Other softwoods	700	3,000	+329	110
Total	25,100	117,500	+368	3,224
Hardwoods				
Red oak	701,800	1,062,400	+51	18,352
White oak	739,700	1,017,600	+38	15,075
Hickory	343,900	522,500	+52	7,443
Soft maple	259,200	341,600	+32	14,144
Elm	367,700	267,400	–27	–5,106
Green–white–black ash	218,200	261,000	+20	6,932
Hard maple	99,800	163,100	+63	3,717
Cottonwood	114,100	157,800	+38	1,976
Sycamore	123,300	134,600	+9	2,412
Black walnut	77,500	119,100	+54	2,279
Hackberry[2]	—	93,500	—	5,683
Black cherry[2]	—	87,700	—	3,663
Basswood	25,800	54,100	+110	1,215
Yellow poplar	26,400	51,800	+96	1,609
Willow[2]	—	50,300	—	1,427
Sweetgum	58,600	45,100	–23	1,163
River birch[2]	—	36,800	—	1,257
Tupelo	13,900	28,000	+101	209
Beech	14,500	12,100	–17	242
Butternut[2]	—	5,700	—	105
Aspen	9,100	1,900	–79	28
Other hardwoods	223,100	203,500	–9	8,966
Total	3,416,600	4,717,600	+38	92,791
Total all species	3,441,700	4,835,100	+40	96,015

[1]Tabulated only in 1985 survey, included with other softwoods in 1962.
[2]Tabulated only in 1985 survey, included with other hardwoods in 1962.
Source: Hahn 1987

Table 6. Total volume and net annual growth of sawtimber and number of live trees on commercial forestland in Illinois by species group, 1985.

Species group[1]	Total volume (thousand board feet)[2]	Net annual growth (thousand board feet)	Number of live trees (in thousands)
Softwoods			
Jack pine	0	0	719
Red pine	19,900	4,312	4,018
White pine	64,200	2,853	5,296
Loblolly pine	2,200	35	125
Shortleaf pine	174,100	4,087	14,721
Bald cypress	49,221	90	91
Eastern red cedar	24,200	360	22,380
Other softwoods	4,000	106	1,214
Total	337,800	11,843	48,564
Hardwoods			
Select white oak[3]	3,852,200	80,721	82,873
Other white oak[3]	487,400	4,512	16,787
Select red oak[3]	1,401,700	26,641	24,662
Other red oak[3]	3,091,500	77,010	111,613
Select hickory[3]	939,500	15,208	88,063
Other hickory[3]	618,900	15,502	97,411
Basswood	207,200	8,060	18,819
Beech	55,400	1,488	4,295
Hard maple	533,300	14,466	116,989
Soft maple	1,232,600	44,147	90,777
Elm	483,400	-9,780	343,522
Black ash	35,200	-103	2,075
White and green ash	747,600	27,437	111,888
Sycamore	605,400	9,518	8,714
Cottonwood	709,900	11,237	12,688
Willow	165,000	9,893	14,316
Hackberry	285,300	14,781	65,287
Bigtooth aspen	1,800	43	12
River birch	104,700	7,414	1,259
Sweetgum	155,201	3,509	10,822
Tupelo	99,400	942	13,307
Black cherry	233,200	16,385	12,507
Black walnut	368,000	14,142	66,492
Butternut	9,900	131	28,611

Table 6 continued.

Species group[1]	Total volume (thousand board feet)[2]	Net annual growth (thousand board feet)	Number of live trees (in thousands)
Yellow poplar	218,600	8,435	1,086
Other hardwoods	513,400	23,564	316,166
Noncommercial species	—[4]	—	216,661
Total	17,156,900	425,303	1,885,629
Total all species	17,494,600	437,146	1,934,193

[1]Scientific names and other information on species are given in Appendix III.
[2]International 1/*f* -inch rule.
[3]Select white oak species include white, swamp white, bur, swamp chestnut, and chinkapin oaks; other white oak species include overcup, chestnut, and post oaks. Select red oak species include cherrybark, shumard, and northern red oaks; other red oak species include scarlet, northern pin, southern red, shingle, black, blackjack, pin, and willow oaks. Select hickory species include pecan and shellbark, shagbark, and mockernut hickories; other hickory species include bitternut and pignut hickories.
[4]No data available.
Source: Hahn 1987

Table 7. Timberland in Illinois (in thousands of acres) by ownership class and stand-size class, 1985.

Ownership class	All stands	Stand-size class			
		Sawtimber	Poletimber	Sapling and seedling	Nonstocked
National forest	225.8	137.2	60.0	28.6	0.0
Miscellaneous federal	66.3	39.0	12.4	14.9	0.0
State	54.7	37.0	0.0	17.7	0.0
County and municipal	41.8	27.3	11.6	2.9	0.0
Forest industry	13.0	10.7	0.0	2.3	0.0
Farmers	1,828.0	1,176.9	359.9	282.3	8.9
Miscellaneous private corporations	263.1	141.8	57.0	57.9	6.4
Miscellaneous private individuals	1,537.2	991.4	272.8	267.8	5.8
Total	4,029.9	2,561.3	773.7	673.8	21.1

Source: Hahn 1987

Table 8. Timberland in Illinois (in thousands of acres) by forest type and stand-size class, 1985.

Forest type	All stands	Stand-size class			
		Sawtimber	Poletimber	Sapling and seedling	Nonstocked
White pine	20.2	7.5	9.6	3.1	0.0
Loblolly–shortleaf pine	45.5	13.8	23.8	7.9	0.0
Oak–pine	13.3	1.7	5.2	6.4	0.0
Oak–hickory	2,025.0	1,456.3	357.1	211.6	0.0
Oak–gum–cypress	137.8	109.4	17.4	11.0	0.0
Elm–ash–soft maple	685.8	457.9	150.1	77.8	0.0
Cottonwood	34.8	19.0	2.9	12.9	0.0
Maple–beech	1,046.4	495.7	207.6	343.1	0.0
Nonstocked	21.1	0.0	0.0	0.0	21.1
Total	4,029.9	2,561.3	773.7	673.8	21.1

Source: Hahn 1987

Table 9. Annual mortality of growing stock, percent mortality of total growing-stock volume, and annual mortality of sawtimber on timberland in Illinois by ownership class, 1984.

Ownership class	Annual mortality of growing-stock volume (thousand cubic feet)[1]	Percent mortality of total growing stock	Annual mortality of sawtimber (thousand board feet)
National forest	3,538	1.17	11,992
Miscellaneous federal	2,156	1.76	7,775
State	1,166	1.36	4,686
County and municipal	1,069	1.59	3,410
Forest industry	134	0.95	538
Farmers	29,235	1.39	90,829
Miscellaneous private corporations	4,503	1.48	11,791
Miscellaneous private individuals	24,780	1.32	75,845
Total	66,581	1.36	206,872

[1]International ¼- inch rule.
Source: Hahn 1987

Table 10. Percent of deciduous, coniferous, and mixed forest on each of 50 Illinois soil associations, including forest acreage and percent of Illinois forest found on each soil association.

Number	Soil association	Percent deciduous	Percent coniferous	Percent mixed	Total percent forested	Acres of forest[1]	Percent of Illinois forest
Dark-colored soils developed under prairie vegetation							
1	Port Byron–Joy	0.94	0.00	0.10	1.04	790	0.02
2	Tama–Muscatine–Sable	0.75	0.00	0.00	0.75	12,000	0.33
3	Tama–Ipava–Sable	0.47	0.00	0.00	0.47	14,490	0.40
4	Herrick–Virden–Piasa	0.93	0.00	0.00	0.93	9,670	0.27
5	Oconee–Cowden–Piasa	2.31	0.00	0.00	2.31	13,560	0.38
6	Hoyleton–Cisne–Huey	2.85	0.08	0.00	2.93	44,760	1.25
7	Winnebago–Durand–Ogle	1.31	0.00	0.00	1.31	1,120	0.03
8	Broadwell–Waukegan–Pillot	0.49	0.00	0.00	0.49	860	0.02
9	Catlin–Flanagan–Drummer	0.39	0.00	0.00	0.39	8,230	0.23
10	Wenona–Rutland–Streator	0.31	0.00	0.04	0.35	520	0.01
11	Plano–Proctor–Worthen	1.78	0.00	0.02	1.80	32,680	0.91
12	Saybrook–Dana–Drummer	0.86	0.00	0.00	0.86	10,670	0.30
13	Griswold–Ringwood	2.93	0.24	0.16	3.33	3,680	0.91
14	Varna–Elliott–Ashkum	0.57	0.01	0.00	0.58	5,620	0.16
15	Symerton–Andres–Reddick	0.43	0.00	0.00	0.43	760	0.02
16	Swygert–Bryce–Mokena	0.18	0.00	0.00	0.18	950	0.03
17	Clarence–Rowe	0.29	0.00	0.00	0.29	330	0.01
18	Harco–Patton–Montgomery	2.88	0.33	0.00	3.21	3,760	0.10
19	Martinton–Milford	1.21	0.00	0.00	1.21	4,360	0.12
20	Lorenzo–Warsaw–Wea	2.71	0.05	0.18	2.94	7,010	0.20
21	Jasper–LaHogue–Selma	1.53	0.21	0.05	1.79	7,690	0.21
22	Sparta–Dickinson–Onarga	3.67	0.93	0.27	4.87	36,650	1.02
23	Channahon–Dodgeville–Ashdale	5.63	0.50	0.16	6.29	14,040	0.39
24	Lawson–Sawmill–Darwin	12.22	0.36	0.04	12.62	294,630	8.20
25	Houghton–Palms–Muskego	7.83	0.00	0.21	8.04	7,650	0.21
Prairie soil: average percent and total acres		2.22	0.11	0.05	2.38	535,910	14.91
Light-colored soils developed under forest vegetation							
31	Seaton–Timula	23.73	0.00	0.03	23.76	53,460	1.49
32	Fayette–Rozetta–Stronghurst	20.70	0.01	0.10	20.81	454,490	12.65
33	Alford–Muren–Iva	17.21	0.68	0.15	18.04	64,460	1.79
34	Clinton–Keomah–Rushville	16.94	0.00	0.04	16.98	446,160	12.41
35	Hosmer–Stoy–Weir	19.13	0.53	0.16	19.99	232,170	6.46
36	Ava–Bluford–Wynoose	17.62	0.68	0.02	18.32	428,500	11.92
37	Westville–Pecatonica–Flagg	6.20	0.02	0.07	6.29	8,930	0.25
38	Middleton–Tell–Thebes	9.82	0.00	0.00	9.82	9,610	0.27

Continued

Table 10 continued.

Number	Soil association	Percent deciduous	Percent coniferous	Percent mixed	Total percent forested	Acres of forest[1]	Percent of Illinois forest
39	Birkbeck–Sabina–Sunbury	10.49	0.00	0.00	10.49	45,100	1.25
41	St. Charles–Camden–Drury	5.54	0.02	0.04	5.58	18,150	0.50
42	Dodge–Russell–Miami	11.28	0.02	0.04	11.34	41,260	1.15
43	Kidder–McHenry	11.88	0.13	2.42	14.43	7,910	0.22
44	Morley–Blount–Beecher	8.19	0.27	0.08	8.54	54,470	1.52
45	St. Clair–Nappanee–Frankfort	11.49	0.00	0.02	11.51	15,510	0.43
46	Markland–Colp–Del Rey	11.35	0.29	0.01	11.65	34,740	0.97
48	Casco–Fox–Ockley	14.48	0.05	0.46	15.19	24,490	0.68
49	Martinsville–Sciotoville	11.48	0.09	0.15	11.72	11,030	0.31
50	Oakville–Lamont–Alvin	11.76	1.28	0.00	13.04	65,220	1.81
51	Ritchey–New Glarus–Palsgrove	7.65	0.00	0.41	8.06	16,170	0.45
52	Alford–Goss–Baxter	59.79	0.03	0.33	60.15	113,280	3.15
53	Alford–Wellston	61.20	1.12	1.11	63.43	71,030	1.98
54	Hosmer–Zanesville–Berks	26.56	2.13	1.71	30.40	153,520	4.27
55	Grantsburg–Zanesville–Wellston	35.64	5.28	3.91	44.83	178,520	4.97
56	Derinda–Schapville–Eleroy	13.93	0.57	0.08	14.58	12,660	0.35
57	Haymond–Petrolia–Karnak	25.72	0.44	1.84	28.00	497,510	13.84
Forest soil: average percent and total acres		18.80	0.55	0.53	19.88	3,058,320	85.09
State: average percent and total acres		10.51	0.33	0.29	11.13	3,594,220	100.00

[1]Data from LUDA; forestland estimates are less than U.S. Forest Service estimates.

Source: Anderson et al. 1976; Fehrenbacher et al. 1984

Satellite Remote Sensing of Illinois Forest Cover and Productivity

A procedure combining remote sensing and geographic information system (GIS) technology was developed to use Landsat Thematic Mapper (TM) data with a 30-meter resolution to calibrate Advanced Very High Resolution Radiometer (AVHRR) data with a 1,100-meter resolution that enabled forest cover estimates to be made over large areas covering multiple states (Iverson et al. 1988, 1989). The two data sets were co-registered, and the average forest cover from classified TM data was determined for the 1,369 TM pixels (picture elements) contained within each AVHRR pixel. A statistical relationship was then developed between AVHRR spectral data and productivity or cover estimates and applied to each AVHRR pixel in the region. The maps that resulted depict regional (428 counties from 10 states) percent forest (see fold-out forest reference map) by each 306-acre AVHRR pixel. Per-AVHRR pixel estimates were then aggregated by county to yield county estimates of percent forest (Fig. 33).

The maps of forest cover (forest reference map and Fig. 33) show vast regions of Illinois and Iowa with very low forest cover. Increased forest percentages are found in the Ozarks and in Mark Twain Forest in Missouri, in the Hoosier Forest in Indiana, in some southwestern Michigan forests, in much of Wisconsin, and in the Shawnee National Forest in southern Illinois. To test the validity of these forest-cover estimates, a comparison was made to U.S. Forest Service estimates of percent forest by county (Fig. 33). The two maps were then overlaid to produce a difference map (Fig. 33). Examination of this third map allows us to assess where AVHRR estimates differ most from those of the U.S. Forest Service.

Correlation analysis revealed a very high relationship between the two estimates, with r=0.89 overall (Table 11). Analysis of states with adequate samples showed highly significant correlation coefficients ranging from 0.72 in 39 Kentucky counties to 0.96 in 77 Missouri counties. Cover estimates for counties within 100 km of the calibration center in Jackson County, Illinois, correlated extremely well (0.96) compared to U.S. Forest Service estimates (Table 11). Comparisons between means using pair-wise t-tests revealed a 0.9 percent higher estimate for the AVHRR data compared to the U.S. Forest Service data over all counties (overall estimate of 24.1 percent forest with the AVHRR estimate and 23.2 percent with the U.S. Forest Service estimate); the two estimates did not differ significantly (Table 11). Seven of the ten states, accounting for over 75 percent of the total number of counties evaluated, had no significant differences between U.S. Forest Service and AVHRR estimates. Counties within 100 km of the calibration center matched very closely.

Differences in estimates, where they exist, can be explained by the various years in which U.S. Forest Service data were collected, by partial cloud cover in the AVHRR scene, and by differences in forestland definitions (Iverson et al. 1989). For example, the underestimation by AVHRR in the extreme southeast corner of the scene and along the eastern edge of Lake Michigan resulted from cloud cover masking AVHRR data in those areas. Another difference between estimates is the definition of forestland. Any group of trees regardless of location or sparseness reflects to the AVHRR sensor. In U.S. Forest Service estimates, however, several categories are called "non-forestland with trees" (see Glossary, Appendix I) and do not enter into the final forest estimates. Examples of this type include cropland with trees, wooded strips, urban forests, windbreaks, and wooded pastures. In Illinois, these categories accounted for 900,800 acres, or 2.5 percent of the State (Table 3). An extreme example is highly suburbanized Lake County in the northeastern corner of Illinois. Only 4,600 acres of forestland were estimated by the U.S. Forest Service (1.5 percent); yet the AVHRR estimate shows between 11 and 20 percent forest cover (forest reference map and Fig. 33).

A similar method was used to estimate forest productivity across the same ten-state area of the Midwest (Iverson et al. 1988). Although results were not quite as good, the method holds promise for developing global models of forest productivity. These remote-sensing technologies allow us to gain valuable information rapidly on the forests of Illinois and surrounding regions. They will never replace field foresters, but they do allow efficient extensions of field estimates across the landscape (and eventually across the globe) and the rapid detection of changing landscapes.

Table 11. Forest cover estimates by AVHRR and U.S. Forest Service (USFS) methods. Overall relationship and summarizations by state and by distance from calibration centers are given. Data include date of USFS survey, average county forest cover according to AVHRR and USFS estimates, correlation coefficient and probability level, t-value and probability level, and number of counties in the sample.

Area	Date	AVHRR (Percent cover)	USFS (Percent cover)	r	t	n
All areas	1966–1988	24.1	23.2	0.89***	1.7	428
Analysis by state						
Arkansas	1988	39.7	40.7	0.89***	–0.3	15
Illinois	1985	12.7	13.6	0.89***	–1.6	100
Indiana	1986	30.3	21.2	0.91***	6.9***	62
Iowa	1974	4.5	4.9	0.80***	–0.8	55
Kentucky	1978	42.1	33.4	0.72***	4.0**	39
Michigan	1966	35.6	41.8	0.78*	–1.6	11
Minnesota	1977	6.0	8.1	0.99***	–4.3*	10
Missouri	1977	32.8	32.6	0.96***	0.3	77
Tennessee	1970	34.1	36.6	0.80***	–0.7	24
Wisconsin	1983	24.6	25.6	0.79***	–0.4	36
Distance from calibration center						
0–100 km		28.5	28.9	0.96***	–0.3	27
100–200 km		27.4	29.9	0.94***	–2.7*	70
200–300 km		36.1	33.0	0.89***	3.1*	96
300–400 km		28.1	24.4	0.78***	2.2	82
>400		12.1	12.4	0.86***	–0.5	153

*P=<0.01
**P=<0.001
***P=<0.0001
Source: Iverson et al. 1988, 1989

Illinois Vegetation and Land Use: Historical Trends

The Illinois geographic information system allowed the analysis of historical trends with respect to Illinois vegetation and land use. By relating present-day and historic land-use data to each other and to other data layers, we were able to get a better understanding of the trends and the reasons for land-use change.

Land-use Trends and Their Relationship to Landscape Attributes

Currently over 80 percent of Illinois is in cropland and pasture (LUDA data, Table 12), the result of massive land-use changes over the past 160 years. According to LUDA data, less than 10 percent of the State supports some form of forest, down from about 38 percent in 1820. When LUDA data and the historic vegetation data are juxtaposed, we find that 2.64 million acres presently in forest were also forest in 1820; somewhat surprisingly, 959,000 acres historically in prairie are now in forest (Table 12). Only 11 percent of the area of Illinois remains in Küchler's (1964) potential natural vegetation (Klopatek et al. 1979); for the conterminous United States, the comparable figure is 66 percent. In this respect, Illinois ranks second only to Iowa in percentage of land disturbed from its potential natural vegetation. Beyond that, only 0.45 percent of the total land and water of Illinois remain in a relatively undisturbed natural state (White 1978). Only 19 percent of the original forests of Illinois and about 0.03 percent of the original prairies of 1820 remain, and most conversions have been to agriculture (Table 12). Based on selected county evaluations and a determination of the bias against wetlands by the General Land Office survey, we estimate that between 59 and 72 percent of the State's wetlands were also lost during this period (Iverson and Risser 1987).

The Illinois geographic information system (IGIS) was used to determine the relationship between Illinois soil and landscape characteristics and historic and present land use and vegetation (Iverson 1988). Eleven soil and landscape factors, including texture, permeability, organic matter, water-holding capacity, solum thickness, and slope, were quantified for each of 50 general soil associations (Fehrenbacher et al. 1984) and correlated with the percentage of each land-use type or the change within each soil association.

The correlation analysis between the percent of each soil association in a land type and the attributes of the landscape revealed an assortment of significant relationships (Table 13). Organic-matter percentages correlated highly to historic vegetation type, an indication of the functional relationship of vegetation to soils, i.e., the fibrous roots of prairie vegetation increased organic-matter content (Table 13) (Jenny 1941). The positive correlation of historic prairies to the productivity index for crops is indicative of the more fertile, organically rich soil formerly in prairie vegetation. Forested landscapes were also found to correlate highly and directly to the maximum slope found for any soil within the association. Again, this finding is logical because dissected regions would be more sheltered than level areas against large fires sweeping across the plains (Burton et al. 1988).

Recent land uses ascertained from the LUDA data also correlated to certain landscape attributes (Table 13). Urban land uses, be they for residential, commercial, industrial, or transportation purposes, had no striking relationships to landscape attributes. Apparently geographic location, i.e., proximity to surrounding urban areas, has been the overriding factor in historic urban development. Cropland and pastureland percentages within each soil association correlated positively with productivity index and organic matter and negatively with slope. Deciduous forest percentages, on the other hand, correlated negatively with organic matter and productivity index and positively with slope. Nearly all arable lands have been converted to agriculture, leaving only highly sloping and/or infertile lands in forest. Much of the coniferous forests in Illinois are plantations and are found largely on abandoned, fairly level farmland in southern Illinois. Like deciduous forests, they are negatively related to productivity index and to organic matter. Coniferous forests, however, were not significantly related to slope. Forested wetlands are generally found on poorly drained, nonsloping landscapes, circumstances that explain the calculated

correlation coefficients (Table 13). The percentage of nonforested wetlands in each soil association was found to correlate positively with available water-holding capacity, solum thickness, and organic content, and negatively with percentage of clay near the soil surface. Wetland marshes are prevalent on deep sand/peat soils, especially in the northeastern part of Illinois. Mines, quarries, and gravel pits correlate negatively with drainage class and productivity index; this finding is not surprising since gravel areas are excessively drained and low in fertility (Iverson 1988).

Changes in land use since 1820 were determined by comparing the percent of each soil association undergoing a particular conversion to the landscape attributes (Table 13). Most of the forestland of 1820 currently exists in one of three land uses: cropland, urban development, or deciduous forestland. The explanations for the relationships between landscape attributes and land-use changes from 1820 to 1980 are the same as those given in the preceding paragraph for 1980 land uses. As mentioned previously, nearly 1 million acres of historic prairie land were converted to forestland over the past century and a half; such is the natural tendency of Illinois prairies in the absence of fire (Risser et al. 1981). Judging from the correlations, this type of conversion occurred on soils low in fertility and organic matter, with high slope angles and low amounts of clay near the surface.

Trends in Forest Area

Trends in forest area are best seen in regional contexts and are tabulated in Table 2 and shown graphically on the fold-out forest reference map. All regions of Illinois have had drastic reductions in forest acreage since the original land surveys, but much of the State has experienced slight increases in forestland since 1962. The Northern Region suffered the greatest loss, through urbanization and conversion to agriculture, and now has only 18 percent of the forests that were present in 1820. Only 29 percent of the original forests remain in the Grand Prairie Region; in this case, most forest reductions were the result of clearing for agriculture. Forests of the Western Region also declined as a result of agricultural clearing, and only 37 percent of the original forests remain. The South Central Region currently has 29 percent of its original forests and is the only region that continues to lose forest. The Southern Unglaciated Region has the highest proportion of remaining forest—42 percent of the acreage of the early 1800s. Further, its forest acres have increased substantially since the late 1940s.

With the exception of the South Central Region, most areas of Illinois gained forest acreage in the past 2.5 decades. This trend can be partially attributed to the reduced number of cattle and the consequent reduction in pastures and hayland in the State. As a result of those reductions, many areas have grown up into forests, especially maple. These circumstances explain the relatively large number of acres of young maple forests shown in Figure 28. To illustrate further, 3.86 million head of cattle were reported in Illinois in 1962 but only 2.60 million head in 1984 (Illinois Agricultural Statistics Service 1962–1986). Similarly, 2.04 million acres of hayland were reported in 1962 but only 1.22 million in 1984. Land in pasture peaked in 1940 with 4.94 million acres; less than one-half of those acres remain in pasture (U.S. Department of Commerce 1984). Many of these acres undoubtedly were converted to row-crop agriculture, but some were left to succeed to forestland.

Forest acreage estimates in 1924 and 1948, though not as accurate as the 1985 data, nevertheless illustrate trends of interest. Total forest acreage in 1924 was only 3.02 million acres—lower than any of the other more recent estimates shown on Table 2 and only 22 percent of the acreage of the original forests (Telford 1926). The rapid decline of Illinois forests in the early years following European settlement is nothing short of phenomenal. Much of the State's forestland, especially the secondary stream bottoms and parts of the uplands, was rapidly cleared for cropland in the first three decades of the nineteenth century. Agriculture was the only important industry in the wooded lands until about 1860.

In 1830, the Illinois prairies were found to be good cropland and in a mere 10 years were essentially settled (96 percent) through a flood of immigration. Over 300,000 people settled in the prairies during this decade, creating an enormous demand for housing material, fuel, and fence posts. Local timber supplies controlled prairie settlement since railroads were not yet in place. In those days, timberland was worth $35 per acre; prairieland was worth only $5 per acre. With the advance of railroad and water transportation (about 1855), fuel and building materials became available from elsewhere and woodlands in the prairie counties were thought of as an encumbrance (Telford 1926).

The timber industry had begun to flourish in Illinois by 1860; by 1870, 92 of the 102 counties had manufacturing establishments based on wood, and forests were estimated to occupy 6.02 million acres (Telford 1926). During the 1880s, total annual lumber production within Illinois reached over 350 million board feet, or 2.2 times the present rate. Lumber production continued to increase until 1900, after which it began to decrease as the resource declined. By 1923, only an estimated 22,000 acres of the original 13.8 million acres remained in virgin forest. Since that time, forest acreages have gradually increased through secondary growth (Table 2).

Several forest types showed profound changes from 1962 to 1985 (Table 14). Especially phenomenal are the vast increases in commercial acreage of white, red, and jack pines, maple–beech, and oak–gum–cypress. Over one-half of the State's elm–ash–soft maple has disappeared since 1962, mainly due to bottomland conversions and disease. Oak–hickory has also been reduced statewide by 337,000 acres. These data make clear that although State forest acreage and volume have increased since 1962, the quality and value of the timber resource have diminished, at least according to today's standards for timber value.

The net volume of growing stock has increased by 40 percent since 1962 (Table 5), a reversal of the trend from 1948 to 1962 when total volume declined by 3 percent (Essex and Gansner 1965). The volume of elms has continued to decline as it did during 1948–1962, but white and red oak, along with black walnut, have increased by 38 to 54 percent since 1962. Species showing the greatest increase in volume were pine, red cedar, oak, hickory, hard maple, basswood, yellow poplar, and tupelo. Only elm, sweetgum, beech, and aspen experienced a loss in growing-stock volume statewide. Average growing-stock volume per acre of commercial forest increased from 865 to 1,200 cubic feet during the period. These data suggest that Illinois forests are generally growing faster than the harvest.

Table 12. Area of Illinois occupied by forest, prairie, and water in 1820, land use in 1980, and changes in land use between 1820 and 1980.

Land use	Number of acres	Percent of state
1820 vegetation map		
Forest	13,828,840	37.67
Prairie	21,639,050	58.95
Water	1,238,900	3.38
1980 LUDA map		
Urban, residential	960,690	2.65
Urban, commercial	295,320	0.81
Urban, industrial	128,100	0.35
Urban, transportation	133,820	0.37
Urban, other	17,690	0.05
Cropland and pastureland	29,090,070	80.20
Orchards, groves, and vineyards	23,110	0.06
Confined feeding operations	10,080	0.03
Other agricultural land	14,170	0.04
Shrub/brush rangeland	12,040	0.03
Deciduous forest	3,386,560	9.34
Coniferous forest	95,140	0.26
Mixed forest	45,700	0.13
Streams and canals	63,720	0.18
Lakes	40,740	0.11
Reservoirs	204,060	0.84
Great Lakes	998,180	2.75
Forested wetlands	164,280	0.45
Nonforested wetlands	49,080	0.14
Strip mines, quarries, and gravel pits	106,070	0.29
Transitional areas	183,580	0.51
1820 to 1980 change		
Forest to agriculture	9,902,710	27.30
Forest to urban	544,730	1.50
Forest remaining forest	2,640,900	7.28
Prairie to forest	958,880	2.60
Prairie to agriculture	19,186,210	52.90
Prairie to urban	1,125,190	3.10

Source: Iverson 1988

Table 13. Correlation coefficients between land use or change in Illinois and landscape attribute.

Land use	Percent sand (10 cm)	Percent sand (50 cm)	Percent clay (10 cm)	Percent clay (50 cm)	Available water	Solum thickness	Productivity index	Permeability	Drainage class	Organic matter	Percent slope
1820 vegetation map											
Forest	–0.01	–0.07	–0.27	–0.05	0.09	0.05	–0.43**	0.06	–0.24	–0.55**	0.50**
Prairie	0.01	0.07	0.27	0.05	–0.09	–0.05	0.43**	–0.06	0.24	0.55**	–0.50**
1980 LUDA map											
Urban, residential	0.31*	0.22	–0.14	–0.06	–0.23	–0.34**	–0.27	–0.03	–0.04	0.03	0.01
Urban, commercial	0.31	0.20	–0.08	0.00	–0.27	–0.36**	–0.24	0.01	–0.01	0.06	–0.05
Urban, industrial	0.23	0.24	–0.05	0.06	–0.30*	–0.21	–0.23	0.00	0.00	0.14	–0.14
Urban, transportation	0.33*	0.24	–0.11	–0.05	–0.25	–0.24	–0.16	–0.07	0.07	0.13	–0.21
Cropland and pastureland	–0.22	–0.11	0.22	0.15	0.09	0.15	0.52**	0.01	0.26	0.35*	–0.44**
Deciduous forest	0.00	–0.07	–0.10	–0.10	0.07	0.05	–0.35*	0.04	–0.27	–0.45**	0.52**
Coniferous forest	–0.02	0.00	–0.08	–0.09	–0.16	0.05	–0.35*	0.14	–0.06	–0.30	0.08
Forested wetlands	–0.02	–0.16	–0.10	–0.02	0.10	0.09	0.14	0.16	0.33**	0.05	–0.39*
Nonforested wetlands	–0.04	0.05	–0.47**	–0.32	0.46**	0.34*	–0.14	–0.44*	0.24	0.69**	–0.15
Strip mines, quarries, gravel pits	0.12	0.25	–0.07	–0.14	–0.14	0.04	–0.31*	–0.05	–0.32*	–0.23	0.19
1820 to 1980 change											
Forest to agriculture	–0.19	–0.09	0.18	0.16	0.05	0.13	0.48**	0.05	0.26	0.28*	–0.42**
Forest to urban	0.35*	0.27	–0.11	–0.09	0.25	0.34*	–0.22	–0.08	0.01	0.14	–0.06
Forest remaining forest	–0.02	–0.10	–0.08	–0.10	0.08	0.03	–0.35**	0.04	–0.29*	–0.44**	0.51**
Prairie to forest	0.09	–0.05	–0.29*	–0.08	–0.03	0.10	–0.45**	0.07	–0.09	–0.50**	0.45**
Prairie to agriculture	–0.17	–0.12	0.21	0.13	0.10	0.16	0.42**	–0.04	0.19	0.31	–0.29*
Prairie to urban	0.32	0.23	–0.14	–0.03	–0.28*	–0.38**	–0.30	–0.01	–0.05	0.01	–0.01

[1]Permeability classes range from 1 to 5, with 1 indicating rapidly permeable.
[2]Drainage classes range from 1 to 5, with 1 indicating well drained.
*Significant at 0.05 level
**Significant at 0.01 level
Source: Iverson 1988

Table 14. Commercial forestland in Illinois (in thousands of acres) by forest type, 1962 and 1985.

Forest type	1962[1]	1985	Percent change
White–red–jack pine	0.5	20.2	+3,900
Loblolly–shortleaf pine	36.9	45.5	+23
Oak–pine	12.8	13.3	+4
Oak–hickory	2,361.7	2,025.0	–14
Oak–gum–cypress	17.8	137.8	+674
Elm–ash–soft maple[2]	1,526.1	720.6	–53
Maple–beech[3]	24.8	1,046.4	+4,119
Nonstocked	—[4]	21.1	
Total	3,980.5	4,029.9	+1

[1]Adjusted from published 1962 data to account for changes in U.S. Forest Service definitions.
[2]Includes cottonwood type in 1962 and 1985.
[3]Includes aspen–birch type in 1962.
[4]No data available.
Source: Hahn 1987

Benefits from the Forests of Illinois

The forests of Illinois provide extensive benefits to the people of Illinois, including timber, fuel, recreation, wildlife, botanical resources, aesthetic values, watershed protection, energy conservation, and an escape valve for the urban dweller. Each of these is discussed here; however, the amount of material given each topic does not indicate author bias but rather the availability of data.

Harvested Timber and Timber Products

Illinois ranks fifth in the nation in demand for wood and 32nd in wood produced. Obviously, Illinois does not cut enough wood to meet the demand, even though much of the supply is there. In 1983, 161 million board feet of timber were harvested in Illinois (Blyth et al. 1987), although much more was grown (see Timber Grown versus Timber Removed, page 56). The board feet of sawlogs grown per county was presented in Figure 23; board feet of sawlogs cut per county is given in Figure 34. The major counties growing sawlogs were Pope, Jackson, Pike, Fayette, and Macoupin (each over 10 million board feet); the major counties cutting sawlogs in 1983 were Franklin, Fulton, Jackson, and White (over 6 million board feet per county).

In 1983, the primary wood-using industry in Illinois processed 146 million board feet of sawlogs in 178 active sawmills. As shown on Table 15, 94 percent of the raw material came from Illinois. Red oak (29 percent), pin oak (19 percent), white oak (16 percent), and cottonwood (10 percent) accounted for the majority of sawlogs processed in the State. Nearly one-half of the elms processed in Illinois came from Wisconsin forests, and 1.2 million board feet of the red oak came from Missouri (Table 15). Conversely, Illinois retained for its own mills 100 percent of all softwood and 86 percent of all hardwood logs grown in the State; the remainder of the hardwood went to neighboring states (Table 16). Missouri processed 8.1 percent of the timber harvested in Illinois in 1983, including 11.9 percent of the red and white oak; Indiana processed 5.2 percent overall, including 6.2 percent of Illinois' red and white oak (Table 16). Clearly, more Illinois timber, especially high-quality stock, is leaving the State than is coming in from surrounding states.

Of the 4 million board feet of veneer and other high-quality logs cut in Illinois during 1983, only 0.3 percent remained in the State. One-half of the remaining veneer logs went to Indiana, 14 percent to Michigan, and 7 percent each to Wisconsin and Missouri; 14 percent went to destinations outside the United States. These data attest to the high quality of the product and the absence of veneer mills in Illinois (only two mills were operating in 1983). More than 63 times as many veneer logs were shipped to other countries (primarily Europe and Japan) as were kept in Illinois. Of the veneer logs produced in Illinois, 64 percent were white oak, 19 percent were walnut, and 14 percent were red oak. The remaining 3 percent consisted of five other hardwood species (Blyth et al. 1987).

No pulpwood plants are currently in operation in Illinois, and all pulpwood materials are shipped to surrounding states. In 1983, 91,000 cords (7.2 million cubic feet) of pulpwood were produced in Illinois; 63 percent of the material was from roundwood, and the remainder was wood residue from sawmills (Blyth et al. 1987). Shortleaf pine was the chief pulpwood species in 1983.

With increased fuel costs in recent years, the consumption of wood as a source of energy has grown considerably. In 1982, nearly 2 million cords of firewood were cut or gathered in Illinois. This figure represents 43 percent of the total trees utilized in 1982 (McCurdy and Burde 1984). As shown in Figure 35, fuelwood is primarily produced (and consumed) in northeastern Illinois, an area of extremely high population density. Cook, McHenry, and Will counties, for example, each harvested over 150,000 standard cords (>11 million cubic feet) of fuelwood during 1983. The Northern Region as a whole averaged 49,482 cords per county in 1983 whereas less than 10 percent (average of 4,548 cords per county) of that cordage was harvested by counties in the Southern Unglaciated Region. Obviously, the amount of fuelwood used correlates more strongly to human population density than to tree population density. White and red oak were the primary fuelwood species in 1983, accounting for 53 percent of the roundwood fuel (Blyth et al. 1987). The majority of firewood (97 percent) was cut from private lands, and 25 percent came from live trees (McCurdy and Burde 1984; Blyth et al.

1985). Two cords of wood or less were used annually by 63 percent of the households that burned firewood; about one-half of these households had been using firewood for less than 5 years. Of the households that used firewood, 64 percent used it to supplement their heating requirements. However, only about 25 percent of those requirements were met by burning wood. In 1982, the average price for a cord of wood was $89; the total value of the fuelwood used that year was approximately $178 million (McCurdy and Burde 1984). Whether firewood consumption will increase or decrease in the future is unclear.

Total roundwood cut (Fig. 36) follows a statewide pattern similar to that of fuelwood consumption, and use of roundwood products correlates primarily to population density and secondarily to location of the major forest resource. The Northern Region had the highest amount of roundwood cut (3.5 million cubic feet per county in 1983), followed by the Grand Prairie (1.4 mcf), Southern Unglaciated (1.3 mcf), South Central (1.1 mcf), and Western (0.9 mcf) regions.

Finally, such wood residues as sawdust, chips, and bark occupy an important component of the industry. In 1983, sawmills produced 201,000 green tons of coarse residue suitable for chipping, of which 88 percent was used for pulp and fuel. In addition, 120,000 green tons of fine residue (sawdust) were produced, of which 86 percent was used for fuel, mulch, or animal bedding. Ninety percent (85,000 green tons) of bark residue was used primarily for mulch and fuel (Blyth et al. 1987).

During 1961–1983, market demands for wood products changed. The average annual increase in roundwood production for sawlogs was 1.4 percent; for fuelwood it was 15.1 percent. The average annual decrease for pulpwood was 2.2 percent (Blyth et al. 1987).

Economic Aspects of Timber Resources

Forestry is a very important economic industry in Illinois. According to U.S. Department of Commerce figures, forest-related industries in Illinois employ 55,000 people with an average payroll of $965 million. In addition, these firms contribute more than $2 billion annually to the State's economy through value added by manufacture, and they invest more than $144 million on capital improvements annually (U.S. Department of Commerce 1982–1985). Of the total employees in Illinois forest-related industries, 22,000 are directly involved in wood processing at 255 primary wood-using firms. The remaining 33,000 are employed by 1,750 secondary wood-using firms with a payroll of $490 million (U.S. Department of Commerce 1982–1985).

According to 1984 Dun & Bradstreet data on forest-related industries, 167,000 employees work for 957 firms that are primarily involved in the manufacture of wood-related products (Table 17). If the paper industry is included, an additional 576 firms and 367,449 employees are involved in forest-product manufacturing. The large discrepancy between this number of employees and the number quoted earlier from the U.S. Department of Commerce can be explained by the fact that Dun & Bradstreet numbers include all employees of the companies involved, including those not directly involved in the wood-manufacturing industry. Nevertheless, the Dun & Bradstreet data provide useful information regarding the size and distribution of the wood industry.

The 89 sawmills and planing mills employ 9,600 people (Table 17), and these facilities are fairly evenly distributed across those portions of Illinois where most of the forest resources occur (Fig. 37). The only county with more than four mills is Cook, which differs from other counties for most of the Dun & Bradstreet data because of its high concentration of industry. Most Illinois mills are fairly small, with 20 to 50 employees, although some have 200 or more employees.

A total of 54,300 employees in 376 firms manufacture millwork, plywood, and structural members (Table 17). By far, the largest number of firms is located in the populous northeastern part of Illinois, especially in Cook, Lake, Kane, and Will counties (Fig. 38). Elsewhere, only Champaign, Lee, and Moultrie counties employ more than 2,000 people in this industry.

The wood-container industry, which includes the manufacture of boxes, pallets, skids, and shooks, accounts for 101 firms that employ 10,700 people (Table 17). About 40 percent of these firms are located in Cook County; smaller operations are scattered throughout Illinois (Fig. 39).

Firms in Illinois that construct mobile and prefabricated homes, the only wood-manufacturing industry in the State not concentrated in northeastern Illinois, employ about 4,350 people (Fig. 40). Somewhat surprisingly, Coles County has the highest number of firms (4) and employees (1,050), followed by Rock Island County with a single firm (Bullock Curt Builders) employing 1,000 people.

The manufacture of particleboard, preservative-treated wood products, and other noncategorized wood products (miscellaneous wood products) employs nearly 49,000 people in 199 firms throughout Illinois (Table 17). Once again, this industry is concentrated in the populous centers rather than in the resource centers. Most of the employees are in the six-county metropolitan area around Chicago, and one-half of the firms and 77 percent of the employees are in Cook County alone (Fig. 41).

The household and office furniture industry employs approximately 39,300 employees in 161 firms (Table 17), and 84.5 percent of the employees work in Cook County (Fig. 42). Very few firms are found downstate because it is more profitable for a firm to be located where the market is rather than where the resource is.

Finally, firms that manufacture paper bags, paperboard, stationery, sanitary paper products, envelopes, corrugated boxes, and food containers employ 367,400 people in 576 firms statewide (Table 17). Once again, most production is centered in the northeastern counties of Illinois (86 percent of the firms are found in the six northeastern counties). Champaign, Jackson, and Madison are the only downstate counties with more than 7,000 employees in this industry (Fig. 43).

A total of 2,800 wholesale firms in Illinois (employing 266,000 people) sell paper products and lumber (Table 17). Paper sales are concentrated in northeastern Illinois (Fig. 44). Wholesale lumber sales, however, are found in every county and in most zipcode areas (Fig. 45). Lumber products for construction, therefore, are close at hand for almost everyone in the State.

Recreation

Among the amenities offered by Illinois woodlands, recreation is by far the most popular. In 1987, an estimated 240 million activity days (days or portions of days spent by persons pursuing recreation) were spent on or near forestlands; approximately $6.3 billion were spent pursuing outdoor recreational activities (Illinois Department of Conservation 1989). Activities most closely aligned with forest recreation (picnicing, observing nature, cross-country skiing, backpacking, hiking, camping, canoeing, horseback riding, snowmobiling, riding off-road vehicles, trapping, and hunting) accounted for 206 million activity days in 1987, or 18.7 days per Illinois resident (Table 18). The numbers increase when such activities as fishing, boating, swimming, and pleasure driving, activities that often occur on or adjacent to forestland, are included. Almost every Illinois citizen realizes recreational benefit from our forests.

An evaluation of recreation by destination shows that 35 percent of all outdoor recreation visits occur in local, county, state, or federal parks (Table 19). Three-quarters of the residents of the State found outdoor recreation on the property of friends—31 percent of all recreational visits. The data in this table also show the importance of proximity; state and federal parks were not as frequently visited because they are fewer in number and more widely scattered.

The majority (93 percent) of the 4,528 areas developed for recreation in Illinois (almost 900,000 acres) are publicly owned and operated (Table 20). The 964,331 total acres available for recreation translate to roughly 2.7 percent of the State's land and water area, a per-capita outdoor recreation acreage of less than 0.1 acre. The percent of commercial forestland in public ownership ranges from 0 percent in Lake County in the northeast to 56.8 percent in Pope County in the south (Fig. 46). On a county basis, the per-capita acreage of publicly owned commercial forest ranges from 0 acres in northeast and east-central Illinois to 18.4 acres in Pope County (Fig. 47). The Northern and Grand Prairie regions average only 0.02 acres for each citizen compared to 4.24 acres per citizen in the Southern Unglaciated Region (i.e., Shawnee area residents) (Fig. 47). Of course, much of the forestland in public ownership, especially in counties like Lake, is not available for commercial use but is available for recreation.

Urban forests and parks are an important part of forest-based recreation in Illinois. Because of the State's demography, first thoughts about recreation frequently focus on rural areas. Neighborhood parks, county forest districts, and local recreation areas, however, represent relatively large amounts of forest used for recreational purposes. Cook County alone has over 67,000 acres within its forest preserve district, much of which is forested and available for recreation. Statewide, over 176,000 acres within 3,647 recreation facilities are owned by county, local, and quasi-public agencies (Table 20). Large numbers of trails, campsites, picnic tables, and the like also attest to the value of Illinois forestlands for recreational purposes (Table 20).

Forest recreation is big business in Illinois. In addition to the recreation dollars spent by Illinois citizens, the recreation industry in the State employs an estimated 150,000 workers. In 1985, almost $580 million was spent by federal, state, and local agencies to provide recreation opportunities and almost $1.8 billion of tax revenues were directly attributable to recreation activities. In 1984, a four-year Park and Conservation Fund Program ($80 million) and an associated Park Road Program ($21 million) were established to improve State recreational sites and facilities (Illinois Department of Conservation 1989).

Wildlife

Illinois woodlands provide habitat for numerous wildlife species, and the consequences of decreases in quality and quantity of habitat are severe (Illinois Wildlife Habitat Commission 1985). For some species, dependence on Illinois forest habitat is quite obvious. For example, Nixon et al. (1978) estimated that 1,000 gray squirrels could be expected in 1 square mile of forest but that an area needs to contain at least 20 percent forest canopy coverage to support such densities. Eastern wild turkey is being successfully restocked in the State, and the population is estimated at 10,000 to 12,000 birds. Ideal habitat parameters for the wild turkey include a mix of hardwood—mature trees that produce acorns, hickory and beech nuts, black cherries, and ash seeds—with adjacent secluded meadows and farm fields. Approximately 600,000 quail were harvested in 1985, and the ideal habitat for this species includes a relatively equal interspersion of cropland, idle land, brush and shrub land, and woodland. There were 31,600 white-tailed deer harvested in 1985, and the largest populations occurred in counties with high forest cover and along forested river valleys.

Game species are important and visible, but many more nongame species require woodland and forest habitat. Birds, such as thrushes, warblers, woodpeckers, nuthatches, kinglets, and whippoorwills, are characteristic of Illinois woodlands. In addition, many insects inhabit forests, and many of these are beneficial and provide food for birds as well as large and small mammals. Some relationships between wildlife and forests are more subtle. The dependence of wood ducks on bottomland timber is readily apparent; however, bottomland forests also provide food and habitat for fish populations, mitigate the effects of floods, restrain the movement of chemicals into lakes and streams, and by shading streams help to lower water temperatures during the stressful summer months.

Graber and Graber (1976) evaluated the forests of Illinois in terms of their capacity to support bird populations. They noted that the age of a forest, its size, tree

species composition, and foliage density were important characteristics in determining its quality as a habitat for birds. Based on these characteristics, their evaluations demonstrated a significant decrease in wildlife habitat for birds in Illinois over the past several decades. Figure 48 depicts a "species-area" curve for bird species based on numerous samples throughout the State. Note that lowland forests typically support a greater number of bird species than do upland forests but that in both types of forest the number of bird species can be expected to increase tenfold as forests increase from less than 10 to approximately 100 acres in size.

The relationship between forest size and wildlife habitat, however, is complex. As Whitcomb et al. (1981) have shown, some bird species inhabit the edges of forest fragments; others inhabit the interior of forests, and some are relatively insensitive to the size of the forest. Small forest fragments, however, select against species that inhabit the interior of forests, and the effect of forest size on number of species is not, therefore, as simple as depicted in Figure 48. Fragmentation of Illinois forests in relation to habitat for forest interior species will be discussed in a later section. Research over past decades has demonstrated that some wildlife species flourish in close proximity to human activity but that others are very sensitive to human activity and their populations dramatically decrease with human disturbance.

Since there are many wildlife species and each has specific habitat requirements, generalized indicators of the quality of forest wildlife habitat are difficult to describe. The Illinois Department of Conservation has developed a forest inventory system that includes some measures of wildlife habitat, for example, density of snag trees and lianas (climbing vines), cover of understory, and certain wildlife food species. This system, called the Illinois Forest Inventory and Data Analysis Program (IFIDAP), provides detailed information on projected timber yield as well.

A number of numerical rating techniques have also been developed to evaluate environmental quality and, in particular, the quality of wildlife habitat, for example, the habitat evaluation index of the U.S. Forest Service (Thomas 1979). In general, these techniques are based on a quantitative measure of the amount of habitat and a subjective measure of the quality of habitat. Ideally, these analyses should encompass all aspects of a given habitat, including breeding, feeding, nesting, and rearing requirements, and such items as availability of water and adequate escape cover. Because of the complexity of the biological system, these requirements are usually summarized in a synthetic index that has been fieldtested and demonstrated to provide an acceptable general indicator of habitat quality for most wildlife species.

For the purpose of evaluating the forests of Illinois, the technique of Graber and Graber (1976) is uniquely appropriate. It was developed specifically for habitats in Illinois and is based on their long and insightful field experience throughout the State. Details of the method are described by the authors, but in essence the approach involves two distinct indices. The first is based on habitat and is presented here as the habitat evaluation index; the second is based on faunal complexity, commonly measured by bird diversity, and is not presented here for lack of data. Calculation of the habitat evaluation index involves (a) the relative amounts of habitat types within the study area, (b) the availability of a particular habitat type within the State or region, (c) the changing availability of the habitat, i.e., increasing or decreasing over time; and (d) the "cost" of a given habitat, which is measured in time required to replace the ecosystem.

Habitat factors were calculated for the State and for the three U.S. Forest Service units within the State (Fig. 1); these data are presented in Tables 21 to 24. Habitat types were broken down into five forest types, each differentiated by age class, and eight other land-use types. Acreage estimates for forests were compiled from the U.S. Forest Service reports of 1962 (Essex and Gansner 1965) and 1985 (Hahn 1987); nonforest uses were compiled from the Illinois Agricultural Statistics Service (1962–1986), the U.S. Department of Commerce Census of Agriculture (1983), and Graber and Graber (1976). Habitat availability was calculated as a function of the scarcity of a given habitat within the State or region (habitat acreage divided by total acreage of the State or region; the quotient divided by 10 to reduce numbers for convenient calculation). The habitat availability value, therefore, decreases as the acreage of the given habitat decreases. Changing availability reflects relative change of a given habitat over the past decade and was interpolated from 1962 forest (or 1975 nonforest) uses. This factor is important because it suggests the potential availability of a given habitat in the future. For example, a value of 50 for elm–ash–cottonwood less than 30 years of age indicates that this forest type decreased by 50 percent during the decade preceding 1985 and thus warrants special consideration in an environmental evaluation (Table 21). That value, therefore, is added to the value for habitat availability to obtain the final availability value of 74. On the other hand, maple–beech stands increased over the past decade, and the values for changing availability are therefore subtracted from the values for habitat availability to obtain final availability values. The replacement factor is an estimate of the time in years required to recreate a given habitat; it is multiplied by the final availability factor and the percent of total area to obtain the habitat factor. A summation of habitat factors yields the habitat factor for the State or region under consideration (Tables 21 to 24).

Illinois habitats with the highest habitat factors and presumably the greatest collective value for wildlife are oak–hickory (30 to 60 years), elm–ash–cottonwood (30 to 60 years), marsh, oak–gum–cypress (>100 years), elm–ash–cottonwood (>100 years), and pastureland and hayland (Table 21). These habitat types surfaced as the most important for varying reasons. The younger elm–ash–cottonwood and oak–hickory types, as well as the pastureland and hayland types, are included because of their drastic decline in the past decade and their consequent high changing-availability factors. The older elm–ash–cottonwood, oak–gum–cypress, and marsh types

rank high because of their rarity and very long replacement times. In the Prairie Unit, the oak–hickory (30 to 60 years), elm–ash–cottonwood (30 to 60 years), and marsh types surfaced as the most important (Table 22). The five highest ranking habitat types in the Claypan Unit (Table 23) were the same as those found statewide (Table 21); in the Southern Unit, those five types, along with elm–ash–cottonwood (<30 years) and oak–hickory (<30 years), proved most important (Table 24). As one might expect, pine and maple–beech types never warranted high habitat factors. This characteristic was due primarily to their increasing availability in the State (negative changing availability); they have increased substantially in areal extent since 1962 (Table 4).

In the final calculation of the habitat evaluation index, the habitat factor for a site or region of interest is divided by the regional or statewide habitat factor. For example, Table 25 reports a habitat evaluation index of 1.5 for the southern 16 counties and only 0.66 for the northern 60 counties. This disparity of habitat value within the State is not surprising but underscores the importance of forestland in providing habitat for Illinois wildlife. The above methodology can be implemented for any site in which acreage estimates can be made along similar habitat definitions. If different habitat definitions are used, statewide and regional habitat and changing availability factors would need to be recalculated.

Two additional examples, the Kennekuk Cove County Park managed by the Vermilion County Conservation District and a linear corridor of private land along U.S. Highway 50 in Clay and Madison counties, were used in the calculation of habitat evaluation indices and in comparisons to State and regional values (Table 26). Kennekuk Park is managed for multiple benefits, and its habitat evaluation index was calculated to be 2.0 at the State level and 3.0 at the regional level. These values indicate that the park has two or three times the value for wildlife as the State as a whole or as the average of the Grand Prairie Region. The linear corridor was evaluated by Illinois Natural History Survey biologists for the Illinois Department of Transportation (M.K. Solecki, personal communication, 1988), and its calculated value for wildlife fell below that of the State or region (indicated by an index below 1.0). Once again, results emphasize the importance of diverse forest habitats in providing wildlife habitat. The same evaluation technique can be applied to any parcel of land with varying land uses. By applying the calculations shown here and in Graber and Graber (1976), comparisons can be made among sites and with the State and regional habitat evaluation indices given in Table 25.

Botanical Resources

Illinois forests provide habitat for an exceptional diversity of plant species and are the natural home for most trees and other woody species. Appendix III lists the 508 taxa of trees, shrubs, and lianas found in Illinois (ILPIN data; Iverson and Ketzner 1988). These taxa represent 15.9 percent of the State's reported flora; 346 (69 percent) of them are associated with forest habitats. Most of the remaining taxa are cultural (escaped from cultivation and not in a forest ecosystem), but some are primarily found in other nonforested habitats. Although woody species are predominantly found in upland and floodplain forest habitats, they are also found in other forested communities (sand forests, flatwoods, thickets), in savannas and wetlands (borders of lakes or streams), in primary habitats (bluffs, glades), in cultural settings (abandoned fields, successional fields, plantations planted on developed land), and even on prairie. A total of 39 percent of the woody taxa utilize upland forests and 26 percent utilize floodplain forests as habitat. Beyond that, their habitats include sand forests (7 percent), flatwoods (3 percent), thickets (28 percent), savannas (12 percent, probably underestimated), wetlands (37 percent), primary habitats (20 percent), cultural settings (53 percent), and prairie (8 percent).

Of the 508 woody taxa in Illinois, 370 (73 percent) are native and 138 (27 percent) are introduced. Many of the introduced taxa have escaped from cultivation. In fact, 69 percent of the introduced taxa are rare or uncommon in Illinois. Because these species are not currently widespread, however, does not indicate that they will never become widespread invaders. On the other hand, 5 percent of the introduced woody taxa are presently common in Illinois and can be considered potential problems for natural communities. Overall,15 percent of the woody taxa are common in Illinois, 33 percent are occasional (common in localized patches), 12 percent are uncommon (localized distribution or sparse), and 40 percent are rare (Appendix III).

Distribution of the woody taxa among the 102 counties in Illinois is also given in Appendix III. The importance of the uncommon taxa is again apparent; 193 taxa (38 percent, including 15 taxa of unknown distribution) have been reported from five or fewer counties and 64.4 percent from 20 or fewer counties. On the other end of the spectrum, 4.5 percent of the woody taxa has been found in 101 or 102 counties and 11.6 percent in more than 80 counties.

The 508 woody taxa include 261 trees, 284 shrubs, and 47 lianas; the total exceeds 508 because some taxa are included in more than one of the woody types. Distribution of the tree taxa by county is shown in Figure 5. As reported earlier, the county distribution pattern shows the greatest variety of trees in the Southern Unglaciated Region (an average of 109 taxa per county), followed by much lower numbers in the Northern (74), South Central (72), Western (67), and Grand Prairie (60) regions. Jackson County has the largest number of tree taxa (145) followed by Pope (129), and Union (128) (Fig. 5). The distribution of shrubs (Fig. 6) indicates that the counties of northern Illinois have the greatest variety, with Cook and Lake counties having the most taxa. The distribution shown in Figures 5 and 6 can, however, be explained in part by the distribution of botanists within the State. Counties in close proximity to institutions with strong botany programs are more intensively surveyed and therefore have higher numbers of reported taxa.

In addition to accounting for the majority of woody taxa, forests include a great number of nonwoody taxa. Including the woody taxa, 1,581 taxa (49.4 percent) of the Illinois flora are associated with forest habitats.The fact that Illinois forests, which occupy only 12 percent of the State's area, provide habitat for nearly one-half of the State's taxa underscores the importance of maintaining forest communities in which to store this valuable biological diversity.

Of the 1,581 forest-associated plant taxa, 1,414 (89 percent) are native to Illinois. The county distribution of native, forest-associated taxa is given in Figure 49. Warren County reports the fewest forest-related taxa (262) and Jackson County the most (954). Again, much of the distribution pattern can be explained by the thoroughness of botanical surveys within individual counties. Forests, especially those in the Southern Unglaciated Region which averages 722 taxa per county, but also those in other regions (Fig.49), are extremely important for their capacity to hold biotic diversity.

Going one step further, the importance of forests in maintaining biotic diversity is critical because 169 (46 percent) of the 366 threatened or endangered taxa in Illinois rely on forest habitat. The county distribution of forest-associated threatened or endangered taxa is given in Figure 50. Fifty-three of Cook County's 132 threatened and endangered taxa are associated with forests, as are many in the Southern Unglaciated Region (average of 24 taxa threatened or endangered) and Northern Region (20 taxa) (Fig. 50). The importance of maintaining high-quality forests as refuges for these taxa cannot be overemphasized, especially in the face of extreme pressures from population growth.

Scenic Values and Visual Quality

In questionnaires (Absher and Anderson 1984; Young et al. 1984) that ranked objectives for owning forestland, such responses as the preservation of natural beauty, the provision of shelter for wildlife, or heritage for future generations were consistently rated important by 80 to 95 percent of the respondents. The high percentage of respondents who maintained very small, unmanaged woodlots is explained in part by the desire to retain the forests in a natural state and in part because many timber-harvesting activities introduce harsh visual elements into the landscape. Thus, many timber stands have remained unmanaged for want of visually acceptable methods of harvesting.

Trees are an important element in the residential landscapes of Illinois communities. They provide color and shade, screen out unpleasant sights and sounds, provide habitat for wildlife, and greatly enhance the aesthetic quality of urban and suburban neighborhoods. Individual homeowners benefit from trees on their property, as is reflected by the increased values for lots with trees. The International Society of Arboriculture has published a guide to the valuation of urban trees (International Society of Arboriculture 1988), and values up to several thousand dollars per tree are not unusual.

The basic objective of forest management is to create a kind of vegetational development that will achieve specific objectives. Aesthetic values, however, can often be realized during the normal planning process, for example, the discriminate cutting of individual trees or selective cutting to improve timber stands.

Watershed Protection

Approximately 3,429,000 acres of privately owned rural forest are present in Illinois (U.S. Department of Agriculture, Soil Conservation Service, 1987). Of these, about 679,000 acres (19.8 percent) are grazed and therefore subject to excessive erosion. Proper forest management, however, can greatly reduce erosion. Though about 12.7 million tons of soil erode each year from forested acres, 66 percent of that tonnage comes from the relatively few grazed forestland acres. Elimination of heavy grazing usually permits the development of understory vegetation and a layer of litter on the soil surface that control excessive erosion. When controlled properly in certain landscapes, light grazing may even provide a beneficial management tool with respect to understory vegetation and multiple uses of the forest. The portion of grazed forestland in Illinois under heavy versus light grazing is not known, and data collection is needed in this area.

Erosion of cropland proceeds at about four times the annual rate of erosion on forestland, 7.0 tons per acre compared to 1.6. Calculations based on erosion rates determined by soil capability class and subclass demonstrate that nearly 65 million more tons of soil would erode if all of the State's forestlands were converted to cropland, an increase of 32.4 percent over the present total of 200.7 million tons lost annually (Table 27). Although total conversion would never occur, this projection shows the value of forestland in protecting the soil resource. Conversely, conversion of cropland to forestland would decrease soil loss substantially, depending on the capability class of the cropland (Table 27). If all croplands were converted to ungrazed forestland, only 42.9 million tons of soil would be lost annually from Illinois, a reduction of 157.8 million tons (Table 27). Obviously, a conversion of this magnitude will not occur, but Table 27 does indicate which capability subclasses should be targeted for conversion to forestland in order to achieve maximum soil savings. For example, conversion of the 1.75 million acres of cropland in capability classes IV through VIII would save 36.5 million tons annually (Table 27). More realistic conversion scenarios will be explored later in the discussion of the future of Illinois forests. Even at present, forestland contributes significantly to the retention of soil and the reduction of sediments that fill and pollute Illinois lakes and streams. In addition, forestland benefits stream and lake habitats by contributing organic matter, reducing water temperature, providing logs and habitat structure for aquatic organisms, and retaining nutrients in surface and ground water.

Windbreaks and Wooded Strips

A windbreak can be defined as a hedge, fence, or row of trees that serves as a protection from wind. Not only do windbreaks protect from wind but they also reduce such

adverse affects of wind as soil erosion, blowing snow, and increased energy consumption. Additionally, windbreaks have aesthetic value and increase habitat for wildlife.

Windbreaks can be divided into two types—farmstead or residential windbreaks and field windbreaks. Those of the first type are used primarily around homes and farm buildings to reduce the effects of winter winds. Field windbreaks are used in open fields to reduce soil erosion, stop blowing snow, and protect livestock.

In 1981, the U.S. Department of Agriculture Soil Conservation Service conducted an inventory of windbreak needs for heated rural buildings in Illinois (subdivisions and urban buildings were not included). The results indicated that approximately 124,000 rural heated buildings could benefit from windbreaks. If these windbreaks were established, the annual heat energy savings would be over 21 trillion British thermal units. This calculation was based on an assumed 15 percent savings for an average home of 1,500 square feet. Had these buildings been heated with electricity, savings would have been 940.8 million kilowatt-hours. Dollar savings, based on unit cost estimates from the Illinois Power Company in Champaign on July 30, 1981, would amount to $32,928,000 per year.

The 1985 U.S. Forest Service forest inventory (Hahn 1987) indicated that 133,100 acres of nonforestland with trees were windbreaks primarily used to protect buildings currently in use (Table 3). Additionally, the inventory identified 178,500 acres of wooded strips; these were defined as an acre or more of natural continuous forestland less than 120 feet wide. Estimates of linear features by point-sampling methods, however, are prone to error. For example, in 1982 the Natural Resource Inventory estimate for windbreaks was only 11,170 acres (U.S. Department of Agriculture, Soil Conservation Service, 1987) compared to the U.S. Forest Service estimate of 133,000 acres. Definitional variation and sampling error are probable explanations for this difference.

The majority of these wooded strips, commonly referred to as fencerows or hedgerows, could serve as field windbreaks. The ideal field windbreak is a narrow belt of trees 40 to 50 percent dense that permits evenly distributed air movement through it. This density stops drifting snow and distributes it more evenly across a field. In spring and summer these windbreaks help to block hot drying winds, thus reducing the evapotranspiration rates of adjacent farm crops. This reduction allows increases in crop yield by reducing plant damage and stress.

In general, these wooded strips and other nonforestland with trees offer little opportunity for management and harvesting. Their greatest value probably lies in their static utility for erosion control, shading of livestock, and other agriculture-related purposes. In addition, these areas produce fuelwood and provide shelter for small game. The intrinsic aesthetic character of trees also enables these lands to provide recreational opportunities and values to the landowner and others.

Urban Forests

The 1985 U.S. Forest Service forest inventory (Hahn 1987) reports 102,800 acres of urban forest and 139,500 acres of urban areas with trees (Table 3). This forest resource is owned by counties, municipalities, park districts, and the private sector. The management objectives of these groups are diverse and their ability to manage the resource is equally variable. An accurate assessment of the amount and function of the urban forest is difficult because it exists in a heterogeneous environment. Further data are needed on the urban forest resource and its multiple uses. We know, however, that urban forests provide many benefits beyond those normally associated with rural forests, including climate modification and energy conservation; the abatement of air, water, and noise pollution; the reduction of unpleasing urban views; and physical and psychological benefits to urban residents.

Most Illinoisans (83 percent) live in urban centers (State of Illinois 1980), and for many of these city dwellers urban forests are their only exposure to the natural environment. Illinois ranks 46th in total public open space per capita, and the Chicago metropolitan area ranks last among the ten largest national urban centers in this regard. Inventoried publicly owned forestland per capita is 0.01 acre or less for all counties in the six-county Chicago area (Fig. 47). Without this resource, life in urban areas lacks the natural quality people inherently expect. Payne (1978) documented this desire for trees by comparing the purchase price of homesites with and without trees. Those with trees typically sell for 5 to 30 percent more than those without trees.

Urban forests form the basis of an estimated $300 million industry in Illinois (Stewart and Reichenbach, personal communication). Municipal tree care accounts for roughly $25 million, line clearance for $30 million, private tree care for $100 million, and forest preserves and park districts for $145 million. More than 3,000 persons are employed in this industry, most of them with the over 500 tree-care businesses located in Illinois.

Based on a survey by the Illinois Council on Forestry Development (1988a), an estimated 6.5 million municipal street trees in Illinois have an estimated value of $3 billion. According to a study of 12 large cities in the United States by the American Forestry Association (1988), less than one-half of the potential number of street trees presently exist, and removals outstrip plantings by a ratio of 4:1. It may or may not be appropriate to extrapolate these figures across Illinois. In the 42 percent of Illinois municipalities that responded to the survey (City of Chicago not included), the number of plantings exceeded removals by nearly 2:1. This figure suggests a relatively positive view of Illinois urban forestry, at least for the 476 responding communities. The survey also showed, however, that the existing inventory is not adequately maintained by knowledgeable foresters. Very few municipalities had street tree inventories, less than 7 percent had trained foresters on their staffs, and 57 percent of the responding communities stated that additional funding was needed for forestry maintenance. Many smaller communities returned the survey, noting that it was not applicable to their communities. This action reveals the mistaken perception that trees in municipal settings do not constitute a forest resource.

An education effort is needed, especially in smaller communities, to encourage the practice of urban forestry management.

The Council survey was also mailed to more than 300 park and forest preserve districts (Illinois Council on Forestry Development 1988a). A total of 173,951 acres of urban land were managed in the 160 responding districts. Few districts had tree inventories (12 percent), very few had trained foresters (4 to 8 percent), and most reported inadequate funding for forestry maintenance programs (60 percent). These data indicate a large potential benefit to be gained from increased attention to forestry programs. The respondents reported a high ratio (6:1) of plantings to removals, although the ratio may be biased because not all dead or dying trees are routinely removed from park and forest preserve districts.

The enormous impact of the utility industry on forestry-related resources is often overlooked. The Council survey was sent to the 29 electric utilities in Illinois to determine their forest-related activities, and 17 (59 percent) responded. The respondents spent $27 million in 1987 on forestry-related items and maintained over 95,000 miles of utility rights-of-way. In 1987 line-clearance tasks included 612,000 trees pruned and 118,000 removed. Educational efforts designed to encourage the planting of slow- and low-growing vegetation beneath lines could substantially reduce expenses in this area while maintaining the value of the trees located in the utility rights-of-way.

Three areas of concern relate to the urban forest resource. The first, as discussed earlier, is inadequate maintenance and management of the resource. The second is the loss of both rural and urban forestland to land development and population pressure. Data are not available on the rate and extent of land-use change in urban regions, although a study to uncover this type of information is underway at the Illinois Natural History Survey. Adequate data are not even available on the amount of forestland within major metropolitan areas. Preliminary data from the above-mentioned study indicate that approximately 17.3 percent of the land area encompassing the six-county Chicago region was forested in 1988 (Elizabeth Cook, personal communication). Much of the urban forest resource exists as residential areas with mature trees; about 39 percent of the forested area in the Chicago region fell into this category. Information from the Northeastern Illinois Planning Commission (1987) shows that 867 quarter sections in that six-county area were urbanized (i.e., population exceeding 1,000 per square mile) between 1970 and 1980. Undoubtedly a sizeable acreage was converted from forestland in the process, and the trend has continued. The third major issue related to urban forests is the development of a usage policy for wood waste. Currently, much of the debris from tree removals and large amounts of other wood waste are transported to landfills, an enormous waste of resources and an unnecessary use of valuable landfill space. Instead, wood waste should be used for fuel or other wood products.

Table 15. Origin of sawlogs processed in Illinois (in thousands of board feet)[1] by species, 1983.

Species	All states	Illinois	Wisconsin	Missouri	Indiana	Iowa	Kentucky
Softwoods							
Cypress	212	192	0	10	0	0	10
Other pine	117	117	0	0	0	0	0
Red cedar	21	21	0	0	0	0	0
Other softwoods	14	14	0	0	0	0	0
Total	364	344	0	10	0	0	10
Hardwoods							
Ash	6,083	5,776	113	69	22	55	48
Pin oak	27,825	27,602	0	14	195	0	14
Basswood	586	558	28	0	0	0	0
Beech	688	642	0	23	0	0	23
Blackgum	340	314	0	10	0	0	16
Black cherry	943	782	48	8	7	97	1
Cottonwood	13,794	12,598	127	119	817	69	64
Elm	3,321	1,663	1,557	38	39	14	10
Pecan hickory	130	113	0	0	3	0	14
Other hickory	6,212	6,110	0	49	25	0	28
Hard maple	2,920	2,840	0	32	23	0	25
Soft maple	7,744	7,568	7	11	81	0	77
Red oak	42,194	39,771	447	1,207	282	276	211
White oak	22,798	21,329	605	411	170	235	48
Sweetgum	2,714	2,610	0	48	8	0	48
Sycamore	2,502	2,383	0	60	55	0	4
Black walnut	3,040	2,530	22	311	11	166	0
Yellow poplar	1,929	1,833	0	48	0	0	48
Other species	367	314	18	0	7	28	0
Total	146,130	137,336	2,972	2,458	1,745	940	679
Total	146,494	137,680	2,972	2,468	1,745	940	689
Percent	100.0	94.0	2.0	1.7	1.2	0.6	0.5

[1]International 1/4-inch rule.
Source: Blyth et al. 1987

Table 16. Destination of sawlogs grown in Illinois (in thousands of board feet)[1] by species, 1983.

Species	Illinois	Missouri	Indiana	Iowa	Other states	Total
Softwoods						
Cypress	192	0	0	0	0	192
Shortleaf pine	0	0	0	0	0	0
Other pine	117	0	0	0	0	117
Red cedar	21	0	0	0	0	21
Other softwoods	14	0	0	0	0	14
Total	344	0	0	0	0	344
Hardwoods						
Ash	5,776	742	688	42	32	7,280
Pin oak	27,602	0	0	0	0	27,602
Basswood	558	21	37	29	0	645
Beech	642	10	20	0	2	674
Blackgum	314	50	49	0	2	415
Black cherry	782	0	85	1	0	868
Cottonwood	12,598	751	331	29	17	13,726
Elm	1,663	739	167	3	12	2,584
Pecan hickory	113	704	477	0	32	1,326
Other hickory	6,110	461	232	20	21	6,844
Hard maple	2,840	162	244	8	7	3,261
Soft maple	7,568	700	859	525	26	9,678
Red oak	39,771	3,681	2,167	177	105	45,901
White oak	21,329	3,580	1,600	312	95	26,916
Sweetgum	2,610	205	117	0	14	2,946
Sycamore	2,383	305	297	0	13	2,998
Black walnut	2,530	171	233	15	5	2,954
Yellow poplar	1,833	121	687	0	8	2,649
Other species	314	572	0	22	24	932
Total	137,336	12,975	8,290	1,183	415	160,199
Total	137,680	12,975	8,290	1,183	415	160,543
Percent	85.8	8.1	5.2	0.7	0.2	100.0

[1]International 1/4-inch rule.

Source: Blyth et al. 1987

Table 17. Number of sites and employees at those sites for selected forest-related industries in Illinois.

Industry[1]	Number of sites	Number of employees
Manufacturing		
Sawmills and planing mills	89	9,574
Millwork, plywood, and structure members	376	54,266
Wood containers and pallets	101	10,705
Wood buildings and mobile homes	31	4,352
Miscellaneous wood products	199	48,673
Wood household and office furniture	161	39,323
Subtotal	957	166,893
Paper and allied products	576	367,449
Total manufacturing	1,533	534,342
Wholesale		
Paper and paper products	1,067	116,251
Lumber and building materials	1,740	149,807
Total wholesale	2,807	266,058

[1]Includes only those industries listing the forest-related category as their primary effort (the first Standard Industrial Code); however, not all employees of these firms are directly involved in forest-related processing.

Source: Dun & Bradstreet data base 1984

Table 18. Days spent in Illinois recreation areas, 1987.[1]

Activity	Days in thousands
Picnicing	28,307
Observing or photographing nature; bird watching	87,449
Cross-country skiing	1,364
Backpacking	686
Hiking	7,213
Tent camping	6,652
Vehicle camping	6,309
Hunting	10,166
Canoeing	2,979
Horseback riding	13,388
Snowmobiling	2,042
Driving off-road vehicles	29,437
Trapping	10,167
Total	206,159
Average days per capita	18.7

[1]This information is considered forest-related because recreation areas tend to be found in forested areas.

Source: Illinois Department of Conservation 1989

Table 19. Outdoor recreation in Illinois by destination, 1987.

Destination	Percent of population visiting	Average number of visits	Percent of total visits
Friend's yard or property	76.1	10.9	31.1
Vacant lot or street	16.4	2.2	6.2
Private club	21.8	5.0	14.3
Commercial recreation area	37.1	4.7	13.4
City or county park, forest preserve, or school yard	61.0	9.5	27.2
Federal recreation area or forest	18.6	1.1	3.2
State park or other state-operated recreation area	31.5	1.6	4.6
Total			100.0

Source: Illinois Department of Conservation 1989

Table 20. Outdoor recreation facilities in Illinois.

Facility	Federal	State	County	Local	Quasi-public	Private	Total
Number of sites	100	313	756	2,730	161	468	4,528
Acres	370,696	353,928	84,534	68,152	23,423	63,598	964,331
Hunting							
Public hunting allowed (acres)	319,197	43,821	0	0	0	33,805	396,823
Waterfowl blinds	45	1,070	0	0	0	322	1,437
Campsites, cabins, and lodges							
Developed campsites	1,343	2,290	2,988	1,108	1,142	30,793	39,664
Modern campsites	883	2,073	581	52	954	10,254	14,797
Primitive campsites	956	3,147	633	147	1,675	3,849	10,407
Backcountry campsites	0	678	95	0	305	148	1,226
Equestrian campsites	1	166	41	41	0	103	352
Cabins	315	68	23	10	1,937	2,094	4,447
Lodges	0	7	0	2	353	946	1,308
Trails and paths (miles)							
Multi-use trails	256	110	323	641	1,959	1,637	4,926
Hiking trails	42	727	532	531	2,164	601	4,617
Bicycle trails	3	38	48	86	22	63	260
Horseback trails	8	492	533	89	144	1,143	2,409
Physical fitness trails (stations)	23	32	432	1,668	654	470	3,279
Nature/interpretive trails	9	110	106	169	531	515	1,440
Off-road vehicle trails	0	4	0	58	0	23	85
Picnic, play, and interpretive areas							
Picnic shelters	80	328	1,224	1,777	887	7,341	11,637
Picnic tables	1,596	18,334	27,825	41,180	10,647	104,144	203,726
Playgrounds	49	68	815	4,633	868	962	4,395
Interpretive centers	7	29	9	41	54	0	140
Fishing, boating, and swimming							
Water area open to the public (acres)	17,920	67,261	7,249	43,455	1,588	77,567	215,040
Fishing piers/docks	15	197	57	190	192	666	1,317
Boat-launching ramps	78	84	112	168	51	638	1,131
Marina slips	501	1,252	0	8,645	27	20,516	30,941
Swimming pools	8	1	56	563	225	1,521	2,374
Swimming beaches (feet)	3,980	2,134	3,240	55,967	26,558	172,971	264,850

Source: Illinois Recreational Facilities Inventory data base, University of Illinois at Urbana-Champaign, Department of Urban and Regional Planning, 1987

Table 21. Habitat factor calculations for Illinois as a whole, 1985.

Land use	Age in years	1985 Acres in thousands	1962 Acres in thousands	Habitat availability	Changing availability	Final availability[1]	Replacement factor	Percent of total area	Habitat factor
Pine	<40	61.8	36.1	52.85	–22.07	30.78	20	0.19	1.16
	>40	17.2	11.3	189.91	–17.53	172.38	50	0.05	4.54
Oak–hickory	<30	273.2	543.8	11.96	30.10	42.06	15	0.84	5.28
	>30	412.9	924.7	7.91	35.02	42.93	45	1.26	24.42
	>60	986.1	617.7	3.31	–19.39	0.10	80	3.01	0.24
	>100	352.8	145.5	9.26	–34.31	0.10	120	1.08	0.13
Oak–gum–cypress	<100	126.4	5.6	25.84	–71.09	0.10	50	0.39	0.02
	>100	11.4	11.2	286.53	–0.77	285.76	120	0.03	11.97
Elm–ash–cottonwood	<30	139.8	472.1	23.36	50.82	74.19	15	0.43	4.76
	>30	252.3	708.6	12.95	44.02	56.97	45	0.77	19.80
	>60	278.7	254.5	11.72	–3.92	7.80	80	0.85	5.32
	>100	15.0	6.9	217.76	–30.68	187.08	120	0.05	10.31
Maple–beech	<50	605.0	7.7	5.40	–75.21	0.10	25	1.85	0.05
	>50	441.4	6.6	7.40	–74.91	0.10	70	1.35	0.09
Row crop		20,700.0	19,524.0	0.16	–4.97	0.10	1	63.37	0.06
Small grain		1,950.0	2,003.0	1.68	2.21	3.89	1	5.97	0.23
Urban, residential		2,864.0	1,805.0	1.14	–44.54	0.10	3	8.77	0.03
Marsh		60.0	51.8	54.44	–12.85	41.59	200	0.18	15.28
Pasture and hayland		2,563.0	4,723.0	1.27	41.26	42.53	3	7.85	10.01
Water		513.0	645.9	6.37	17.76	24.12	1	1.57	0.38
Fallow		30.5	1,735.2	107.10	97.90	204.99	1	0.09	0.19
Prairie		9.5	8.5	343.83	–9.62	334.22	15	0.03	1.46
Total		32,664.0[2]	34,248.7					100.00	115.73

[1]When the value for changing availability of an increasing habitat equals or exceeds its availability value, the final availability value is not reduced below 0.10; this practice avoids negative numbers.

[2]Agreement in total acreages for 1962 and 1985 was not possible due to the wide variation of data sources and their respective methodologies.

Source: Essex and Gansner 1965; Hahn 1987; Illinois Agricultural Statistics Service 1962–1986; U.S. Department of Commerce 1983; Graber and Graber 1976

Table 22. Habitat factor calculations for the U.S. Forest Service Prairie Unit, 1985. Locations of units and counties are given in Figure 1.

Land use	Age in years	1985 Acres in thousands	1962 Acres in thousands	Habitat availability	Changing availability	Final availability[1]	Replacement factor	Percent of total area	Habitat factor
Pine	<40	13.2	12.5	164.32	−2.36	161.96	20	0.06	1.97
	>40	3.5	3.9	619.71	4.73	624.45	50	0.02	5.04
Oak–hickory	<30	99.0	188.9	21.91	28.31	50.22	15	0.46	3.44
	>30	158.4	321.3	13.69	30.90	44.59	45	0.73	14.65
	>60	404.8	214.7	5.36	−25.66	0.10	80	1.87	0.15
	>100	178.4	50.6	12.16	−45.24	0.10	120	0.82	0.10
Oak–gum–cypress	<100	0.0	1.9	0.00	0.00	0.00	50	0.00	0.00
	>100	0.0	3.9	0.00	0.00	0.00	120	0.00	0.00
Elm–ash–cottonwood	<30	51.6	164.1	42.03	48.66	90.70	15	0.24	3.24
	>30	105.0	246.2	20.66	36.90	57.55	45	0.48	12.54
	>60	88.7	88.4	24.45	−0.15	24.31	80	0.41	7.95
	>100	0.0	2.4	0.00	0.00	0.00	120	0.00	0.00
Maple–beech	<50	313.2	2.7	6.93	−75.76	0.10	25	1.44	0.04
	>50	255.2	2.3	8.50	−75.70	0.10	70	1.18	0.08
Row crop		15,160.9	—[2]	0.14	−4.97	0.10	1	69.90	0.07
Small grain		888.7	—	2.44	2.21	4.65	1	4.10	0.19
Urban, residential		2,183.3	—	0.99	−44.54	0.10	3	10.07	0.03
Marsh		35.3	—	61.44	−12.85	48.59	200	0.16	15.82
Pasture and hayland		1,425.4	—	1.52	41.26	42.78	3	6.57	8.43
Water		302.1	—	7.18	17.76	24.94	1	1.39	0.35
Fallow		23.2	—	93.49	97.90	191.39	1	0.11	0.20
Prairie		—	—	343.83	−9.62	334.21	15	0.03	1.46
Total		21,689.9						100.00	75.75

[1]When the value for changing availability of an increasing habitat equals or exceeds its availability value, the final availability value is not reduced below 0.10; this practice avoids negative numbers.

[2]No data available on a regional basis; the changing availability factors used are based on the statewide figures shown in Table 21.

Source: Essex and Gansner 1965; Hahn 1987; Illinois Agricultural Statistics Service 1962–1986; U.S. Department of Commerce 1983; Graber and Graber 1976

Table 23. Habitat factor calculations for the U.S. Forest Service Claypan Unit, 1985. Locations of units and counties are shown in Figure 1.

Land use	Age in years	1985 Acres in thousands	1962 Acres in thousands	Habitat availability	Changing availability	Final availability[1]	Replacement factor	Percent of total area	Habitat factor
Pine	<40	2.0	13.1	384.63	–2.36	455.33	20	0.03	2.37
	>40	0.0	4.1	0.00	4.73	0.00	50	0.00	0.00
Oak–hickory	<30	102.9	197.8	7.48	28.31	36.10	15	1.34	7.24
	>30	145.4	336.3	5.29	30.90	41.63	45	1.89	35.41
	>60	346.2	224.7	2.22	–25.66	0.10	80	4.50	0.36
	>100	106.0	52.9	7.26	–45.24	0.10	120	1.38	0.17
Oak–gum–cypress	<100	52.0	2.0	14.79	0.00	0.10	50	0.68	0.03
	>100	3.5	4.1	219.79	0.00	226.72	120	0.05	12.38
Elm–ash–cottonwood	<30	35.2	171.7	21.85	48.66	84.62	15	0.46	5.81
	>30	98.7	257.7	7.79	36.90	48.98	45	1.28	28.28
	>60	113.5	92.6	6.78	–0.15	0.10	80	1.48	0.12
	>100	11.0	2.5	69.93	0.00	19.34	120	0.14	3.32
Maple–beech	<50	132.1	2.8	5.82	–75.76	0.10	25	1.72	0.04
	>50	120.3	2.4	6.39	–75.70	0.10	70	1.56	0.11
Row crop		4,411.0	—[2]	0.17	–4.97	0.10	1	57.34	0.06
Small grain		623.1	—	1.23	2.21	3.44	1	8.10	0.28
Urban, residential		440.1	—	1.75	–44.54	0.10	3	5.72	0.02
Marsh		15.5	—	49.63	–12.85	36.78	200	0.20	14.82
Pasture and hayland		808.8	—	0.95	41.26	42.21	3	10.51	13.31
Water		120.4	—	6.39	17.76	24.15	1	1.57	0.38
Fallow		4.9	—	156.99	97.90	254.89	1	0.06	0.16
Prairie		—	—	343.83	–9.62	334.21	15	0.03	1.46
Total		7,692.6						100.00	126.13

[1]When the value for changing availability of an increasing habitat equals or exceeds its availability value, the final availability value is not reduced below 0.10; this practice avoids negative numbers.
[2]No data available on a regional basis; the changing availability factors used are based on the statewide figures shown in Table 21.
Source: Essex and Gansner 1965; Hahn 1987; Illinois Agricultural Statistics Service 1962–1986; U.S. Department of Commerce 1983; Graber and Graber 1976

Table 24. Habitat factor calculations in Illinois for the U.S. Forest Service Southern Unit, 1985. Locations of units and counties are given in Figure 1.

Land use	Age in years	1985 Acres in thousands	1962 Acres thousands	Habitat availability	Changing availability	Final availability[1]	Replacement factor	Percent of total area	Habitat factor
Pine	<40	46.6	10.4	7.14	–70.70	0.10	20	1.40	0.03
	>40	13.7	3.3	24.28	0.00	0.10	50	0.41	0.02
Oak–hickory	<30	71.3	157.0	4.67	28.62	38.99	15	2.14	12.53
	>30	109.1	267.0	3.05	36.34	41.67	45	3.28	61.49
	>60	235.1	178.3	1.42	–18.01	0.10	80	7.07	0.57
	>100	68.4	42.0	4.86	–27.84	0.10	120	2.06	0.25
Oak–gum–cypress	<100	74.4	1.6	4.47	–71.84	0.10	50	2.24	0.11
	>100	7.9	3.2	42.11	6.94	7.22	120	0.24	2.06
Elm–ash–cottonwood	<30	53.0	136.3	6.28	62.77	46.87	15	1.59	11.20
	>30	48.6	204.6	6.85	41.19	65.10	45	1.46	42.80
	>60	76.5	73.5	4.35	–8.70	2.61	80	2.30	4.81
	>100	4.0	2.0	83.18	–50.60	55.40	120	0.12	7.99
Maple–beech	<50	159.7	2.2	2.08	–74.08	0.10	25	4.80	0.12
	>50	65.9	2.0	5.05	–74.25	0.10	70	1.98	0.14
Row crop		1,200.1	—[2]	0.28	–4.97	0.10	1	36.07	0.04
Small grain		420.6	—	0.79	2.21	3.00	1	12.64	0.38
Urban, residential		240.5	—	1.38	–44.54	0.10	3	7.23	0.02
Marsh		9.3	—	35.77	–12.85	22.92	200	0.28	12.82
Pasture and hayland		329.0	—	1.01	41.26	42.27	3	9.89	12.54
Water		90.9	—	3.66	17.76	21.42	1	2.73	0.59
Fallow		2.4	—	138.63	97.90	236.53	1	0.07	0.17
Prairie		—	—	343.83	–9.62	334.21	15	0.03	1.46
Total		3,327.0						100.00	172.12

[1]When the value for changing availability of an increasing habitat equals or exceeds its availability value, the final availability value is not reduced below 0.10; this practice avoids negative numbers.
[2]No data available on a regional basis; the changing availability factors used are based on the statewide figures shown in Table 21.
Source: Essex and Gansner 1965; Hahn 1987; Illinois Agricultural Statistics Service 1962–1986; U.S. Department of Commerce 1983; Graber and Graber 1976

Table 25. Habitat factors and evaluation indices for Illinois and for the three U.S. Forest Service units (calculated from tables 21 through 24).

Area	Cumulative habitat factor	Habitat evaluation index[1]
State of Illinois	115.7	1.00
Southern Unit (16 counties)	172.1	1.49
Claypan Unit (26 counties)	126.1	1.09
Prairie Unit (60 counties)	75.8	0.66

[1]Relative to State
Source: Essex and Gansner 1965; Hahn 1987; Illinois Agricultural Statistics Service 1962–1986; U.S. Department of Commerce 1983; Graber and Graber 1976

Table 26. Habitat factor summaries for Kennekuk Cove County Park in Vermilion County and a highway corridor in Clay and Madison counties, with their calculated regional and state habitat evaluation index.

Land use	Age in years	Kennekuk Cove County Park in Vermilion County		Highway corridor in Clay and Madison counties	
		Acres	Habitat factor	Acres	Habitat factor
Pine	<40	0.0	0.00	0.0	0.00
	>40	0.0	0.00	0.0	0.00
Oak–hickory	<30	331.0	87.04	0.0	0.00
	>30	94.0	83.76	26.7	67.74
	>60	64.0	0.31	0.0	0.00
	>100	0.0	0.00	0.0	0.00
Oak–gum–cypress	<100	0.0	0.00	0.0	0.00
	>100	0.0	0.00	0.0	0.00
Elm–ash–cottonwood	<30	1.0	1.94	0.0	0.00
	>30	3.0	7.52	0.0	0.00
	>60	6.0	7.96	0.0	0.00
	>100	13.0	12.00	0.0	0.00
Maple–beech	<50	0.0	0.00	50.0	0.18
	>50	0.0	0.00	0.0	0.00
Row crop		93.0	0.01	384.2	0.06
Small grain		0.0	0.00	0.0	0.00
Urban, residential		139.0	0.03	90.2	0.04
Marsh		0.0	0.00	0.0	0.00
Pasture and hayland		353.0	26.80	99.8	18.19
Water		199.0	2.24	2.4	0.16
Fallow		0.0	0.00	36.0	5.20
Prairie		353.0	0.32	1.1	1.27
Total		1,649.0	229.93	690.4	92.85
Regional habitat evaluation index[1]			3.03		0.74
State habitat evaluation index[2]			1.99		0.80

[1]Calculated by dividing the habitat factor by the regional cumulative habitat factor (75.8 for Kennekuk Cove, 126.1 for the highway corridor) given in Table 25.
[2]Calculated by dividing the habitat factor by the State cumulative habitat factor (115.7) given in Table 25.
Source: Burnett 1988 (Kennekuk Cove County Park); M.K. Solecki, personal communication, 1988 (Illinois Department of Transportation highway project in Clay and Marion counties.)

Table 27. Difference in soil loss due to erosion between cropland and forestland in Illinois by soil capability class and subclass, and projected soil losses or gains under forest or cropland conversions.

Soil Capability class and subclass	Difference in soil loss cropland to forestland[1] (tons/acre/year)	Forest		Cropland	
		Forested acres (in thousands)	Potential soil loss if cropped (thousand tons/year)	Cropland acres (in thousands)	Potential soil saved if forested (thousand tons/year)
I	3.3	65.9	217.5	3,971.5	13,106.0
IIe	6.8	290.8	1,977.4	5,974.1	40,623.9
IIw	3.2	521.3	1,668.2	8,158.2	26,106.2
IIs	2.4	30.9	170.4	381.8	916.3
IIIe	14.8	325.7	4,820.4	2,264.7	33,517.6
IIIw	3.2	201.8	645.8	2,079.2	6,653.4
IIIs	2.6	13.0	33.8	149.9	389.7
Subtotal, Classes I–III		1,449.4	9,533.5	22,979.4	121,313.1
IVe	24.2	339.6	8,218.3	878.2	21,252.4
IVw	2.9	27.9	80.9	148.9	431.8
IVs	2.6	48.6	126.4	178.8	464.9
V	3.1	90.3	279.9	64.3	199.3
VIe	31.8	797.5	25,260.5	389.3	12,379.7
VIw	1.6	1.3	2.1	1.2	1.9
VIs	4.4	30.6	134.6	32.8	144.3
VIIe	39.4	521.7	20,555.0	38.6	1,520.8
VIIw	0.0	1.2	0.0	0.0	0.0
VIIs	6.2	113.2	701.8	15.9	98.6
VIII	—[2]	8.1	0.0	0.0	—
Subtotal, Classes IV–VIII		1,980.0	55,359.5	1,748.0	36,493.7
Total		3,429.4	64,893.0	24,727.4	157,807.0

[1]Calculated by comparing average erosion rates between cropland and ungrazed forestland by capability subclass.
[2]Cannot be computed because no cropland is found in class VIII.
Source: U.S. Department of Agriculture, Soil Conservation Service, 1982

Ownership of Forests in Illinois

Approximately 90 percent (3.64 million acres) of the commercial forests in Illinois are privately owned, mostly by farmers and other private individuals (Table 28); the remaining 10 percent (389 thousand acres) are publicly owned. The county distribution of publicly owned forests is shown in Figure 51; Figures 52 to 58 indicate other ownership patterns: federal, state, county and municipal, farmers, private individuals (excluding farmers), private corporations, and forest industry. The federal government owns 7.2 percent of the State's commercial forests (292,100 acres), primarily from the 226,000 acres of the Shawnee National Forest (Table 28). The Southern Unglaciated Region, which includes the Shawnee National Forest, averages 6.5 times as much publicly owned forest as the next highest region (Figs. 51 and 52). Nevertheless, a surprisingly high number of federally owned forests are found outside the Shawnee counties, for a statewide average of 2,840 acres of federal forest per county. Federally owned forests account for 75 percent of publicly owned commercial forests (Table 28). The State also owns more land in the southern counties, with an average of 1,610 acres per county in the Southern Unglaciated Region (Fig. 53). Local governmental bodies, however, own relatively more land in the Western Region, with an average of 850 county and municipal acres per county compared to less than a 400-acre average in counties from other regions (Fig. 54). The Southern Unglaciated Region has the least amount of locally owned public land, probably a function of supply and demand economics. The number of farmer-owned acres is highest in the Western Region, with an average of 30,600 acres per county (Fig. 55); statewide, farmers own 45.3 percent of all commercial forestland in Illinois (Table 28). Private individuals who are not farmers own the second largest fraction of the Illinois forest, 38.1 percent (Table 28). The South Central Region has the highest county average (23,600 acres of forest owned by private individuals) (Fig. 56), but the Western and Southern Unglaciated regions also have high averages. Private corporations own about 263 thousand acres of commercial forestland, primarily in the southern and western parts of the State (Fig. 57). The forest industry (Fig. 58) owns only 13,000 acres, and these are concentrated in the Southern one-half of the State.

When we categorize commercial forestland by forest types and ownership class (Table 29), we find that nearly all of the loblolly–shortleaf pines in Illinois are owned by the federal government, mostly in the Shawnee National Forest. Conversely, although farmers own few pines except for white pine, they own over one-half of the maple–beech forest type.

An analysis of the ownership of private forest in Illinois based on a U.S. Department of Agriculture Cooperative Extension Service data base indicates that 169,073 forest owners each held an average of 21.5 acres (Table 30). Larger land holdings generally occurred in the southern part of the State (Fig. 59); however, the distribution of forestland owners was relatively even throughout the State, with the lowest number in the Southern Unglaciated Region (Fig. 60). Counties in the Grand Prairie Region had the smallest average holdings (9.2 acres per landowner) and the lowest acreage of forestland (Table 2, Fig. 4). One would expect landowner objectives for owning forestland to vary according to location in the State and size of forest holding. For example, income from the sale of timber is more likely to be of primary interest to landowners with significant forestland holdings, whereas landowners with smaller forestland holdings are more likely to have wildlife or aesthetics as their principle objective.

The U.S. Forest Service forest inventories of 1948, 1962, and 1985 were compiled with the Natural Resource Inventories of 1967, 1977, and 1982 to determine trends in forest ownership in Illinois. Publicly owned forest acreage has increased with acquisitions in state, county, and municipal forestland during the last decades; however, over 90 percent of Illinois forestland remains under private ownership, and 45 percent of Illinois forests are farmer-owned. Because the overwhelming majority of the State's forests are privately owned, future management efforts should focus more directly on the private sector.

A survey of the owners (mostly farmers) of private nonindustrial forest in Illinois (Young et al. 1984) indicated that most privately owned forests in the State are relatively

small; 50 percent of those sampled had less than 20 acres (Table 31). Further, forest tracts are often dissected in small patches or strips separate from other forest areas, i.e., 50 percent of the respondents indicated that their forests are not continuous. Fifty-eight percent of the owners were older than 50 years of age and 64 percent earned $20,000 per year or more. Four statistics of particular interest to program managers were identified in this study: (1) 51 percent of the sample felt that the quality of the logger's work was a deterrent to managing their forests for wood products; (2) 76 percent of the sample were unaware of government assistance programs for forestry; (3) 85 percent were unaware of the Illinois tax structure that encourages forest management; and (4) 83 percent had never received professional assistance with woodland management. Even in southern Illinois where holdings were larger and the majority of owners viewed their forests as business enterprises, only 6 percent of the owners had forest management plans (McCurdy and Mercker 1986). These studies make clear that owners of forestland are largely unaware of the importance of forest management and the opportunities for economic assistance. Educational programs are critically needed. Efforts by the Illinois Council on Forestry Development (1986, 1988b) have attempted to alleviate this situation, but additional research is needed to determine what motivates private landowners to own and operate their forestland and how government programs can best assist them.

Table 28. Ownership of commercial forests in Illinois, 1985.

Ownership class	Thousands of acres	Percent of total
National forest	225.8	5.6
Other federal forest	66.3	1.6
State forest	54.7	1.4
County and municipal forest	41.8	1.0
Total public	388.6	9.6
Farmers	1,828.0	45.3
Private individuals (excluding farmers)	1,537.2	38.1
Private corporations	263.1	6.5
Forest industry	13.0	0.3
Total private	3,641.3	90.4

Source: Hahn 1987

Table 29. Commercial forestland in Illinois (in thousands of acres) by forest type and ownership class, 1985.

Forest type	All owners	National forest	Other federal forest	State forest	County and municipal forest	Farmers	Private individuals	Private corporations	Forest industry
White pine	20.2	3.1	0.0	3.5	0.0	7.6	6.0	0.0	0.0
Loblolly–shortleaf pine	45.5	37.5	4.0	0.0	0.0	0.0	0.0	4.0	0.0
Oak–pine	13.3	2.7	0.0	0.0	0.0	0.0	6.4	4.2	0.0
Oak–hickory	2,025.0	154.3	15.5	23.0	7.4	901.4	811.6	103.9	7.9
Oak–gum–cypress	137.8	7.3	0.0	4.0	0.0	34.1	82.1	10.3	0.0
Elm–ash–soft maple	685.8	10.0	27.6	17.9	15.6	321.8	230.7	59.4	2.8
Cottonwood	34.8	0.0	4.0	0.0	0.0	14.6	7.5	8.7	0.0
Maple–beech	1,046.4	10.9	15.2	6.3	18.8	539.6	387.1	66.2	2.3
Nonstocked	21.1	0.0	0.0	0.0	0.0	8.9	5.8	6.4	0.0
Total	4,029.9	225.8	66.3	54.7	41.8	1,828.0	1,537.2	263.1	13.0

Source: Hahn 1987

Table 30. Privately owned commercial forest (in thousands of acres), number of forest owners, and average acres per owner by region in Illinois.

Region	Privately owned commercial forest	Number of forest owners	Acres per owner
Northern	231.5	15,266	15.2
Grand Prairie	518.3	56,541	9.2
Western	1,135.9	34,418	33.0
South Central	1,451.4	56,682	25.6
Southern Unglaciated	303.8	6,166	49.3
Total	3,640.9	169,073	21.5

Source: Hahn 1987; U.S. Department of Agriculture, Cooperative Extension Service, landowner data base, 1984

Table 31. Survey of private, nonindustrial forest owners in Illinois.[1]

Forest owner

Age	%	Income	%	Education	%	Major occupation	%	Reasons for owning forest (most important to least important)
<50	58	< $10,000	9	No high school degree	31	Farming or agriculture	46	Providing wildlife habitat
40–50	23	$10,000–20,000	27	High school degree	43	Skilled worker	18	Preservation of beauty
30–40	14	$20,000–30,000	20	More than 12 years	26	Professional	9	Heritage for future generations
		$30,000–40,000	17			Laborer	6	Personal timber use
		$40,000 or more	27			Owner and manager	3	Family recreation
						Retired	12	Hunting
								Investment
								Home site
								Income from sale of timber

Forest property

Type	%	Size	%	Continuity	%
Upland forest	81	<20 acres	50	Continuous blocks	50
Bottomland forest	17	20–125 acres	45	Separate patches	43
Pine plantation	2	>125 acres	5	Windbreaks, streams, corridors, small patches	7
Average		39.4 acres			

[1]The sample for this survey was taken from a list of farm owners and operators obtained from the Cooperative Extension Service of the U.S. Department of Agriculture.

Source: Young et al. 1984

The Shawnee National Forest

The Shawnee National Forest is treasured by the people of Illinois for its natural beauty and unique character. Although the surrounding area is mostly flat cropland, the Shawnee Forest offers a setting of hills, trees, and outstanding bluffs and streams. The Shawnee Forest was established just over 50 years ago when much of southern Illinois was worn-out, abandoned farmland or forestland that had been logged many times with no attempt at reforestation. In August 1933, the National Forest Reservations Commission approved the establishment of two areas within which land purchases were to be made. A few years later, on September 6, 1939, President Franklin D. Roosevelt proclaimed these areas the Shawnee National Forest. The forest has been managed for over 50 years under a multiple-use concept that ensures the conservation and wise use of its many resources. The forest presently encompasses 261,592 acres and includes numerous clear streams, unusual bluffs and rock formations, and a wide diversity of plants and animals.

Major Features of the Forest

Wildlife abound in the Shawnee National Forest: over 237 species of birds, 100 species of reptiles and amphibians, and 109 species of fish. Included are white-tailed deer, wild turkey, squirrel, and bobwhite quail in addition to 77 rare species of wildlife found in few other places in Illinois.

Because several regional ecotypes merge in the Shawnee Forest, it supports a very high diversity of plant communities. The swamp tupelo of the South, the red cedar of the North, and the prickly pear cactus of the West merge with the flowering dogwood of the East. Over 100 plant taxa found in the forest are listed as threatened or endangered in Illinois; these constitute over 27 percent of the State's threatened and endangered plants. In addition, 72 areas in the forest were included in the Illinois Natural Areas Inventory (White 1978). These habitats for both animals and plants are dependent on the protection offered by the careful management of the forest. Most (64.4 percent) of the forest is the oak–hickory type. Stands of pines in plantations are also common and occupy 17.9 percent of the forest, especially on its east side. Other forest types include cove hardwoods (6.1 percent), bottomland hardwoods (4.3 percent), pin oak (2.6 percent), black locust (1 percent), cedar (0.5 percent), brush (2.7 percent), and open (0.4 percent) (U.S. Forest Service 1986). Management of these vegetative communities has provided the habitat essential for resident wildlife populations as well as quality timber products.

The Shawnee National Forest and southern Illinois provide a diversity of landscapes not found elsewhere in the State. The remarkable geologic features of the area provide scenic beauty and are a prized natural resource. The geologic processes that formed the landscape are also responsible in part for the existence of mineral resources of national significance. Some 90 percent of the nation's domestic production of fluorspar takes place within the forest boundary. Other mineral resources occurring or suspected to occur there include coal, oil, gas, tripoli, refractory clay, sand, gravel, and barite.

The forest also has a rich cultural history. Native Americans have used the area's resources for over 15,000 years. French and English explorers and settlers also played an important role in this history. More than 1,230 archaeological sites have been identified in the forest. Managing these sites and inventorying other cultural resources found in the forest are important components of Shawnee management.

Recreational uses of the forest focus on fishing, hunting, camping, off-road vehicle use, horseback riding, and hiking and have become increasingly important as urban populations seek renewal, relaxation, and physical challenge in the outdoor environment. The diverse setting of forests, hills, and streams attracts thousands of recreational users each year. Campgrounds, picnic areas, boat-launching sites, and trail systems are provided and maintained for forest visitors.

Traditional uses of the forest include timber management—the protection and utilization of the timber resource to provide a sustained yield of wood for lumber and paper. Timber harvesting thins dense stands of trees, helps to regenerate older stands, and maintains habitat for wildlife. Reforestation is also a continuing part of timber manage-

ment. In combination, the various practices of timber management ensure that the forest will maintain a diversity of tree species and a range of sizes from seedlings to large, old-growth trees.

Future of the Forest

The basic mission of the Shawnee National Forest is to care for the land and serve the people. This mission requires a balanced consideration of all forest resources in meeting the present needs of society as well as those of future generations. A 50-year management plan that outlines the future mission of the forest and the means to achieve it has recently been adopted (U.S. Forest Service 1986). Through the implementation of this plan, the Shawnee National Forest will continue to provide recreational experiences and services to the public while assuring protection of soil, water, visual, and cultural resources.

Under the 50-year plan, the Shawnee Forest will remain a diverse forest, presenting its visitors with a mosaic of hills and streams bordered by stands of hardwoods and pines. Small openings will be interspersed to provide scenic vistas and additional diversity to the forested wildlife habitat. The acreage of hardwoods will increase as many of the existing pine stands are reforested to hardwood. Habitat conditions for game and nongame wildlife species will be enhanced through a variety of specific management approaches, and wildlife populations will thereby likely increase. Special emphasis will be given to the protection of the many rare plants and animals that inhabit the forest. Cooperative efforts with other government agencies and private organizations in fisheries and wildlife management will continue.

A wide variety of recreational opportunities are also provided for in the plan, and these range from highly developed recreation sites to semiprimitive motorized and nonmotorized areas that provide isolation from the sights and sounds of most human activity. No new campgrounds or picnic areas will be constructed. Instead, opportunities for dispersed recreational uses will be emphasized: hunting, fishing, hiking, horseback riding, off-road vehicle use, remote camping, and the observation of natural features within the forest. Seven roadless areas are recommended to ensure opportunities for wilderness study and will be managed to provide semiprimitive nonmotorized recreation. An additional area will be managed with emphasis on off-road vehicle use in a semiprimitive motorized setting. Another area will be managed for a variety of benefits, including timber production and roaded-natural recreation use.

Seventy-eight areas in the forest have been identified for special management. Among these are 4 intensive research areas, including the Kaskaskia Experimental Forest and the Dixon Springs Agricultural Center, 4 cultural resource sites listed on the National Register of Historic Places, 17 botanical areas, 43 ecological areas, 3 geological areas, and 7 zoological areas. Twelve of these areas are also recommended for further evaluation as research areas.

Timber management activities under the 50-year plan will be closely coordinated with the habitat needs of wildlife. Harvesting will be used to regenerate older stands of trees and to thin out dense stands of young conifers. These activities also help to create desired habitat conditions for many wildlife species by maintaining a diverse forest structure (i.e., locations with low, youthful vegetation as well as locations with overmature, dead, or dying trees). Timber harvest will also be designed to retain the relatively unfragmented forest conditions required by such neotropical migrant birds as the warblers. Several stands of 1,100 or more acres each will be managed as forest interior units to keep them as unfragmented blocks in perpetuity. Additional stands of trees will be managed to retain larger and older trees for wildlife and visual quality.

Reforestation will be aimed at perpetuating hardwood species in most instances. There will be no conversion of hardwood to pine, and pine will gradually be converted to hardwood except on poor or eroded sites not capable of growing quality hardwoods.

Mineral exploration and development will continue at a cautious rate. The management direction explicit in the 50-year plan provides for the discovery and use of mineral resources consistent with the protection and use of all forest resources. Strict standards and guidelines will be followed to ensure the protection of the soil and water resources of the forest. In addition, five streams are recommended for further study as part of the Wild and Scenic Rivers System.

By adhering to the 50-year plan and to a multiple-use concept, managers of the Shawnee National Forest will be able to minimize environmental degradation and ensure that a wide range of users enjoy the benefits of the forest for generations to come.

Future of Illinois Forest Resources

The uses to which privately owned forestland might be put include one or more of the following: (1) protection of the soil, of archaeological and other cultural resources, of threatened, endangered, or sensitive species, and of unique biological and geological features; (2) enhanced visual and scenic qualities; (3) improved water quality; (4) habitat for wildlife; (5) recreation; and (6) production of wood products. Of these, the potential to realize immediate income is usually limited to timber or fuelwood production, hunting, and recreation. Other uses often included under multiple-use management are of value to the landowner and to society but are not considered marketable.

The ability to protect soil productivity, improve water quality, and provide renewable forest resources depends on the number of owners who elect forest management objectives that generate these benefits. When owners act individually to select a single or limited use of their forestland as opposed to choosing a full range of integrated uses, the benefits to be gained through cumulative effects are lost. The future of forestry in Illinois will require the efforts of forestland owners along with those of specialists in agroforestry, computer systems, and silviculture if management schemes are to vary according to the ecological situation on the land (Benzie et al. 1986).

Timber Grown versus Timber Removed

Growing-stock volume of timber increased by 40 percent between 1962 and 1985, from 3.4 to 4.8 billion cubic feet (Raile and Leatherberry 1988). During that time, statewide net annual growth decreased by 23 percent, from 125 million cubic feet in 1962 to 96 million cubic feet in 1985 (Raile and Leatherberry 1988). These data indicate that the forest resource of Illinois is maturing. The removal or death of large trees cancels out the growth of many younger trees, and the net annual growth rate decreases. The total volume inventory continues to increase, however, because annual growth remains positive, albeit slower than earlier rates of growth.

The U.S. Forest Service estimated total average annual removals between1962 and 1985 by combining estimates of removals for products and logging residues (Blyth et al. 1987) with "other removals"— trees removed but not used for products or trees removed by a change in land use, such as commercial timberland to nature preserve. Total removals of growing stock were estimated to be 68.6 million cubic feet, compared to an estimated growing-stock growth of 96 million cubic feet in 1985. Illinois, therefore, was "removing" 71 percent of annual growth (Table 32). Similarly, the U.S. Forest Service estimated the net annual growth of sawtimber to be 437 million board feet compared to 308.8 million board feet of total removals (71 percent of growth was "removed") (Raile and Leatherberry 1988). Of the 308.8 million board feet of removals, approximately one-half was produced as sawlogs or veneer logs (Blyth et al. 1987).

The U.S. Forest Service also used site-class information that combines the maximum average net growth per acre in fully stocked, unmanaged stands with areal estimates for each site class to estimate potential net growth of Illinois forests. Using this method, which assumes stands are fully stocked and evenly distributed by age class, the U.S. Forest Service estimated a potential annual growth of 323 million cubic feet, or 3.3 times as much as is currently grown. The stated assumptions, however, do not allow a direct comparison between the two estimates. The estimate of 323 million cubic feet is based on unmanaged stands; by thinning, fertilizing, and using genetically superior stock, growth could be even higher (Raile and Leatherberry 1988). These data underscore the importance of the Forestry Development Act and the use of management plans to the future of the timber resources of Illinois.

Although the following calculations are not correct in an absolute sense and the units of measure differ, a cautious interpretation of the data allows an examination of the distribution of roundwood and sawlogs cut versus the distribution of those grown across the State. The county distribution (Fig. 61) of roundwood cut (including 107 million cubic feet of fuelwood cut that did not qualify as growing stock) versus growing stock grown (includes only 5-inch dbh or larger stock; see Glossary, Appendix I) shows a wide disparity among counties. In the northeastern one-quarter of Illinois, much more roundwood is cut (primarily as fuelwood, Fig. 35) than growing stock is

grown (Fig. 61). On the other hand, the southern and western counties (including the Western, South Central, and Southern Unglaciated regions) show a surplus of wood grown. Across Illinois, 96 million cubic feet of growing stock were grown compared to 68.6 million cubic feet of growing stock removed in 1985. An additional 78.6 million cubic feet of nongrowing stock material (large branches, etc.) were harvested, making a total of 147.2 million cubic feet of roundwood material removed (Raile and Leatherberry 1988). No data are available on the county distribution of nongrowing-stock growth, but that information would add substantially to the growing-stock figures.

Data for sawlogs cut versus sawlogs grown cannot be directly compared, but a county distribution map was prepared to show general trends (Fig. 62). Here the net annual growth of sawtimber by county (which includes growth used for sawlog harvest, 4 million board feet of veneer logs, and a significant amount of "other removals") is compared to sawlog harvest by county. Because only about one-half of the sawtimber removals across the State actually made it to the sawmills in the form of sawlogs, a very rough estimate of sawtimber-growth excess by county can be retrieved by halving the estimates shown in Figure 62. However, because fuelwood and "other removals" due to development are expected to be much higher in the northeastern counties, the values for those counties in Figure 62 are probably inflated; those for the southern and western counties (counties with much less fuelwood and other removals) are probably quite accurate.

Net annual growth and removal comparisons are made on the basis of species group in Table 32. Growth exceeded removals for all species except bald cypress, other white oak (overcup, chestnut, and post), other red oak (scarlet, pin, shingle, southern red, black, blackjack, and willow), elm, and cottonwood groups (Table 32) (Raile and Leatherberry 1988). Other red oak had the largest number of removals, 17.8 million cubic feet in 1983 compared to only 5.5 million cubic feet in 1962. Excess removals in some of these species groups might be attributable to continued bottomland conversions, especially in southern Illinois, and to Dutch elm disease. Widest differences favoring growth over removals were found in the soft maple and other hardwoods groups (Table 32), data that provide more evidence for the increasing prevalence of less desirable timber species in Illinois.

Opportunities for Converting Marginal Cropland to Forestland

The U.S. Department of Agriculture Soil Conservation Service periodically conducts a national resources inventory that provides basic data on the status and condition of the nation's soil, water, and related resources. Table 33 summarizes rural land acreage, annual soil loss per acre, and total annual soil loss in each of five land-use categories (U.S. Department of Agriculture, Soil Conservation Service, 1987). In Illinois, approximately 200.7 million tons of soil erode each year on 31.9 million acres of rural land. The average annual soil loss is about 6.3 tons per acre. These figures mean that for every bushel of corn produced in the State, 1.5 bushels of soil are lost. For every pound of food grain produced in Illinois, 3.3 pounds of soil are lost (Iverson 1987). The magnitude of erosion in Illinois is serious indeed, particularly when we consider that the number one industry in the State is agriculture. If Illinois is to maintain a viable agricultural economy of this magnitude, the need for soil conservation must be addressed.

Approximately 86 percent (172 million tons annually) of all sheet and rill erosion in Illinois occurs on cropland, with an average annual soil loss of 7 tons. As shown in Table 27, most of these losses could be eliminated if cropland were converted to ungrazed forestland. Obviously, large-scale conversions are not practical, but targeting especially erosive areas for conversion would help a great deal. Only 12.6 million tons of soil (6.3 percent of the total loss) are lost each year from forestland. Soil losses due to erosion on grazed forestland average 13.1 tons per acre; on ungrazed forestland, soil loss is considerably lower, only 1.6 tons per acre (Table 33).

Marginal cropland, as defined by the Illinois Department of Agriculture and the Illinois Soil Conservation Service, is the land most susceptible to erosion and includes Capability Classes IVe, VI, VII, and VIII (the best agricultural land is Class I; extremely steep, nonarable land is Class VIII). According to this definition, the 1982 Natural Resources Inventory (U.S. Department of Agriculture, Soil Conservation Service, 1987) classified about 1.28 million acres of Illinois as marginal land (Table 34).

Legislation to implement the Illinois Erosion and Sediment Control Program and Standards was passed by the General Assembly in 1977 as an amendment to the Illinois Soil and Water Conservation Districts Act. Soil losses on agricultural land were to be voluntarily reduced to the tolerable level of no more than 5 tons per acre per year by the year 2000. A soil loss of that magnitude on most soil types can theoretically be replaced each year by natural soil-building processes. The Illinois Department of Agriculture was given the responsibility for drafting a set of guidelines for reaching "T" or tolerance levels by the year 2000 (Illinois Department of Agriculture 1985). No civil or criminal penalties were included for noncompliance; however, a complaint process may be initiated to encourage violators to comply with local and State soil-loss standards.

The Food Security Act of 1985 and its Federal Conservation Reserve Program aim to remove from farming cropland in Capability Classes VI, VII, or VIII because such lands are considered too steep or shallow to farm. Additionally, cropland in other capability classes that are eroding at high rates may be enrolled. To be eligible, land must have been used to produce an annual crop in two of the five years from 1981 through 1985. Based on criteria used in the first Federal Conservation Reserve Program sign-up, approximately 12 percent (3,062,400 acres) of Illinois cropland is eligible for the program. The criteria for subsequent sign-ups have been changed to allow even more acres to be eligible; however, the law

states that no more than 25 percent of total cropland in a county can be enrolled in the program. Thus, the maximum number of acres that can be enrolled in Illinois is 2,877,100 (Table 35, Fig. 63). Counties of the Western Region have the greatest number of eligible acres, averaging 37,500 acres per county. In contrast, the heavily forested Southern Unglaciated Region has only 12,700 eligible acres per county. These data suggest that deep loess deposits mask the problem in the Western Region and that this region has the largest area with crops growing on marginal lands. If all eligible cropland in Illinois were converted to permanent cover (grass or trees), 75 million tons of soil would be saved annually, a reduction of almost 44 percent of all cropland erosion in the State.

The goal of the Federal Conservation Reserve Program is for one-eighth (12.5 percent) of all contracted land to go to forest cover. If that goal is met in Illinois, roughly 360,000 acres of new forest would become available for wildlife habitat, recreation, watershed protection, and the production of timber products. However, of the 396,000 acres enrolled in sign-ups 1 through 6, only 7,600 acres were contracted for tree planting, an actual rate of tree planting on program land in Illinois of less than 2 percent. A trend for increasing tree acreage is apparent in later sign-ups, however, and final figures will probably exceed 2 percent. If we assume a conversion rate of 2 percent for all eligible acres in Illinois, 58,700 acres of new trees would be established in the State (Table 35). The South Central Region would have the highest number of acres converted to forests, nearly 19,000; the Southern Unglaciated Region would have only 1,900 new forest acres.

The results of converting 58,700 acres to forestland would be highly beneficial. All conversions would significantly benefit wildlife, particularly in the prairie counties where diversity of land use is limited. Short-term economic return would be provided by the sale of wood products; in the long term, economic diversity would result from the sale of sawlogs. About 1.5 million tons of soil would be saved annually as a result of the conversion of these acres.

Although the statewide percentage of sign-ups contracted for trees is only 2 percent, the geographic distribution of this percentage is highly variable (Fig. 64). For example, 43.5 percent of the acres reserved for conservation in Champaign County have been for trees. In general, the Northern (4.7 percent average sign-up for trees by county) and Grand Prairie (5.1 percent) regions tend to have higher proportions enrolled in trees; the Southern Unglaciated Region on the other hand has the lowest sign-up ratio for trees (1 percent) (Fig. 64).

The total acreage for the first six sign-up periods of the Conservation Reserve Program is provided in Figure 65. Ten counties enrolled over 200 acres of trees; 16 counties enrolled none. Even though the Southern Unglaciated Region had the lowest percentage of acres going into trees, it had the highest number of acres going into trees (125 per county) because over 75 percent of its eligible lands were enrolled (Fig. 63). Only 9.8 percent of the eligible acres have been signed up in the Northern Region, 9 in the Grand Prairie, 15 in the Western, and 20.7 in the South Central regions. If educational efforts continue, increased percentages for trees are possible among the remaining eligible acres, especially in the four northern regions where at least 80 percent of the eligible acres have not yet been enrolled in the program.

Consequences of Forestland Conversions

Even though the thrust of many conservation efforts is to convert erosive cropland to permanent cover, some forested areas will continue to be converted to other uses through agriculture, urbanization, industrialization, and highway development. New legislation couched in "sodbuster" terminology (breaking new ground deemed marginal for agriculture will not be undertaken without penalty) will help to prevent the conversion of forestland to cropland in Capability Classes IVe, VI, VII, and VIII if the landowner wants to remain eligible for other programs. Nevertheless, about 1,616,000 acres of Illinois forestland in other capability classes could be converted to cropland without penalty from the federal government. Many of these acres exist as Illinois bottomland forests, the most rapidly declining forest type in recent decades. Along with the benefits noted earlier, bottomland forests are especially valuable because of their natural flood control characteristics. The conversion of such acres to other uses should, therefore, be stopped whenever possible. Federal "swampbuster" legislation, like the sodbuster legislation, may prevent the conversion of some wetland acres to cropland because landowners would not be eligible for certain commodity programs if they convert wetlands that meet these criteria to cropland.

Natural Resource Inventory data (U.S. Department of Agriculture, Soil Conservation Service, 1987) show that approximately 512,000 acres in Capability Classes I, II, and III have medium-to-high potential for conversion to cropland. Presumably 50,000 acres could easily be converted in the next 20 years. The result would be increased erosion (unless excellent cropland conservation practices were followed) and a reduction in wildlife habitat, recreation potential, and other uses of forestland. Certainly some of the most productive forestland would no longer be producing timber and wood products.

Mined Land Conversions

Surface mining activities affect several thousand acres of Illinois land each year, largely in the western and southern parts of the State. Data for 1983 to 1985 indicate that only 80 percent of the forest that existed on lands prior to mining is being returned to forest after mining operations cease (Table 36). On the other hand, fish and wildlife habitat has been increased by an average factor of 8.3. The sum of forestland and fish and wildlife habitat, therefore, exceeds the acreage that existed before mining. Presumably some of the multiple uses of forestland can be realized in combination with fish and wildlife habitat, but the potential timber supply will be diminished on these lands. In some cases, particularly where acres are charac-

terized by hardpan, forest productivity can be enhanced by mining disturbance, especially when compaction is minimized (for example, see the various Ashby references listed in Appendix V).

Forest Fragmentation

Evidence documenting the negative implications for wildlife of forest fragmentation is increasing (Harris 1984; Blake and Karr 1987; Robinson 1988). Fragmentation is especially troublesome to neotropical migrant birds that need large blocks of uninterrupted forest for successful nesting. As more "edge" develops among fragmented forests, more opportunities exist for such edge-adapted species as the cowbird to invade the area and restrict the reproductive success of forest-interior species.

To determine the extent of fragmentation, the number, size, and density of forested parcels within the State were determined. LUDA data (1:250,000 scale) were processed with ARC/INFO software so that the number and size of the forested parcels in each of the 16 quadrangles in Illinois (Fig. 66) could be tabulated. The largest spatial unit possible (the quadrangle) was chosen because further subdivision (such as counties) would have artificially fragmented the parcels. Parcels were tabulated into the following classes: (1) less than 100 acres (down to the resolution of the data, about 40 acres; many small woodlots were therefore missed by the LUDA data); (2) 100 to 200 acres; (3) 200 to 600 acres; (4) 600 to 1,100 acres; (5) more than 1,100 acres; and (6) all forested parcels in the data set. To estimate parcel density, the number of parcels in the quadrangle were divided by the number of township equivalents (23,040 acres in a township) within that quadrangle. The number of parcels, density of parcels per township equivalent, and their average area and perimeter edge lengths are given for each size class and quadrangle (Table 37).

Across the State, 10,121 forested parcels meet LUDA criteria for limits of resolution (about 40 acres). Of these, about 44 percent are less than 100 acres in size and 10 percent are more than 600 acres (Table 37). Approximately 540 parcels are in excess of 1,100 acres and could potentially be large enough to support neotropical migrant nesting. LUDA data, however, make no distinction among disturbance levels, ownership, or the shape of the forests, and the actual number of parcels available for neotropical migrant nesting would be much lower. For example, the Shawnee National Forest, the area of highest forest density in the State, has only 22 sites large enough and shaped to qualify as management units for forest interior species (M. Sponel, Shawnee National Forest, personal communication). According to LUDA data, more than one-half of the total forest area in Illinois is in large blocks of 1,100 acres or more. The total forest-nonforest edge of the LUDA polygons is 35,157 miles within the State, an average of 3.5 miles per forest parcel. The average size per parcel is 358 acres, with 3,572 acres the statewide average for parcels greater than 1,100 acres (Table 37). Across the State, an average of 6.1 forest parcels exists per township equivalent, with 69 percent of them roughly 40 to 200 acres in size.

Viewing the density of forest parcels by quadrangle reveals certain spatial trends (Fig. 67). Southern Illinois contains the highest density of forest parcels, followed by western and northern Illinois. The Peoria quadrangle in central Illinois has the lowest number of forest parcels in any size class. Northern Illinois quadrangles, for example the Aurora quadrangle, have comparatively high numbers of forest parcels smaller than 600 acres but a low density of parcels potentially large enough to support forest interior species (>600 acres). To find an average of at least one block of forest exceeding 600 acres in every township, one must go to the southern one-quarter of the State, to the Belleville, Paducah, and St. Louis quadrangles (Fig. 67).

The Paducah quadrangle, which occupies the southern part of Illinois, has 74 parcels over 1,100 acres each; some are very large, and the average is 6,273 acres for that size class (Table 37). On the other hand, the Vincennes partial quadrangle, located on the southeastern edge of Illinois, has only one large forest block (1,110 acres). The Belleville quadrangle has the most forest parcels (1,715), but the density of 8.4 per township is lower than that for the Paducah (10.1) and St. Louis (8.5) quadrangles and ties with that of Aurora. Even though the density is identical for Aurora on the north and Belleville on the south, Belleville parcels average over twice the area of Aurora parcels. The rapid urbanization of the Aurora quadrangle (and the Davenport quadangle) is probably responsible for the fragmentation of these forests. The Forest Preserve Districts within the Chicago and Racine quadrangles are maintaining some larger blocks of forest; without these, the average parcel size in those quadrangles would be extremely small.

The Danville and Peoria quadrangles in east-central Illinois have the lowest forest density and a very low density of large forest tracts—only one forest block over 600 acres for every five townships. Most of the forests in these quadrangles exist as small woodlots or narrow riparian forests.

These data demonstrate the severe fragmentation that has occurred in Illinois, a fragmentation that has contributed to decreased populations of many neotropical migrant birds and other wildlife species that require large contiguous blocks of forest. Efforts, such as those initiated in the Shawnee National Forest to manage large blocks as Forest Interior Management Units (M. Sponel, Shawnee National Forest, personal communication), should be encouraged and expanded.

Table 32. Net annual growth and removals by species group of growing stock and sawtimber on timberland in Illinois.

Species group	Growing stock (thousand cubic feet) Growth	Removals	Sawtimber (thousand board feet)[1] Growth	Removals
Softwoods				
Shortleaf pine	1,891	1,535	4,087	2,533
Other pine	765	103	7,200	413
Bald cypress	13	70	90	353
Red cedar	445	131	360	228
Other softwoods	110	26	106	14
Total	3,224	1,865	11,843	3,541
Hardwoods				
Select white oak[2]	14,409	12,611	80,721	66,194
Other white oak[2]	666	2,317	4,512	11,514
Select red oak[2]	5,459	4,600	26,641	21,412
Other red oak[2]	12,893	17,772	77,010	85,322
Select hickory[2]	3,773	3,395	15,208	13,205
Other hickory[2]	3,670	2,102	15,502	6,875
Basswood	1,215	377	8,060	1,789
Beech	242	224	1,488	1,171
Hard maple	3,717	1,713	14,466	7,382
Soft maple	14,144	3,744	44,147	16,889
Elm	–5,106	2,268	–9,780	6,600
Ash	6,932	4,144	27,334	16,647
Sycamore	2,412	1,180	9,518	5,276
Cottonwood	1,976	3,580	11,237	19,243
Sweetgum	1,163	946	3,509	4,431
Tupelo	209	183	942	811
Black cherry	3,663	799	16,385	2,478
Black walnut	2,279	1,084	14,142	5,012
Yellow poplar	1,609	833	8,435	4,265
Other hardwoods	17,166	2,869	55,826	8,693
Total	92,791	66,741	425,303	305,209
Total all species	96,015	68,606	437,146	308,750

[1]International 1/*f*-inch rule.
[2]Select white oak species: white, swamp white, bur, swamp chestnut, and chinkapin oaks. Other white oak species: overcup, chestnut, and post oaks. Select red oak species: cherrybark, shumard, and northern red oaks. Other red oak species: scarlet, northern pin, southern red, shingle, black, blackjack, pin, and willow oaks. Select hickory species: pecan and shellbark, shagbark, and mockernut hickories. Other hickory species: bitternut and pignut hickories.
Source: Raile and Leatherberry 1988

Table 33. Acreage, soil-loss rate, and soil-loss totals for five rural land-use categories.

Land use	Acreage (thousand acres)	Soil-loss rate (tons/acre/year)	Soil-loss total (million tons/year)
Cropland	24,727.4	7.0	172.4
Pasture	3,157.3	3.0	9.4
Grazed forest	638.1	13.1	8.3
Ungrazed forest	2,791.3	1.6	4.3
Other rural land	622.8	10.4	6.3
Total/average	31,936.9	6.3	200.7

Source: U.S. Department of Agriculture, Soil Conservation Service, 1987

Table 34. Marginal land in Illinois.

Soil capability class	Land use	Thousands of acres
IVe	Eroding cropland	794.0
VI	Cropland	423.0
VII	Cropland	55.0
VIII	Pastureland	5.0
Total		1,277.0

Source: U.S. Department of Agriculture, Soil Conservation Service, 1987

Table 35. Projected conversions in thousands of acres from cropland to forestland under the Federal Conservation Reserve Program.

Region	Eligible acreage	Converted acreage at a rate of 12.5 percent	Converted acreage at a rate of 2 percent
Northern	395.7	49.3	7.9
Grand Prairie	707.5	88.9	14.4
Western	787.6	98.5	15.8
South Central	896.9	112.5	18.7
Southern Unglaciated	89.5	11.2	1.9
Total	2,877.2	360.4	58.7

Source: U.S. Department of Agriculture, Soil Conservation Service, National Resource Inventory data base, 1982

Table 36. Land use preceding surface mining and approved postmining land use for coal permits issued during three calendar years in Illinois.

Year and status	Land use in acres									
	Cropland	Pasture-land	Forestry	Resi-dential	Industry/ commercial	Recre-ation	Fish and wildlife	Unde-veloped	Water	Total
1983 Premining	5,797.7	3,446.3	1,701.4	26.6	3,735.9	0.0	194.0	751.5	331.6	15,984.8
Postmining	4,903.4	6,789.2	1,168.0	5.9	137.8	0.0	1,502.9	194.6	1,283.0	15,984.8
1984 Premining	18,184.5	7,433.3	6,144.6	129.8	2,189.4	0.0	606.2	2,676.3	975.5	38,339.6
Postmining	15,091.7	11,110.9	4,877.8	17.6	955.2	0.0	2,790.5	1,376.7	2,119.2	38,339.6
1985 Premining	5,428.9	3,191.6	3,017.9	64.7	2,171.0	0.0	14.0	2,275.1	766.9	16,930.1
Postmining	3,392.6	6,342.4	2,631.0	13.2	442.8	0.0	2,466.9	414.1	1,277.2	16,930.1

Source: Illinois Department of Mines and Minerals 1986

Table 37. Deciduous forest in Illinois by 1:250,000 quadrangles and by parcel-size classes.

Quadrangle	Number of township equivalents	Parcel-size class (acres)	Number of parcels	Number per township	Average area (acres)	Average perimeter edge (miles)
Aurora	197.1	<100	866	4.4	58.3	1.24
		100–200	364	1.8	141.5	2.23
		200–600	334	1.7	327.2	4.05
		600–1,100	51	0.3	822.5	8.06
		>1,100	36	0.2	2,463.7	20.47
Total/average			1,651	8.4	207.5	2.66
Belleville	205.3	<100	610	3.0	64.8	1.29
		100–200	471	2.3	141.0	2.08
		200–600	394	1.9	339.3	3.72
		600–1,100	112	0.6	807.6	7.28
		>1,100	128	0.6	3,188.4	21.50
Total/average			1,715	8.4	430.5	3.96
Burlington	130.2	<100	373	2.9	64.9	1.25
		100–200	255	2.0	140.7	2.02
		200–600	212	1.6	345.3	3.69
		600–1,100	57	0.4	795.1	6.89
		>1,100	63	0.5	2,750.2	18.10
Total/average			960	7.4	366.6	3.43

Continued

Table 37 continued.

Quadrangle	Number of township equivalents	Parcel-size class (acres)	Number of parcels	Number per township	Average area (acres)	Average perimeter edge (miles)
Chicago	44.6	<100	59	1.3	59.0	1.26
		100–200	39	0.9	132.0	2.13
		200–600	33	0.7	347.7	4.24
		600–1,100	7	0.2	845.8	8.67
		>1,100	14	0.3	2,815.1	19.93
Total/average			152	3.4	430.5	4.19
Danville	47.2	<100	31	0.7	59.0	1.20
		100–200	22	0.5	140.9	2.01
		200–600	24	0.5	325.3	3.52
		600–1,100	6	0.1	787.3	6.71
		>1,100	9	0.2	1,827.7	12.50
Total/average			92	1.9	368.6	3.46
Davenport	62.4	<100	214	3.4	61.2	1.28
		100–200	111	1.8	147.0	2.24
		200–600	100	1.6	319.1	3.83
		600–1,100	21	0.3	815.1	8.01
		>1,100	11	0.2	2,353.4	18.74
Total/average			457	7.3	226.3	2.78
Decatur	202.6	<100	408	2.0	61.4	1.23
		100–200	251	1.2	143.4	2.10
		200–600	200	1.0	340.6	3.81
		600–1,100	64	0.3	805.9	7.06
		>1,100	66	0.3	2,529.2	17.36
Total/average			989	4.9	351.6	3.43
Dubuque	18.3	<100	61	3.3	54.6	1.18
		100–200	27	1.5	133.5	1.93
		200–600	23	1.3	367.7	3.57
		600–1,100	10	0.5	730.9	5.76
		>1,100	11	0.6	3,543.6	17.94
Total/average			132	7.2	467.3	3.50
Indianapolis	44.9	<100	87	1.9	60.1	1.21
		100–200	66	1.5	139.7	1.97
		200–600	60	1.3	339.0	3.74
		600–1,100	20	0.4	852.7	7.41
		>1,100	22	0.5	2,047.4	15.44
Total/average			255	5.7	380.0	3.72

Table 37 continued.

Quadrangle	Number of township equivalents	Parcel-size class (acres)	Number of parcels	Number per township	Average area (acres)	Average perimeter edge (miles)
Paducah	124.1	<100	598	4.8	58.6	1.29
		100–200	281	2.3	138.2	2.20
		200–600	237	1.9	348.5	4.04
		600–1,100	64	0.5	780.6	7.90
		>1,100	74	0.6	6,273.3	37.45
Total/average			1,254	10.1	534.8	4.48
Peoria	199.8	<100	182	0.9	64.9	1.32
		100–200	164	0.8	141.7	2.14
		200–600	129	0.6	332.8	3.93
		600–1,100	27	0.1	825.5	7.90
		>1,100	25	0.1	2,722.5	19.59
Total/average			527	2.5	319.4	3.42
Quincy	107.8	<100	323	3.0	62.3	1.29
		100–200	193	1.8	139.8	2.15
		200–600	178	1.7	334.7	3.92
		600–1,100	47	0.4	825.3	7.75
		>1,100	55	0.5	4,696.0	26.92
Total/average			796	7.4	507.2	4.24
Racine	10.9	<100	10	0.9	54.4	1.21
		100–200	10	0.9	141.1	2.02
		200–600	10	0.9	379.3	5.00
		600–1,100	1	0.1	684.4	10.29
		>1,100	2	0.2	3,418.3	28.83
Total/average			33	3.0	402.1	4.55
Rockford	97.2	<100	474	4.9	53.7	1.19
		100–200	158	1.6	144.8	2.22
		200–600	104	1.1	319.7	3.82
		600–1,100	14	0.1	773.1	7.91
		>1,100	7	0.1	1,532.7	13.08
Total/average			757	7.8	136.3	2.00
St. Louis	28.2	<100	109	3.9	57.9	1.22
		100–200	50	1.8	145.2	2.16
		200–600	48	1.7	314.6	3.87
		600–1,100	20	0.7	783.4	7.28
		>1,100	14	0.5	4,505.4	27.95
Total/average			241	8.5	445.7	4.00

Continued

Table 37 continued.

Quadrangle	Number of township equivalents	Parcel-size class (acres)	Number of parcels	Number per township	Average area (acres)	Average perimeter edge (miles)
Vincennes	28.2	<100	74	2.6	62.6	1.28
		100–200	14	0.5	140.5	2.12
		200–600	13	0.5	283.6	3.60
		600–1,100	4	0.1	730.1	6.70
		>1,100	1	0.0	1,109.5	14.93
Total/average			106	3.8	135.0	2.01
State Total	1,548.8	<100	4,479		270,160	5,624
		100–200	2,476		349,749	5,284
		200–600	2,099		705,213	8,119
		600–1,100	525		422,554	3,923
		>1,100	542		1,875,086	12,207
Total			10,121		3,622,762	35,157
State Average		<100		2.7	60.3	1.26
		100–200		1.5	141.3	2.13
		200–600		1.3	336.0	3.86
		600–1,100		0.3	804.9	7.47
		>1,100		0.3	3,571.6	22.52
Total/average				6.1	358.0	3.47

Source: LUDA data base

Local Implementation: A Case Study

Technical and social innovations at several levels will be required if the largely untapped potential for forestry in Illinois is to be realized. Attention is usually focused on the role of state agencies, forest industries, and private landowners, but local (i.e., municipal and county) natural resource agencies play a unique and valuable role as well because local public lands provide ideal sites for demonstrating conventional and experimental woodland management systems. Bridging the gap between researchers and landowners is increasingly important as new management systems (for example, agroforestry schemes) are devised to meet changing landowner objectives. Local agencies can also help landowners organize themselves to share equipment and experience and to improve their position in the marketplace by pooling resources. Safeguarding such community interests as wildlife habitat, soil and water resources, and the quality of the visual landscape is another appropriate function of local agencies because the impacts of forestry practices are often best evaluated at a scale of several hundred to several thousand acres.

The following case history illustrates how one local agency, the Vermilion County Conservation District, took responsibility for managing its own lands and is providing a realistic example for local landowners. The district's woodland management program includes inventory, planning, production research, utilization research, and demonstration. The inventory and planning activities relate to a 1,600-acre park, but they provide a model for similar activities on other local-scale land areas. In the research area, the district is investigating the use of low-grade logs for the production of edible mushrooms and the suitability of traditional silvicultural methods for small woodlands and marginal farmlands that need to be converted to permanent cover. Demonstration activities focus on the local suitability of tree species for various uses.

Forest Inventory

The Illinois Council on Forest Development recognized that the wise management and use of forestland require current and consistent data for assessing its status—timber and wildlife, recreational uses, and the extent of erosion. To that end, they recommended the development and maintenance of a detailed and accessible forestry data base that would assist in preparing management plans and solving specific resource problems (Illinois Council on Forestry Development 1986).

To implement this recommendation for the Vermilion County Conservation District, the Illinois Natural History Survey developed a land-cover inventory of the district's 1,600-acre Kennekuk Cove County Park that was then automated on a geographic information system (GIS) (Burnett 1988) to provide the district with a powerful tool for tracking the status of its lands. The park was classified into 42 categories of cover types, with the smallest parcel 0.1 acre in size. The classification system is a three-level hierarchy that allows one to consider land resources at different levels of detail. Level 1 contains seven categories based on vegetation or land use: farmland, developed land, woodland, herbaceous vegetation, shrubby vegetation, savanna, and water. In level 2, natural vegetation types (but not farmland, developed land, or water) are subdivided on the basis of topography (upland, bottomland, ravine). In level 3, vegetation and topography types are further subdivided into age classes that are important for planning purposes. Together, these maps and the accompanying data base summarize the current status of the park's resources and provide a firm basis for planning future management.

Forest Modeling

The Council determined that the State of Illinois and such other public entities as counties and municipalities own thousands of acres of land that are both undeveloped and underutilized. Managing these lands for production as well as for research and demonstration is not incompatible with using them for recreation, wildlife habitat, soil conservation, natural area protection, or numerous other land uses. The recommendation of the Council, therefore, was to require the development of long-range management plans for all state-owned lands and to encourage other public agencies that control undeveloped land to undertake similar long-range planning activities (Illinois Council on Forestry Development 1986).

To facilitate land-management planning for Kennekuk Cove County Park, the Illinois Natural History Survey developed a computer model that simulates changes expected in the park's cover types over the next 100 years in response to alternative management strategies. The model, an adaptation of the DYNAST program originally developed for forestry planning in the Southeast (Boyce 1985), begins with the initial GIS inventory and tracks the "flow of acres" among various cover types over time. Figure 68 shows a simplified diagram of the land-cover changes conceptualized for the park. For example, an area that starts as abandoned farmland would flow to the herbaceous type after a delay of 1 year. If the area were not converted back to farmland by management action, it would remain herbaceous for a delay of 10 years and then flow to shrubby or savanna type. In the actual model, the flow network is larger and more complex because land categories are broken down by topography and age.

In addition to simulating the natural succession of vegetation types, the model allows management actions to be specified for reversing (reversion) or redirecting (conversion) the course of succession. Reversions and conversions can be specified as variable annual rates and minimum acreages can be specified for cover types; the model in turn derives the necessary rates for management actions. Furthermore, successional delays can be easily modified if desired.

The purpose of the model is to allow park planners to ask "what-if" questions regarding management policies. For example, what would the park look like in 50 or 100 years if a "forever wild" policy were established? Barring catastrophic fires or storms, the implications of such a policy are shown in Figure 69a. In contrast, Figure 69b shows land-cover trends under a "stabilization" policy in which minimum acreages are set to their initial inventory values. At first glance, such a policy might appear to conserve current conditions, but the age structure of the park's woodlands would continue to change over time (Fig. 70a). If, for example, managers wish to maintain some proportion of young woodlands to favor certain wildlife, the management plan must include some woodland harvesting. Figure 70b shows changes in the age structure of the upland woodlands under a policy to stabilize current cover-type proportions and to harvest upland woodlands for fuelwood at an age of 40 years. With this policy, the number of acres in each of the age classes becomes stabilized.

The preceding result is not accidental. Rather, the model is designed to seek a state of dynamic equilibrium among cover types. In other words, the model assumes that planners are interested in guiding the landscape toward a distribution of cover types that will provide a desirable mix of benefits and be sustained through a smooth, predictable level of management activity.

The model uses the structure of the landscape (distribution of cover types among age and area classes) as the basis for comparing the benefits expected from alternative management plans. For example, given a projected future landscape structure, timber and cordwood yields can be estimated directly from conventional yield tables. Wildlife habitat quality can be estimated by comparing the relative proportions of available cover types with proportions of cover types thought to be optimal for the species of interest. For example, Figure 71 shows a simplified schematic of a habitat-suitability algorithm for wild turkey. Similar procedures can be followed for visual quality, soil conservation, and other concerns.

By linking algorithms that estimate benefits from landscape structure to the core model that projects changes in landscape structure, the flow of benefits over time can be estimated. The projected benefits for all proposed management plans can then be compared. Similarly, costs for implementing alternative plans can be displayed. For example, trends for two benefits—wild turkey habitat suitability (Fig. 72) and fuelwood production (Fig. 73)—are shown for two alternative plans. Management for turkey suitability stabilizes proportions of level 2 cover types (Fig. 72a) at their current values and harvests only upland woodlands for cordwood at an age of 40 years (Fig. 72b). Management for maximum fuelwood, on the other hand, allows natural succession to proceed unimpeded and harvests cordwood from upland and bottomland forests, also at an age of 40 years (Fig. 73). The trade-off is between improving the quality of turkey habitat with lower cordwood production (Fig. 72) and reducing the quality of turkey habitat with higher cordwood production (Fig. 73). When the implications of each alternative are clearly displayed, the choice is left to the political process. Other plans can be easily simulated to explore compromise solutions.

Alternative Production Methods: Traditional Silviculture

The Council found that a crop of trees grown properly on appropriate sites can yield a higher long-term net return per acre than other crops. The Council therefore recommended to expand research on woodlot productivity and alternative forest production systems, on integrated agriculture and forestry, and on fuelwood production systems for the private landowner (Illinois Council on Forestry Development 1986).

Two silvicultural practices common in preindustrial Europe but virtually unknown in North America are currently being investigated by the Vermilion District. The first is based on coppicing, a practice wherein sprouts are repeatedly harvested and regenerated from semipermanent stumps. The silvicultural system is generally referred to as short-rotation intensive culture (SRIC). Although SRIC plantations can produce impressive yields of small-dimension wood, they are high-input monocultures that produce few other benefits and are more suited to the purposes of large industries than to the needs of typical Illinois woodland owners.

Traditionally, coppicing in Europe was usually done as part of a joint production system known as coppice-with-standards. About two-thirds of the stand was devoted to trees coppiced for fuelwood; the remaining one-third was occupied by scattered, long-rotation timber trees

known as standards. The standards not only diversified the wood products available for sale or use, but also provided habitat for wild flora and fauna, soil protection, and aesthetic benefits (Burnett 1987).

Because coppice-with-standards appears to be capable of producing a combination of benefits consistent with the multiple-use objectives of many landowners, an experimental woodlot was established at Forest Glen County Preserve. During the 1984–1985 dormant season, approximately two-thirds of a 3.3-acre stand of green ash and black cherry saplings was cut to create the coppice component. The remainder of the stand was left in 37 clumps of saplings from which standards will be selected.

Although rates of growth for the coppice and prospective standards are being measured annually, quantitative conclusions about the productivity of the experimental stand cannot yet be drawn. Preliminary findings, however, indicate that the coppiced green ash and black cherry are regenerating vigorously and withstanding competition from herbaceous vegetation with no management. An experiment is being conducted with the clumps of prospective standards to determine the effect of thinning on the growth rates of reserved trees. Periodic wildlife censuses are also being conducted.

The second production method under investigation is pollarding. Like coppicing, this method relies on the rapid regeneration of sprouts from repeatedly harvested trees. In pollarding, however, trees are cut off 8 to 12 feet above ground. This technique was designed to allow trees to regenerate in the presence of browsing livestock and wildlife. Pollards can be grown close together in woodlots or shelterbelts, but traditionally they were often spaced widely enough to allow the growth of a permanent pasture layer.

In addition to the wood products pollards generate, they can improve livestock production in agroforestry systems through microclimate moderation, supplemental forage production, and improved soil fertility (Burnett and Gilluly 1988). Because pollards usually develop hollows in their trunks, they create habitat for cavity-dwelling wildlife. The parklike character of pasture-with-pollard also enhances the visual quality of the landscape and increases recreational potential. Finally, because pollards have large, thick-barked trunks and elevated sprouts, they are resistant to fire. This attribute makes pollards potentially valuable in managing savanna vegetation that must be periodically burned. Based on these potential benefits and on research indicating that at least some native trees respond well to pollarding (Burnett and Gilluly 1988), plans are being made to develop an experimental pasture-with-pollard unit at Kennekuk Cove County Park.

Alternative Utilization: Shiitake Mushrooms

The Council observed that forest products harvested in Illinois are frequently manufactured and marketed in such a way that landowners, loggers, and sawmills and other wood-processing firms receive less than full value for their products, especially low-grade products. Their subsequent recommendation was to initiate research projects designed to improve the use of low-grade wood products and wood residue and to develop appropriate markets. One interesting possibility is the production of shiitake mushrooms on low-grade woods (Illinois Council on Forestry Development 1986).

Shiitake mushrooms (*Lentinus edodes*) grow best on oak, but some other species are also acceptable. Because logs 2 to 8 inches in diameter and 3 feet long are preferred, low-grade wood of little commercial value can be used. Little capital investment is required, and the market potential for these flavorful mushrooms is promising (Leatham 1982). In the United States, retail prices for domestically produced fresh shiitake mushrooms currently range from $6 to $20 per pound, and estimates are that wholesale growers could gross between $900 and $2,000 per cord over the 5-year production span (Wilkes 1985).

Many strains of the shiitake fungus are available, and numerous methods of production can be used. In general, the process requires cutting the logs, inoculating them with the mushroom spawn, managing the moisture content of the inoculated logs during incubation, and harvesting the mushrooms. An important first step for potential growers in new geographic areas is choosing strains that grow well in the local climate. Hundreds, if not thousands, of shiitake mushroom growers are found in the United States, but most of them are in California, the northern Lake States, and the Appalachians. Consequently, the initial phase of the Vermilion County Conservation District's shiitake mushroom project has concentrated on assessing the productivity of likely strains on logs from various tree species. In combination with the strain-screening work, a comparison is being made of logs soaked before the fruiting season with those not soaked. Preliminary results indicate that some strains clearly produce mushrooms sooner than others and that soaked logs out-produce unsoaked logs. Additional efforts are needed to encourage production by local landowners, develop local markets, and improve the labor efficiency of the production process.

Demonstration and Education

The Council determined that funding to implement educational programs is inadequate and that not enough personnel from private and public agencies and organizations are available to conduct the work. The Council recommended that educational programs in rural and urban forestry, wood products manufacturing and utilization, and nature appreciation be made available to a larger segment of the population (Illinois Council on Forestry Development 1986). The Illinois Wildlife Habitat Commission also urged that a vigorous attempt be made to use public lands with high visibility to demonstrate the practicality of taking wildlife and habitat into consideration when making decisions about land use (Illinois Wildlife Habitat Commission 1985).

Forest Glen County Preserve and Kennekuk Cove County Park provide excellent sites for demonstrating land-management practices to the public. Forest Glen is well known for its mature ravine forest, and Kennekuk Cove is strategically located along the Middlefork River,

the first and only permanently protected waterway in Illinois. Both parks have active educational programs for local groups and special annual events that draw people from long distances. Demonstrations of woody plant materials have long been a normal part of the educational program. At present, several demonstrations have been established, including a teaching arboretum of more than 180 taxa of wood plants, an ongoing experimental plantation to assess the growth rates of commonly available nursery stock under different management practices, a variety of plantings of wildlife food and cover shrubs, and the experimental coppice-with-standards and shiitake sites.

One of the principal challenges facing natural resource agencies today is how to expand the middle ground between exploitive and preservationist approaches to land management. Exploitive agricultural and forestry practices cause serious environmental and social problems, but solving these problems through land preservation is economically unrealistic. Land-management methods that provide a healthy environment without requiring continual financial subsidies are needed. Developing such methods is a difficult task, but landowners are becoming more interested in managing their woodlands for multiple benefits, and new technologies— from computer software to wood-combustion hardware—are providing improved ways to achieve sustainable yields and use them efficiently. In addition, old technologies that served multiple-use objectives well in the past are being revived.

The case study of the Vermilion County Conservation District illustrates how local land-management agencies can play a key role in developing and promoting environmentally sound production systems. Because such agencies have a mandate for public education, they can initiate promising new practices before most landowners are ready to take the risk. By providing personnel and equipment to help implement and monitor management programs, local agencies can greatly extend the efforts of state agencies. Finally, local public lands are where local landowners are most likely to see demonstrations and be persuaded to try what they see. Further partnerships between state and local agencies should be part of the efforts to expand and improve forestry practices in Illinois.

Research Recommendations

The following research recommendations are made in the hope that the forest resources of Illinois can be managed in a manner that will not only enhance their value for varied uses but will encourage the appreciation of these resources by the people of the State.

Update of Statewide Forest Inventory

As noted earlier in this publication, statewide inventories of the forest resources of Illinois were completed in 1948, 1962, and 1985. Intervals of this length are excessive for accurately assessing the status of and changes in the forests of the State. Comprehensive data describing these forests should be collected at least every ten years and made available in a variety of formats to a broad range of users. These inventories should be carefully planned, and funding should be obtained from the State for the collection and distribution of data. Innovative technologies for acquiring, storing, and manipulating data, such as remote sensing and geographic information systems, should be encouraged. Special emphasis should be given to the accurate assessment of the status of the urban forest resource, its special needs with regard to management, and the numerous benefits it provides to the people of Illinois. Funding should be the responsibility of the State. The inventory itself should be a responsibility of the Illinois Department of Conservation, with advice from the Illinois Council on Forest Development.

Long-term Research on Management Options

Management practices directly affect the forests of Illinois as well as the benefits we derive from them. The impact of a given management option, however, may not be evident for many years. As a result, long-term research directed at evaluating the consequences of management options, including various silvicultural practices, is essential. Research and educational efforts such as those described in the case study of the Vermilion County Conservation District should be encouraged in other locations. Future research should be designed to determine long-term consequences to all aspects of the forest resource, including timber, wildlife, botany, recreation, and aesthetics. Funding for these studies should be provided in the budgets of the federal, state, and local agencies that will conduct these investigations.

Enhancing Multiple Use

The forests of Illinois provide many types of benefits and consequently are managed for multiple uses. Some of these uses inherently conflict, and research is needed to address how multiple benefits are best achieved. The evaluation of multiple uses is often difficult because many benefits derived from forests have not traditionally been measured in dollars (for example, calculating the value of erosion control or decreased sediment input into streams and lakes). As a result, researchers need to explore ways in which ecological, recreational, aesthetic, and economic values can be considered simultaneously in resource management and preservation. Funding for these studies should be provided through the budgets of natural resource agencies.

Role of Private Landowners

As noted earlier in this publication, private landowners have an enormous influence on the forests of Illinois; yet these individuals have diverse reasons for maintaining woodlands and place various values on them. The question of values is further complicated because direct economic values are more obvious to landowners and easier to calculate than such important uses as erosion protection or wildlife habitat. Research, therefore, is needed to determine what motivates (or does not motivate) individuals to maintain woodlands and how best to encourage them to undertake forest management. The role that private landowners might play in enhancing the multiple uses of the forestlands of Illinois also needs investigation. The work at the Vermilion County Conservation District provides a good starting point, and funding for this type of research needs to be a cooperative venture on the part of the State and private individuals.

Data Base on Economic and Natural Values of Forests

Because forests represent a long-term commitment of the land resource and include a wide array of benefits of interest to many people and to a variety of industries, a comprehensive data base needs to be developed and maintained. These data should be stored in a way that ensures confidentiality (when necessary), but they should also be able to be manipulated so that information can be presented in a number of ways according to the requirements of a variety of users. Such a data base should be incorporated into existing natural resource data bases, thus avoiding costly duplication of hardware and software. The Illinois Forest Inventory Data Analysis Program provides a useful beginning for this initiative, as do the data in this document, data that can also be found in the Illinois Geographic Information System at the Illinois Natural History Survey. Data bases must be developed and maintained by all information-acquiring agencies and private groups so that information can be shared among all groups.

Trees as a Crop

The forest literature reports on several approaches for growing trees as a crop for fuelwood and other purposes. Further research, however, is needed to determine how best to combine the growth characteristics of given tree species with conditions at particular sites. These cropping systems must not only be evaluated within the ecological context of a given site, but they must also be seen from the perspective of current and future economic conditions. Sustainable agricultural systems, including the use of strategically placed trees, must be incorporated into future land management plans. Funding for the development of these systems must be shared by state and federal governments and private organizations.

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Figure 1. Forest resource regions and U.S. Forest Service units.

Data in many subsequent figures are summarized according to average county values for the 102 counties of the State (S), the 12 counties of the Northern Region (N), the 31 counties of the Grand Prairie Region (GP), the 21 counties of the Western Region (W), the 31 counties of the South Central Region (SC), and the 7 counties of the Southern Unglaciated Region (SU). Totals by State or region can be calculated by multiplying data by the number of counties in the State or region.

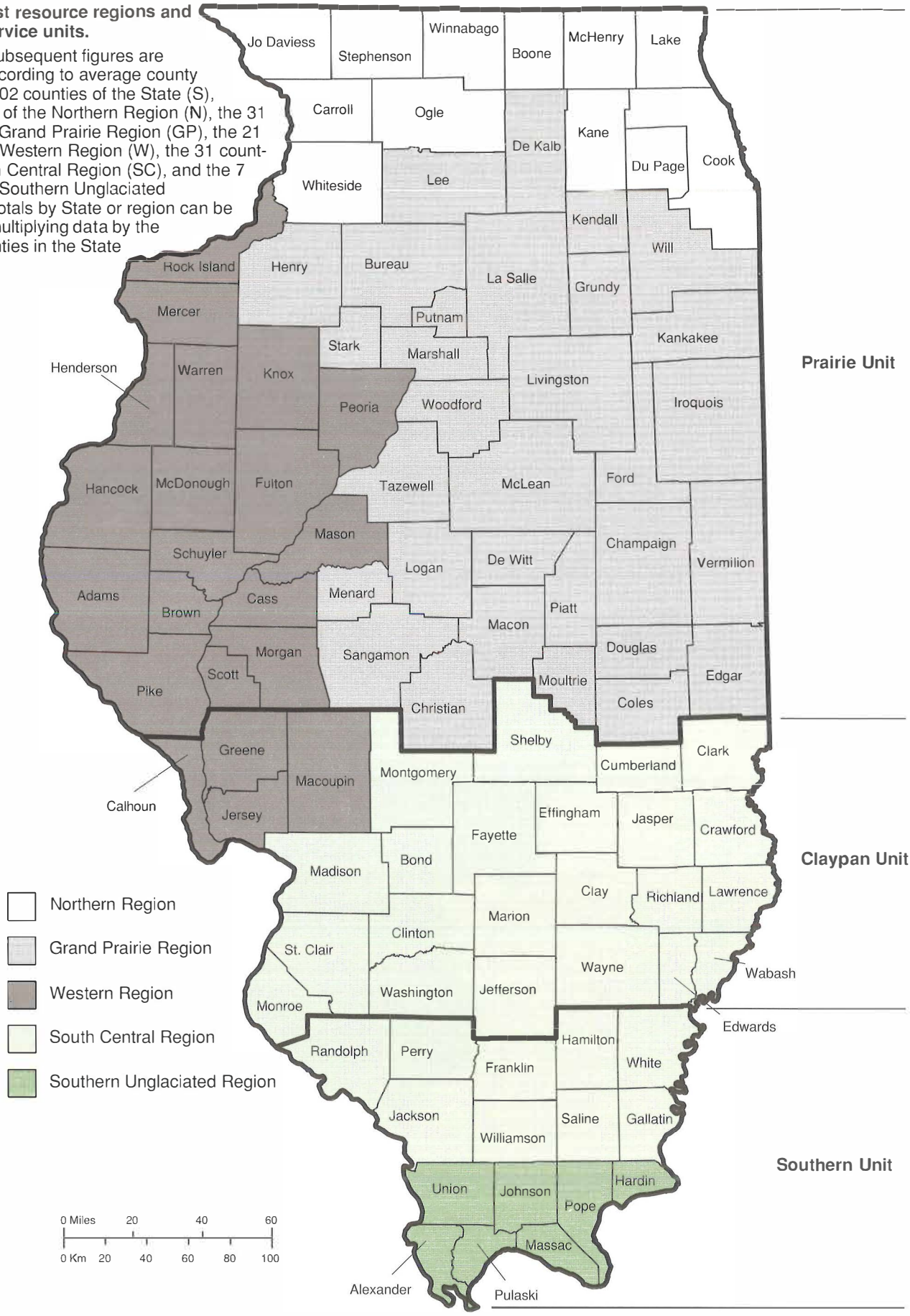
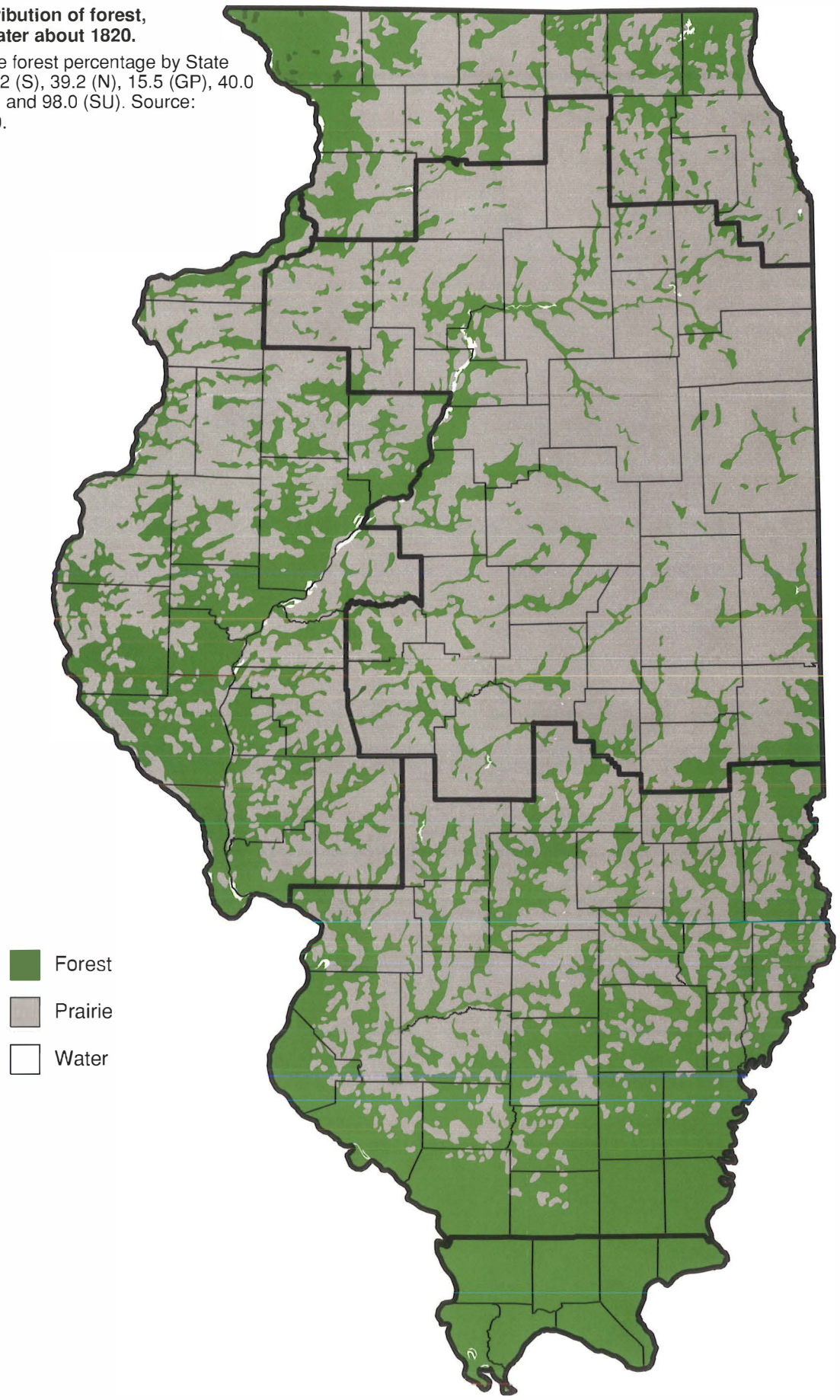


Figure 2. Distribution of forest, prairie, and water about 1820.

County average forest percentage by State and region: 38.2 (S), 39.2 (N), 15.5 (GP), 40.0 (W), 56.7 (SC), and 98.0 (SU). Source: Anderson 1970.



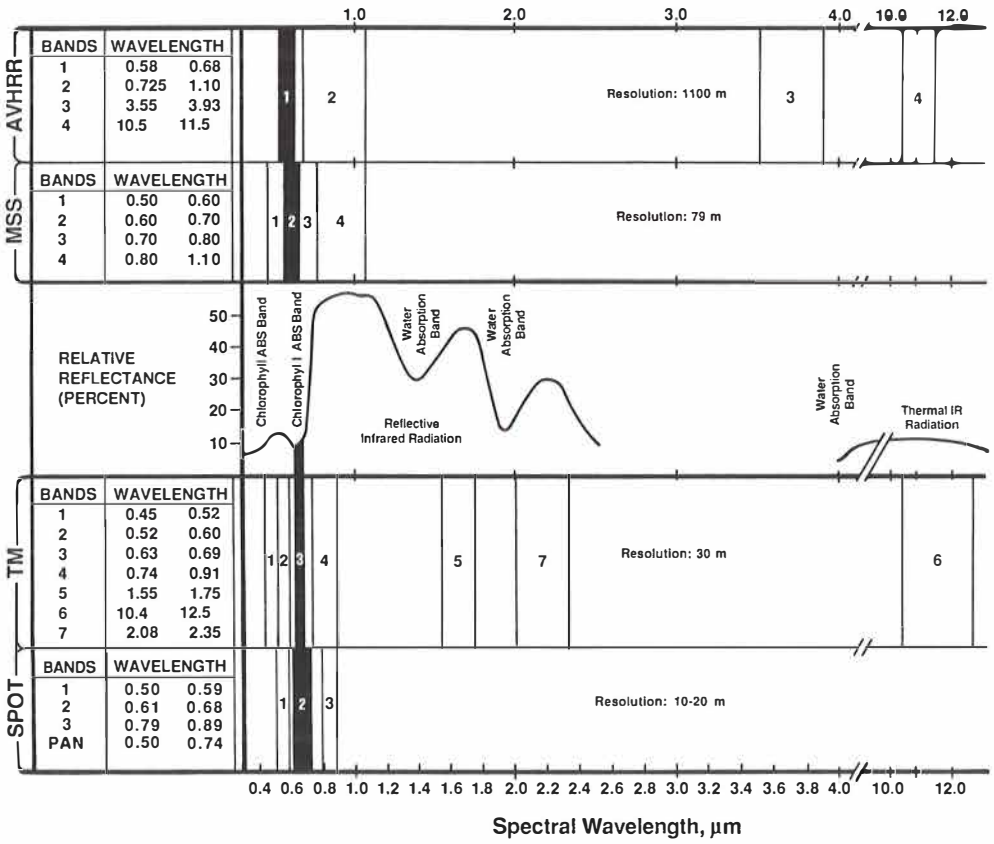


Figure 3. Electromagnetic spectrum for green vegetation in Illinois and the wavelength bands collected by four satellites.
Source: Iverson et al. 1989.

Figure 4. Commercial forest acreage.

County average by State and region: 39,500 (S), 20,100 (N), 17,300 (GP), 56,200 (W), 50,900 (SC), and 70,200 (SU). Source: Hahn 1987.

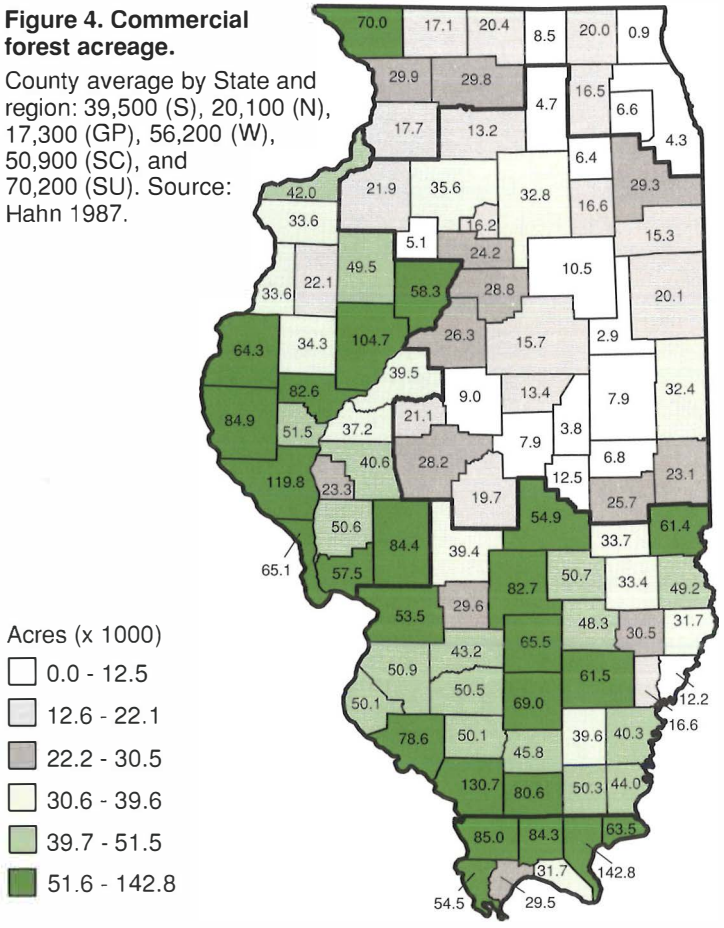


Figure 5. Number of tree taxa.

County average by State and region: 70 (S), 74 (N), 60 (GP), 67 (W), 72 (SC), and 109 (SU). Source: Iverson and Ketzner 1988.

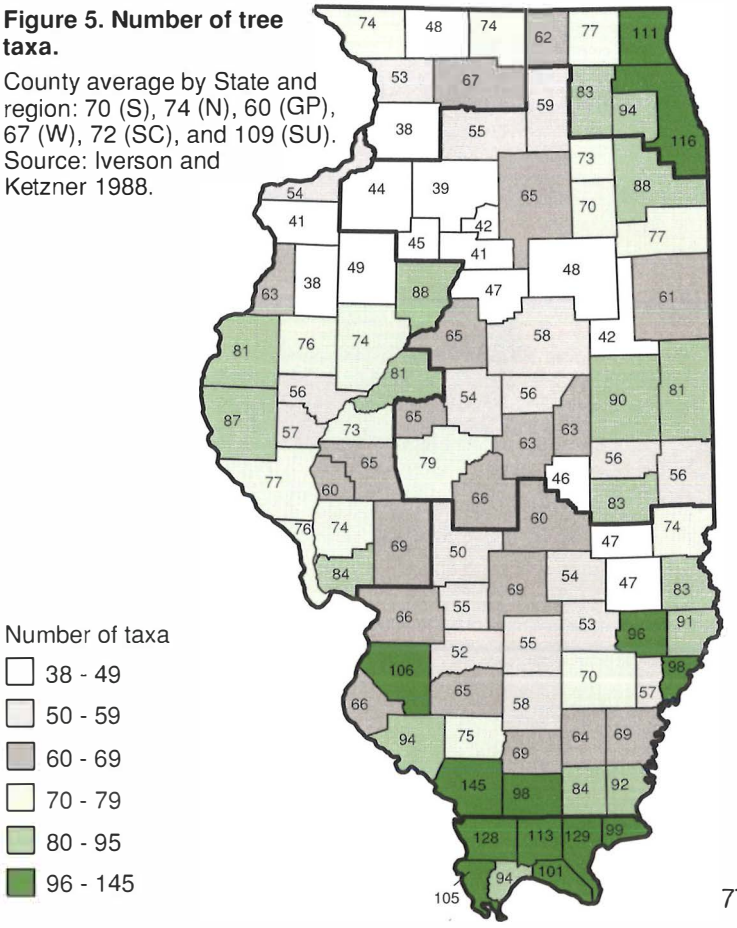


Figure 6. Number of shrub taxa.

County average by State and region: 54 (S), 88 (N), 51 (GP), 49 (W), 44 (SC), and 66 (SU). Source: Iverson and Ketzner 1988.

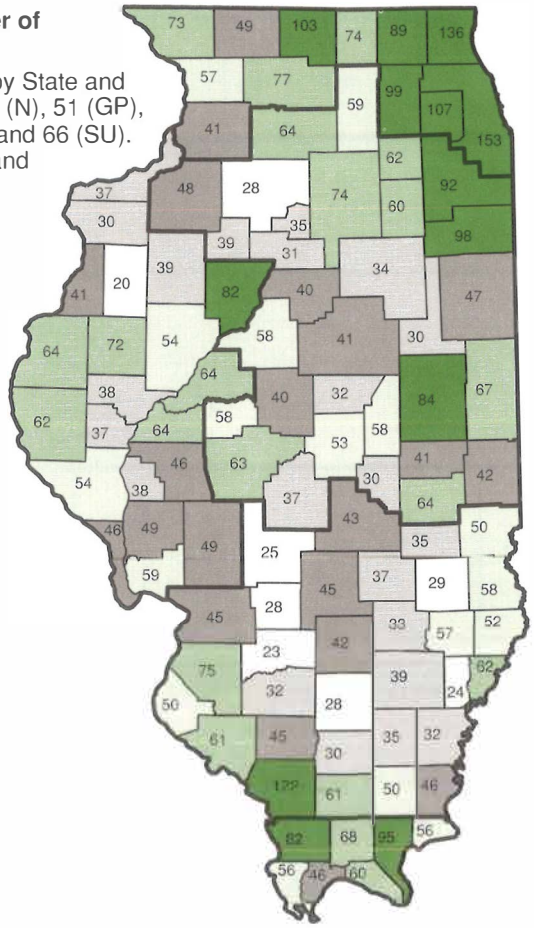


Figure 7. Oak-hickory forest acreage.

County average by State and region: 20,100 (S), 12,300 (N), 8,400 (GP), 28,500 (W), 25,700 (SC), and 35,100 (SU). Source: Hahn 1987.

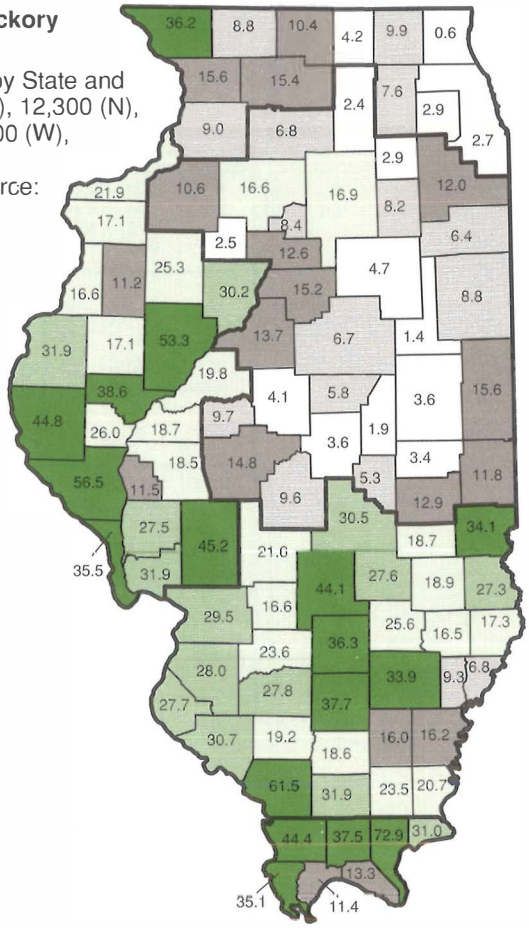


Figure 8. Cottonwood forest acreage.

County average by State and region: 340 (S), 190 (N), 170 (GP), 510 (W), 390 (SC), and 670 (SU). Source: Hahn 1987.

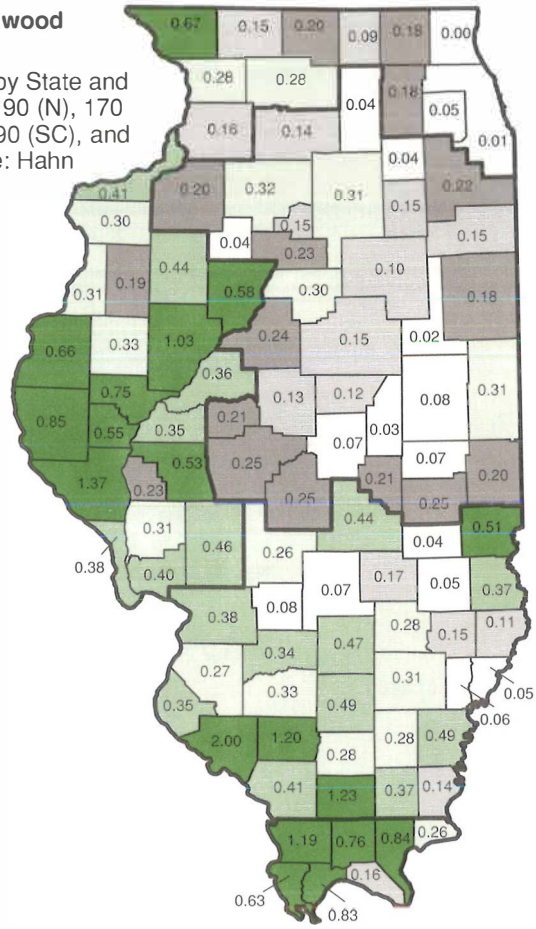


Figure 9. Maple-beech forest acreage.

County average by State and region: 10,300 (S), 6,500 (N), 6,000 (GP), 17,100 (W), 10,700 (SC), and 13,100 (SU). Source: Hahn 1987.

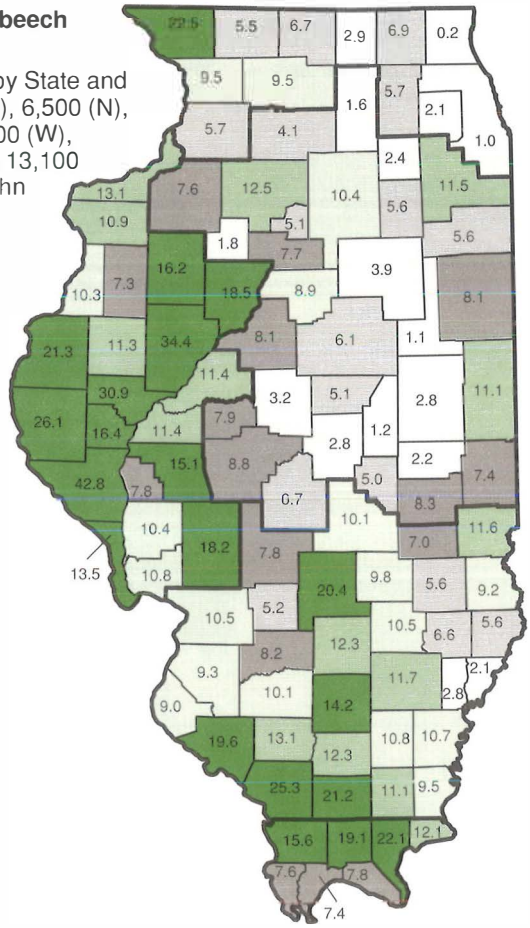
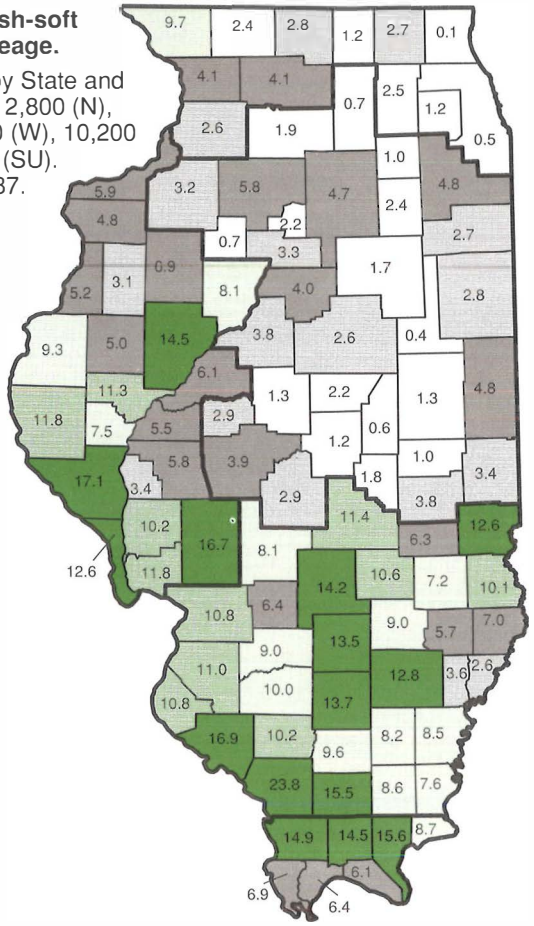


Figure 10. Elm-ash-soft maple forest acreage.

County average by State and region: 6,700 (S), 2,800 (N), 2,600 (GP), 8,700 (W), 10,200 (SC), and 10,400 (SU). Source: Hahn 1987.

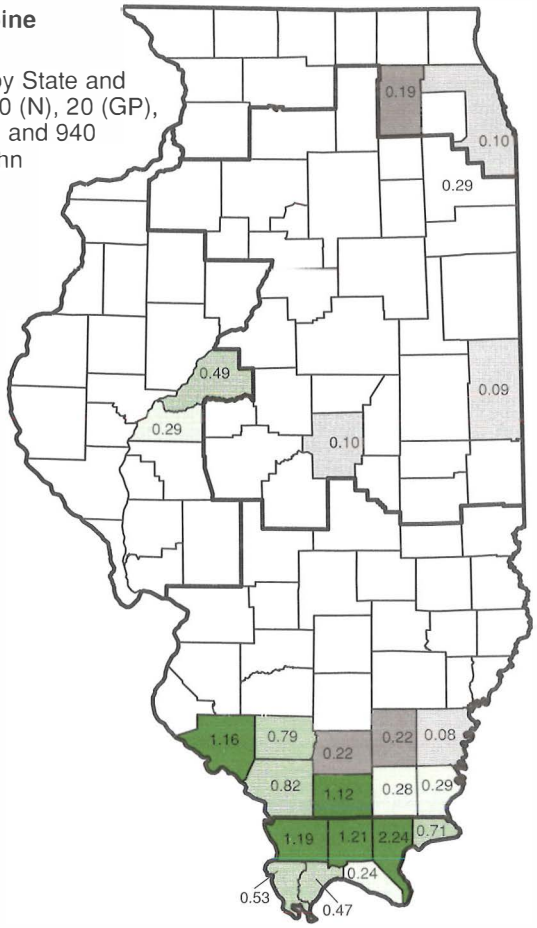


Acres (x 1000)

- 0.0 - 2.5
- 2.6 - 3.8
- 3.9 - 7.0
- 7.1 - 10.0
- 10.1 - 11.8
- 11.9 - 23.8

Figure 11. Oak-pine forest acreage.

County average by State and region: 130 (S), 20 (N), 20 (GP), 40 (W), 160 (SC), and 940 (SU). Source: Hahn 1987.

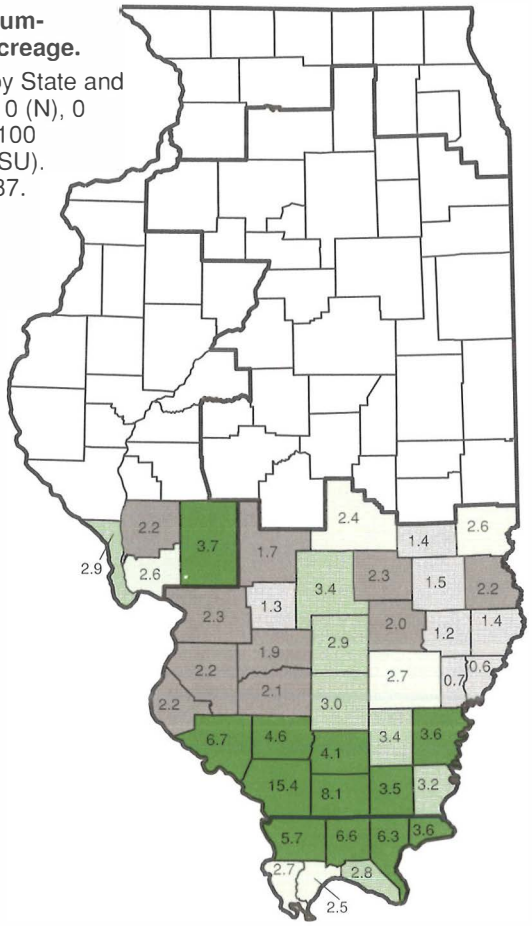


Acres (x 1000)

- 0.00
- 0.08 - 0.15
- 0.16 - 0.23
- 0.24 - 0.31
- 0.32 - 0.82
- 0.83 - 2.24

Figure 12. Oak-gum-cypress forest acreage.

County average by State and region: 1,400 (S), 0 (N), 0 (GP), 500 (W), 3,100 (SC), and 4,300 (SU). Source: Hahn 1987.



Acres (x 1000)

- 0.0
- 0.6 - 1.5
- 1.6 - 2.3
- 2.4 - 2.7
- 2.8 - 3.4
- 3.5 - 15.4

Figure 13. Shortleaf pine forest acreage.

County average by State and region: 440 (S), 0 (N), 0 (GP), 0 (W), 320 (SC), and 5,040 (SU). Source: Hahn 1987.

Acres (x 1000)

- 0.00
- 0.20 - 0.49
- 0.50 - 0.99
- 1.00 - 4.99
- 5.00 - 9.99
- 10.00 - 21.87

Figure 14. White pine forest acreage.

County average by State and region: 220 (S), 230 (N), 180 (GP), 430 (W), 100 (SC), and 310 (SU). Source: Hahn 1987.

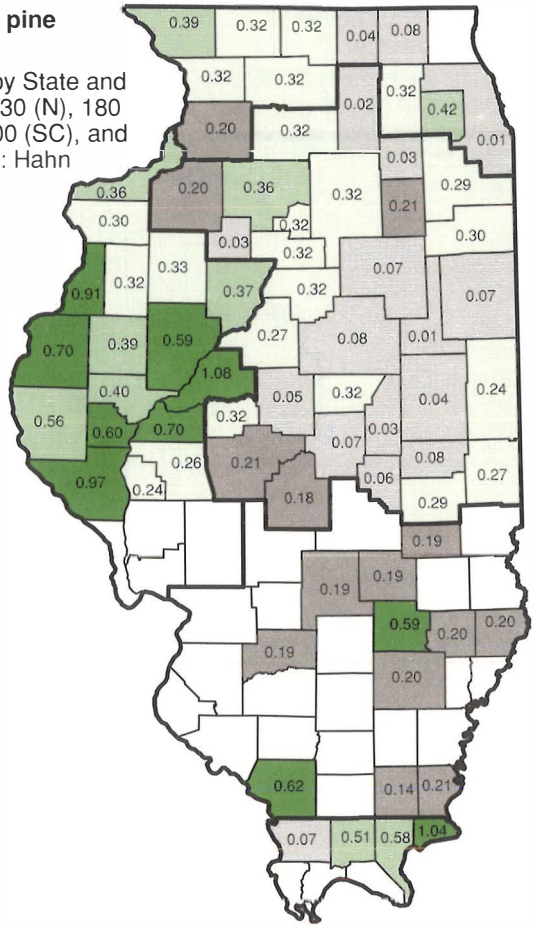


Figure 15. Volume of growing stock for all tree species.

County average by State and region: 47.4 (S), 24.0 (N), 18.4 (GP), 66.0 (W), 63.2 (SC), and 90.0 (SU). Source: Hahn 1987.

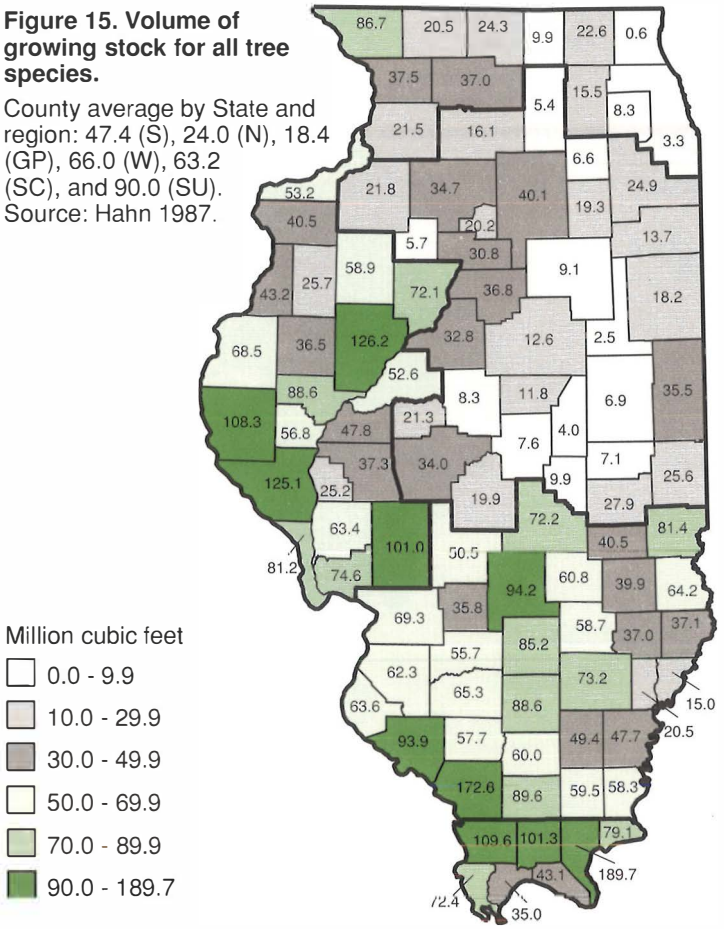


Figure 16. Volume of growing stock for hard hardwoods–species with a specific gravity >0.50, including oak, hickory, and ash.

County average by State and region: 32.4 (S), 16.0 (N), 12.2 (GP), 44.9 (W), 44.3 (SC), and 59.6 (SU). Source: Hahn 1987.

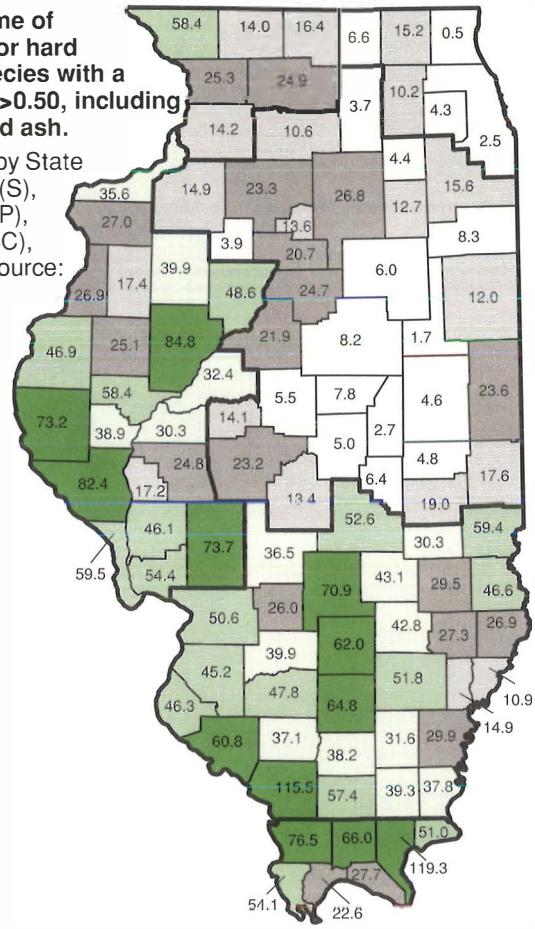


Figure 17. Volume of growing stock for soft hard woods–species with a specific gravity <0.50, including elm, cottonwood, basswood, and soft maple.

County average by State and region: 13.8 (S), 7.6 (N), 5.8 (GP), 20.1 (W), 17.9 (SC), and 22.9 (SU). Source: Hahn 1987.

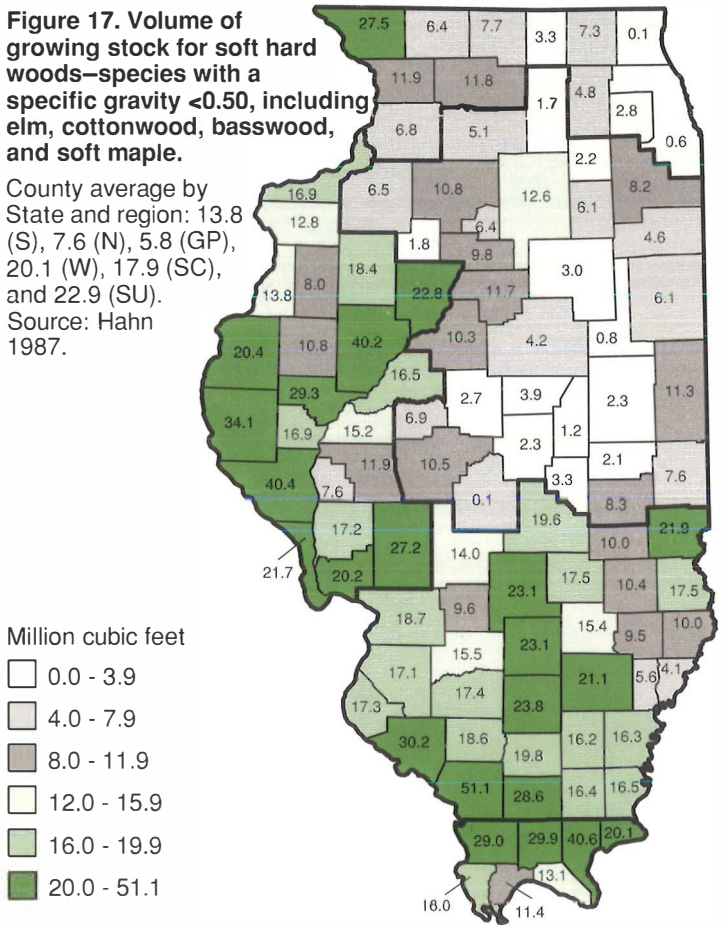


Figure 18. Volume of growing stock for pine.

County average by State and region: 1.0 (S), 0.3 (N), 0.3 (GP), 0.8 (W), 0.7 (SC), and 6.7 (SU). Source: Hahn 1987.

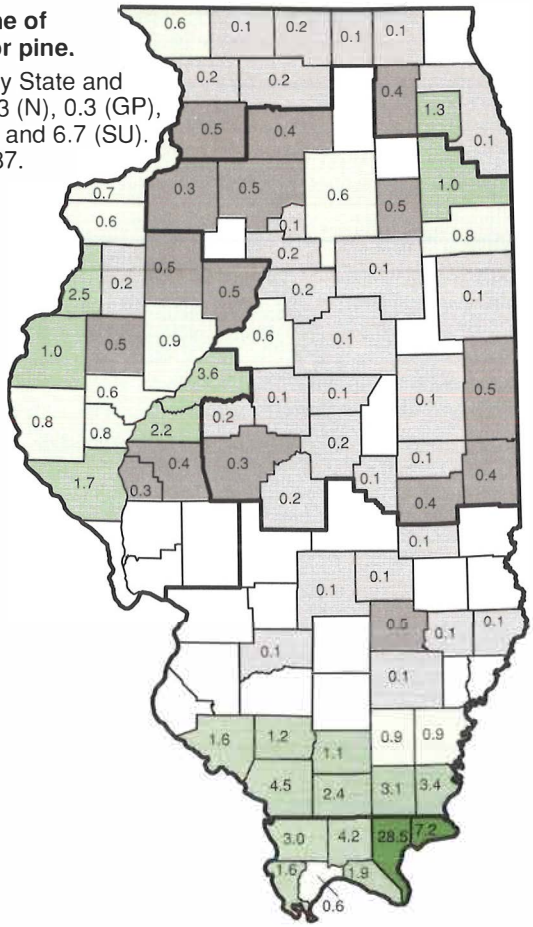


Figure 19. Annual growth of growing stock.

County average for all species by State and region: 941 (S), 402 (N), 362 (GP), 1,242 (W), 1,314 (SC), and 1,873 (SU). For a rough conversion to net sawtimber growth in thousands of board feet, multiply values by 4.6. Source: Hahn 1987.

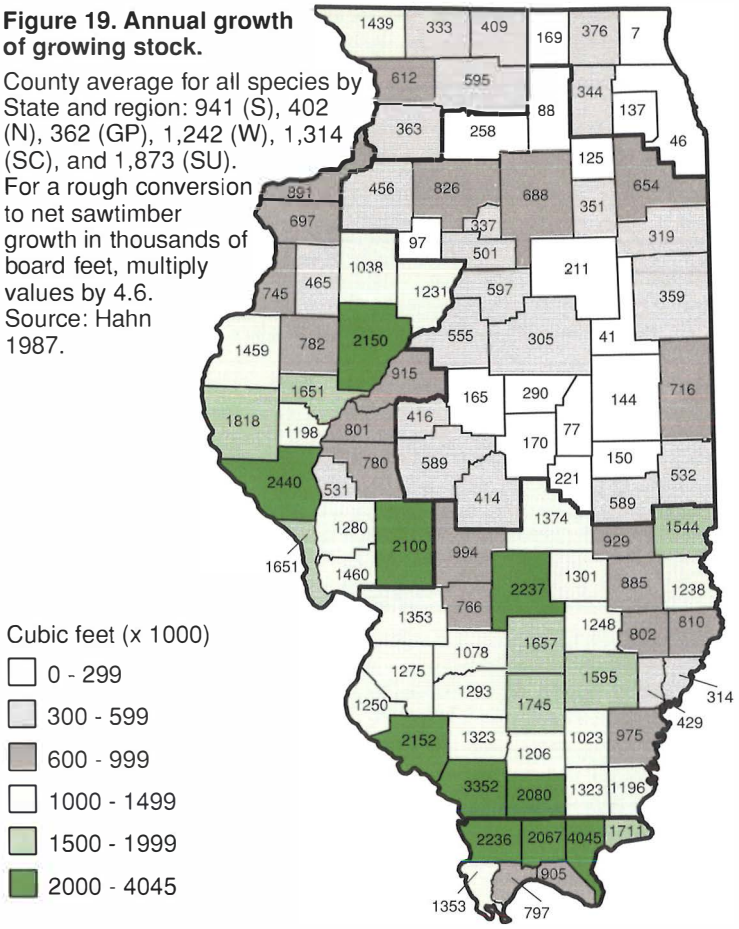


Figure 20. Annual growth of hard hardwoods.

County average by State and region: 572 (S), 255 (N), 228 (GP), 781 (W), 797 (SC), and 1,025 (SU). Source: Hahn 1987.

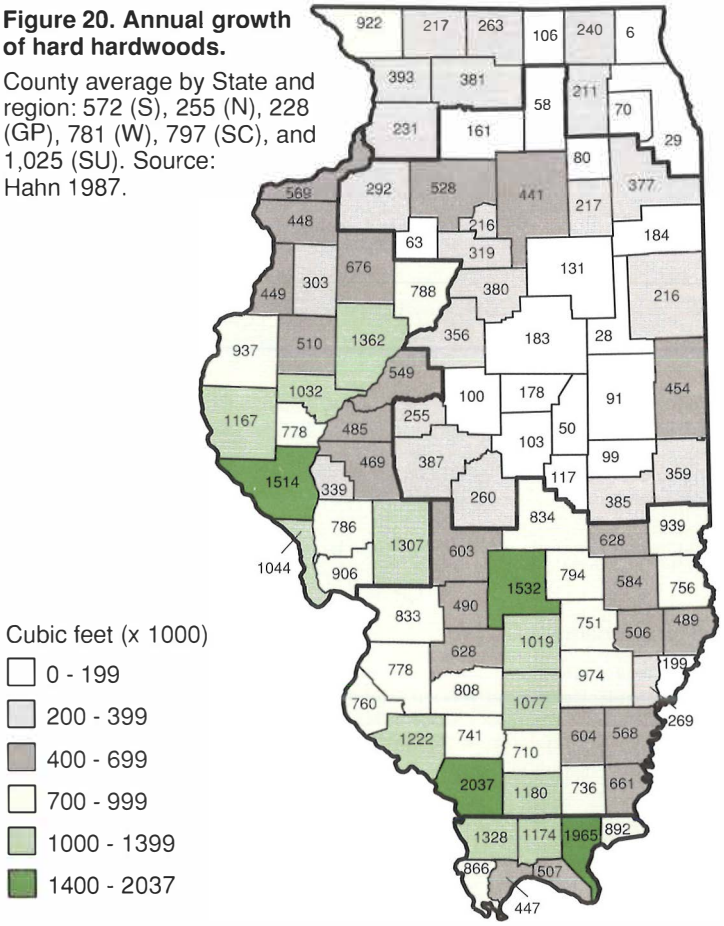


Figure 21. Annual growth of soft hardwoods.

County average by State and region: 336 (S), 139 (N), 127 (GP), 441 (W), 490 (SC), and 605 (SU). Source: Hahn 1987.

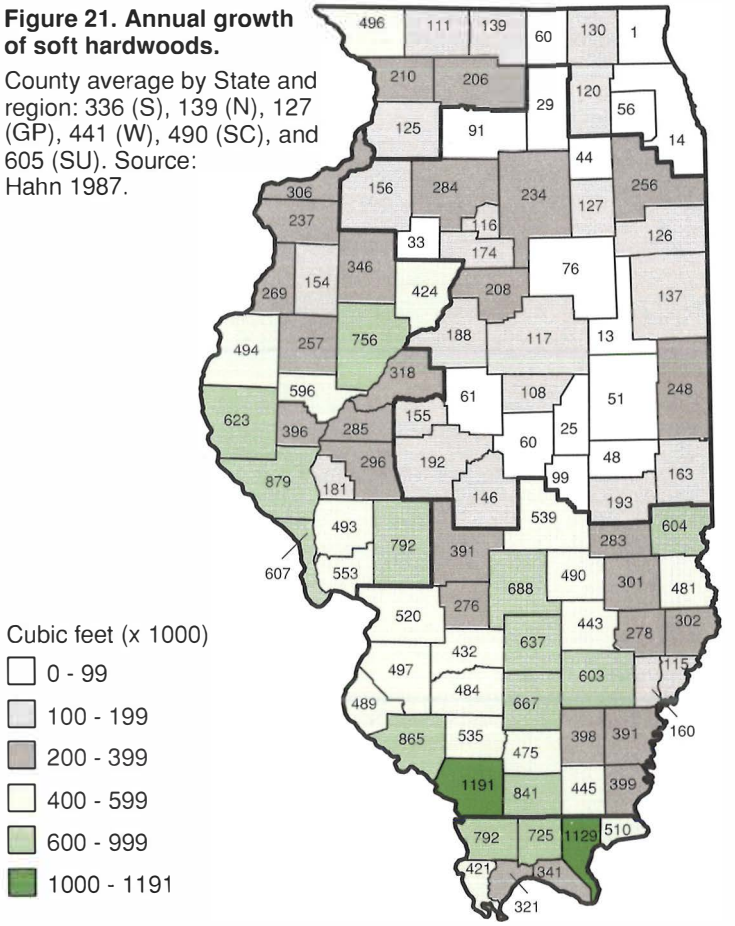


Figure 22. Annual growth of pine.

County average by State and region: 27 (S), 6 (N), 5 (GP), 15 (W), 21 (SC), and 219 (SU). Source: Hahn 1987.

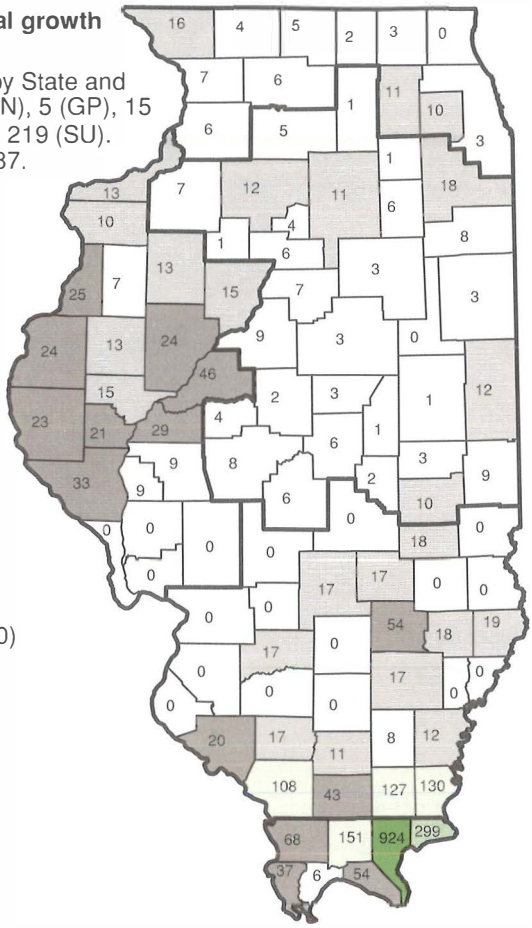


Figure 23. Sawlogs grown.

Data includes total resources in the stands. County average by State and region: 4,285 (S), 1,772 (N), 1,555 (GP), 5,764 (W), 6,312 (SC), and 7,274 (SU). Source: Hahn 1987.

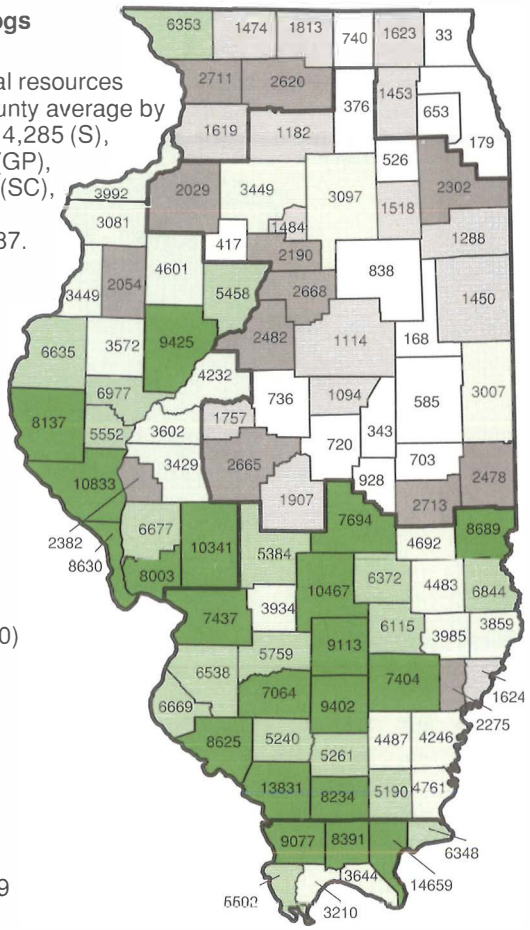


Figure 24. Proportion of sawtimber in commercial forests.

County average by State and region: 63 (S), 71 (N), 60 (GP), 66 (W), 62 (SC), and 58 (SU). Source: Hahn 1987.

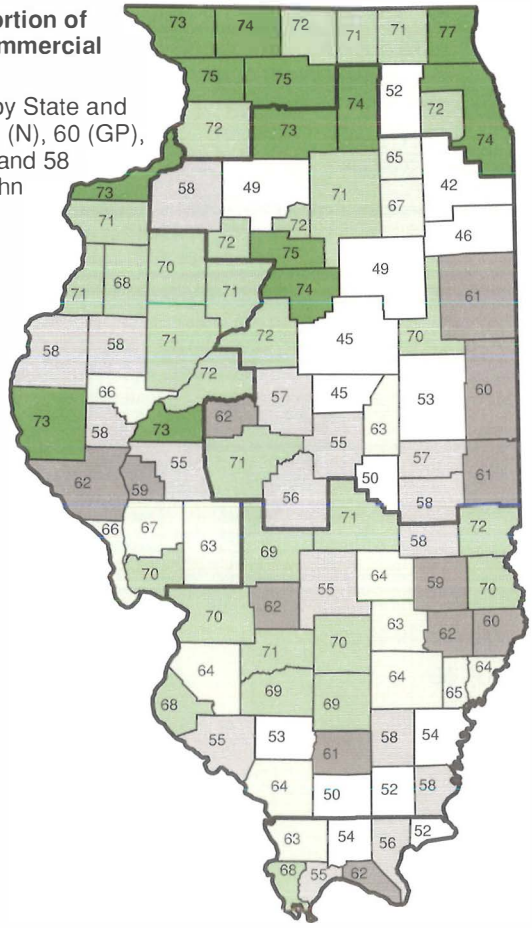


Figure 25. Sawtimber acreage.

County average by State and region: 25,100 (S), 14,400 (N), 10,500 (GP), 37,300 (W), 32,000 (SC), and 40,900 (SU). Source: Hahn 1987.

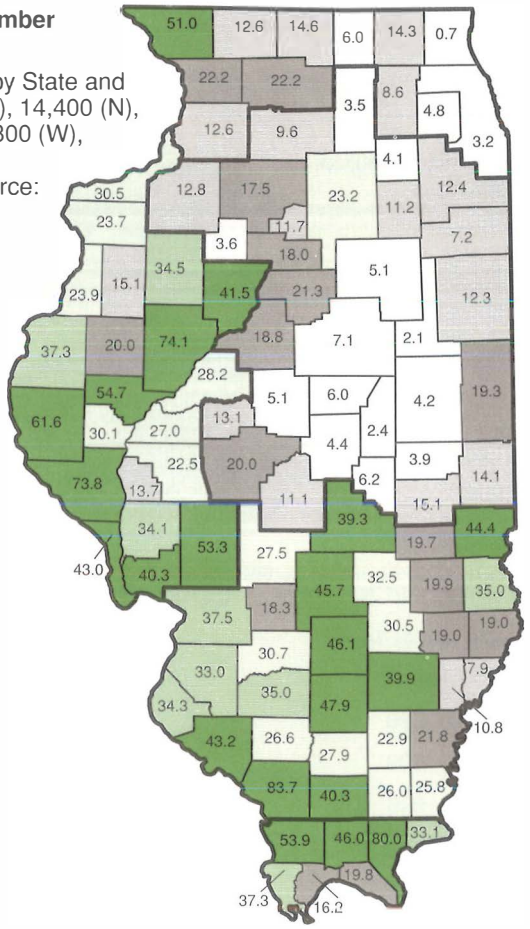


Figure 26. Pole timber acreage.

County average acreage by State and region: 7,600 (S), 3,100 (N), 3,500 (GP), 10,300 (W), 9,600 (SC), and 15,800 (SU). Source: Hahn 1987.

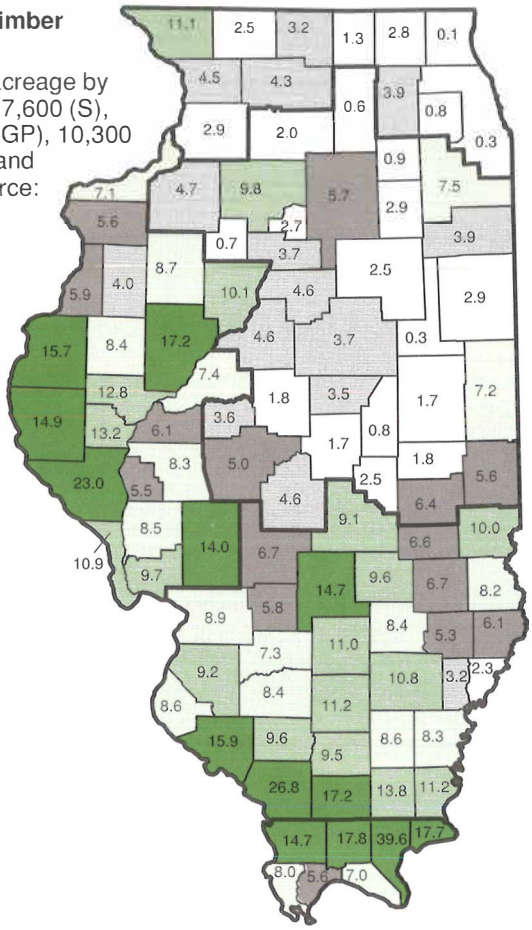
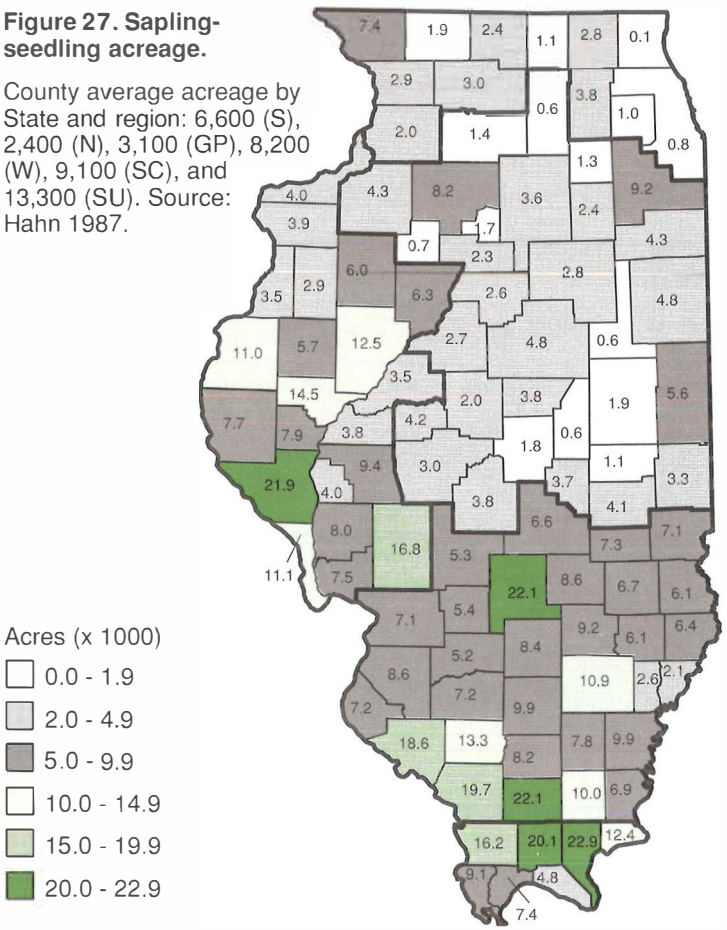


Figure 27. Sapling-seedling acreage.

County average acreage by State and region: 6,600 (S), 2,400 (N), 3,100 (GP), 8,200 (W), 9,100 (SC), and 13,300 (SU). Source: Hahn 1987.



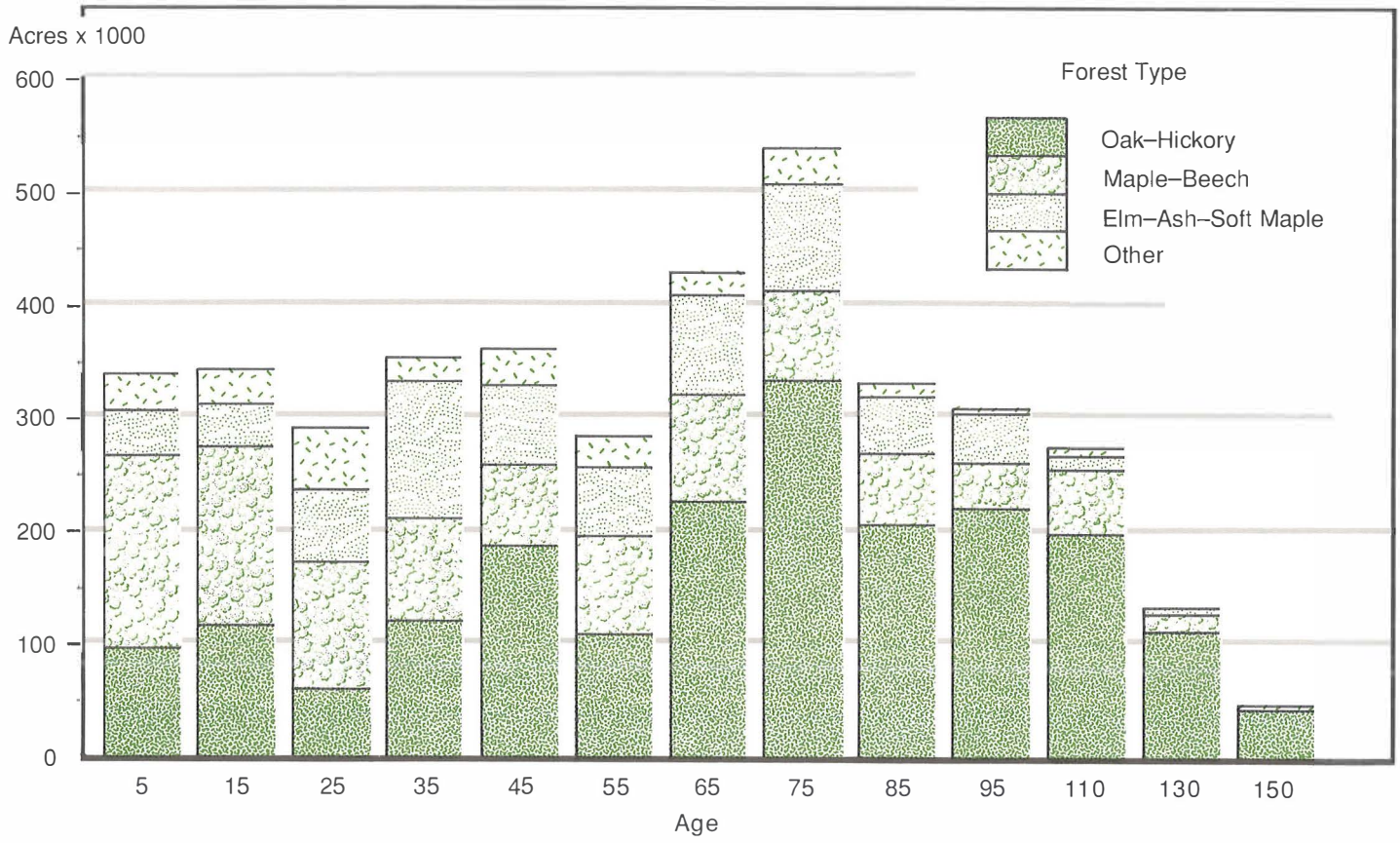
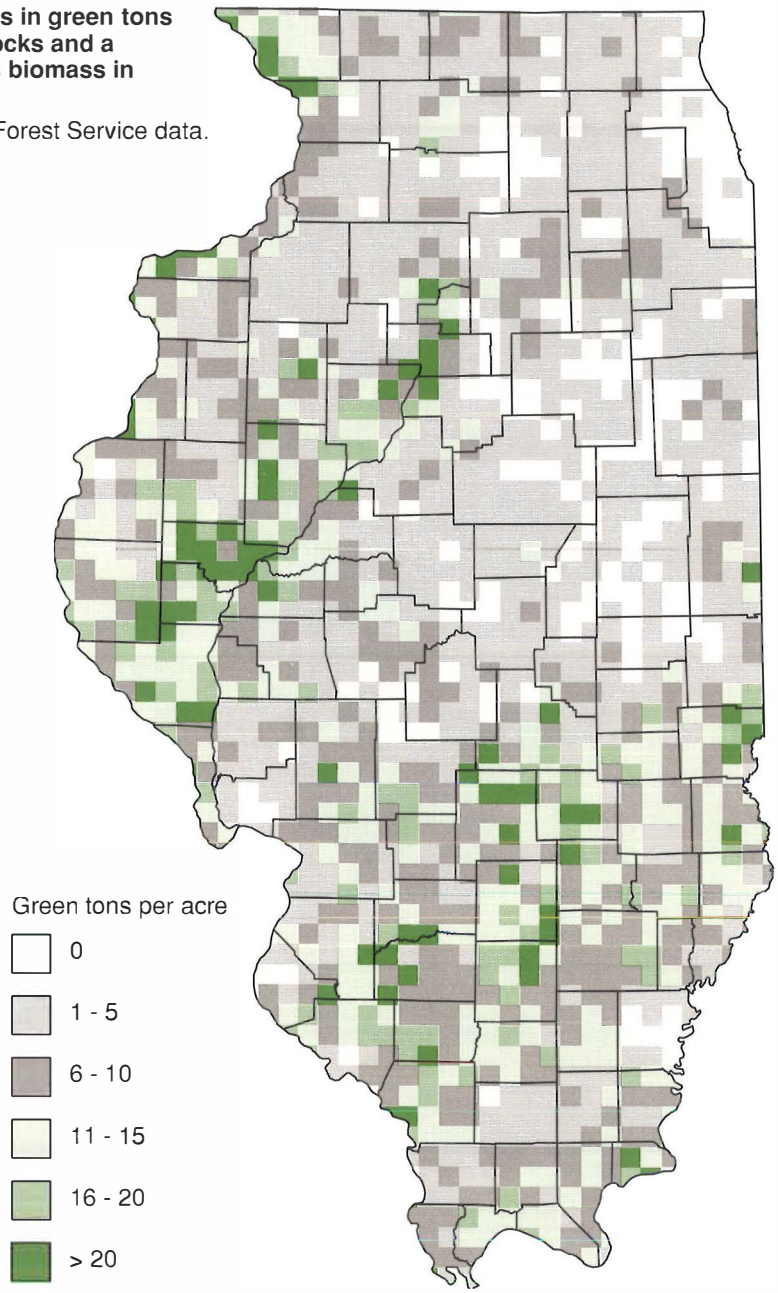
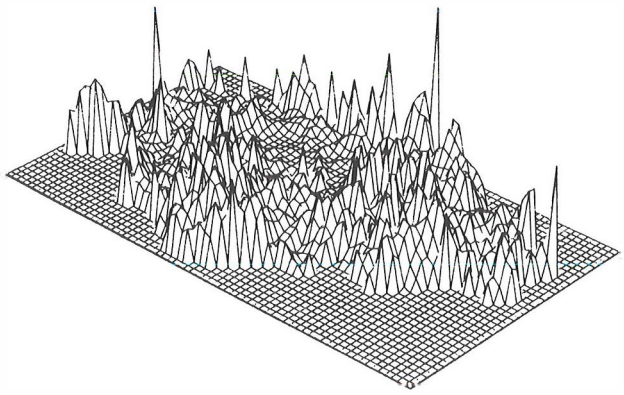


Figure 28. Acreage by age classes of the three major forest types in Illinois.
Source: Hahn 1987.

Figure 29. Total woody biomass in green tons per acre for township-sized blocks and a stereogram pair to view Illinois biomass in three dimensions.

Source: Burnett 1988, with U.S. Forest Service data.





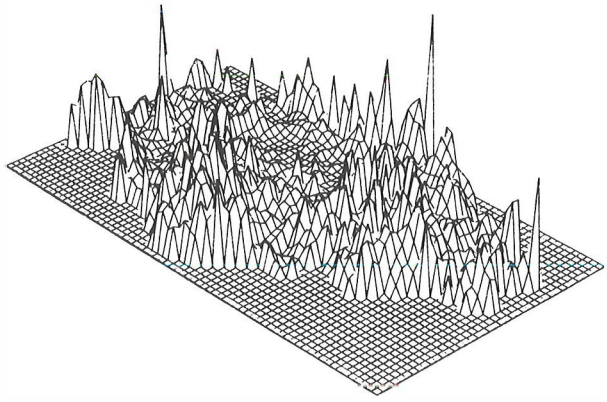


Figure 30. Distribution of forests managed or protected by state and federal agencies.

Source: Illinois Geographic Information System data, described in Risser and Iverson 1988.

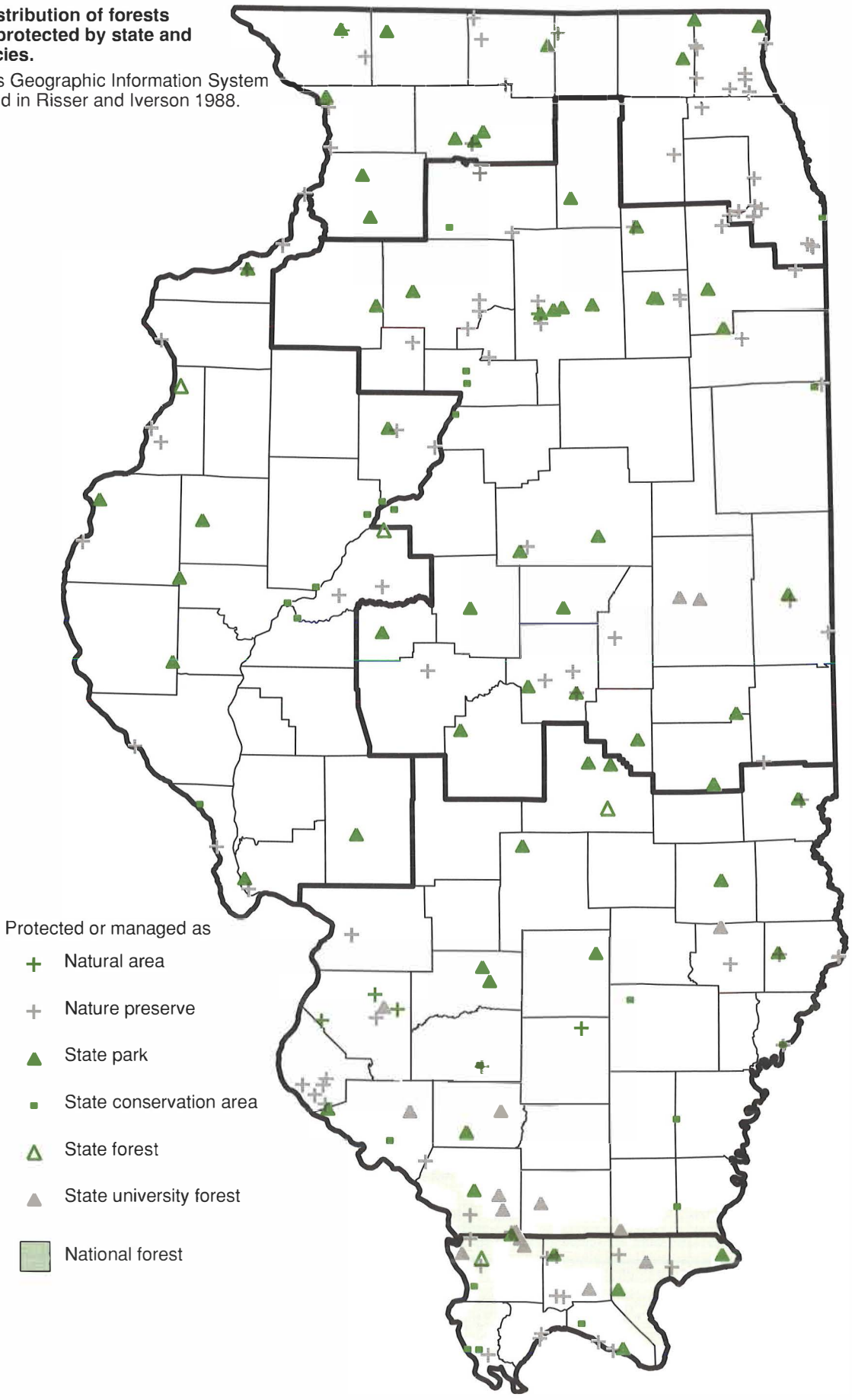


Figure 31. Location of high-quality forests, grades A and B as designated by the Natural Areas Inventory.
Source: White 1978.

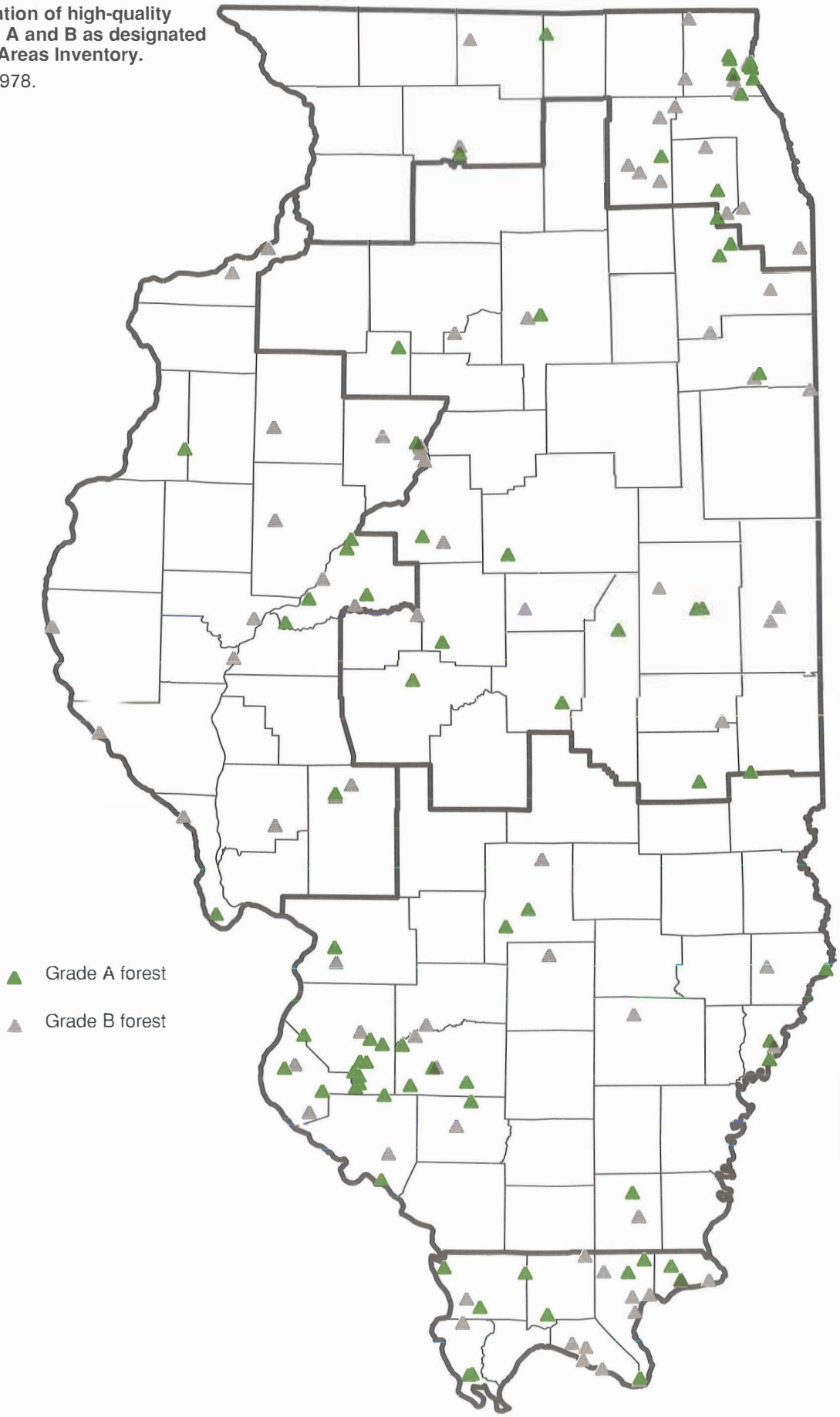
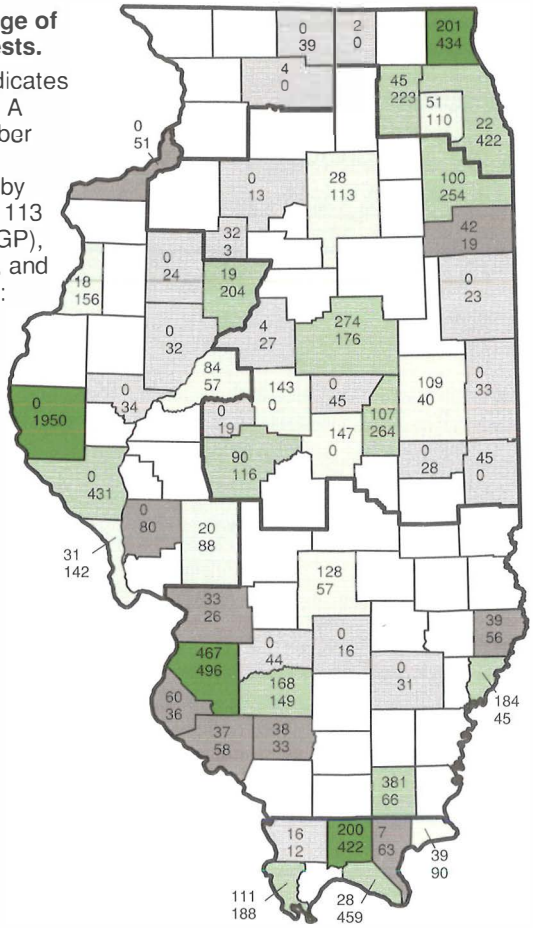
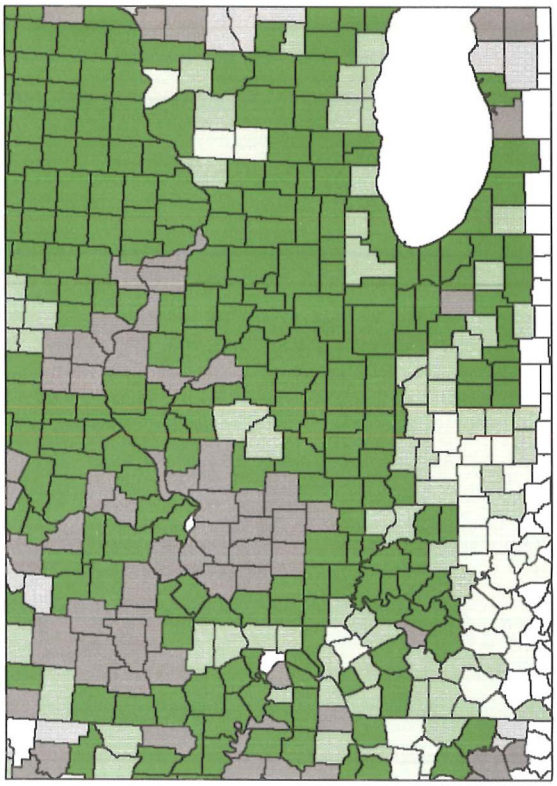


Figure 32. Acreage of high-quality forests.

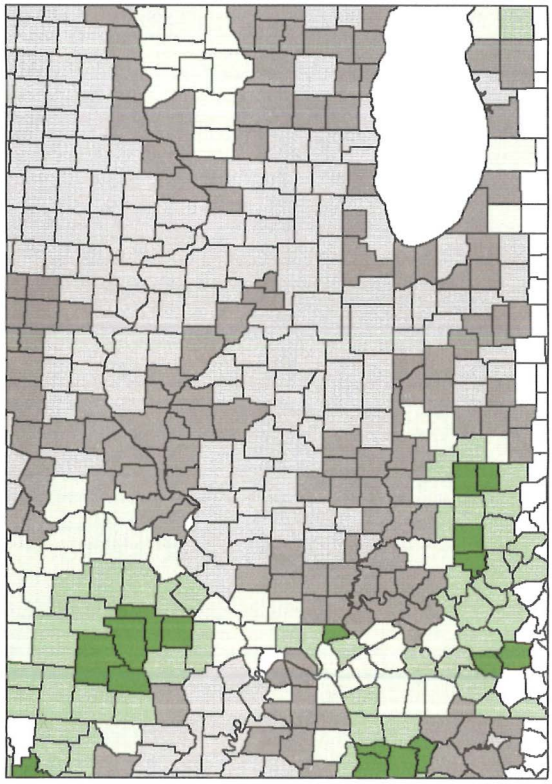
Upper number indicates acreage of Grade A forest; lower number Grade B. County average acreage by State and region: 113 (S), 129 (N), 74 (GP), 162 (W), 85 (SC), and 233 (SU). Source: White 1978.



Acres
- 0
- 1 - 49
- 50 - 99
- 100 - 199
- 200 - 499
- 500 - 1950



Percent difference
- Nonstudy
- < -15
- -15 to -6
- -5 to 5
- 6 to 15
- > 15



Percent forest cover
- Nonstudy
- 1 - 10
- 11 - 30
- 31 - 50
- 51 - 70
- 71 - 100

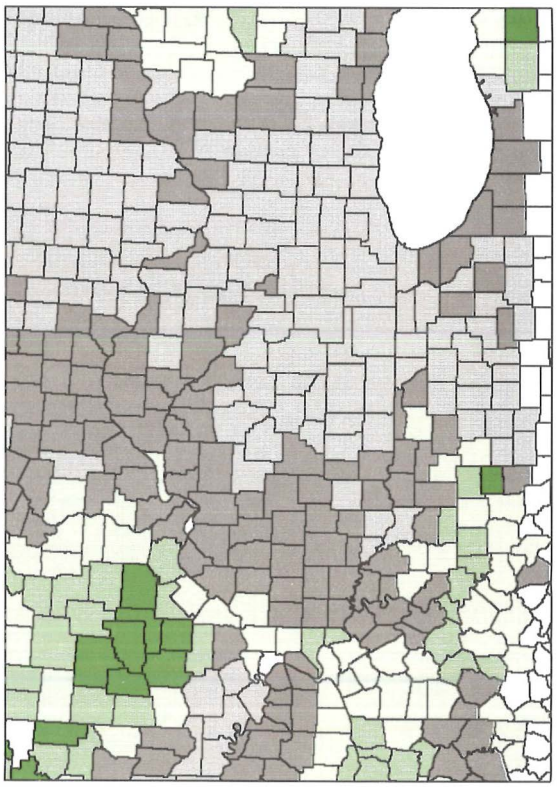


Figure 33. Forest Cover percentages for 428 counties in several midwestern states.

Estimates by AVHRR satellite (lower left) and by U.S. Forest Service (lower right); differences between the two estimates (upper right). Source: Iverson et al. 1988.

Figure 34. Sawlogs cut.

Data includes only logs sent to sawmills. County average by State and region: 1,657 (S), 510 (N), 572 (GP), 1,638 (W), 2,883 (SC), and 3,060 (SU). Source: Blyth et al. 1987.

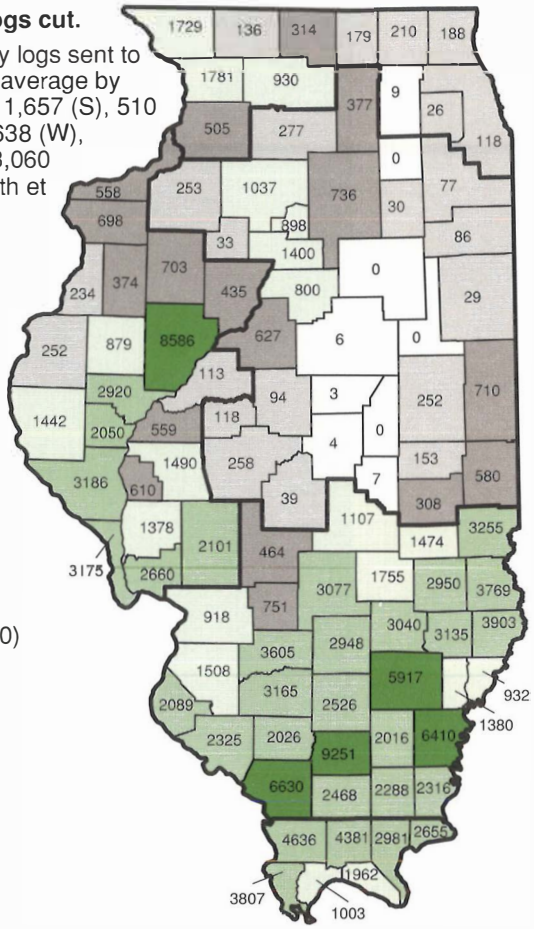


Figure 35. Fuelwood production.

County average by State and region: 16,012 (S), 49,482 (N), 19,228 (GP), 7,907 (W), 7,918 (SC), and 4,548 (SU). To approximate cubic feet, multiply by 79. Source: Blyth et al. 1987.

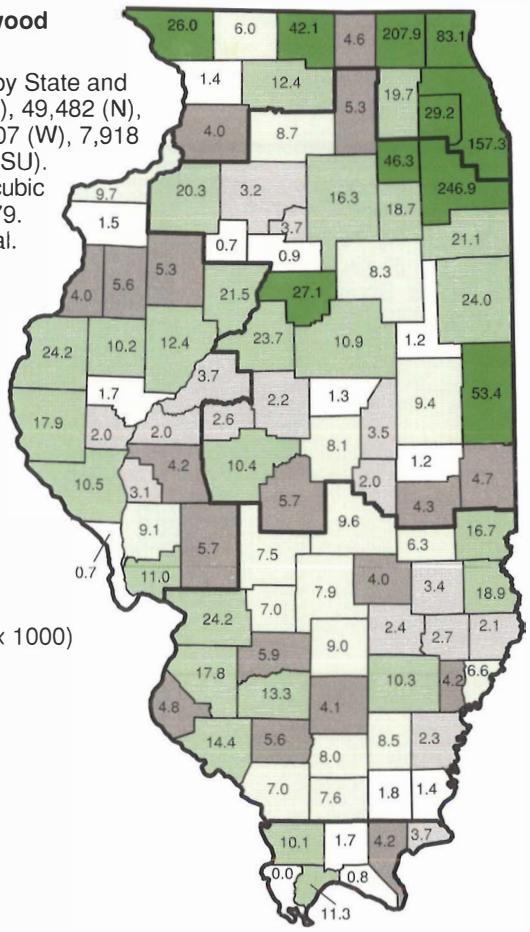


Figure 36. Roundwood cut.

County average by State and region: 1,445 (S), 3,546 (N), 1,410 (GP), 888 (W), 1,082 (SC), and 1,279 (SU). Source: Blyth et al. 1987.

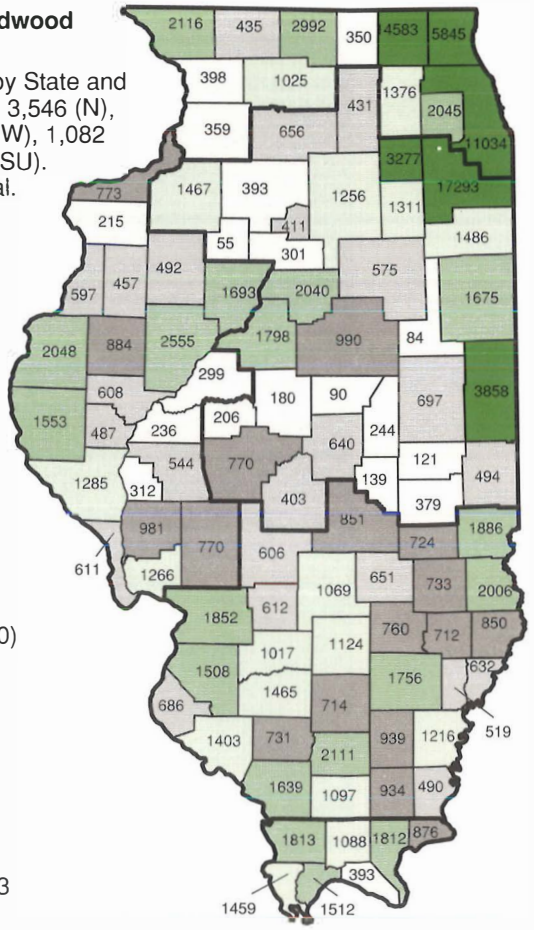


Figure 37. Sawmills and planing mills by zipcode.

Upper number indicates number of sites by county; lower number indicates number of employees. Source: Dun & Bradstreet data base 1984.

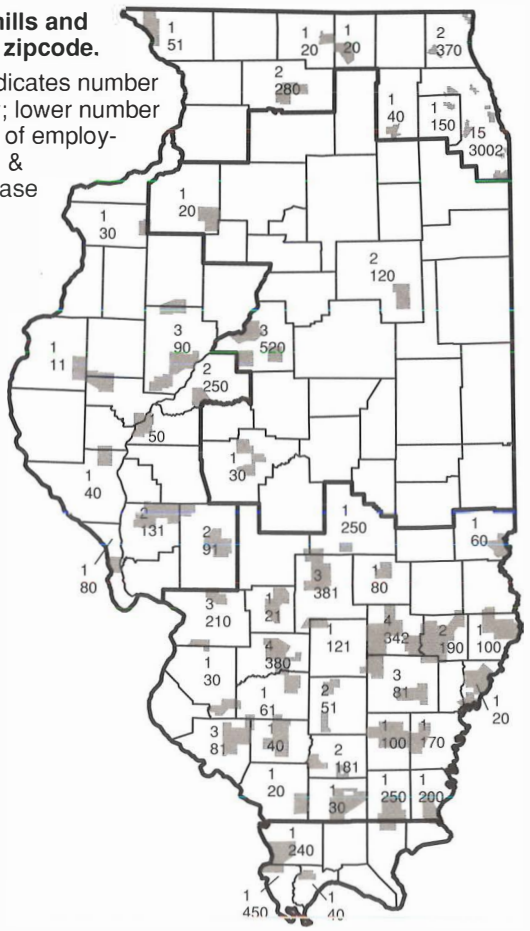


Figure 38. Millwork, plywood, and structural member firms by zipcode.

Upper number indicates number of sites by county; lower number indicates number of employees. Source: Dun & Bradstreet data base 1984.

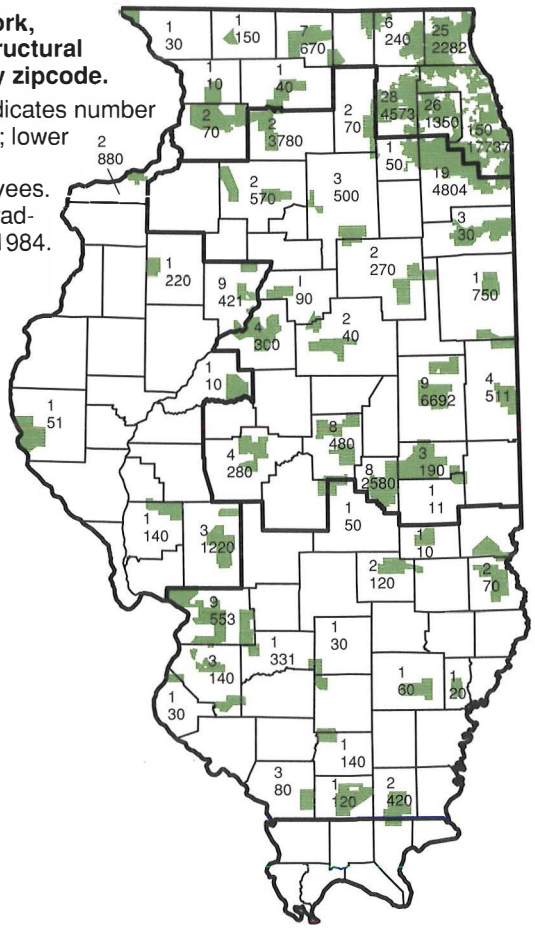


Figure 39. Wood container and pallet firms by zipcode.

Upper number indicates number of sites by county; lower number indicates number of employees. Source: Dun & Bradstreet data base 1984.

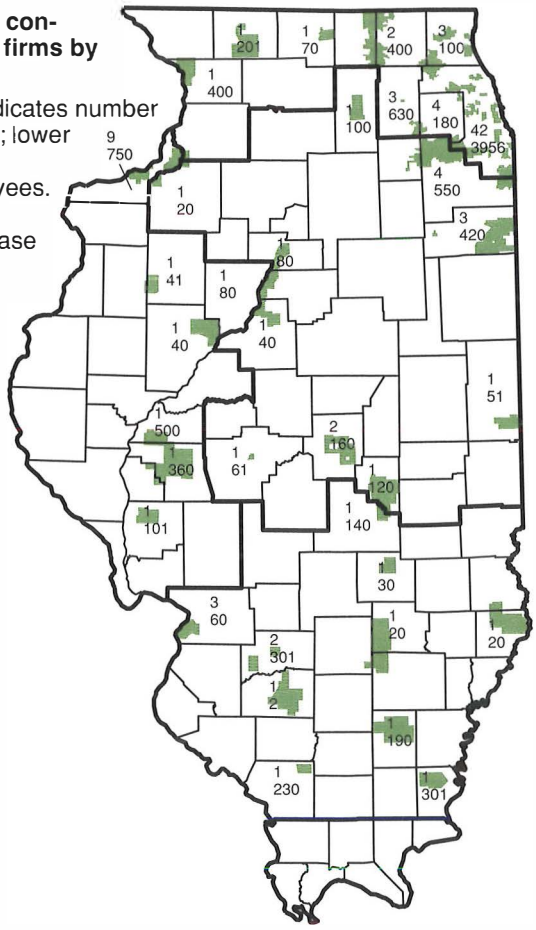


Figure 40. Wood building and mobile home firms by zipcode.

Upper number indicates number of sites by county; lower number indicates number of employees. Source: Dun & Bradstreet data base 1984.

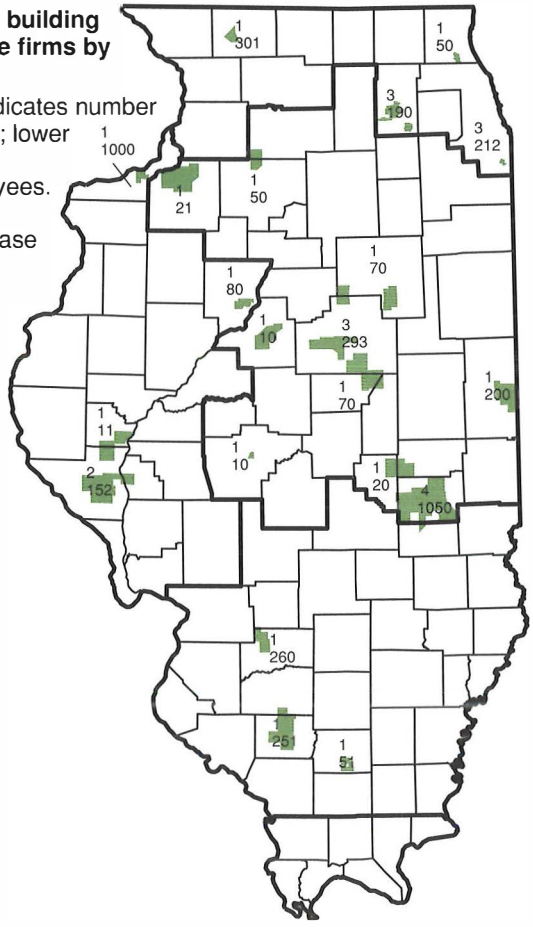


Figure 41. Miscellaneous wood product firms by zipcode.

Upper number indicates number of sites by county; lower number indicates number of employees. Source: Dun & Bradstreet data base 1984.

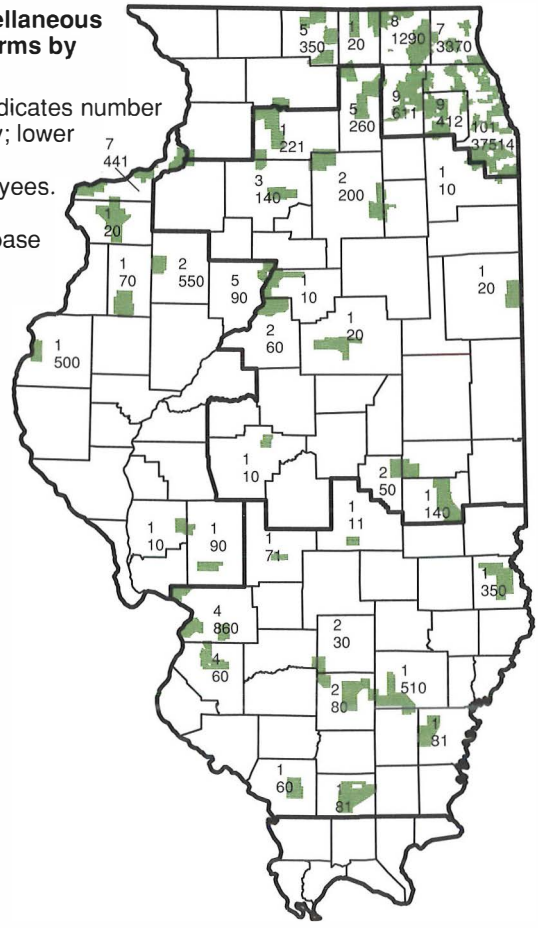


Figure 42. Wood household and office furniture firms by zipcode.

Upper number indicates number of sites by county; lower number indicates number of employees. Source: Dun & Bradstreet data base 1984.

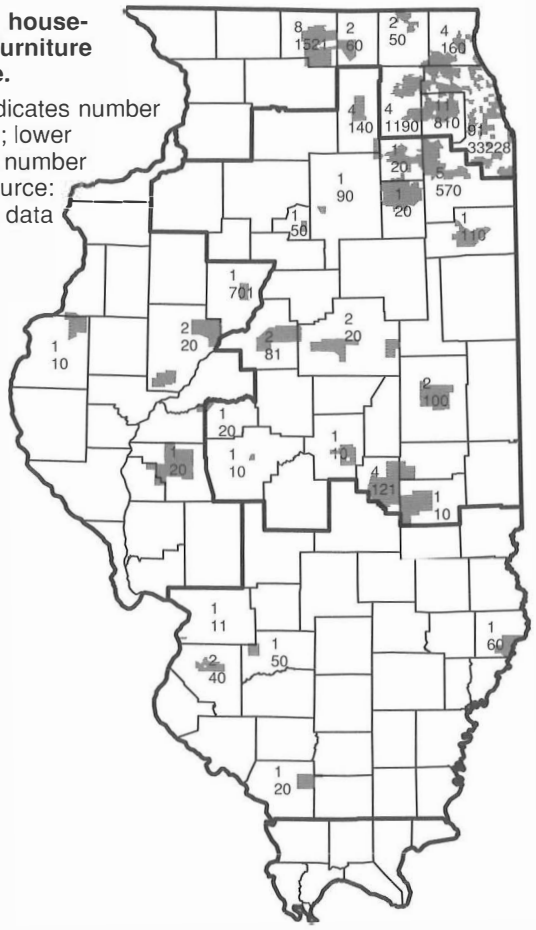


Figure 43. Paper and allied product firms by zipcode.

Upper number indicates number of sites by county; lower number indicates number of employees. Source: Dun & Bradstreet data base 1984.

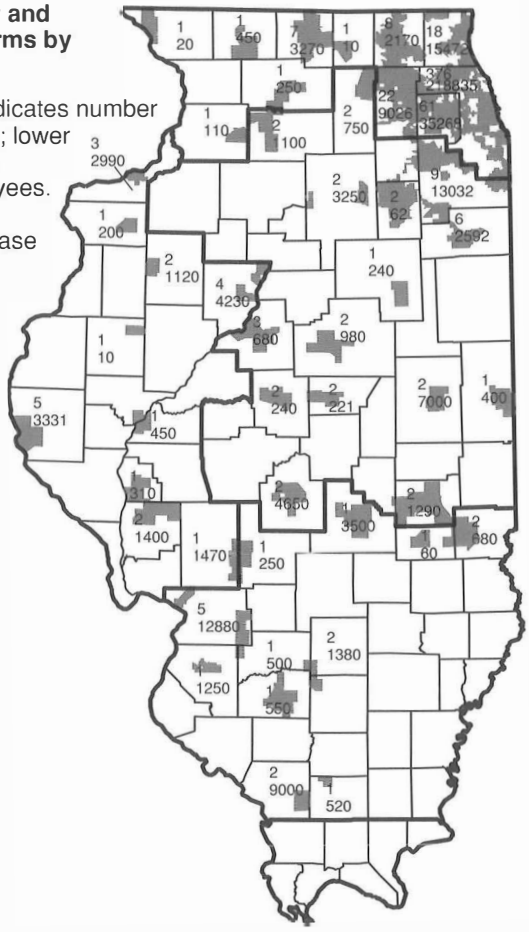


Figure 44. Wholesale paper product firms by zipcode.

Upper number indicates number of sites by county; lower number indicates number of employees. Source: Dun & Bradstreet data base 1984.

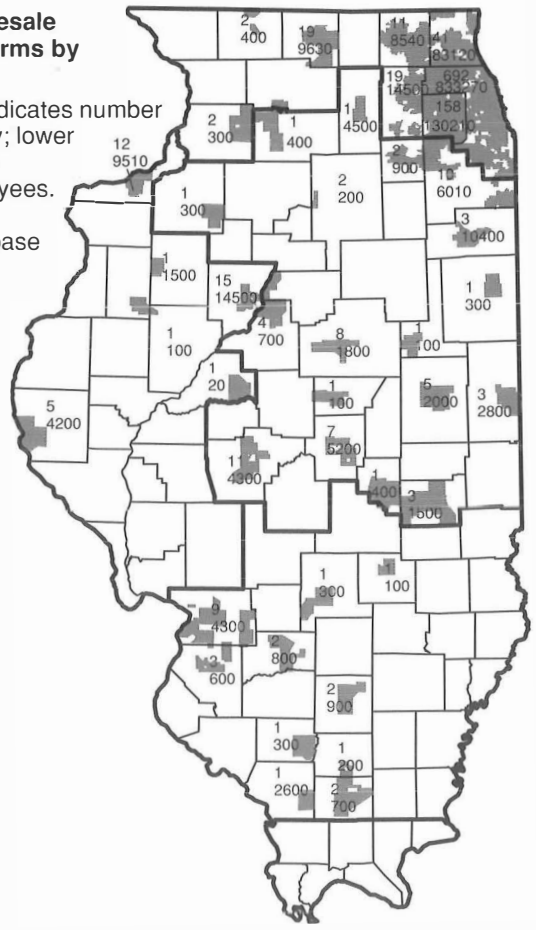


Figure 45. Wholesale lumber and other building material firms by zipcode.

Upper number indicates number of sites by county; lower number indicates number of employees. Source: Dun & Bradstreet data base 1984.

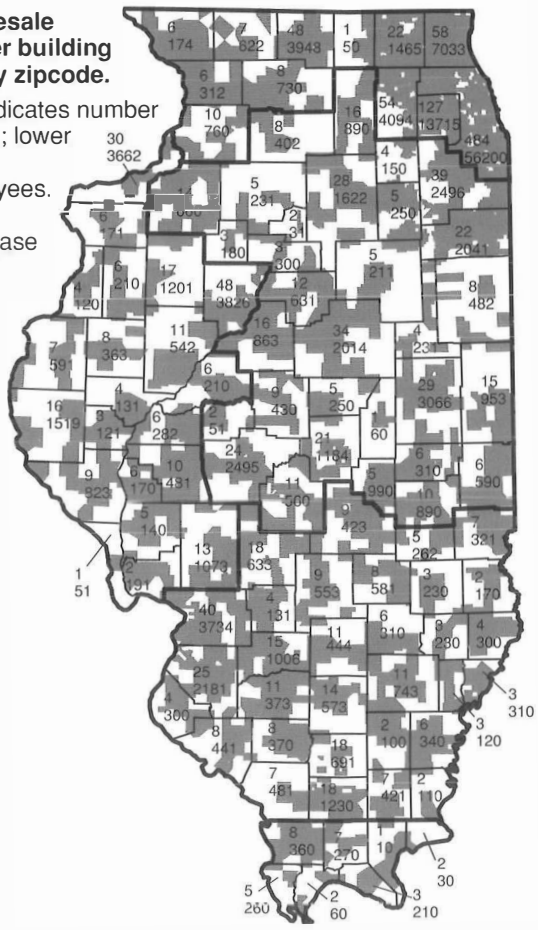


Figure 46. Percent of commercial forests in public ownership.

County average by State and region: 6.3 (S), 3.7 (N), 3.2 (GP), 3.9 (W), 6.4 (SC), and 31.3 (SU). Source: Hahn 1987.

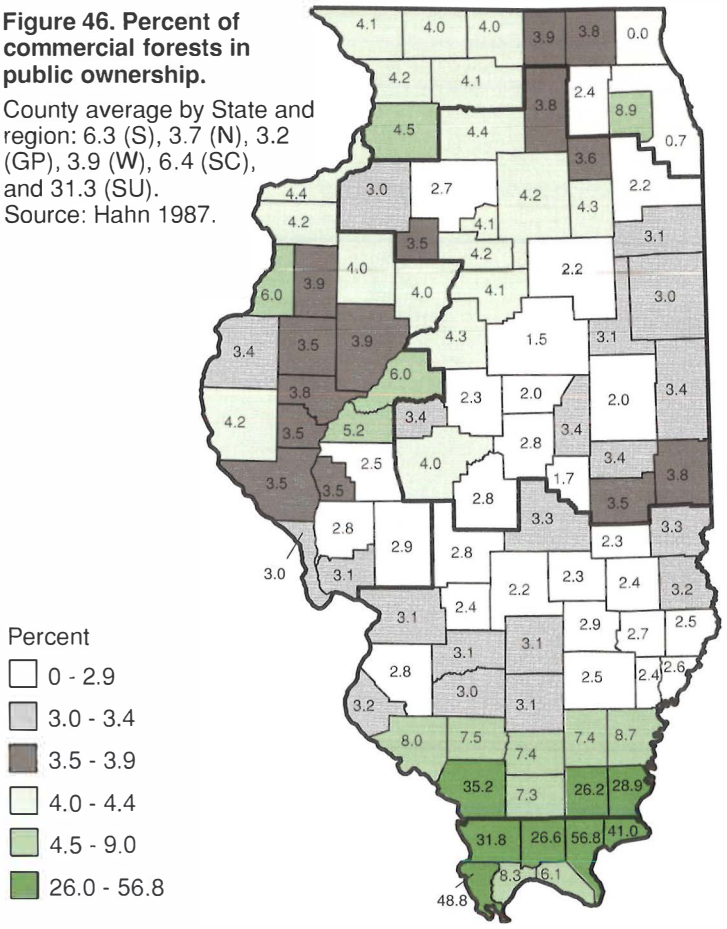
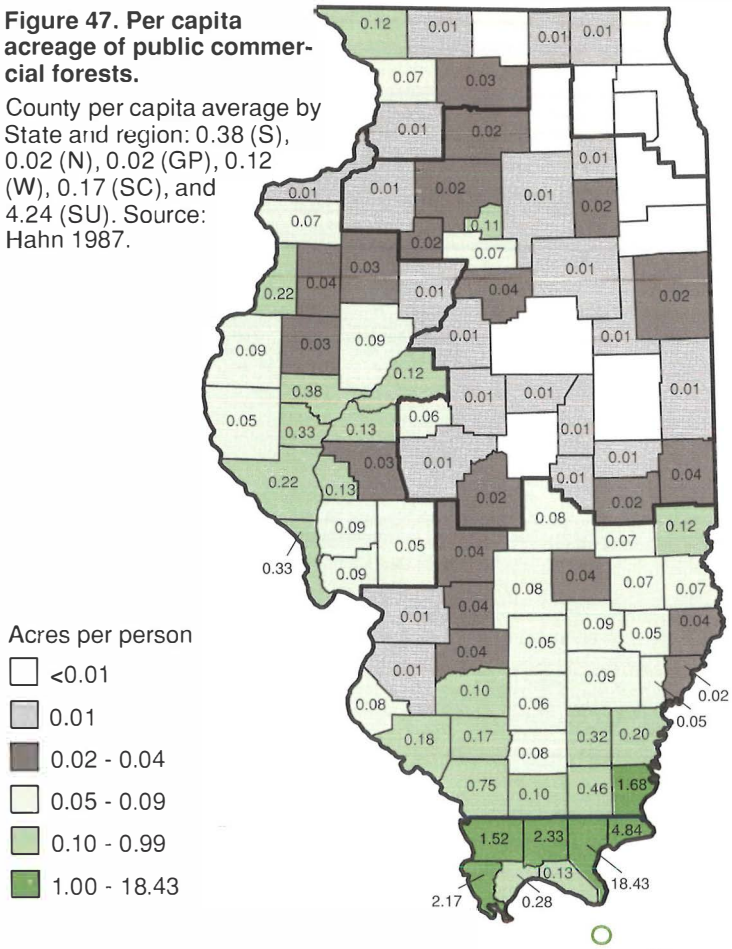


Figure 47. Per capita acreage of public commercial forests.

County per capita average by State and region: 0.38 (S), 0.02 (N), 0.02 (GP), 0.12 (W), 0.17 (SC), and 4.24 (SU). Source: Hahn 1987.



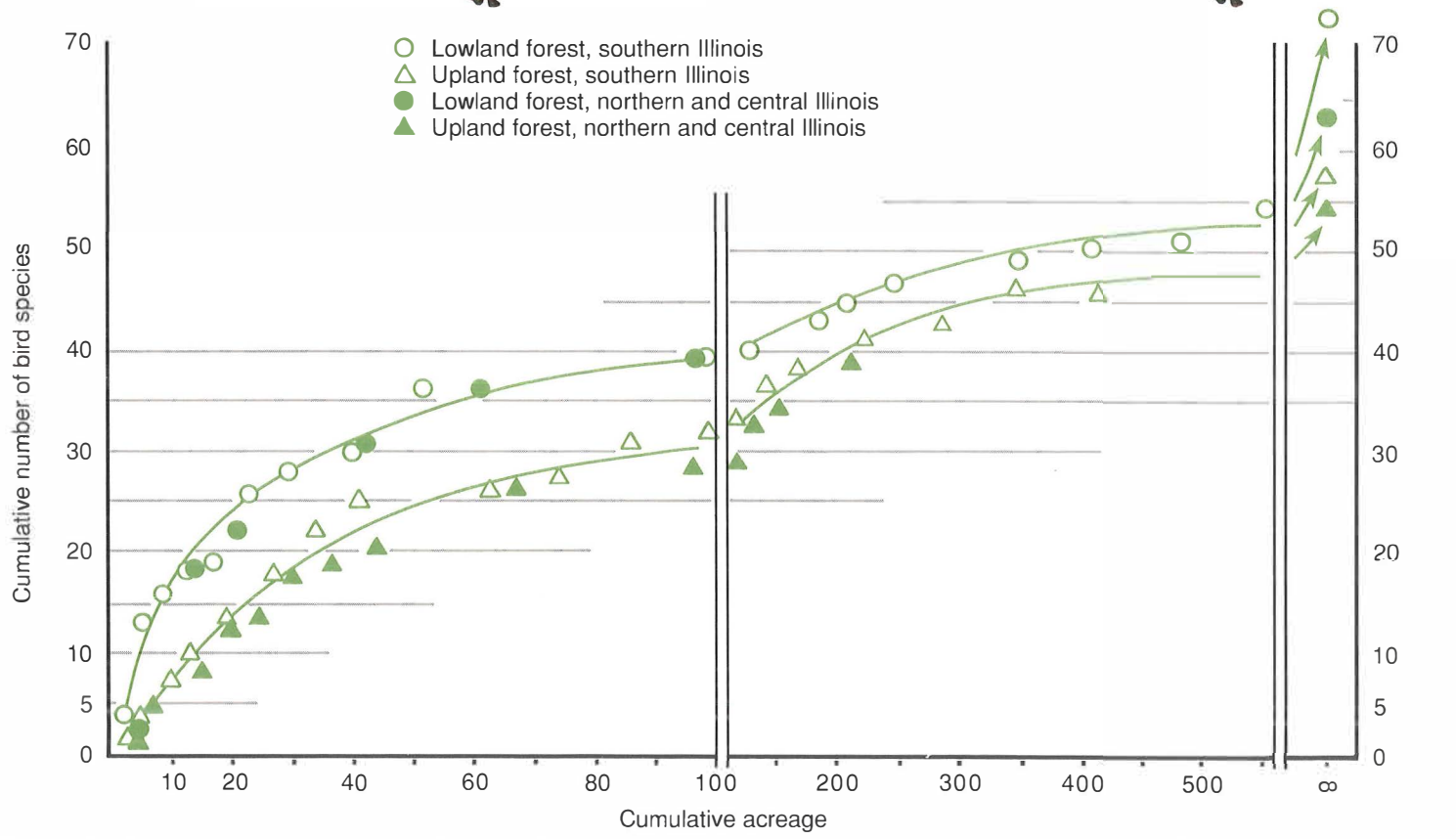
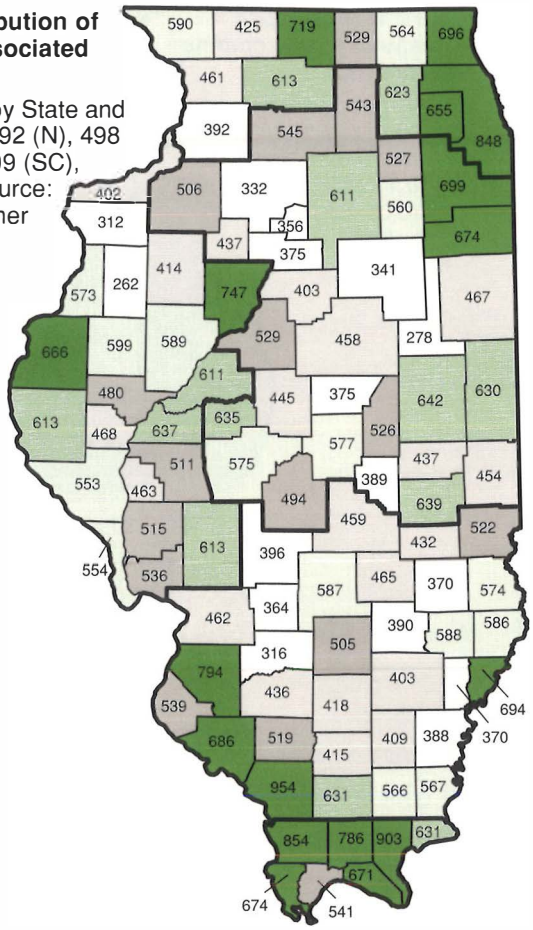


Figure 48. Number of bird species nesting in upland and lowland forest tracts of varying sizes in the northern, central, and southern thirds of Illinois.

Source: Graber and Graber 1976.

Figure 49. Distribution of native forest-associated taxa.

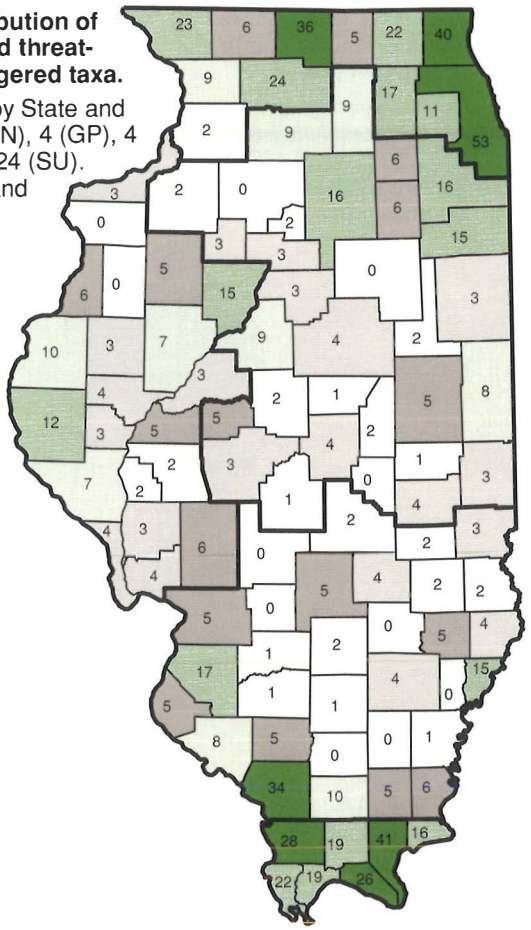
County average by State and region: 534 (S), 592 (N), 498 (GP), 529 (W), 509 (SC), and 722 (SU). Source: Iverson and Ketzner 1988.



Number of taxa
- 260 - 399
- 400 - 474
- 475 - 549
- 550 - 599
- 600 - 649
- 650 - 954

Figure 50. Distribution of forest-associated threatened and endangered taxa.

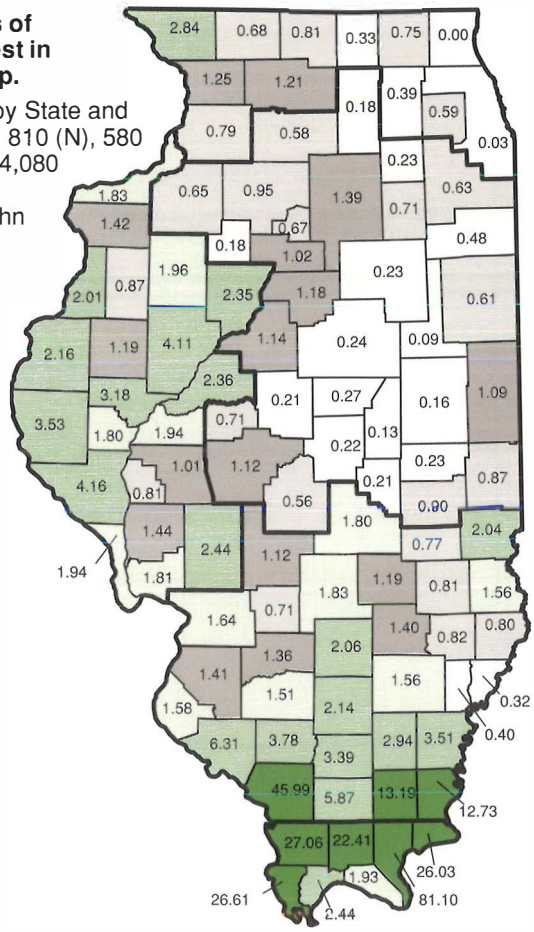
County average by State and region: 8 (S), 20 (N), 4 (GP), 4 (W), 4 (SC), and 24 (SU). Source: Iverson and Ketzner 1988.



Number of taxa
- 0 - 2
- 3 - 4
- 5 - 6
- 7 - 10
- 11 - 25
- 26 - 53

Figure 51. Acres of commercial forest in public ownership.

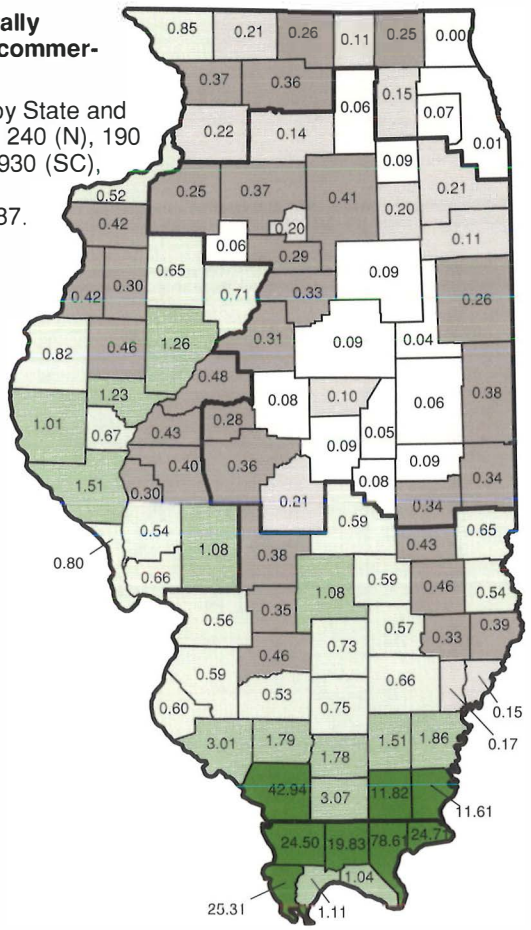
County average by State and region: 3,780 (S), 810 (N), 580 (GP), 2,110 (W), 4,080 (SC), and 26,800 (SU). Source: Hahn 1987.



Acres (x 1000)
- 0.00 - 0.49
- 0.50 - 0.99
- 1.00 - 1.49
- 1.50 - 1.99
- 2.00 - 9.99
- 10.00 - 81.10

Figure 52. Federally owned acres of commercial forest.

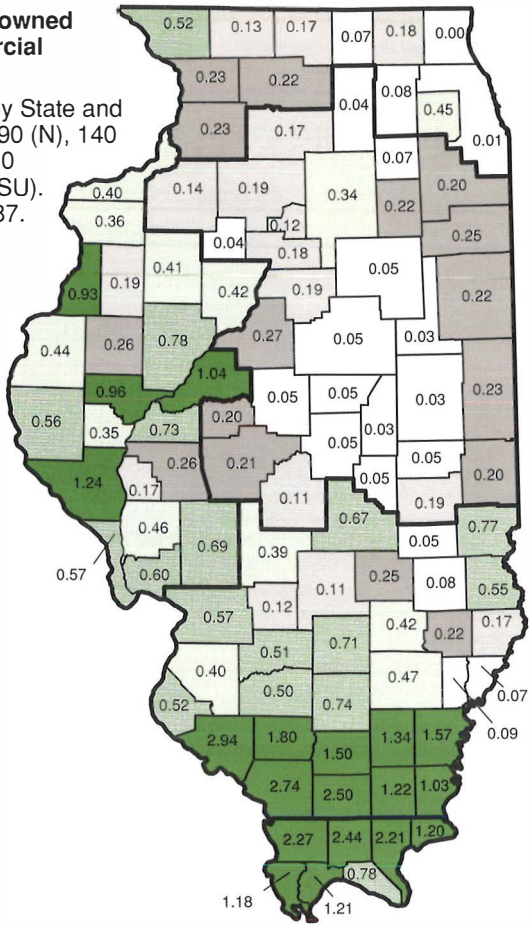
County average by State and region: 2,840 (S), 240 (N), 190 (GP), 700 (W), 2,930 (SC), and 25,020 (SU). Source: Hahn 1987.



Acres (x 1000)
- 0.00 - 0.09
- 0.10 - 0.24
- 0.25 - 0.49
- 0.50 - 0.99
- 1.00 - 9.99
- 10.00 - 78.61

Figure 53. State-owned acres of commercial forest.

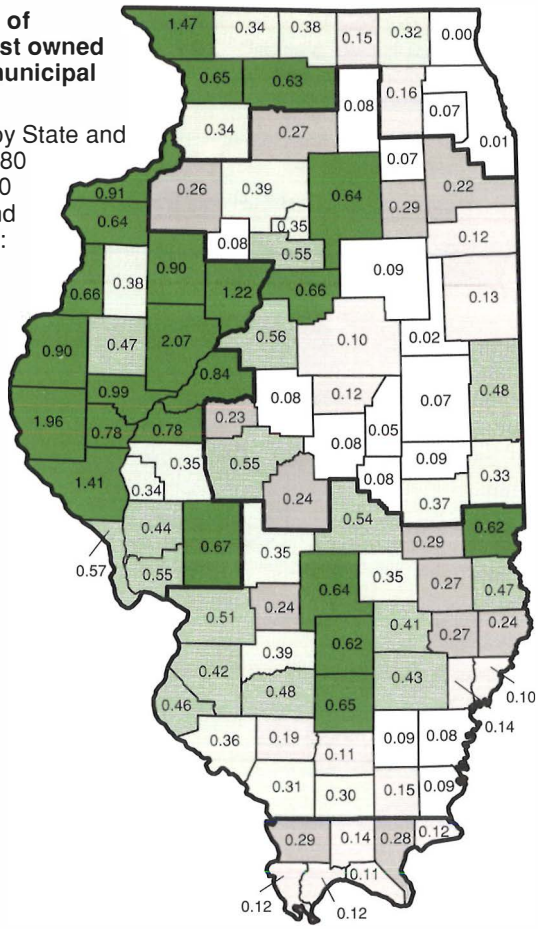
County average by State and region: 540 (S), 190 (N), 140 (GP), 560 (W), 810 (SC), and 1,610 (SU). Source: Hahn 1987.



Acres (x 1000)
- 0.00 - 0.09
- 0.10 - 0.19
- 0.20 - 0.29
- 0.30 - 0.49
- 0.50 - 0.79
- 0.80 - 2.94

Figure 54. Acres of commercial forest owned by county and municipal governments.

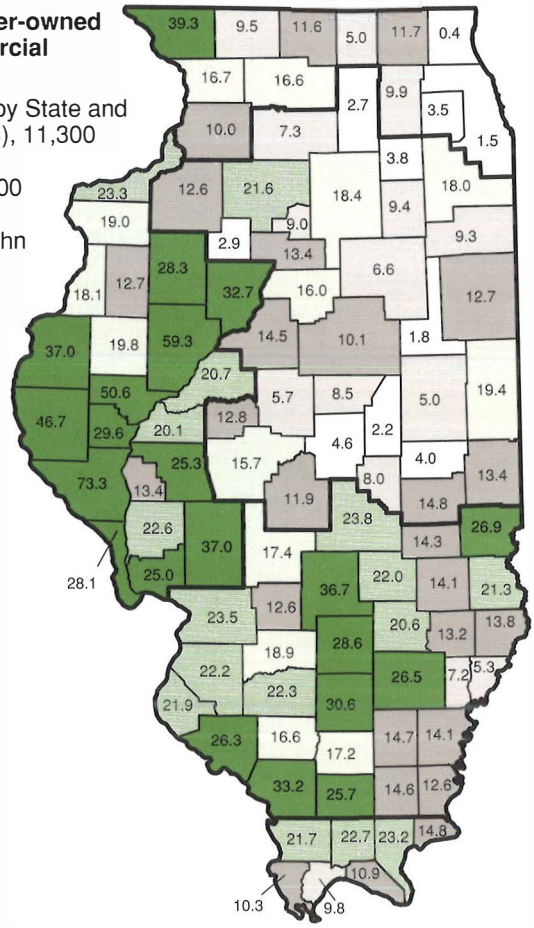
County average by State and region: 410 (S), 380 (N), 250 (GP), 850 (W), 340 (SC), and 170 (SU). Source: Hahn 1987.



Acres (x 1000)
- 0.00 - 0.09
- 0.10 - 0.19
- 0.20 - 0.29
- 0.30 - 0.39
- 0.40 - 0.59
- 0.60 - 2.07

Figure 55. Farmer-owned acres of commercial forest.

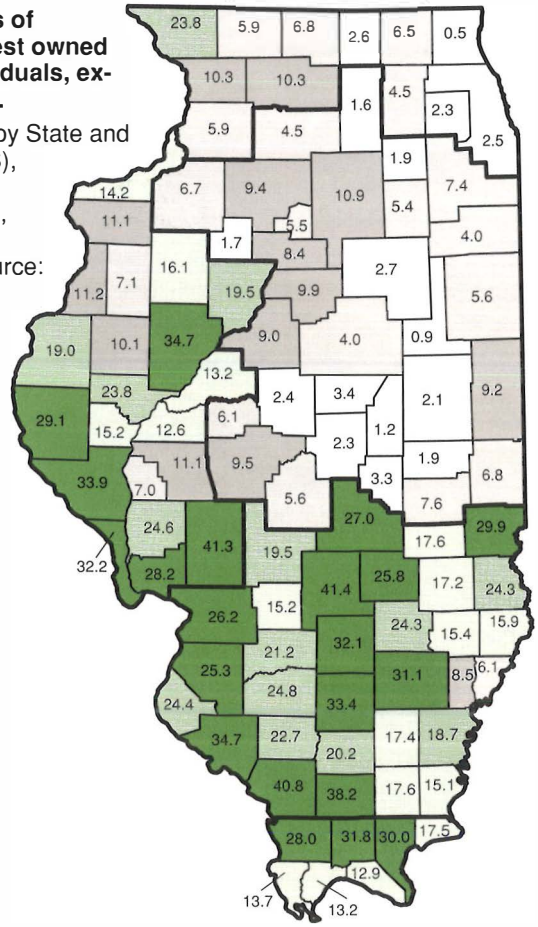
County average by State and region: 17,900 (S), 11,300 (N), 10,200 (GP), 30,600 (W), 20,000 (SC), and 16,200 (SU). Source: Hahn 1987.



Acres (x 1000)
- 0.0 - 4.9
- 5.0 - 9.9
- 10.0 - 14.9
- 15.0 - 19.9
- 20.0 - 24.9
- 25.0 - 73.3

Figure 56. Acres of commercial forest owned by private individuals, excluding farmers.

County average by State and region: 15,100 (S), 6,800 (N), 5,200 (GP), 19,800 (W), 23,600 (SC), and 21,000 (SU). Source: Hahn 1987.



Acres (x 1000)
- 0.0 - 3.9
- 4.0 - 7.9
- 8.0 - 11.9
- 12.0 - 17.9
- 18.0 - 24.9
- 25.0 - 41.4

Figure 57. Acres of commercial forest owned by private corporations, excluding forest industry.

County average by State and region: 2,600 (S), 1,200 (N), 1,300 (GP), 3,500 (W), 3,100 (SC), and 5,500 (SU). Source: Hahn 1987.

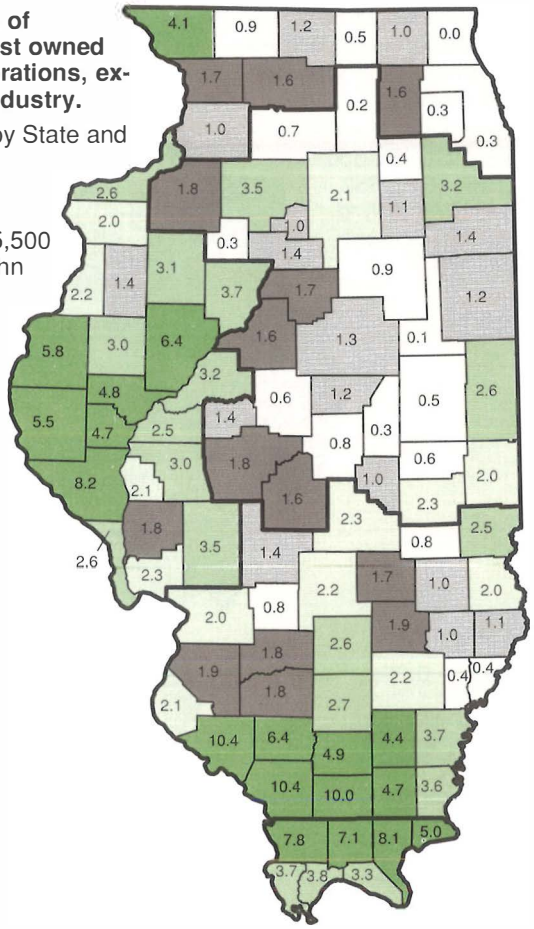


Figure 58. Acres of commercial forest owned by forest industry.

County average by State and region: 150 (S), 30 (N), 80 (GP), 140 (W), 240 (SC), and 280 (SU). Source: Hahn 1987.

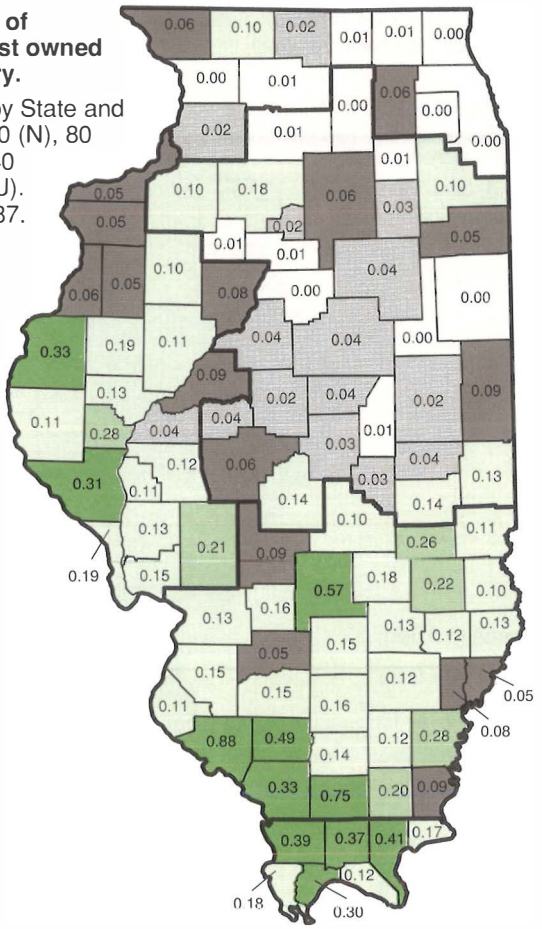


Figure 59. Acres of private commercial forestland per owner.

County average by State and region: 21.5 (S), 15.2 (N), 9.2 (GP), 33.0 (W), 25.6 (SC), and 49.3 (SU). Source: U.S. Department of Agriculture, Cooperative Extension Service, Forest Owners Data Base 1984; Hahn 1987.

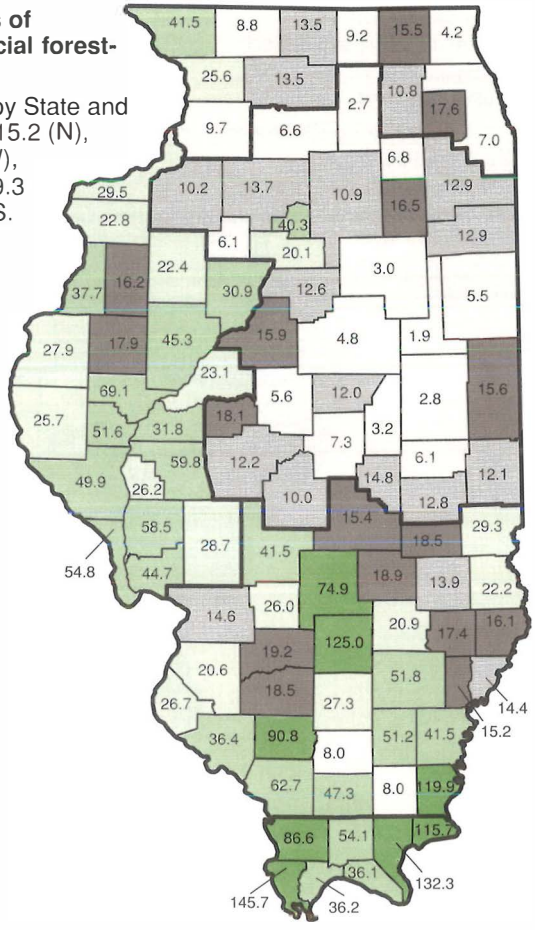


Figure 60. Number of landowners with commercial forestland.

County average by State and region: 1,657 (S), 1,272 (N), 1,823 (GP), 1,638 (W), 1,828 (SC), and 880 (SU). Source: U.S. Department of Agriculture, Cooperative Extension Service, Forest Owners Data Base 1984.

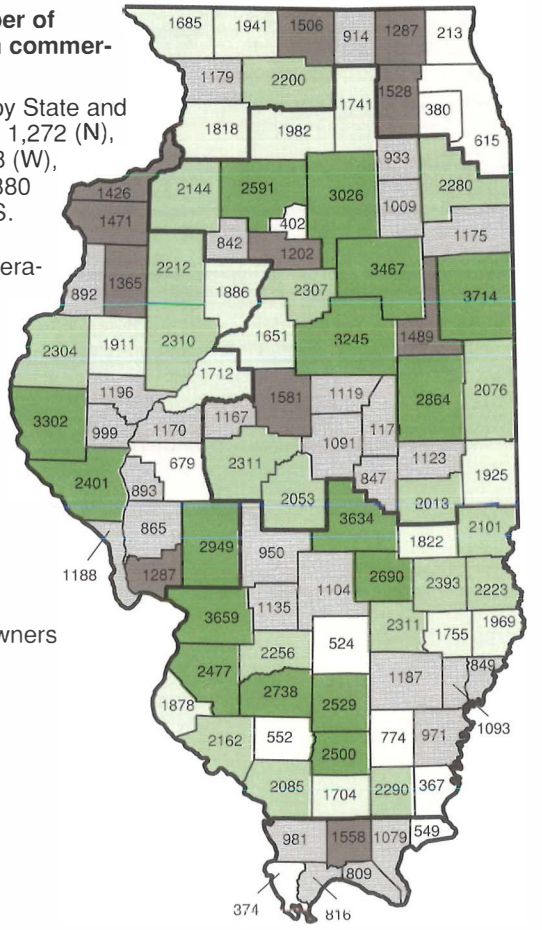
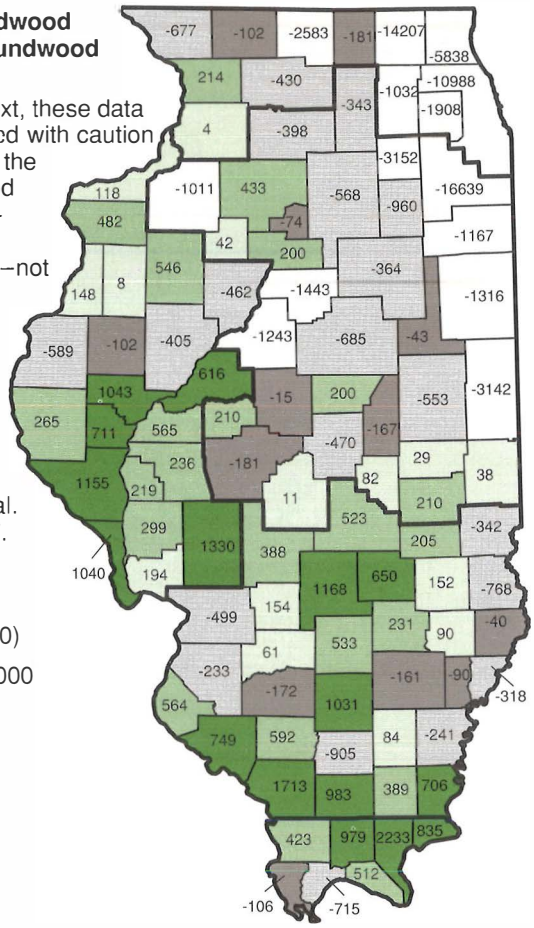


Figure 61. Roundwood grown minus roundwood removed.

As noted in the text, these data must be interpreted with caution because much of the excess roundwood removed in northeastern Illinois is nonmerchantable–not growing stock–fuelwood. County average by State and region: -504 (S), -3,144 (N), -1,047 (GP), 353 (W), 232 (SC), and 594 (SU). Source: Blyth et al. 1987; Hahn 1987.

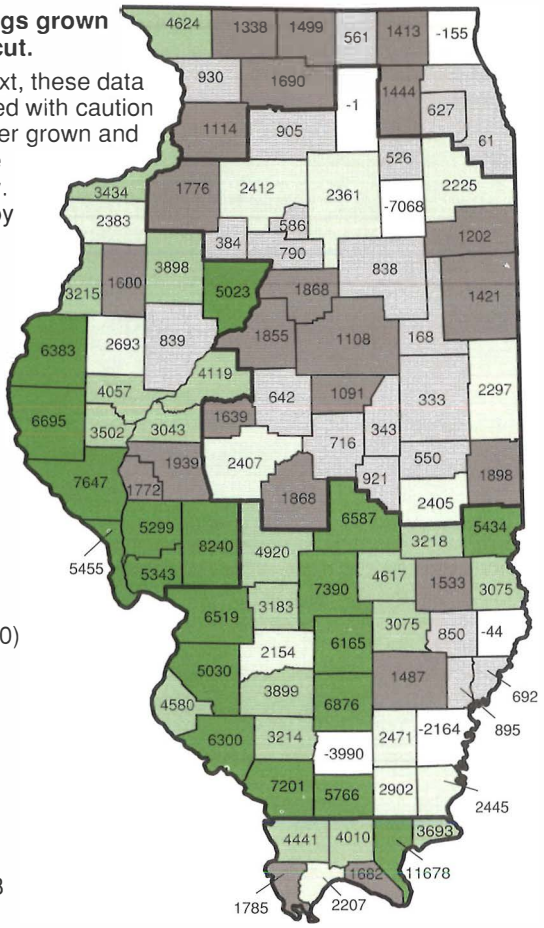


Cubic feet (x 1000)

- -16,639 to -1000
- -999 to -200
- -199 to 0
- 1 to 199
- 200 to 599
- 600 to 2233

Figure 62. Sawlogs grown minus sawlogs cut.

As noted in the text, these data must be interpreted with caution because sawtimber grown and sawtimber cut are defined differently. County average by State and region: 2,627 (S), 1,262 (N), 982 (GP), 4,126 (W), 3,428 (SC), and 4,213 (SU). Source: Blyth et al. 1987; Hahn 1987.

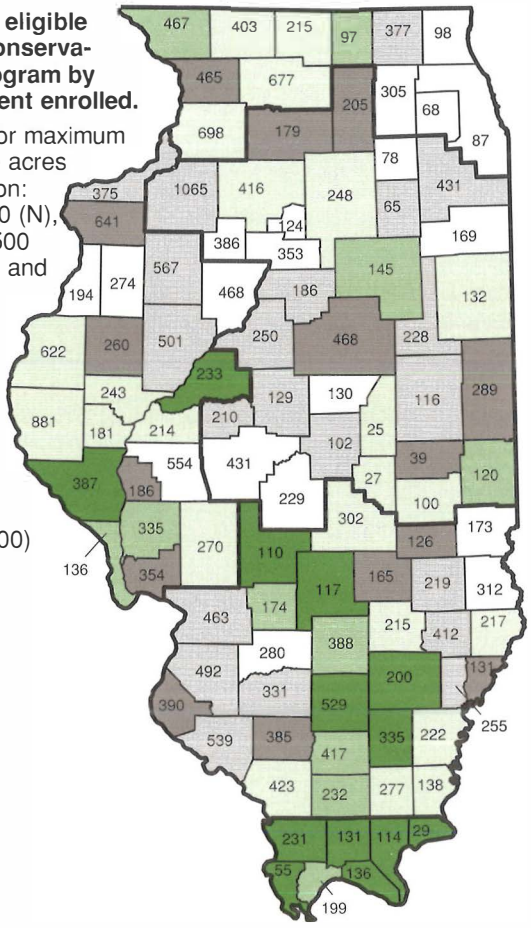


Board feet (x 1000)

- -7068 - 0
- 1 - 999
- 1000 - 1999
- 2000 - 2999
- 3000 - 4999
- 5000 - 11,678

Figure 63. Acres eligible (x 100) for the Conservation Reserve Program by county and percent enrolled.

County average for maximum number of eligible acres by State and region: 27,700 (S), 29,000 (N), 22,800 (GP), 37,500 (W), 28,900 (SC), and 12,700 (SU). Source: U.S. Department of Agriculture, Soil Conservation Service data.



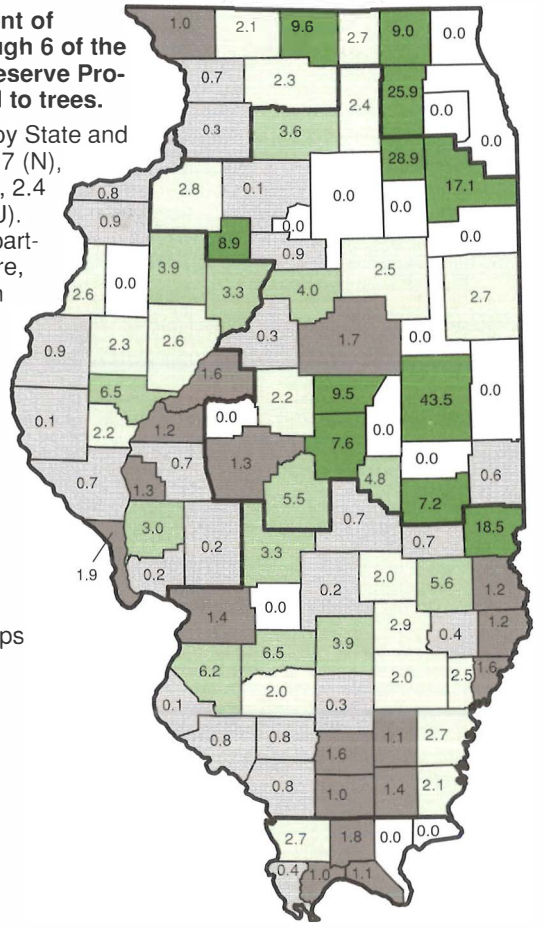
Eligible acres (x100) shown on map.

Percent enrolled

- 0.0 - 3.9
- 4.0 - 7.9
- 8.0 - 11.9
- 12.0 - 19.9
- 20.0 - 39.9
- 40.0 - 104.1

Figure 64. Percent of sign-ups 1 through 6 of the Conservation Reserve Program committed to trees.

County average by State and region: 3.3 (S), 4.7 (N), 5.1 (GP), 1.8 (W), 2.4 (SC), and 1.0 (SU). Source: U.S. Department of Agriculture, Soil Conservation Service data.

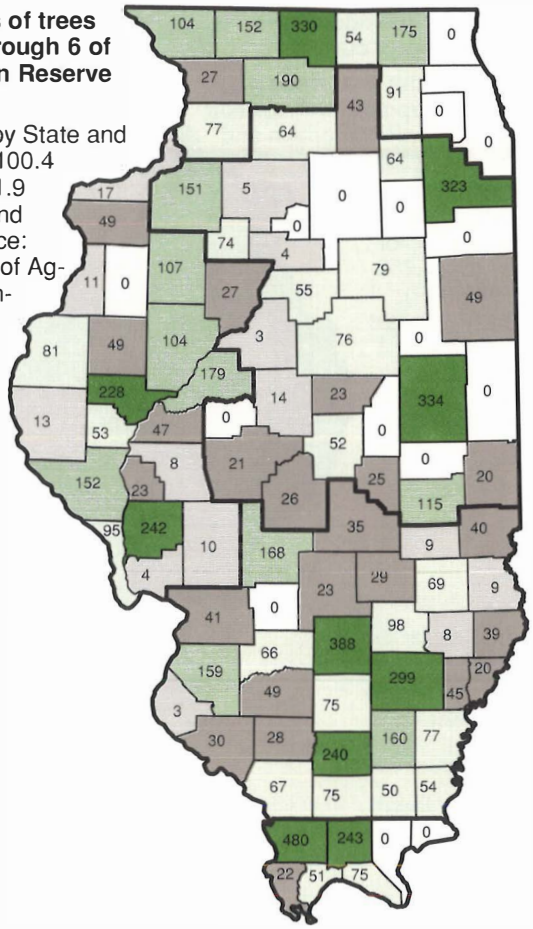


Percent of sign-ups

- 0.0
- 0.1 - 0.9
- 1.0 - 1.9
- 2.0 - 2.9
- 3.0 - 6.9
- 7.0 - 43.5

Figure 65. Acres of trees in sign-ups 1 through 6 of the Conservation Reserve Program.

County average by State and region: 75.3 (S), 100.4 (N), 52.5 (GP), 71.9 (W), 79.5 (SC), and 124.7 (SU). Source: U.S. Department of Agriculture, Soil Conservation Service data.



Acres
- 0
- 1 - 19
- 20 - 49
- 50 - 99
- 100 - 199
- 200 - 480

Figure 66. The 1:250,000 quadrangles used in the fragmentation analysis.

Source: LUDA data, after Anderson et al. 1976.

Figure 67. Fragmentation of forestlands by quadrangle.

Data are presented for all parcels and for those 40–100 acres, 100–200 acres, 200–600 acres, 600–1,100 acres, and more than 1,100 acres. Source: LUDA data, after Anderson et al. 1976.

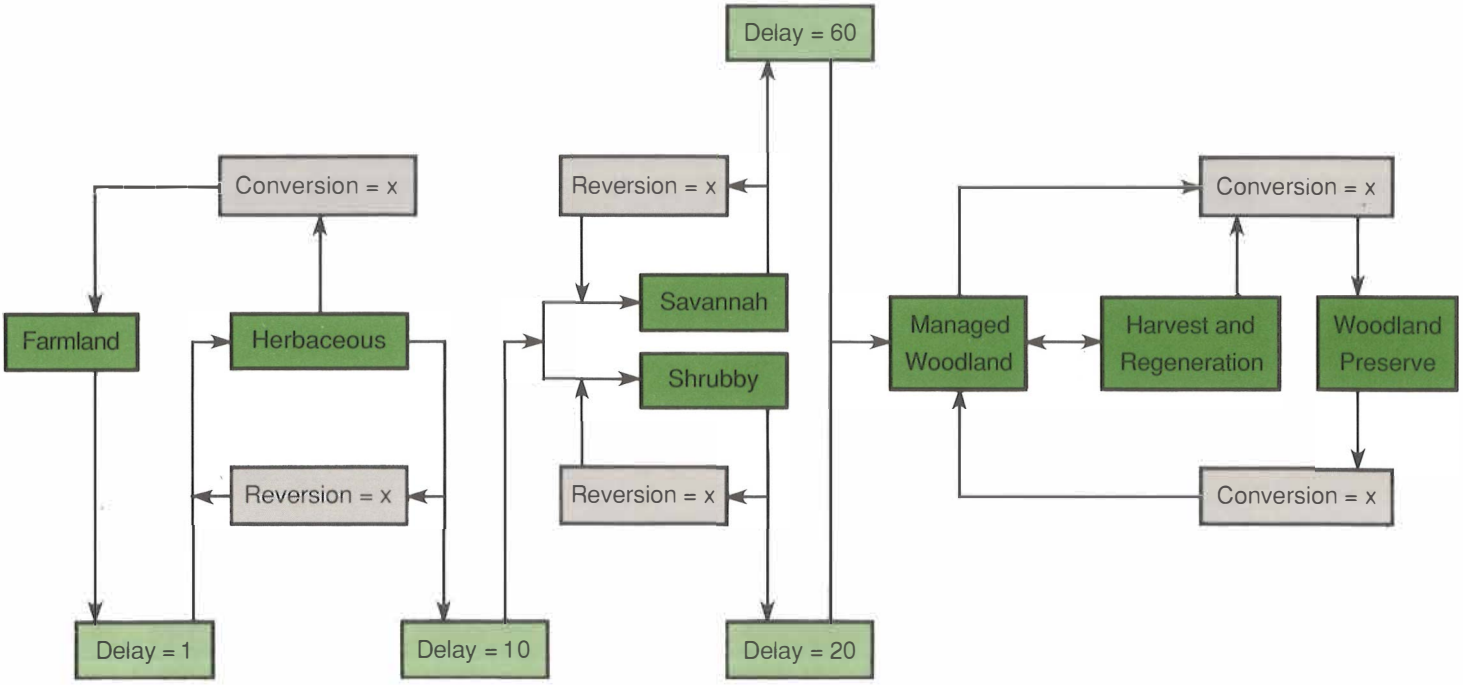


Figure 68. Overall structure of the DYNAST-based landscape simulation model for Kennekuk Cove County Park.

Arrows represent the flow of acres among cover types over time. Delay values indicate the number of years required for natural changes in cover types. Conversion and reversion values specify transfer rates among cover types to be implemented by policy. Source: Burnett 1988.

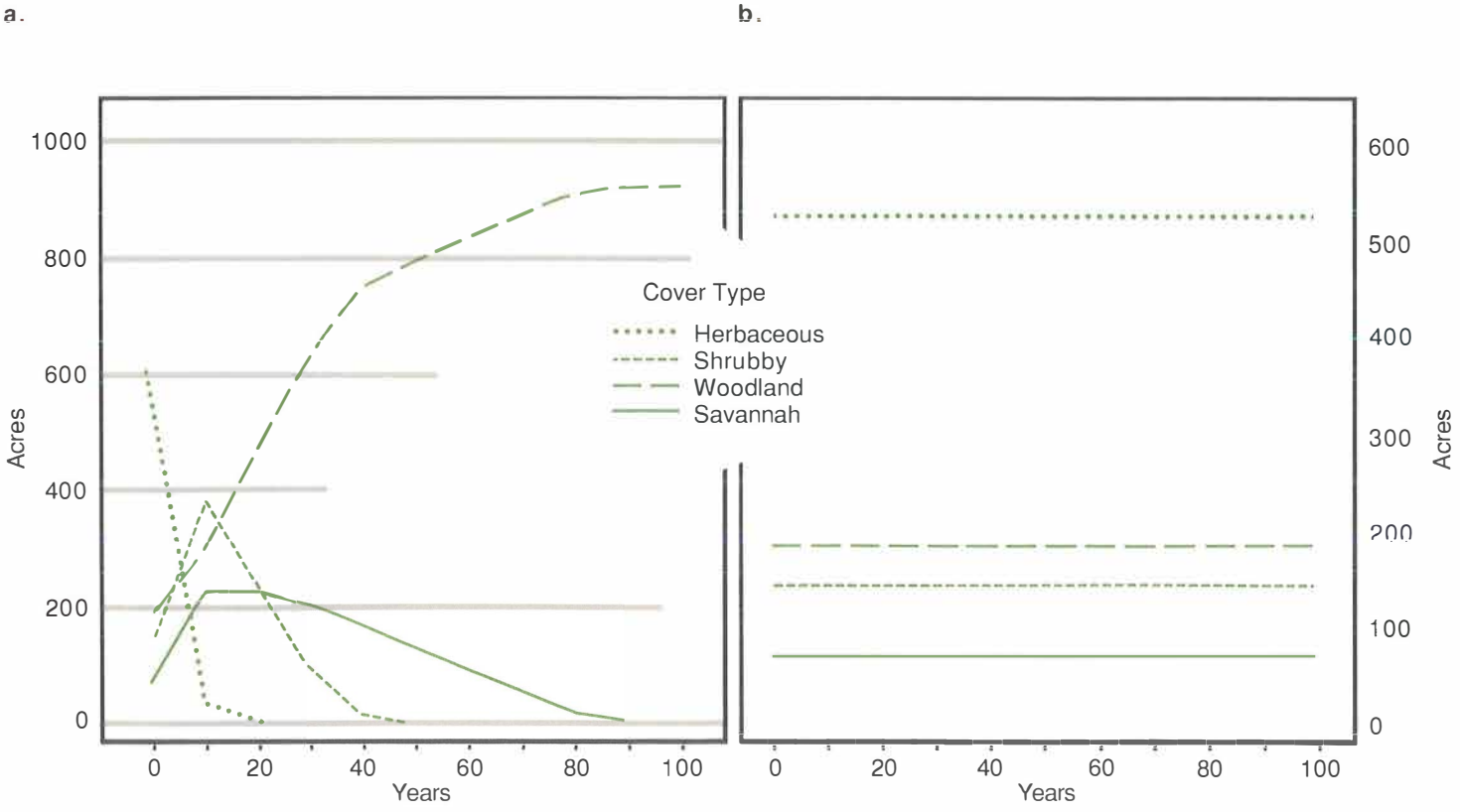


Figure 69. Simulated changes in cover-type acreages for Kennekuk Cove County Park.

Two management policies are illustrated: (a) no management under which herbaceous and shrubby areas are allowed to convert to woodland or savannah, and (b) stable management under which minimum areas for herbaceous and shrubby types are set to initial inventory values. Vertical scales vary between graphs. Source: Burnett 1988.

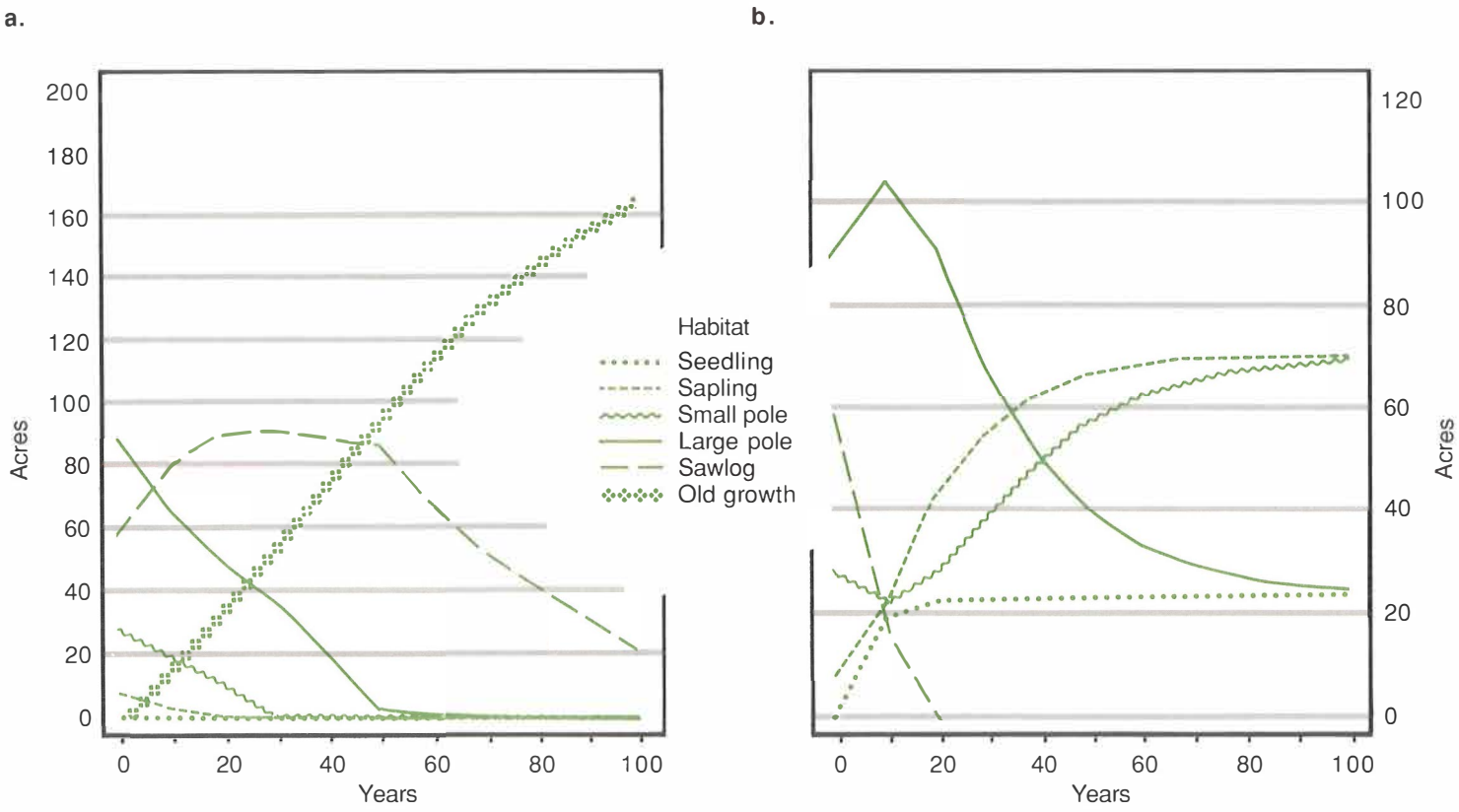


Figure 70. Simulated changes in acreages of wooded upland habitats (age class) at Kennekuk Cove County Park.

Two management policies are illustrated: (a) stable management with no change in cover-type acreages and no harvesting, and (b) stable management of cover type with harvesting of upland woods for fuel at 40 years. Vertical scales vary between graphs. Source: Burnett 1988.

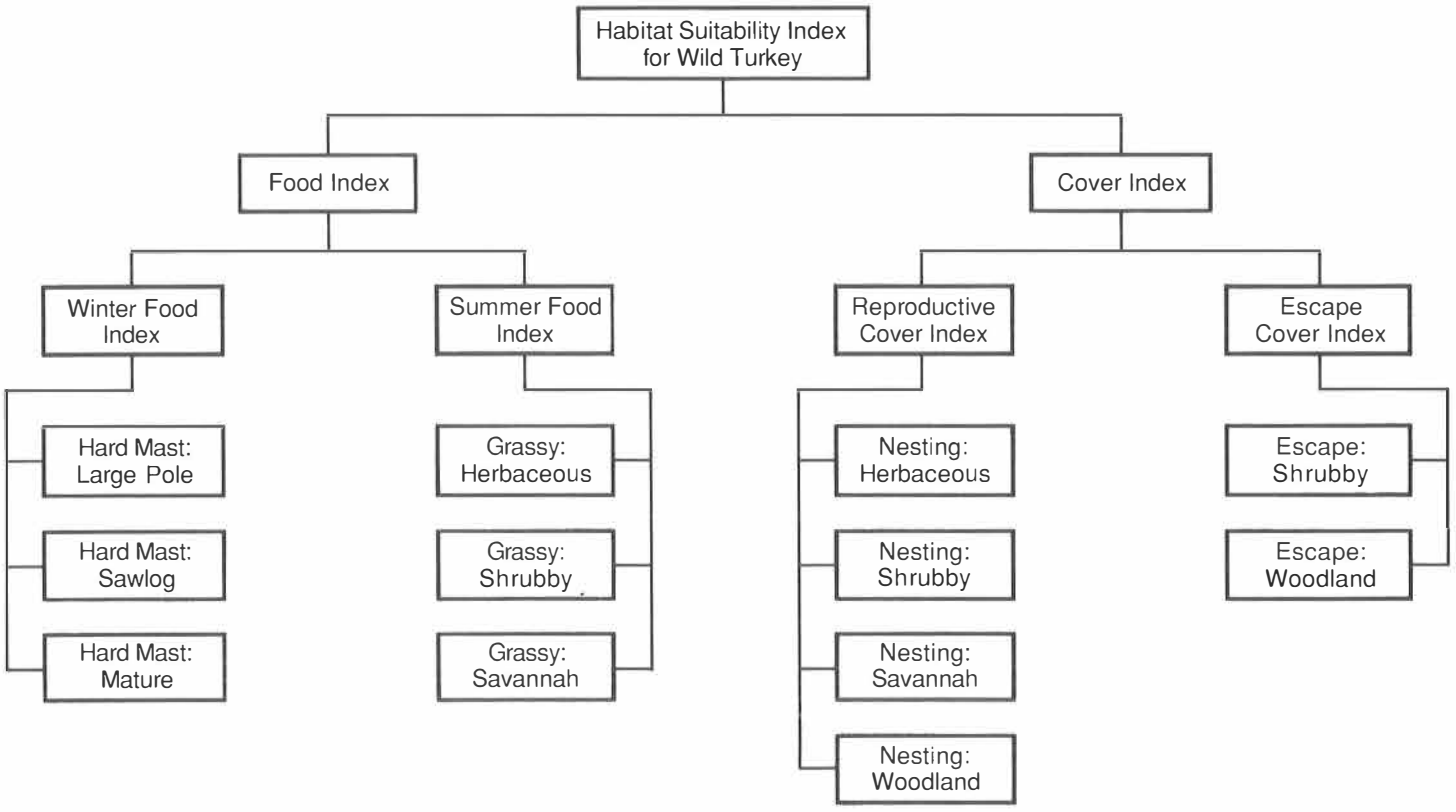


Figure 71. Schematic of the habitat-suitability algorithm for wild turkey in Kennekuk Cove County Park.

Source: Burnett 1988.

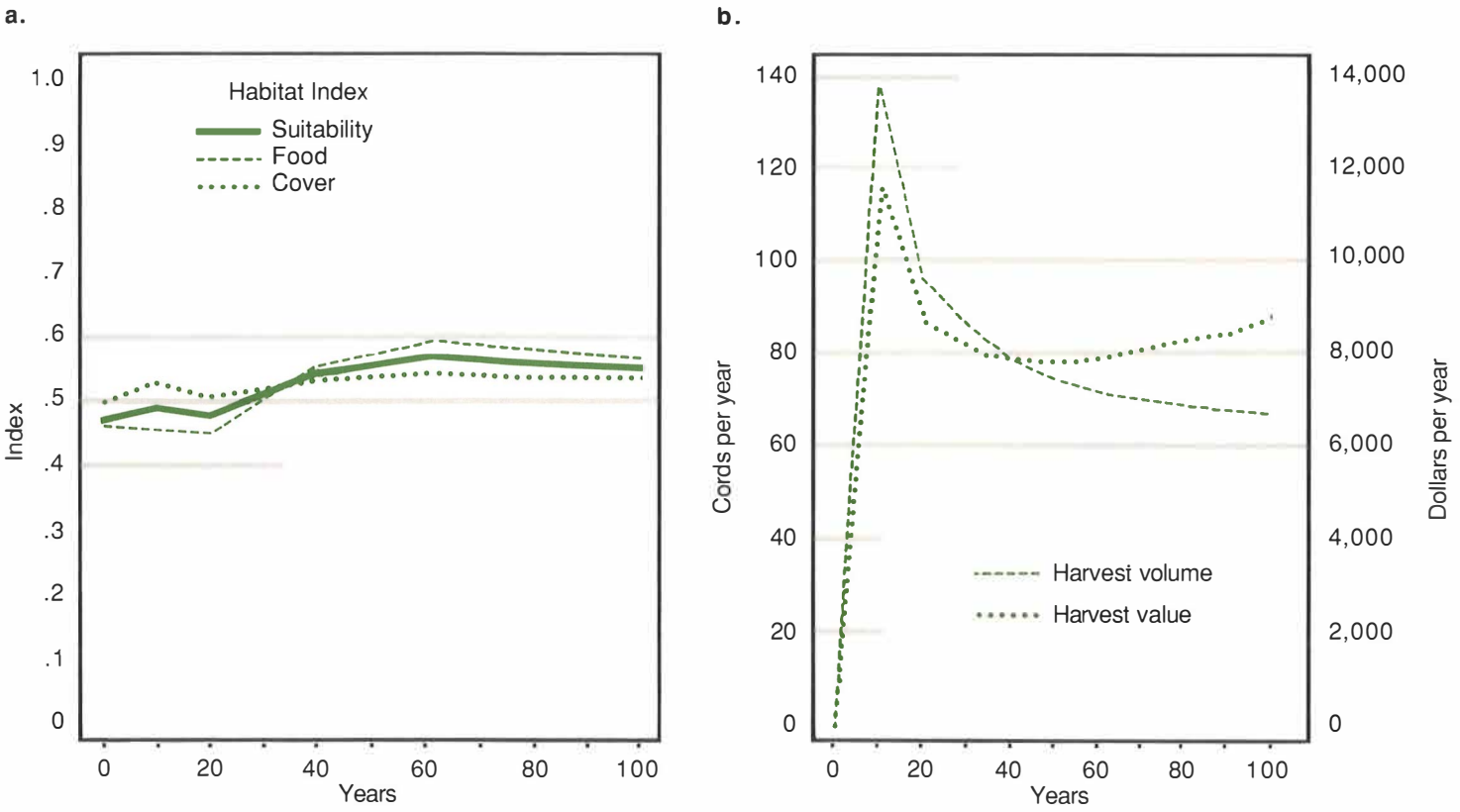


Figure 72. Simulated changes in (a) wild turkey habitat suitability and (b) cordwood harvest and gross dollars for Kennekuk Cove County Park.

These changes were achieved under a management policy that maximized wild turkey habitat under stable cover classes and harvested fuelwood only from upland forests. Source: Burnett 1988.

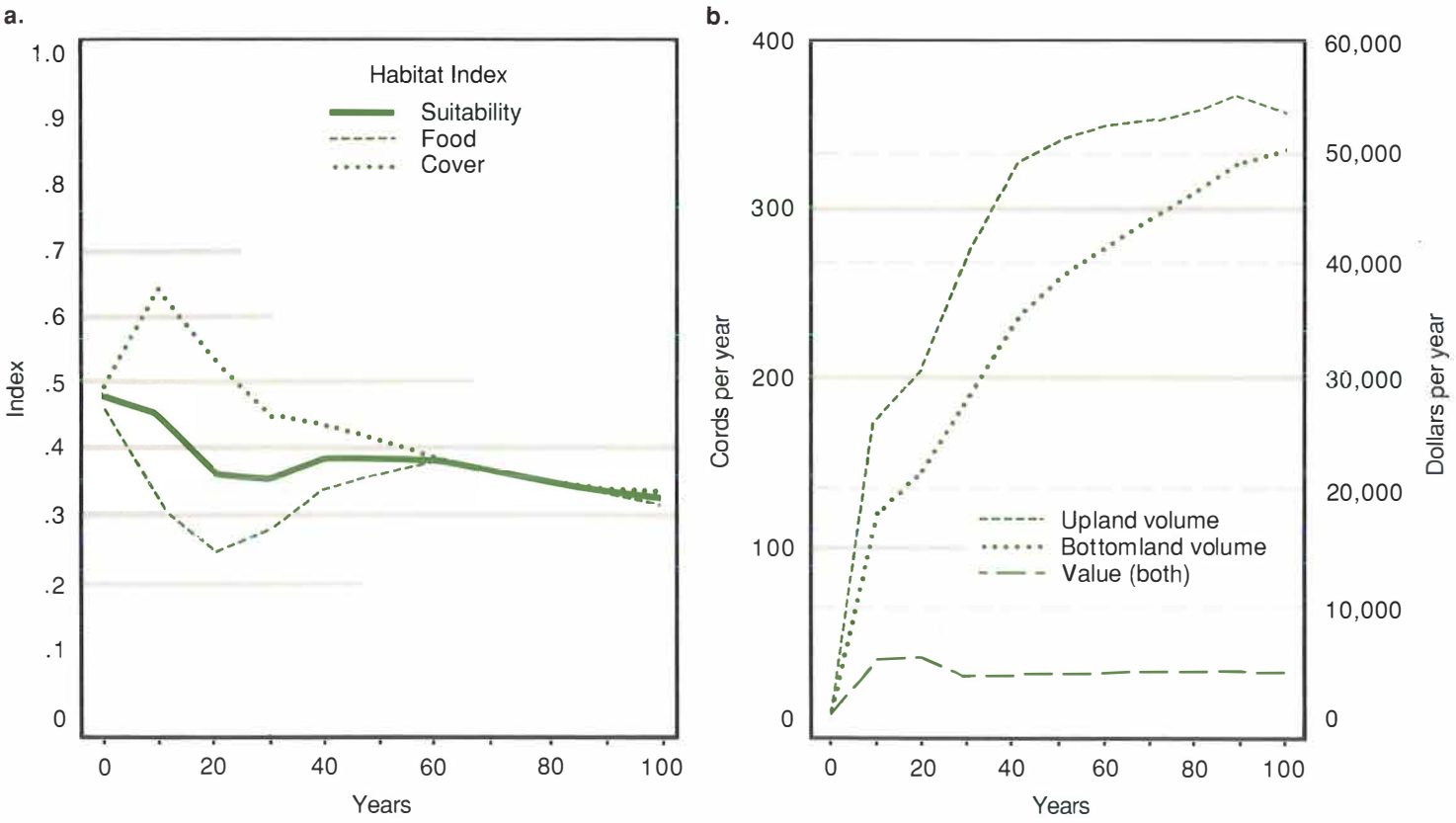


Figure 73. Simulated changes in (a) wild turkey habitat suitability and (b) cordwood harvest and gross dollars for Kennekuk Cove County Park.

These changes were achieved under a management policy that maximized fuelwood production. Source: Burnett 1988.

Appendix I
Glossary of Terms

Scientific names and other information about species that are mentioned here are given in Appendix III.

Tree Species Types. Classification of tree species based on specific gravity of the wood and taxonomic order.

Hard hardwoods. Hardwood species with an average specific gravity greater than 0.50, such as oak, hard maple, hickory, and ash.

Hardwoods. Dicotyledonous trees, usually broad-leaved and deciduous. See soft hardwoods and hard hardwoods.

Soft hardwoods. Hardwood species with an average specific gravity less than 0.50, such as gum, yellow poplar, cottonwood, red maple, basswood, and willow.

Softwoods. Coniferous trees, usually evergreen, having needles or scalelike leaves.

Biomass. The above-ground volume of live trees in a given area, including bark and foliage, reported in green tons. Biomass has five components:

Growing-stock bole. Biomass of the bole of a growing-stock tree extending from a 1-foot stump and terminating at a diameter of 4 inches.

Growing-stock tops and limbs. Biomass of a growing-stock tree minus the 1-foot stump and the growing-stock bole.

Cull bole. Biomass of a cull tree extending from a 1-foot stump and terminating at a diameter of 4 inches.

Cull tops and limbs. Biomass of a cull tree minus the 1-foot stump and the cull bole.

1- to 5-inch trees. Biomass of all live trees in a given area from 1 to 5 inches in diameter at breast height (dbh).

Forest-cover Types. A classification of forestland based on one or more species that form a plurality of the live-tree stocking. Major forest types in Illinois are described below.

White pine. Forests in which eastern white pine account for a plurality of the stocking. Common associates include jack and red pine.

Loblolly–shortleaf pines. Forests in which loblolly and shortleaf pines, singly or in combination, make up a plurality of the stocking. Common associates include gum, hickory, sassafras, and yellow poplar.

Oak–pine. Forests in which hardwoods (usually white, scarlet, chestnut, northern red, or black oak), singly or in combination, make up a plurality of the stocking but where pines account for 25 to 50 percent of the stocking. Common associates include gum, hickory, sassafras, and yellow poplar.

Oak–hickory. Forests in which upland oaks or hickories, singly or in combination, account for a plurality of the stocking. Common associates include yellow poplar, elm, maple, black walnut, black locust, and sassafras.

Oak–gum–cypress. Bottomland forests in which tupelo, black gum, sweet gum, oak, or cypress, singly or in combination, make up a plurality of the stocking. Common associates include cottonwood, willow, ash, elm, hackberry, and maple.

Elm–ash–soft maple. Forests in which lowland elm, ash, red maple, and cottonwood, singly or in combination, account for a plurality of the stocking. Common associates include boxelder, willow, sycamore, and beech.

Cottonwood. Forests in which cottonwood accounts for at least 50 percent of the stock. Common associates include willow, elm, soft maple, and ash.

Maple–beech. Forests in which hard maple or beech, singly or in combination, make up a plurality of the stocking. Common associates include soft maple, elm, and basswood.

Land-use Classes. Classification of the land based on its use and vegetative cover.

Land. Dry land and land temporarily or partially covered by water, such as marshes, swamps, and floodplains; streams and sloughs less than 120 feet wide; and lakes, reservoirs, and ponds less than 1 acre in area.

Forestland. Land stocked by forest trees of any size to a level of at least 16.7 percent or land formerly having such tree cover and not currently developed for nonforest use. The minimum area for

classification as forestland is 1 acre. Roadside, streamside, and shelterbelt strips of timber must have a crown width of at least 120 feet to qualify as forestland. Unimproved roads and trails, streams or other bodies of water, or clearings in forested areas are classed as forestland if they are less than 120 feet wide.

Commercial forestland (timberland). Forestland that produces or is capable of producing crops of industrial wood (more than 20 cubic feet per acre per year when managed) and is not withdrawn from timber utilization by administrative regulation or statute.

Noncommercial forestland. Forestland that does not qualify as commercial forest:

Unproductive forestland (woodland). Forestland incapable of yielding crops of industrial wood (more than 20 cubic feet per acre per year when managed) because of adverse site conditions (such as shallow soil, dry climate, poor drainage, high elevation, steepness, and rockiness).

Productive reserved forestland (reserved timberland). Land capable of producing crops of industrial wood (more than 20 cubic feet per acre when managed) but withdrawn from timber utilization through administrative regulation or statute, for example, state parks, natural areas, and forest preserves; includes land used exclusively for growing Christmas trees, as indicated by annual shearing.

Nonforestland. Land that never supported forests and land formerly forested where forest use is now precluded by development for nonforest use. If intermingled in forested areas, nonforest parcels must be more than 120 feet wide and more than 1 acre in area to qualify as nonforestland.

Nonforestland without trees. Nonforestland with no live trees present.

Nonforestland with trees. Nonforestland with one or more trees per acre at least 5 inches dbh.

Urban and other built-up areas. Areas within the legal boundaries of cities and towns; suburban areas developed for residential, industrial, or recreational purposes; schoolyards; cemeteries; roads, railroads, and airports; beaches; power lines and other rights-of-way. Nonforestland not included in any other specified land-use class is also included here.

Windbreaks. A group of trees used primarily to protect buildings currently in use from the effects of wind.

Wooded pasture. An area that is currently improved for grazing or shows other evidence of grazing and is stocked in growing-stock trees at a rate of more than 16.7 percent but less than 25 percent.

Wooded strip. An acre or more of natural continuous forestland that would meet survey standards for commercial forestland except that it is less than 120 feet wide.

Cropland. Land under cultivation within the past 24 months, including cropland harvested, cropland on which crops failed, cultivated summer fallow cropland, idle cropland used only for pasture, orchards, and land in soil-improvement crops but excluding land cultivated in improved pasture.

Marsh. Nonforestland that characteristically supports low, generally herbaceous or shrubby vegetation and is intermittently covered with water.

Idle farmland. Former cropland, orchards, improved pasture, and farm sites not tended within the past 2 years and presently stocked with trees at a rate of less than 16.7 percent.

Improved pasture. Land currently improved for grazing by cultivating, seeding, irrigating, or clearing of trees or brush and stocked with live trees at a rate of less than 16.7 percent.

Pastured timberland. Timberland (commercial forestland) for which the primary use is wood production but is presently used for grazing.

Ownership Classes. Classification of land according to the status of the owner.

Private land. Land under the legal right of possession or lawful title of an individual, organization, or corporation; not government owned.

Farmer-owned land. Land owned by farm operators, excluding land leased by farm operators from such nonfarm owners as railroad companies or the State.

Forest industry land. Land owned by companies or individuals operating primary wood-using industries.

Miscellaneous private land. Privately owned land other than farmer-owned land and land owned by forest industries.

Public land. Land owned by local, state, or federal governments.

County and municipal land. Land owned by counties and local public agencies or municipalities or leased to these governmental units for 50 years or more.

Miscellaneous federal land. Federal land other than national forest and land administered by the Bureau of Land Management.

National forest land. Federal land that has been legally designated as national forest or areas where land is to be purchased for national forest and other land administered by the U.S. Forest Service.

State land. Land owned by or leased to a state for 50 years or more.

Stands. Aggregations of trees or other growth occupying a specific area and sufficiently uniform in composition (species), age classes, and condition to be distinguishable from the forest or other growth on adjoining areas.

Stand-age class. Age of the main stand. Main stand refers to trees of the dominant forest type and stand-size class.

Stand-area class. The extent of a continuous forested area of the same forest type, stand-size class, and stand-density class.

Stand-size class. A classification of stocked (see stocking) forestland based on the size class of live trees on the area: sawtimber, poletimber, or seedlings and saplings.

Sawtimber. A stand stocked with growing-stock trees at a rate of at least 10 percent, with one-half or more of this stocking in sawtimber or poletimber trees and with sawtimber stocking at least equal to poletimber stocking.

Poletimber. A stand stocked with growing-stock trees at a rate of at least 10 percent, with one-half or more of this stocking in sawtimber and/or poletimber trees and with poletimber stocking exceeding that of sawtimber.

Sapling and seedling. A stand stocked with growing-stock trees at a rate of at least 10 percent and with saplings and/or seedlings accounting for more than one-half of the stocking.

Stocking. The degree of occupancy of land by trees. Stocking is measured by basal area and/or the number of trees in a stand by size or age and spacing compared to the basal area and/or number of trees required to fully utilize the growth potential of the land, i.e., the stocking standard. A stocking percent of 100 indicates full utilization of the site and is equivalent to 80 square feet of basal area per acre in trees 5 inches dbh and larger. In a stand of trees less than 5 inches dbh, a stocking percent of 100 indicates that the present number of trees is sufficient to produce 80 square feet of basal area per acre when the trees reach 5 inches dbh. Stands are grouped into the following stocking classes:

Overstocked stands. Stands in which stocking of trees is more than 130 percent.

Fully stocked stands. Stands in which stocking of trees is from 100 to 129 percent.

Medium-stocked stands. Stands in which stocking of trees is from 60 to 99 percent.

Poorly stocked stands. Stands in which stocking of trees is from 16.7 to 59 percent.

Nonstocked. Commercial forestland stocked with growing-stock trees at a rate less than 16.7 percent.

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

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

Tree-quality Classes. Classification of trees according to their timber quality.

Growing-stock trees. All live sawtimber, poletimber, sapling and seedling trees (see tree-size classes); cull trees are not considered to be growing stock.

Desirable trees. Growing-stock trees with no serious defects in quality that would limit present or prospective use, trees of relatively high vigor, and trees that contain no pathogens that might cause death or serious deterioration before rotation age. These are the trees that would be favored in silvicultural operations.

Acceptable trees. Growing-stock trees that do not qualify as desirable trees.

Cull trees. Live trees that do not contain at least one 8-foot sawlog now or prospectively because of limbiness, crook, or rot. Trees with no commercial use are also classified as cull.

Salvable dead trees. Standing or downed trees that are considered currently or potentially merchantable.

Tree-size Classes. Classification of trees according to their diameters.

Sawtimber trees. Live trees of commercial species at least 9 inches in diameter for softwoods and 11 inches in diameter for hardwoods and containing at least one 8-foot sawlog that meets minimum log grade or tie and timber specification.

Poletimber trees. Live trees of commercial species at least 5 inches in diameter but smaller than sawtimber size and of good form and vigor.

Sapling and seedling. Live trees of commercial species less than 5 inches in diameter and of good form and vigor.

Timber Removed. Removals of timber from commercial forestland.

Timber removals from growing stock. Cubic-foot volume of sound wood in growing-stock trees removed for forest products during a specified year, including roundwood products, logging residues, and other removals (see definition below).

Timber removals of sawtimber. Net board-foot volume of live sawtimber trees removed for forest products during a specified year, including roundwood products, logging residues, and other removals (see definition below).

Other removals. Growing-stock trees removed but not utilized for products, or trees left standing but "removed" from timberland classification by land-use change. Examples are removals during such cultural operations as timber-stand improvement, land clearing, and changes in land use.

Timber-products output. Net volume of rough forest products cut from growing stock, cull trees, dead trees, limb wood, and manufacturing plant by-products.

Plant by-products. Manufacturing plant residues used for such products as mulch, pulp chips, and fuelwood.

Logging residue. Net volume of live sawtimber and poletimber trees cut or killed by logging on commercial forestland and not converted to timber products.

Roundwood products. Logs, bolts, or other round sections (including chips from roundwood) cut from trees for industrial or consumer uses. Saw logs, veneer logs and bolts, cooperage logs and bolts, pulpwood, fuelwood, piling, poles, hewn trees, mine timbers, and various other round, split, or hewn products are included.

Volume. Amount of wood available for timber products.

Growing-stock volume. Net volume in cubic feet of sound wood in the central stem of live sawtimber and poletimber trees (5 inches or more in diameter) from a 1-foot stump to a minimum 4-inch top diameter outside bark, or to the point where the central

stem breaks into limbs. Cubic feet can be converted to standard cords by dividing by 79.

Sawtimber volume. Net volume of the sawlog portion of live sawtimber trees in board feet (international ¼-inch rule). The sawlog portion extends from the stump to a minimum top diameter outside bark of 7 inches for softwoods and 9 inches for hardwoods, or to the point where defects reduce sawlog quality below certain standards.

All-timber volume. Cubic-foot volume of sound wood in the bole of growing stock, cull, or salvable dead trees 5 inches or larger in diameter from the stump to a minimum 4-inch top diameter outside bark or to the point where the central stem breaks into limbs.

Growth. Annual increment of volume.

Net annual growth of growing stock. Annual change in volume of sound wood in live sawtimber and poletimber trees and total volume of trees entering these classes through in-growth less volume losses resulting from natural causes.

Net annual growth of sawtimber. Annual change in volume of live sawtimber trees and total volume of trees reaching sawtimber size less volume losses resulting from natural causes.

Source: Essex and Gansner 1965; Raile and Leatherberry 1988; Society of American Foresters 1950

Appendix II
Data Output for Persimmon: Illinois Plant Information Network (ILPIN)

The following pages simulate the printout from the Illinois Plant Information Network for persimmon. Similar information is available for the 3,200 vascular taxa found in Illinois. Readers who would like ILPIN data should contact Louis Iverson or David Ketzner at the Illinois Natural History Survey. A manual (Iverson and Ketzner 1988) is available for those who wish to use and more fully understand this data base. The manual also lists names and addresses of seed companies referred to by number in the data base (see, for example, Procurement Comments below).

FILE: XPERSIMMON
ENTER SCIENTIFIC NAME (FIRST LETTER CAPITALIZED)
ILLINOIS PLANT INFORMATION NETWORK
Developed and managed by L. Iverson and D. Ketzner, Center for Biodiversity, INHS

INFORMATION ON SPECIES: Diospyros virginiana

DIVISION: ANTHOPHYTA
CLASS: DICOTYLEDENAE
ORDER: EBENALES
FAMILY: EBENACEAE
SCIENTIFIC NAME: Diospyros virginiana
AUTHORITY: L.

COMMON NAMES:
- PERSIMMON
- POSSUMWOOD

SYNONOMY:
- Diospyros pubescens Pursh
- Diospyros virginiana L. var. pubescens (Pursh) Dippel
- Diospyros virginiana L. var. platycarpa Sarg.
- Diospyros virginiana L. var. platycarpa Sarg. f. atra Sarg.

RECORD NUMBER: 802

CODES: SCS- DIVI5 ILPIN- 6627NTRN TAXA-CODE- 50 5150 10 5 5 0 0 0 0

NATURAL COMMUNITIES:
- FOREST
  - UPLAND FOREST
    - DRY
    - DRY-MESIC
    - MESIC
  - FLOODPLAIN FOREST
    - MESIC
    - WET-MESIC
- PRIMARY
  - GLADE
    - LIMESTONE

CULTURAL
AGRICULTURAL FIELD
FIELD DIVISION
SUCCESSIONAL FIELD
ABANDONED CROPLAND
ABANDONED FORAGELAND
EARLY
DEVELOPED LAND
RESTORATION
FOREST

SAF FOREST COVER TYPE:
CENTRAL
Other Central Types
listed
Sassafras - Persimmon

NATURAL DIVISION: unavailable

COUNTIES:

ADAMS	ALEXANDER	BOND	BROWN	CALHOUN
CASS	CHAMPAIGN	CHRISTIAN	CLARK	CLAY
CLINTON	COLES	CRAWFORD	CUMBERLAND	DOUGLAS
EDGAR	EDWARDS	EFFINGHAM	FAYETTE	FRANKLIN
FULTON	GALLATIN	GREENE	HAMILTON	HANCOCK
HARDIN	JACKSON	JASPER	JEFFERSON	JERSEY
JOHNSON	LAWRENCE	MCDONOUGH	MACON	MACOUPIN
MADISON	MARION	MASON	MASSAC	MENARD
MONROE	MONTGOMERY	MORGAN	MOULTRIE	PEORIA
PERRY	PIATT	PIKE	POPE	PULASKI
RANDOLPH	RICHLAND	ST. CLAIR	SALINE	SANGAMON
SCHUYLER	SCOTT	SHELBY	TAZEWELL	UNION
WABASH	WASHINGTON	WAYNE	WHITE	WILLIAMSON

GROWTH FORM: Dicot-woody

TAXONOMIC CHARACTERISTICS:
ROOTS: Primary
LEAF ARRANGEMENT: Alternate
LEAF TYPE: Simple
LEAF MARGIN: Entire
LEAF VENATION: Pinnate
LEAF SHAPE: Oblong Ovate Oval
INFLORESCENCE: Dischasium Solitary–few
FLOWER MEROUS: 4
FLOWER STRUCTURE: Incomplete Regular
FLOWER COLOR: Yellow White
FLOWER PLACEMENT: Hypogynous
FRUIT: Berry

DISTINGUISHING CHARACTERISTIC COMMENTS:
Flowers are occasionally 5-merous. Pistillate flowers solitary, staminate flowers cymose (Spongberg, 1977).

GEOGRAPHIC INFORMATION:
ORIGIN: Native

POPULATION DYNAMICS:
STATE STATUS: Not listed
FEDERAL STATUS: Not listed
COMMONNESS: Occasional
ENDEMIC: Not endemic

BIOLOGIC:
HABIT: Tree
LIFE CYCLE: Perennial
REPRODUCTION: Sexual Vegetative
FLOWERING PERIOD:
MONTH BEGINNING- 5 MONTH END- 6

TROPHIC STATUS: Autotrophic
CO_2 FIXATION: C_3
SEX: Unisexual -dioecious

BIOLOGIC COMMENTS:
Occasionally individuals produce both staminate and pistillate flowers. Perfect flowers are rarely formed. Seedless persimmons are sometimes formed through parthenocarpy (Spongberg, 1979). Two chromosome races of persimmon exist: 2n = 60 and 2n = 90 (Baldwin and Culp, 1941).

ENVIRONMENTAL RELATIONSHIPS: No data entered

FUNCTIONAL RELATIONSHIPS:
MAJOR DISPERSAL AGENTS: MAMMAL -internal
MAJOR POLLINATION AGENT: INSECT bee

HUMAN RELATIONSHIP DATA:
EDIBLE: Yes
SHOWY FLOWERS: No LANDSCAPING: Yes AMOUNT: Medium

HUMAN FACTOR COMMENTS:
Fruit is edible.

WILDLIFE AND LIVESTOCK INFORMATION:
FOOD VALUE:
DEER VALUE: Good - Fruit Leaves Stems Buds
UPLAND GAME VALUE: Good - Fruit Leaves Buds
WATERFOWL VALUE: Unknown
SMALL NONGAME BIRD VALUE: Good - Fruit
SMALL MAMMAL VALUE: Good - Fruit
AQUATIC MAMMAL VALUE: Unknown
FISH VALUE: Unknown

COVER VALUE: No data entered

WILDLIFE COMMENTS:
Terrestrial furbearers (especially red foxes and raccoons) eat fruit, buds, and foliage. Its value as food for upland gamebirds pertains especially to bobwhite.

LIVESTOCK PALATABILITY DATA: No data entered

REVEGETATION PLANTINGS:
ESTABLISHMENT REQUIREMENTS: Easy
SHORT-TERM REVEGETATION POTENTIAL: Poor
LONG-TERM REVEGETATION POTENTIAL: Good
WEEDINESS: Colonizing
SEED AVAILABILITY: Good

PROCUREMENT COMMENTS:
Seed company numbers: 14,18,19,21,27,28

PROPAGATION COMMENTS:
Form - seedlings

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END OF DATA FOR SPECIES: Diospyros virginiana

(1) DATA FOR ANOTHER SPECIES (2) QUIT ?

PLEASE ENTER CHOICE (NUMBER).

2

Appendix III
Woody Plant Species in Illinois[1]

Scientific name	Common name	Natural community	Prevalence in Illinois	Native or introduced	Tree/shrub/ liana	Counties
Acer floridanum	Southern sugar maple	Upland forest	Uncommon	N	T	4
A. ginnala	Amur maple	Cultural	Rare	I	T/S	4
A. negundo	Ash-leaved maple Boxelder	Floodplain forest Cultural	Common	N	T	102
A. nigrum	Black maple	Upland forest Floodplain forest Wetland Cultural	Common	N	T	40
A. platanoides	Norway maple	Cultural	Occasional	I	T	9
A. pseudoplatanus	Sycamore maple	Cultural	Rare	I	T	1
A. rubrum	Red maple Scarlet maple Swamp maple	Upland forest Floodplain forest Flatwoods Wetland Primary Cultural	Common	N	T	39
var. *drummondii*	Drummond's red maple Swamp red maple	Upland forest Floodplain forest Wetland	Occasional	N	T	13
f. *tomentosum*	Red maple	Upland forest	Rare	N	T	1
var. *trilobum*	Red maple	Floodplain forest Wetland	Rare	N	T	2
A. saccharinum	River maple Silver maple Soft maple White maple	Floodplain forest Cultural	Common	N	T	102
A. saccharum	Hard maple Rock maple Sugar maple	Upland forest Sand forest Floodplain forest Wetland Cultural	Common	N	T	95
var. *schneckii*	Schneck's sugar maple	Upland forest Floodplain forest	Occasional	N	T	9
Aesculus flava	Sweet buckeye Yellow buckeye	Upland forest	Rare	N	T/S	1

Scientific name	Common name	Natural community	Prevalence in Illinois	Native or introduced	Tree/shrub/ liana	Counties
A. glabra	Ohio buckeye	Upland forest Floodplain forest Cultural	Occasional	N	T	65
var. *leucodermis*	Ohio buckeye	Upland forest	Rare	N	T	1
A. hippocastanum	Horse chestnut	Cultural	Rare	I	T	8
A. pavia	Red buckeye	Floodplain forest Upland forest Thickets Cultural	Rare	N	T/S	7
Ailanthus altissima	Tree-of-heaven	Cultural	Occasional	I	T	65
Albizia julibrissin	Mimosa	Cultural	Occasional	I	T	11
Alnus glutinosa	Black alder	Floodplain forest Cultural	Uncommon	I	T	8
A. incana subsp. *rugosa*	Speckled alder	Thickets Wetland Cultural	Rare	N	S	6
A. serrulata	Common alder Hazel alder Smooth alder	Floodplain forest Wetland	Occasional	N	T/S	10
Amelanchier arborea	Juneberry Shadblow serviceberry Shadbush	Upland forest Thickets Wetland Primary Cultural	Occasional	N	T/S	67
A. humilis	Low shadbush	Cultural	Uncommon	N	S	15
A. interior	Shadbush	Floodplain forest Wetland	Rare	N	T	3
A. laevis	Shadbush	Upland forest Wetland	Uncommon	N	S	16
A. sanguinea	Round-leaved serviceberry	Cultural	Rare	N	T/S	1
Amorpha canescens	Lead plant	Prairie Primary Cultural	Common	N	S	67
A. fruticosa	False indigo	Floodplain forest Thickets Wetland	Occasional	N	S	81
var. *angustifolia*	False indigo	Floodplain forest Thickets Wetland	Rare	N	S	1
var. *croceolanata*	False indigo	Floodplain forest	Rare	N	S	1
A. nitens	Smooth false indigo	Thickets Wetland	Rare	N	S	1
Ampelopsis arborea	Pepper vine	Floodplain forest Thickets Wetland	Rare	N	L	6
A. cordata	Raccoon grape	Upland forest Floodplain forest Thickets Wetland Cultural	Common	N	L	38

Scientific name	Common name	Natural community	Prevalence in Illinois	Native or introduced	Tree/shrub/ liana	Counties
Andromeda polifolia var. *glaucophylla*	Bog rosemary	Wetland	Rare	N	S	2
Aralia elata	Japanese angelica tree	Cultural	Rare	I	T/S	1
A. spinosa	Angelica tree Devil's walking stick Hercules' club	Upland forest Floodplain forest Primary Cultural	Occasional	N	T/S	14
Arctostaphylos uva-ursi subsp. *coactilis*	Bearberry Kinnickinnick	Sand forest Prairie Primary	Rare	N	S	6
Aristolochia tomentosa	Dutchman's pipe Pipe vine	Floodplain forest Wetland	Rare	N	L	9
Aronia melanocarpa	Black chokeberry	Sand forest Prairie Wetland Primary Cultural	Occasional	N	S	13
A. prunifolia	Purple chokeberry	Prairie Wetland	Occasional	N	S	5
Artemisia abrotanum	Garden sagebrush Oldman wormwood Southernwood	Cultural	Rare	I	S	2
A. absinthium	Absinthe Common wormwood	Cultural	Rare	I	S	11
A. frigida	Fringed sagebrush Prairie sagebrush Prairie sagewort	Cultural	Rare	I	S	1
A. pontica	Roman wormwood	Cultural	Uncommon	I	S	3
Asimina triloba	Banana tree Pawpaw	Upland forest Floodplain forest Cultural	Common	N	T	80
Berberis canadensis	Allegheny barberry American barberry	Sand forest	Rare	N	S	2
B. thunbergii	Japanese barberry	Upland forest Thickets Cultural	Occasional	I	S	37
B. vulgaris	Common barberry	Cultural	Occasional	I	S	19
Berchemia scandens	Rattan vine Supple-jack	Upland forest Floodplain forest	Rare	N	L	1
Betula ×purpusii	Purpus' Birch	Wetland	Rare	N	T/S	1
B. ×sandbergii	Sandberg's birch	Wetland	Rare	N	T/S	2
B. alleghaniensis	Yellow birch	Upland forest Primary	Rare	N	T	6
B. nigra	Red birch River birch	Floodplain forest Wetland	Common	N	T	62
B. papyrifera	Canoe birch Paper birch	Upland forest Wetland Primary Cultural	Uncommon	N	T	6

Scientific name	Common name	Natural community	Prevalence in Illinois	Native or introduced	Tree/shrub/ liana	Counties
B. populifolia	Gray birch	Thickets Prairie Cultural	Rare	N	T	5
B. pumila	Dwarf birch Swamp birch	Wetland	Rare	N	S	6
var. *glabra*	Smooth dwarf birch	Wetland	Rare	N	S	1
var. *glandulifera*	Dwarf birch	Wetland	Rare	N	S	2
Bignonia capreolata	Cross vine	Floodplain forest Thickets Wetland Cultural	Uncommon	N	L	14
Broussonetia papyrifera	Paper mulberry	Thickets Cultural	Uncommon	I	T	5
Brunnichia ovata	Buckwheat vine Ladies' eardrops	Floodplain forest Thickets Wetland	Uncommon	N	L	7
Bumelia lanuginosa						
var. *oblongifolia*	Chittam wood Woolly buckthorn	Upland forest Prairie Savanna Primary	Rare	N	T/S	3
B. lycioides	Southern buckthorn	Floodplain forest Thickets Wetland Primary	Rare	N	T/S	6
Calycanthus floridus	Strawberry shrub	Upland forest Cultural	Rare	I	S	1
Calycocarpum lyonii	Cupseed	Floodplain forest Thickets Wetland	Rare	N	L	10
Campsis radicans	Trumpet creeper	Upland forest Floodplain forest Thickets Wetland Cultural	Common	N	L	82
Caragana arborescens	Pea-tree	Cultural	Rare	I	T/S	4
Carpinus caroliniana	American hornbeam	Upland forest Wetland Primary Cultural	Common	N	T	72
Carya ×lecontei	Bitternut hickory	Floodplain forest	Rare	N	T	1
C. aquatica	Water hickory	Floodplain forest Wetland	Uncommon	N	T	7
C. cordiformis	Bitternut hickory Pignut hickory Swamp hickory Yellowbud hickory	Upland forest Floodplain forest Wetland Cultural	Common	N	T	102
C. glabra	Pignut hickory	Upland forest	Common	N	T	67
var. *megacarpa*	Pignut hickory	Upland forest	Rare	N	T	*

Scientific name	Common name	Natural community	Prevalence in Illinois	Native or introduced	Tree/shrub/ liana	Counties
C. illinoensis	Pecan	Upland forest Floodplain forest Cultural	Occasional	N	T	51
C. laciniosa	Big shellbark hickory Kingnut hickory Riverbank hickory	Upland forest Floodplain forest Wetland Cultural	Occasional	N	T	41
C. ovalis	False shagbark hickory Small-fruited hickory Sweet pignut hickory	Upland forest	Common	N	T	45
var. *obovalis*	Sweet pignut hickory	Upland forest	Occasional	N	T	*
var. *odorata*	Sweet pignut hickory	Upland forest	Rare	N	T	*
C. ovata	Scaly-bark hickory Shagbark hickory Shellbark hickory	Upland forest Floodplain forest Cultural	Common	N	T	102
var. *fraxinifolia*	Ash-leaved shagbark hickory	Upland forest	Rare	N	T	*
var. *nuttallii*	Small shagbark hickory	Upland forest	Rare	N	T	*
C. pallida	Pale hickory	Upland forest	Rare	N	T	3
C. texana	Black hickory Red hickory Texas hickory	Sand forest Savanna Primary Upland forest	Occasional	N	T	27
C. tomentosa	Mockernut hickory	Upland forest	Occasional	N	T	73
Castanea dentata	American chestnut	Upland forest Cultural	Rare	N	T	8
C. mollissima	Chinese chestnut	Cultural	Rare	I	T	2
Catalpa bignonioides	Common catalpa Indian bean Lady cigar tree	Floodplain forest Wetland Cultural	Occasional	I	T	18
C. speciosa	Cigar tree Indian bean Western catalpa	Floodplain forest Wetland Cultural	Occasional	N	T	42
Ceanothus americanus	New Jersey tea	Upland forest Thickets Prairie Savanna Primary	Occasional	N	S	94
var. *pitcheri*	New Jersey tea	Upland forest Prairie Savanna Primary	Uncommon	N	S	13
C. herbaceus	Inland New Jersey tea Redroot	Sand forest Prairie	Rare	N	S	5
Celastrus orbiculatus	Round-leaved bittersweet	Thickets Cultural	Rare	I	L	11
C. scandens	Bittersweet	Upland forest Sand forest Thickets Wetland Primary Cultural	Occasional	N	L	94

Scientific name	Common name	Natural community	Prevalence in Illinois	Native or introduced	Tree/shrub/ liana	Counties
Celtis laevigata	Sugarberry	Upland forest Floodplain forest Wetland Primary	Common	N	T	34
var. *smalli*	Toothed sugarberry	Floodplain forest Wetland	Occasional	N	T	4
var. *texana*	Cliff sugarberry	Upland Primary	Occasional	N	T/S	3
C. occidentalis	Hackberry	Upland forest Floodplain forest Savanna Wetland Primary Cultural	Common	N	T/S	99
var. *canina*	Hackberry	Floodplain forest Wetland	Common	N	T	102
var. *pumila*	Small hackberry	Upland forest Floodplain forest Primary	Occasional	N	T/S	21
C. tenuifolia	Dwarf hackberry	Upland forest Primary	Occasional	N	T/S	18
var. *georgiana*	Dwarf hackberry	Upland forest Primary	Occasional	N	T/S	6
Cephalanthus occidentalis	Buttonbush	Floodplain forest Thickets Wetland	Occasional	N	T/S	94
var. *pubescens*	Buttonbush	Floodplain forest Thickets Wetland	Occasional	N	T/S	*
Cercis canadensis	Eastern redbud	Upland forest Thickets Savanna Primary Cultural	Common	N	T/S	88
Chaenomeles japonica	Japanese quince	Cultural	Rare	I	S	1
Chamaedaphne calyculata var. *angustifolia*	Leatherleaf	Wetland	Occasional	N	S	4
Cladrastis kentuckea	Yellowwood	Upland forest Primary	Rare	N	T	2
Clematis occidentalis	Purple clematis Mountain clematis	Upland forest	Rare	N	L	1
C. virginiana	Virgin's bower	Upland forest Thickets Wetland Cultural	Occasional	N	L	61
Cocculus carolinus	Snailseed	Upland forest Floodplain forest Thickets Wetland Primary Cultural	Occasional	N	L	15

Scientific name	Common name	Natural community	Prevalence in Illinois	Native or introduced	Tree/shrub/ liana	Counties
Comptonia peregrina	Sweet fern	Prairie Savanna Cultural	Rare	N	S	6
Cornus alternifolia	Green osier dogwood Pogoda dogwood Alternate-leaved dogwood	Upland forest Thickets Wetland Cultural	Uncommon	N	T	34
C. amomum	Willow dogwood Silky dogwood	Upland forest Thickets Wetland Cultural	Uncommon	N	S	3
C. drummondii	Rough-leaved dogwood	Upland forest Floodplain forest Primary	Common	N	T/S	78
C. florida	White dogwood Flowering dogwood	Upland forest Floodplain forest Cultural	Common	N	T	55
C. foemina	Stiff dogwood	Floodplain forest Wetland	Occasional	N	S	16
C. obliqua	Silky dogwood Pale dogwood	Thickets Prairie Wetland Primary	Common	N	S	70
C. racemosa	Gray dogwood	Upland forest Floodplain forest Thickets Prairie Wetland Cultural	Common	N	S	88
C. rugosa	Round-leaved dogwood	Upland forest Primary	Uncommon	N	S	11
C. stolonifera	Red-twig dogwood Red osier dogwood	Thickets Wetland Primary	Occasional	N	S	41
var. *baileyi*	Bailey's dogwood	Primary	Rare	N	S	2
Corylus americana	American filbert Hazelnut	Upland forest Thickets Savanna Cultural	Common	N	S	102
C. rostrata	Beaked hazelnut Beaked filbert	Upland forest Thickets	Rare	N	S	1
Crataegus acutifolia	Hawthorn	Savanna Wetland	Rare	N	T	2
C. calpodendron	Urn-shaped hawthorn	Savanna Wetland Primary	Occasional	N	T/S	32
C. coccinioides	Hawthorn	Thickets Savanna	Uncommon	N	T/S	3
C. collina	Hawthorn	Floodplain forest	Rare	N	T	2
C. corusca	Hawthorn	Thickets Savanna Cultural	Rare	N	T	1

Scientific name	Common name	Natural community	Prevalence in Illinois	Native or introduced	Tree/shrub/ liana	Counties
C. crus-galli	Cock-spur thorn	Thickets Savanna Cultural	Occasional	N	T/S	73
var. *barrettiana*	Barrett's thorn	Thickets	Rare	N	T	1
C. cuneiformis	Hawthorn	Savanna Wetland Cultural	Occasional	N	T	4
C. engelmannii	Barberry-leaved hawthorn	Thickets	Occasional	N	T/S	7
C. faxonii	Hawthorn	Thickets Cultural	Rare	N	T/S	1
C. fecunda	Fruitful thorn	Savanna Wetland	Rare	N	T	2
C. hannibalensis	Hawthorn	Thickets	Rare	N	T/S	1
C. holmesiana	Hawthorn	Thickets Savanna Cultural	Occasional	N	T/S	12
C. lucorum	Hawthorn	Upland forest Savanna Wetland Cultural	Uncommon	N	T/S	4
C. macrosperma	Hawthorn	Thickets Savanna Cultural	Occasional	N	T/S	6
C. margaretta	Hawthorn	Thickets Savanna	Occasional	N	T/S	16
C. marshallii	Parsley haw	Upland forest Floodplain forest	Rare	N	T/S	1
C. mollis	Red haw	Floodplain forest Savanna Wetland Cultural	Occasional	N	T	78
C. monogyna	English hawthorn	Cultural	Rare	I	T/S	3
C. neobushii	Hawthorn	Thickets	Rare	N	S	2
C. nitida	Hawthorn	Floodplain forest Savanna Wetland	Rare	N	T	3
C. pedicellata	Hawthorn	Thickets Wetland Cultural	Rare	N	T/S	2
C. permixta	Hawthorn	Thickets Savanna	Rare	N	T	1
C. phaenopyrum	Washington thorn	Savanna Cultural	Occasional	N	T	8
C. pringlei	Hawthorn	Thickets Savanna Wetland Cultural	Rare	N	T	1
C. pruinosa	Hawthorn	Thickets Savanna Cultural	Occasional	N	T/S	26
C. punctata	Dotted thorn	Floodplain forest Thickets Cultural	Occasional	N	T/S	33

Scientific name	Common name	Natural community	Prevalence in Illinois	Native or introduced	Tree/shrub/ liana	Counties
C. succulenta	Hawthorn	Upland Thickets Primary Cultural	Occasional	N	T/S	18
C. tortilis	Hawthorn	Thickets Savanna Cultural	Rare	N	T/S	1
C. viridis	Green thorn	Floodplain forest	Occasional	N	T	23
Cydonia oblonga	Common quince	Cultural	Rare	I	S	1
Deutzia scabra	Pride-of-Rochester	Cultural	Rare	I	S	1
Diervilla lonicera	Bush honeysuckle	Sand forest	Occasional	N	S	14
Diospyros virginiana	Persimmon Possomwood	Upland forest Floodplain forest	Occasional	N	T	65
Dirca palustris	Leatherwood Moosewood Ropebark	Floodplain forest Thickets Wetland Cultural	Uncommon	N	S	20
Elaeagnus angustifolia	Russian olive	Thickets Wetland Cultural	Rare	I	T/S	10
E. multiflora	Oleaster	Cultural	Rare	I	S	2
E. umbellata	Oleaster Autumn olive	Thickets Cultural	Rare	I	S	6
Epigaea repens	Trailing arbutis	Sand forest	Rare	N	S	*
Euonymus alatus	Burning bush Winged euonymus	Cultural Upland forest	Rare	I	S	10
E. americanus	Strawberry bush	Floodplain forest	Uncommon	N	S	7
E. atropurpureus	Burning bush Wahoo	Upland forest Floodplain forest Wetland Cultural	Occasional	N	S	89
E. europaeus	European spindle tree	Floodplain forest Cultural	Rare	I	S	2
E. fortunei	Climbing euonymus	Cultural	Occasional	I	S	3
E. kiautschovicus	Climbing euonymus	Cultural	Rare	I	S	1
E. obovatus	Running strawberry bush	Upland forest	Uncommon	N	S	19
Fagus grandifolia var. *caroliniana*	American beech Beech	Upland forest Wetland Cultural	Occasional	N	T	23
Forestiera acuminata	Swamp privet	Floodplain forest Wetland Cultural	Rare	N	T/S	34
Fraxinus americana	White ash	Upland forest Floodplain forest Cultural	Common	N	T	95
F. nigra	Black ash	Upland forest Floodplain forest	Occasional	N	T	27
F. pennsylvanica	Green ash Red ash	Upland forest Floodplain forest Wetland	Occasional	N	T	74

Scientific name	Common name	Natural community	Prevalence in Illinois	Native or introduced	Tree/shrub/ liana	Counties
F. profunda	Pumpkin ash	Floodplain forest Wetland	Occasional	N	T	19
F. quadrangulata	Blue ash Square-stemmed ash	Upland forest Primary Cultural	Occasional	N	T	50
Gaultheria procumbens	Checkerberry Creeping wintergreen Wintergreen	Upland forest Wetland	Rare	N	S	4
Gaylussacia baccata	Black huckleberry	Upland forest Thickets Prairie Wetland Primary	Occasional	N	S	19
Gleditsia aquatica	Water locust	Floodplain forest Wetland	Rare	N	T	15
G. triacanthos	Honeylocust	Upland forest Floodplain forest Thickets Cultural	Common	N	T	99
f. *inermis*	Thornless honeylocust	Floodplain forest	Rare	N	T	*
Gossypium hirsutum	Cotton	Cultural	Rare	I	S	2
Gymnocladus dioicus	Kentucky coffee tree	Upland forest Floodplain forest Wetland Cultural	Occasional	N	T	69
Halesia carolina	Silverbell tree	Upland forest	Rare	N	T	2
Hamamelis virginiana	Witch-hazel	Upland forest Sand forest Primary Cultural	Occasional	N	T/S	23
Hedera helix	English ivy	Cultural	Rare	I	L	1
Hibiscus syriacus	Rose-of-Sharon Shrubby althea	Thickets Cultural	Occasional	I	S	1
Hudsonia tomentosa	Beach heath Beach heather False heather	Prairie Primary	Rare	N	S	5
var. *intermedia*	Beach heath Beach heather False heather	Prairie Primary	Rare	N	S	1
Hydrangea arborescens	Wild hydrangea	Upland Wetland	Common	N	S	54
Hypericum densiflorum	Shrubby St. John's-wort	Floodplain forest Wetland	Rare	N	S	3
H. hypericoides	St. Andrew's cross	Upland forest Sand forest Wetland	Rare	N	S	1
H. kalmianum	Kalm's St. John's-wort	Prairie Wetland Primary	Uncommon	N	S	2

Scientific name	Common name	Natural community	Prevalence in Illinois	Native or introduced	Tree/shrub/ liana	Counties
H. lobocarpum	St. John's-wort	Upland forest Floodplain forest	Rare	N	S	2
H. prolificum	Shrubby St. John's-wort	Upland forest Primary Cultural	Occasional	N	S	43
H. stragulum	St. Andrew's cross	Upland forest Primary	Occasional	N	S	11
Ilex decidua	Swamp holly	Wetland Primary	Occasional	N	T/S	39
I. opaca	American holly	Upland forest	Rare	N	T/S	1
I. verticillata	Winterberry	Upland forest Floodplain forest Flatwoods Thickets Wetland Cultural	Occasional	N	T/S	19
Itea virginica	Virginia willow	Floodplain forest Wetland	Uncommon	N	S	6
Juglans cinerea	Butternut White walnut	Upland forest Floodplain forest Cultural	Uncommon	N	T	67
J. nigra	Black walnut	Upland forest Floodplain forest Wetland Cultural	Common	N	T	101
Juniperus communis	Common juniper Ground juniper	Primary	Uncommon	N	T	1
var. *depressa*	Common juniper Ground juniper	Primary	Uncommon	N	S	2
J. horizontalis	Trailing juniper	Prairie Primary	Rare	N	S	2
J. virginiana	Eastern red cedar	Upland forest Floodplain forest Wetland Primary Cultural	Common	N	T	98
Kerria japonica	Yellow rose	Cultural	Rare	I	S	*
Koelreuteria paniculata	Goldenrain tree	Cultural	Rare	I	T	1
Larix decidua	European larch	Cultural	Uncommon	I	T	3
L. laricina	American larch Tamarack	Wetland Cultural	Uncommon	N	T	3
Ligustrum obtusifolium	Privet	Thickets Cultural	Uncommon	I	S	4
L. vulgare	Privet	Thickets Cultural	Rare	I	S	24
Lindera benzoin	Feverbush Spicebush Wild allspice	Upland forest Floodplain forest Wetland Cultural	Common	N	S	51
var. *pubescens*	Hairy spicebush	Upland forest Floodplain forest	Rare	N	S	3

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Linnaea borealis subsp. *americana*	Twinflower	Wetland	Rare	N	S	1
Liquidambar styraciflua	Red gum Sweetgum	Upland forest Floodplain forest Cultural	Occasional	N	T	29
Liriodendron tulipifera	Tulip tree Tulip poplar Yellow poplar	Upland forest Cultural	Common	N	T	27
Lonicera ×bella	Honeysuckle	Thickets Cultural	Occasional	I	S	22
L. ×minutiflora	Bush honeysuckle	Cultural	Rare	I	S	1
L. ×muendeniensis	Bush honeysuckle	Cultural	Occasional	I	S	11
L. ×muscaviensis	Bush honeysuckle	Cultural	Rare	I	S	1
L. ×xylosteoides	Bush honeysuckle	Cultural	Uncommon	I	S	2
L. dioica	Limber honeysuckle Red honeysuckle	Upland forest Thickets	Uncommon	N	S/L	8
var. *glaucescens*	Red honeysuckle	Upland Wetland	Rare	N	S/L	1
L. flava	Yellow honeysuckle	Upland forest Primary	Uncommon	N	L	2
L. japonica	Japanese honeysuckle	Floodplain forest Thickets Cultural	Common	I	L	50
var. *chinensis*	Japanese honeysuckle	Cultural	Rare	I	L	2
L. maackii	Amur honeysuckle	Cultural	Occasional	I	S	14
L. morrowi	Morrow's honeysuckle	Thickets Cultural	Rare	I	S	8
L. prolifera	Grape honeysuckle	Upland forest	Common	N	L	57
L. ruprechtiana	Manchurian honeysuckle	Cultural	Rare	I	S	2
L. sempervirens	Trumpet honeysuckle	Wetland Cultural	Occasional	I	L	24
L. standishii	Honeysuckle	Thicket Cultural	Rare	I	S	1
L. tatarica	Tartarian honeysuckle	Thickets Cultural	Occasional	I	S	26
L. xylosteum	European fly honeysuckle	Thickets Cultural	Rare	I	S	9
Lycium barbarum	Common matrimony vine	Thickets Cultural	Occasional	I	S	40
L. chinense	Chinese matrimony vine	Cultural	Rare	I	S	3
Maclura pomifera	Hedge apple Osage orange	Cultural	Common	I	T	93
Magnolia acuminata	Cucumber magnolia Cucumber tree	Upland forest Floodplain forest Cultural	Rare	N	T	6
Malus ×soulardii	Soulard crabapple	Cultural	Rare	N	T/S	1
M. angustifolia	Narrow-leaved crabapple	Floodplain forest Flatwoods	Rare	N	T/S	3
M. coronaria	Wild sweet crabapple	Upland forest Floodplain forest	Occasional	N	T/S	29
var. *dasycalyx*	Narrow-leaved crabapple	Upland forest Floodplain forest	Uncommon	N	T/S	4

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M. ioensis	Iowa crabapple	Upland forest Thickets Cultural	Common	N	T/S	101
M. pumila	Apple	Cultural	Occasional	I	T	23
Menispermum canadense	Moonseed	Upland forest Floodplain forest Thickets Wetland Cultural	Common	N	L	95
Morus alba	White mulberry	Cultural	Common	I	T	84
var. *tatarica*	Russian mulberry	Cultural	Common	I	S	32
M. rubra	Red mulberry	Upland forest Floodplain forest Cultural	Common	N	T	90
Nemopanthus mucronatus	Mountain holly	Thickets Wetland	Rare	N	S	1
Nyssa aquatica	Swamp tupelo Tupelo gum Water tupelo	Floodplain forest Wetland	Occasional	N	T	8
N. sylvatica	Black gum Black tupelo Pepperidge Sour gum	Upland forest Floodplain forest Flatwoods Wetland Cultural	Occasional	N	T	33
var. *caroliniana*	Black gum Black tupelo Sour gum	Upland forest	Occasional	N	T	*
Ononis spinosa	Rest harrow	Cultural	Rare	I	S	1
Ostrya virginiana	Hop hornbeam Ironwood	Upland forest Wetland Cultural	Common	N	T	102
Oxydendrum arboreum	Sourwood	Upland forest Thickets	Rare	I	T	1
Parthenocissus inserta	Virginia creeper	Upland forest Thickets Primary Cultural	Occasional	N	L	30
P. quinquefolia	Virginia creeper	Upland forest Thickets Primary Cultural	Common	N	L	102
P. tricuspidata	Boston ivy	Cultural	Rare	I	L	2
Paulownia tomentosa	Paulownia Princess tree	Thickets Cultural	Uncommon	I	T	6
Philadelphus coronarius	Sweet mock orange	Thickets Cultural	Rare	I	S	1
P. inodorus	Scentless mock orange	Cultural	Rare	I	S	1
P. pubescens	Mock orange	Primary	Rare	N	S	2

Scientific name	Common name	Natural community	Prevalence in Illinois	Native or introduced	Tree/shrub/ liana	Counties
Phoradendron serotinum	Mistletoe	Floodplain forest Flatwoods Wetland	Occasional	N	S	19
Physocarpus opulifolius	Common ninebark	Wetland Primary Cultural	Occasional	N	S	28
Picea abies	Norway spruce	Cultural	Rare	I	T	1
P. mariana	Black spruce	Wetland	Rare	I	T	1
Pinus banksiana	Jack pine	Sand forest Prairie Savanna Primary	Rare	N	T	5
P. echinata	Shortleaf pine Yellow pine	Upland forest Cultural	Rare	N	T	4
P. nigra	Austrian pine	Cultural	Rare	I	T	1
P. pungens	Prickly pine Table mountain pine	Cultural	Rare	I	T	1
P. resinosa	Red pine	Sand forest Primary Cultural	Rare	N	T	3
P. rigida	Pitch pine	Sand forest	Occasional	I	T	1
P. strobus	White pine	Upland forest Sand forest Wetland Cultural	Occasional	N	T	9
P. sylvestris	Scotch pine	Sand forest Cultural	Occasional	I	T	4
P. taeda	Loblolly pine	Cultural	Rare	I	T	5
P. wallichiana	Bhutan pine Himalayan white pine	Cultural	Rare	I	T	1
Planera aquatica	Planer tree Water elm	Wetland Floodplain forest	Uncommon	N	T	5
Platanus occidentalis	Buttonwood Plane tree Sycamore	Floodplain forest Wetland Primary Cultural	Common	N	T	102
Populus ×gileadensis	Balm-of-Gilead	Cultural	Rare	I	T	1
P. ×smithii	Barnes' aspen	Floodplain forest	Rare	N	T	2
P. alba	White poplar	Wetland Cultural	Occasional	I	T	56
P. balsamifera	Balsam poplar Tacamahac	Prairie Savanna Wetland Primary	Rare	N	T	4
P. canescens	Gray poplar	Cultural	Uncommon	I	T	4
P. deltoides	Eastern cottonwood	Floodplain forest Prairie Wetland Primary Cultural	Common	N	T	94
P. grandidentata	Big-tooth aspen Large-toothed aspen	Upland forest Cultural	Occasional	N	T	46

Scientific name	Common name	Natural community	Prevalence in Illinois	Native or introduced	Tree/shrub/ liana	Counties
P. heterophylla	Swamp cottonwood	Floodplain forest Wetland	Occasional	N	T	21
P. nigra	Black poplar	Cultural	Rare	I	T	1
var. *italica*	Lombardy poplar	Primary Cultural	Rare	I	T	6
P. tremuloides	Quaking aspen	Upland forest Thickets Wetland Cultural	Common	N	T	37
Potentilla fruticosa	Bush cinquefoil Shrubby cinquefoil	Prairie Wetland	Rare	N	S	8
Prunus americana	American plum Wild plum	Upland forest Thickets Cultural	Occasional	N	T/S	88
var. *lanata*	Wild plum	Upland forest Thickets Cultural	Occasional	N	T/S	54
P. angustifolia	Chickasaw plum	Thickets Cultural	Occasional	N	T/S	33
P. armeniaca	Apricot	Cultural	Rare	I	T	1
P. avium	Sweet cherry	Thickets Cultural	Rare	I	T	1
P. cerasus	Pie cherry Sour cherry	Thickets Cultural	Rare	I	T	3
P. hortulana	Wild goose plum Wild plum	Upland forest Floodplain forest Thickets Wetland	Occasional	N	T	50
P. mahaleb	Mahaleb cherry Perfumed cherry	Cultural	Rare	I	T/S	13
P. mexicana	Big tree plum Wild plum	Upland forest	Rare	N	T	3
P. munsoniana	Wild goose plum	Upland forest	Occasional	N	T	18
P. nigra	Canada plum	Upland forest Thickets Wetland	Occasional	N	T	11
P. padus	European bird-cherry	Thickets Cultural	Rare	I	T/S	1
P. pensylvanica	Pin cherry	Upland forest	Uncommon	N	T/S	15
P. persica	Peach	Cultural	Occasional	I	T	31
P. serotina	Wild black cherry	Upland Cultural	Common	N	T	102
P. susquehanae	Sand cherry	Prairie Primary	Uncommon	N	S	9
P. triloba	Flowering almond Flowering plum	Cultural	Rare	I	T/S	*
P. virginiana	Common chokecherry	Upland forest Sand forest Thickets Primary Cultural	Occasional	N	T/S	53

Scientific name	Common name	Natural community	Prevalence in Illinois	Native or introduced	Tree/shrub/ liana	Counties
Ptelea trifoliata	Wafer ash	Upland forest Thickets Savanna Primary Cultural	Occasional	N	T/S	85
var. *mollis*	Wafer ash	Primary	Rare	N	T/S	4
Pueraria lobata	Kudzu-vine	Cultural	Occasional	I	L	8
Pyrus calleryana	Ornamental pear	Cultural	Rare	I	T	1
P. communis	Pear	Cultural	Occasional	I	T	29
P. pyrifolia	Chinese pear	Wetland Cultural	Rare	I	T	1
Quercus alba	White oak	Upland forest Sand forest Floodplain forest Flatwoods Savanna Cultural	Common	N	T	102
Q. bicolor	Swamp white oak	Floodplain forest Flatwoods Wetland Cultural	Occasional	N	T	62
Q. coccinea	Scarlet oak	Upland forest	Occasional	N	T	13
Q. ellipsoidalis	Hill's oak Northern pin oak	Upland forest Flatwoods Savanna	Occasional	N	T	18
Q. falcata	Southern red oak Spanish oak	Upland forest Flatwoods Savanna	Occasional	N	T	20
Q. imbricaria	Jack oak Laurel oak Shingle oak	Upland forest Floodplain forest Wetland Primary Cultural	Common	N	T	90
Q. lyrata	Overcup oak	Floodplain forest Wetland	Occasional	N	T	27
Q. macrocarpa	Bur oak Mossy cup oak	Upland forest Floodplain forest Savanna Cultural	Common	N	T	102
Q. marilandica	Blackjack oak Scrub oak	Upland forest Sand forest Flatwoods Savanna Primary	Occasional	N	T	56
Q. michauxii	Basket oak Cow oak Swamp chestnut oak	Floodplain forest Wetland	Occasional	N	T	19
Q. nuttallii	Nuttall's oak	Floodplain forest	Rare	N	T	1
Q. pagoda	Cherrybark oak Swamp Spanish oak	Floodplain forest	Occasional	N	T	9

Scientific name	Common name	Natural community	Prevalence in Illinois	Native or introduced	Tree/shrub/liana	Counties
Q. palustris	Pin oak Spanish oak Water oak	Floodplain forest Flatwoods Wetland Cultural	Common	N	T	78
Q. phellos	Willow oak	Wetland	Uncommon	N	T	5
Q. prinoides var. *acuminata*	Chinkapin oak Yellow chestnut oak	Upland forest Primary	Occasional	N	T	85
Q. prinus	Basket oak Chestnut oak Rock chestnut oak	Upland forest	Uncommon	N	T	4
Q. rubra	Northern red oak Red oak	Upland forest Sand forest Cultural	Common	N	T	96
Q. shumardii	Shumard's oak	Upland forest Floodplain forest Wetland	Occasional	N	T	21
var. *schneckii*	Schneck's red oak	Upland forest	Occasional	N	T	7
Q. stellata	Post oak	Upland forest Flatwoods Savanna Primary	Common	N	T	56
Q. velutina	Black oak Yellow-barked oak	Upland forest Sand forest Savanna Wetland Primary Cultural	Common	N	T	102
f. *missouriensis*	Black oak Yellow-barked oak	Upland forest	Rare	N	T	2
Rehsonia floribunda	Japanese wisteria	Cultural	Rare	I	L	1
R. sinensis	Chinese wisteria	Cultural	Rare	I	L	3
Rhamnus alnifolia	Alder buckthorn	Wetland	Rare	N	S	6
R. caroliniana	Carolina buckthorn	Upland forest Wetland Primary	Uncommon	N	T/S	10
R. cathartica	Common buckthorn	Cultural	Occasional	I	T/S	24
R. davurica	Buckthorn Dahurian buckthorn	Cultural	Rare	I	T	1
R. frangula	Glossy buckthorn	Wetland Cultural	Occasional	I	T/S	18
var. *angustifolia*	Narrow-leaved glossy buckthorn	Cultural	Rare	I	T/S	1
R. lanceolata	Lance-leaved buckthorn	Wetland Primary	Rare	N	S	45
Rhododendron periclymenoides	Pink azalea	Upland forest Thickets	Rare	N	S	1
R. prinophyllum	Pink azalea	Upland forest Thickets Primary	Rare	N	S	3
Rhodotypos scandens	Jetbead	Upland forest Thickets	Rare	I	S	1

Scientific name	Common name	Natural community	Prevalence in Illinois	Native or introduced	Tree/shrub/ liana	Counties
Rhus aromatica	Aromatic sumac Fragrant sumac	Sand forest Prairie Savanna Primary Cultural	Occasional	N	S	51
var. *arenaria*	Beach sumac Fragrant sumac	Prairie Primary	Uncommon	N	S	19
var. *serotina*	Fragrant sumac	Sand forest Savanna Primary	Rare	N	S	1
R. copallina	Dwarf sumac Shining sumac Winged sumac	Upland forest Prairie Cultural	Common	N	T/S	52
R. glabra	Smooth sumac	Upland forest Prairie Cultural	Common	N	T/S	102
R. typhina	Staghorn sumac	Upland forest Thickets Savanna Wetland Cultural	Occasional	N	T/S	27
Ribes americanum	Wild black currant	Upland forest Floodplain forest Thickets	Common	N	S	34
R. cynosbati	Dogberry Prickly gooseberry	Upland forest Primary	Occasional	N	S	35
R. hirtellum	Northern gooseberry	Upland forest Wetland Primary	Rare	N	S	8
R. missouriense	Missouri gooseberry	Upland forest Thickets Cultural	Common	N	S	76
R. nigrum	Black currant	Thickets Cultural	Rare	I	S	1
R. odoratum	Buffalo currant Golden currant	Cultural	Occasional	I	S	29
R. rubrum	Red currant	Thickets Cultural	Occasional	I	S	9
Robinia hispida	Bristly locust	Cultural	Occasional	I	S	9
R. pseudoacacia	Black locust	Upland forest Thickets Cultural	Common	N	T	88
R. viscosa	Clammy locust	Cultural	Rare	I	T/S	1
Rosa acicularis	Prickly rose	Upland Thickets	Rare	N	S	1
R. arkansana	Lunell's rose	Cultural	Rare	I	S	1
R. blanda	Meadow rose	Thickets Savanna Cultural	Occasional	N	S	34
R. canina	Dog rose	Thickets Wetland Cultural	Occasional	I	S	4

Scientific name	Common name	Natural community	Prevalence in Illinois	Native or introduced	Tree/shrub/liana	Counties
R. carolina	Pasture rose	Upland forest Prairie Savanna Primary Cultural	Common	N	S	96
var. *villosa*	Pasture rose	Upland forest Prairie Savanna Cultural	Occasional	N	S	*
R. eglanteria	Sweet-brier	Cultural	Occasional	I	S	29
R. gallica	French rose	Cultural	Rare	I	S	2
R. micrantha	Small sweet-brier	Cultural	Rare	I	S	1
R. moschata	Musk rose	Cultural	Rare	I	S	1
R. multiflora	Japanese rose Multiflora rose	Cultural	Common	I	S	59
R. palustris	Swamp rose	Floodplain forest Thickets Wetland	Occasional	N	S	44
R. rubrifolia	Red-leaved rose	Cultural	Rare	I	S	1
R. rugosa	Rugose rose	Thickets Cultural	Rare	I	S	1
R. setigera	Illinois rose Prairie rose	Thickets Savanna Cultural	Occasional	N	S	77
var. *tomentosa*	Prairie rose	Thickets Savanna Cultural	Occasional	N	S	*
R. spinosissima	Burnet rose Scotch rose	Thickets Cultural	Occasional	I	S	3
R. suffulta	Sunshine rose	Thickets Prairie Cultural	Occasional	N	S	33
R. wichuriana	Memorial rose	Cultural	Rare	I	S	1
Rubus allegheniensis	Common blackberry	Upland forest Thickets Savanna Cultural	Common	N	S	84
R. alumnus	Blackberry	Cultural	Rare	N	S	3
R. argutus	Highbush blackberry	Upland forest Thickets	Common	N	S	48
R. avipes	Blackberry	Thickets	Rare	N	S	1
R. discolor	Himalaya-berry	Cultural	Rare	I	S	2
R. enslenii	Arching dewberry Southern dewberry	Upland forest Savanna Primary	Rare	N	S	7
R. flagellaris	Dewberry	Sand forest Savanna Cultural	Common	N	S	82
R. frondosus	Blackberry	Thickets Savanna Cultural	Occasional	N	S	46

Scientific name	Common name	Natural community	Prevalence in Illinois	Native or introduced	Tree/shrub/ liana	Counties
R. hispidus	Swamp dewberry	Upland forest Thickets Prairie Wetland	Uncommon	N	S	18
R. idaeus	Cultivated raspberry	Cultural	Occasional	I	S	27
R. laciniatus	Cut-leaved blackberry Evergreen blackberry	Cultural	Uncommon	I	S	8
R. occidentalis	Black raspberry Blackcap raspberry	Upland forest Thickets Savanna Primary Cultural	Common	N	S	80
R. odoratus	Flowering raspberry Purple-flowering raspberry	Cultural	Rare	N	S	7
R. pensylvanicus	Blackberry	Thickets Savanna Cultural	Occasional	N	S	64
R. phoenicolasius	Wineberry	Cultural	Occasional	I	S	4
R. roribaccus	Velvet-leaved dewberry	Savanna Cultural	Uncommon	N	S	5
R. schneideri	Bristly blackberry	Prairie	Rare	N	S	2
R. strigosus	Red raspberry	Wetland	Uncommon	N	S	13
R. trivialis	Southern dewberry	Floodplain forest Wetland Cultural	Uncommon	N	S	8
Salix ×myricoides	Willow	Floodplain forest Wetland	Rare	N	S	1
S. ×subsericea	Willow	Wetland	Rare	N	S	2
S. alba	White willow	Wetland Cultural	Occasional	I	T	37
var. *calva*	White willow	Wetland Cultural	Rare	I	T	1
var. *vitellina*	White willow	Wetland Cultural	Rare	I	T	3
S. amygdaloides	Peach-leaved willow	Floodplain forest Wetland	Occasional	N	T	57
S. babylonica	Weeping willow	Wetland Cultural	Rare	I	T	7
S. bebbiana	Beaked willow Smooth bebb willow	Wetland	Occasional	N	T/S	11
S. candida	Hoary willow Sage willow	Prairie Wetland	Uncommon	N	S	13
S. caprea	Goat willow	Thickets Cultural	Rare	I	T/S	3
S. caroliniana	Carolina willow Ward's willow	Upland forest Floodplain forest Wetland	Uncommon	N	T	13
S. discolor	Pussy willow	Floodplain forest Thickets Wetland	Occasional	N	S	44
S. eriocephala	Willow	Floodplain forest Wetland	Rare	N	T	7

Scientific name	Common name	Natural community	Prevalence in Illinois	Native or introduced	Tree/shrub/ liana	Counties
S. exigua	Sandbar willow	Wetland Primary	Common	N	S	96
S. fragilis	Brittle willow Crack willow	Floodplain forest Wetland Cultural	Occasional	I	T	24
S. glaucophylloides var. *glaucophylla*	Blue-leaf willow	Wetland Primary	Uncommon	N	S	16
S. humilis	Prairie willow	Prairie Savanna	Occasional	N	S	79
var. *hyporhysa*	Prairie willow	Prairie	Occasional	N	S	9
var. *microphylla*	Sage willow	Prairie Savanna	Uncommon	N	S	7
S. lucida	Shinning willow	Wetland	Uncommon	N	T/S	8
S. nigra	Black willow	Floodplain forest Wetland	Common	N	T	102
S. pedicellaris var. *hypoglauca*	Bog willow Interocean bog willow	Wetland	Rare	N	S	8
S. pentandra	Bay-leaved willow Laurel willow	Wetland Cultural	Rare	I	T/S	3
S. petiolaris	Meadow willow Petioled willow	Prairie Wetland	Uncommon	N	S	12
S. purpurea	Basket willow Purple osier	Cultural	Rare	I	S	3
S. rigida	Heart-leaved willow Yellow willow	Wetland	Occasional	N	S	49
S. sericea	Silky willow	Wetland	Occasional	N	T/S	24
S. serissima	Autumn willow	Wetland	Rare	N	S	2
S. syrticola	Dune willow Sand-dune willow	Primary	Rare	N	S	2
Sambucus canadensis	Common elder Elderberry Golden elder	Upland forest Floodplain forest Wetland Cultural	Common	N	S	102
S. racemosa var. *pubens*	Red-berried elder	Upland forest Wetland	Uncommon	N	S	7
Sassafras albidum	Sassafras	Upland forest Thickets Cultural	Common	N	T	77
var. *molle*	Red sassafras	Upland Thickets Cultural	Occasional	N	T	27
Shepherdia canadensis	Buffalo-berry Soapberry	Primary	Rare	N	S	2
Smilax bona-nox	Bullbrier Catbrier Greenbrier	Upland forest Thickets Savanna Wetland Primary Cultural	Uncommon	N	L	13
var. *hederaefolia*	Bullbrier Catbrier Greenbrier	Cultural	Uncommon	N	L	6

Scientific name	Common name	Natural community	Prevalence in Illinois	Native or introduced	Tree/shrub/ liana	Counties
S. glauca	Catbrier Greenbrier	Upland forest Wetland Primary Cultural	Common	N	L	16
var. *leurophylla*	Catbrier Greenbrier	Upland forest Wetland Primary Cultural	Rare	N	L	4
S. hispida	Bristly greenbrier Catbrier	Upland forest Thickets Wetland	Common	N	L	98
S. rotundifolia	Catbrier Greenbrier	Upland forest Floodplain forest Flatwoods Thickets Wetland	Common	N	L	23
Sorbus americana	American mountain ash	Wetland Primary	Rare	N	T	1
S. aucuparia	European mountain ash	Wetland Cultural	Occasional	I	T	8
Spiraea alba	Meadow-sweet	Prairie Wetland	Occasional	N	S	34
S. japonica	Japanese spiraea	Thickets Cultural	Rare	I	S	1
S. latifolia	Meadow-sweet	Cultural	Rare	I	S	2
S. prunifolia	Bridal-wreath	Cultural	Rare	I	S	2
S. tomentosa	Hardhack	Thickets Prairie Wetland Primary	Rare	N	S	9
Staphylea trifolia	Bladdernut	Upland forest Floodplain forest Thickets Wetland Cultural	Common	N	S	102
Styrax americana	Mock orange Storax	Floodplain forest Wetland	Uncommon	N	S	8
S. grandifolia	Big-leaf snowbell bush	Upland forest	Rare	N	S	1
Symphoricarpos albus var. *laevigatus*	Garden snowberry	Cultural	Rare	I	S	9
S. occidentalis	Western snowberry Wolfberry	Prairie	Occasional	N	S	19
S. orbiculatus	Buckbrush Coralberry Indian currant	Upland forest Thickets Cultural	Occasional	N	S	84
Syringa vulgaris	Lilac	Cultural	Rare	I	S	8
Tamarix gallica	French tamarisk	Thickets Wetland	Rare	I	T/S	3
Taxodium distichum	Bald cypress Gulf cypress Southern cypress	Floodplain forest Wetland Cultural	Uncommon	N	T	14

Scientific name	Common name	Natural community	Prevalence in Illinois	Native or introduced	Tree/shrub/ liana	Counties
Taxus canadensis	Canada yew	Upland forest Wetland	Rare	N	S	8
Thuja occidentalis	Arbor vitae White cedar	Wetland Primary Cultural	Uncommon	N	T	5
Thymus praecox	Creeping thyme	Cultural	Rare	I	S	2
Tilia americana	American linden Basswood	Upland forest Sand forest Floodplain forest Primary Cultural	Occasional	N	T	92
var. *neglecta*	Basswood	Upland forest Floodplain forest	Rare	N	T	4
T. heterophylla	White basswood	Upland forest Floodplain forest	Rare	N	T	4
Toxicodendron radicans	Poison ivy	Upland forest Sand forest Floodplain forest Thickets Primary Cultural	Common	N	S/L	102
T. toxicarium	Poison oak	Sand forest Prairie Savanna Primary	Rare	I	S	1
T. vernix	Poison sumac	Wetland	Occasional	N	S	7
Trachelospermum difforme	Climbing dogbane	Upland forest Floodplain forest Thickets Wetland	Uncommon	N	L	11
Ulmus alata	Winged elm	Upland forest Primary	Common	N	T	22
U. americana	American elm	Upland forest Floodplain forest Flatwoods Wetland Cultural	Common	N	T	102
U. procera	English elm	Upland forest Thickets	Rare	I	T	1
U. pumila	Siberian elm	Cultural	Common	I	T/S	34
U. rubra	Slippery elm	Upland forest Floodplain forest Wetland Primary	Common	N	T	102
U. thomasii	Cork elm Rock elm	Upland forest Floodplain forest	Rare	N	T	10
Vaccinium angustifolium	Low-bush blueberry	Sand forest Flatwoods Prairie Savanna Wetland Primary	Occasional	N	S	9

Scientific name	Common name	Natural community	Prevalence in Illinois	Native or introduced	Tree/shrub/ liana	Counties
V. arboreum	Farkleberry	Upland forest Sand forest Thickets Savanna Wetland Primary	Occasional	N	T/S	12
var. *glaucescens*	Farkleberry	Sand forest Thickets Wetland Primary	Occasional	N	T/S	4
V. corymbosum	High-bush blueberry	Wetland	Rare	N	S	7
V. macrocarpon	American cranberry Large cranberry	Wetland	Rare	N	S	4
V. myrtilloides	Canada blueberry	Wetland	Rare	N	S	4
V. pallidum	Low-bush blueberry	Upland forest Sand forest Thickets Savanna Primary Cultural	Occasional	N	S	30
V. stamineum	Deerberry	Upland forest Thickets Primary	Rare	N	S	1
Viburnum acerifolium	Maple-leaved arrowwood	Upland forest Primary Cultural	Occasional	N	S	12
V. dentatum var. *deamii*	Southern arrowwood	Upland forest Floodplain forest	Rare	N	S	3
V. lantana	Wayfaring tree	Cultural	Rare	I	T/S	4
V. lentago	Nannyberry	Upland forest Wetland Cultural	Occasional	N	T/S	38
V. molle	Arrowwood	Upland forest Primary	Rare	N	S	5
V. opulus	European high-bush cranberry	Upland forest Thickets Cultural	Occasional	I	S	23
V. prunifolium	Black haw Nannyberry	Upland forest Floodplain forest Cultural	Occasional	N	T/S	84
V. rafinesquianum	Downy arrowwood	Upland forest Savanna	Occasional	N	S	28
V. recognitum	Smooth arrowwood	Upland forest Floodplain forest Wetland	Occasional	N	S	39
V. rufidulum	Rusty nannyberry Southern black haw	Upland forest Wetland Primary	Occasional	N	T/S	20
V. trilobum	High-bush cranberry	Upland Wetland	Rare	N	S	18

Scientific name	Common name	Natural community	Prevalence in Illinois	Native or introduced	Tree/shrub/ liana	Counties
Vitis aestivalis	Summer grape	Upland forest Sand forest Thickets Savanna Primary	Occasional	N	L	69
var. *argentifolia*	Silver-leaved grape	Upland forest Sand forest Thickets Savanna Primary	Occasional	N	L	*
V. cinerea	Winter grape	Floodplain forest Thickets Wetland Cultural	Occasional	N	L	66
V. labrusca	Labruscan vineyard grape	Thickets Cultural	Rare	I	L	1
V. palmata	Catbird grape	Floodplain forest Wetland	Uncommon	N	L	20
V. riparia	Riverbank grape	Upland forest Sand forest Floodplain forest Thickets	Occasional	N	L	94
var. *praecox*	Riverbank grape	Floodplain forest Thickets Wetland	Occasional	N	L	*
var. *syrticola*	Riverbank grape	Thickets Primary	Rare	N	L	*
V. rupestris	Sand grape	Wetland	Rare	N	L	2
V. vulpina	Frost grape	Floodplain forest Thickets Wetland Cultural	Occasional	N	L	83
Wisteria frutescens	Wisteria	Floodplain forest Wetland Cultural	Uncommon	N	L	16
Zanthoxylum americanum	Prickly ash	Upland forest Thickets Savanna Cultural	Occasional	N	S	69

[1]Data were retrieved from the Illinois Plant Information Network (Iverson and Ketzner 1988). Nomenclature follows Mohlenbrock (1986); other information comes from a variety of sources, including Mohlenbrock (1986).
*Taxon occurs in Illinois, but its distribution is unknown.

Appendix IV
Illinois Forests on the Illinois Natural Areas Inventory

Location	Natural community	Grade[1]	Acres	County
American Beach Woods/Lincoln Trail State Park	Mesic upland forest	BD	40	Clark
Atwood Ridge	Dry upland forest	BC	33	Union
Baber Woods	Dry-mesic upland forest	AD	49	Edgar
Baer Brothers Woodlot	Southern flatwoods	A	20	St. Clair
Barker Bluff	Dry upland forest	B	46	Hardin
Barkhausen Woods	Dry sand forest	A	45	Mason
Beall Woods	Dry-mesic upland forest	AC	118	Wabash
Beall Woods	Wet-mesic floodplain forest	AB	199	Wabash
Behnken Tract	Dry-mesic upland forest	BC	48	Randolph
Behre Bluff	Southern flatwoods	AB	21	Perry
Behre Bluff	Dry-mesic upland forest	AB	27	Perry
Bell Smith Springs	Mesic upland forest	BC	33	Pope
Bernett Woods	Dry-mesic upland forest	A	28	Saline
Berry's Woods	Dry-mesic upland forest	C	20	Christian
Black Hawk Forest	Dry-mesic upland forest	B	52	Rock
Black Lake	Wet floodplain forest	BC	26	Gallatin
Blair Woods	Mesic upland forest	B	41	Lake
Blair Woods	Dry-mesic upland forest	A	65	Lake
Bloomingdale Grove	Mesic upland forest	B	21	DuPage
Bloomingdale Grove	Dry-mesic upland forest	BC	20	DuPage
Bohbrink Woods	Southern flatwoods	B	20	Washington
Bohm Woods	Mesic upland forest	A	31	Madison
Bohm Woods	Dry-mesic upland forest	BC	25	Madison
Bois du Sangamon Nature Preserve/Mueller Woods	Mesic upland forest	BC	33	Macon
Boyds Hollow Woods	Mesic upland forest	AC	56	Peoria
Bradley Branch Woods	Southern flatwoods	AC	22	Monroe
Brownfield Woods	Mesic upland forest	AD	60	Champaign
Browning Woods	Dry-mesic upland forest	BC	41	Schuyler
Browning Woods	Mesic upland forest	BC	103	Schuyler
Busse Woods	Mesic upland forest	AD	293	Cook
Busse Woods	Dry-mesic upland forest	BD	169	Cook
Camp Vandeventer	Dry upland forest	BC	35	Monroe
Camp Vandeventer	Dry-mesic upland forest	BC	21	Monroe
Campbell's Woods	Mesic upland forest	BC	41	Kankakee
Carpenter Park	Mesic upland forest	B	20	Sangamon

Location	Natural community	Grade[1]	Acres	County
Carpenter Park	Dry-mesic upland forest	BC	108	Sangamon
Carpenter Park	Wet-mesic floodplain forest	A	94	Sangamon
Cave Hill	Dry upland forest	AC	253	Saline
Cedar Bluff	Dry/Xeric upland forest	AB	109	Johnson
Chaney Woods	Dry-mesic upland forest	BC	40	Macoupin
Clifton Terrace[2]	Mesic upland forest	B	20	Madison
Cooke Forest	Mesic upland forest	B	20	Winnebago
Crabtree Farm Woods	Dry-mesic upland forest	AC	34	Lake
Crane Creek Woods[2]	Dry-mesic upland forest	A	26	Mason
Dean Hills Nature Preserve	Mesic upland forest	B	55	Fayette
Dennison Hollow	Dry upland forest	AC	140	Saline
Detweiller Park	Mesic upland forest	BC	111	Peoria
Drift Island	Wet floodplain forest	BD	573	Pike
Dry Fork Woods	Dry-mesic upland forest	B	28	Wayne
Duck Soup Woods	Dry sand forest	AC	30	Mason
Edward L. Ryerson Conservation Area	Mesic upland forest	B	34	Lake
Edward L. Ryerson Conservation Area	Dry-mesic upland forest	BD	87	Lake
Edward L. Ryerson Conservation Area	Mesic floodplain forest	BD	100	Lake
Elburn Forest Preserve	Dry-mesic upland forest	BD	56	Kane
Elkhart Hill	Mesic upland forest	AD	156	Logan
Eversgerd Flatwoods	Southern flatwoods	BC	54	Clinton
Fish Lake Woods	Wet floodplain forest	AC	120	Fayette
Forest Park Nature Preserve	Mesic upland forest	BC	372	Peoria
Fort Massac Area	Wet-mesic floodplain forest	B	23	Massac
Fort Massac Area	Mesic floodplain forest	BD	28	Massac
Freeburg Rod and Gun Club Woods	Wet/Wet-mesic floodplain forest	AB	63	St. Clair
Freeburg Woods/Peaceful Acres	Wet-mesic floodplain forest	AD	128	St. Clair
Freeburg Woods/Peaceful Acres	Wet floodplain forest	AC	77	St. Clair
Fulling's Woods	Mesic upland forest	BC	33	Crawford
Funks Grove	Mesic upland forest	AD	776	McLean
Gardner Woods	Wet/Wet-mesic floodplain forest	BC	3,320	Adams
Goodes Memorial Woods/Modesto Woods	Dry-mesic upland forest	BC	40	Macoupin
Gossmann Woods	Southern flatwoods	AB	35	St. Clair
Gossmann Woods[2]	Wet/Wet-mesic floodplain forest	AC	26	St. Clair
Grandview Woods	Mesic upland forest	B	43	Peoria
Grandville Woods	Wet-mesic floodplain forest	BC	47	Jasper
Hammond's Woods	Wet-mesic floodplain forest	AC	48	Clark
Harper's Woods Nature Preserve	Dry-mesic upland forest	AC	46	Stark
Hart Woods	Wet-mesic floodplain forest	B	35	Saline
Hartley Memorial Forest Preserve	Dry-mesic upland forest	B	40	Winnebago
Hayes Woods[2]	Dry-mesic upland forest	AC	32	Fayette
Helm's Woods	Dry-mesic upland forest	BD	69	Kane
Herrman's Woods	Dry-mesic upland forest	AD	32	Lake
Horseshoe Bend	Dry-mesic upland forest	BC	59	Vermilion
Horseshoe Forest Nature Preserve	Mesic floodplain forest	AC	52	Alexander
Horseshoe Forest Nature Preserve	Wet floodplain forest	BC	118	Alexander
Horseshoe Lake Nature Preserve	Wet floodplain forest	AC	110	Alexander
Horseshoe Lake Nature Preserve	Mesic floodplain forest	AC	90	Alexander
Huddleston Woods	Dry-mesic upland forest	B	37	Jasper
Illiniwek Forest	Mesic upland forest	BC	36	Rock Island
Indian Creek Woods/Curtis Woods	Mesic upland forest	BC	30	Tazewell
Indian Point	Mesic upland forest	BD	29	Johnson
Indian Point	Dry upland forest	AC	75	Johnson
Jackson Hollow	Mesic upland forest	AC	228	Pope
Jackson Slough Woods	Wet/Wet-mesic floodplain forest	AC	117	St. Clair

Location	Natural community	Grade[1]	Acres	County
Jackson Slough Woods	Southern flatwoods	B	54	St. Clair
John Harper Timber/Rector Woods	Dry-mesic upland forest	B	24	Fulton
Johnson Woods	Dry-mesic upland forest	AC	36	Washington
Johnson Woods	Wet floodplain forest	AC	38	Washington
Johnson's Mound	Mesic upland forest	B	43	Kane
Johnson's Mound	Dry-mesic upland forest	B	23	Kane
Jubilee State Park	Dry-mesic upland forest	BC	27	Peoria
Julius J. Knobeloch Woods Nature Preserve/Hazel Creek	Dry-mesic upland forest	BC	30	St. Clair
Kaskaskia Woods	Dry-mesic upland forest	BD	24	Hardin
Keeling Hill North	Dry upland forest	AB	22	Hardin
Keeling Hill South	Dry upland forest	B	41	Hardin
Krause Woods	Dry-mesic upland forest	AD	43	Calhoun
Lake Bluff Woods	Mesic upland forest	AC	28	Lake
Lake Bracken Woods	Dry-mesic upland forest	B	34	Knox
Lake Pinckneyville Woods	Dry-mesic upland forest	BC	22	Perry
Laona Heights Forest Preserve	Dry-mesic upland forest	B	20	Winnebago
Lewis Estate	Wet-mesic floodplain forest	BD	252	Massac
Lewis Estate North	Wet floodplain forest	BC	100	Massac
Lewis Estate North	Wet-mesic floodplain forest	BD	134	Massac
Little Black Slough, Heron Pond Area	Dry-mesic upland forest	AD	1,189	Johnson
Little Black Slough, Heron Pond Area	Mesic upland forest	AD	711	Johnson
Little Black Slough, Heron Pond Area	Mesic floodplain forest	BC	206	Johnson
Little Black Slough, Heron Pond Area	Wet-mesic floodplain forest	BD	1,049	Johnson
Little Black Slough, Heron Pond Area	Wet floodplain forest	BC	617	Johnson
Lively Branch Woods	Dry upland forest	AB	23	St. Clair
Lloyd's Woods	Mesic upland forest	BD	83	Lake
Lodge Park	Wet-mesic floodplain forest	AD	174	Piatt
Lowden State Park	Dry-mesic upland forest	B	20	Ogle
Lusk Creek Canyon	Dry-mesic upland forest	BC	164	Pope
Lyons Prairie	Dry-mesic upland forest	BC	38	Lake
MacArthur Woods Nature Preserve	Mesic floodplain forest	AC	130	Lake
MacArthur Woods Nature Preserve	Dry-mesic upland forest	BC	104	Lake
Maple Grove Forest Preserve	Mesic upland forest	B	51	DuPage
Marissa Woods Nature Preserve	Southern flatwoods	A	20	St. Clair
Marys River Woods	Wet-mesic floodplain forest	AC	43	Randolph
Matthiessen State Park	Dry-mesic upland forest	BC	159	LaSalle
Mayer Post Oak Flatwoods[2]	Southern flatwoods	A	26	Perry
McCormick Nature Preserve	Mesic upland forest	AB	30	Lake
McCormick Nature Preserve	Dry-mesic upland forest	AD	81	Lake
McCoy Woods/Mackinaw River Forest	Wet floodplain forest	AC	25	Tazewell
Media Woods	Dry-mesic upland forest	AC	25	Henderson
Mermet Swamp Nature Preserve	Wet-mesic floodplain forest	BD	26	Massac
Messenger Woods	Dry-mesic upland forest	BC	63	Will
Messenger Woods	Mesic upland forest	AD	105	Will
Mettler Woods/Hammer's Woods	Dry-mesic upland forest	BC	65	DeWitt
Middlefork Woods	Mesic upland forest	BC	30	Vermilion
Miller-Anderson Woods Nature Preserve	Dry-mesic upland forest	BC	143	Bureau
Miller-Anderson Woods Nature Preserve	Mesic upland forest	BD	77	Bureau
Mooseheart Ravine	Dry-mesic upland forest	B	20	Kane
Morton Arboretum	Mesic upland forest	BC	79	DuPage
Mount's Woods	Dry-mesic upland forest	AC	67	Wabash
Myers Forest and Game Preserve	Dry-mesic upland forest	B	20	Bureau
Nettie Hart Woodland Memorial	Dry-mesic upland forest	B	30	Champaign
New Athens Woods	Southern flatwoods	A	59	St. Clair

Location	Natural community	Grade[1]	Acres	County
New Athens Woods	Wet floodplain forest	AB	107	St. Clair
New Crystal Lake Club	Wet-mesic floodplain forest	BC	704	Henderson
Norris Woods[2]	Mesic floodplain forest	B	2,176	Jefferson
Norris Woods Nature Preserve/Jones Woods	Dry-mesic upland forest	AD	81	Kane
North Detweiller Woods	Mesic upland forest	BC	44	Peoria
Oral Harris Woods	Dry-mesic upland forest	B	31	Wabash
Paw Paw Woods	Dry-mesic upland forest	BC	50	Cook
Paw Paw Woods	Mesic upland forest	AC	37	Cook
Paw Paw Woods	Wet-mesic floodplain forest	BC	34	Cook
Pilcher Park	Wet-mesic upland forest	B	50	Will
Pilcher Park	Wet floodplain forest	B	32	Will
Pilcher Park	Mesic upland forest	AC	92	Will
Pin Oak Lake/Big Britches	Wet-mesic floodplain forest	BC	204	Pike
Posen Woods Nature Preserve	Southern flatwoods	A	26	Washington
Providence Woods/Reisch Woods	Dry-mesic upland forest	B	20	Greene
Raccoon Grove Forest Preserve	Dry-mesic upland forest	BC	69	Will
Rahe's Woods	Dry/Mesic/Dry-mesic upland forest	AD	46	Monroe
Red Hills State Park/Red Hills Woods	Dry upland forest	B	26	Lawrence
Redman's Forest	Mesic upland forest	B	2,198	Clark
Riprap Landing Woods	Wet/Wet-mesic floodplain forest	BC	187	Calhoun
River Road Woods	Mesic upland forest	AB	20	Lake
Robert Allerton Park	Wet/Wet-mesic floodplain forest	BC	468	Piatt
Robert Allerton Park	Dry-mesic upland forest	AC	327	Piatt
Robert Allerton Park	Mesic upland forest	AC	97	Piatt
Robeson Hills Nature Preserve	Mesic upland forest	AD	256	Lawrence
Rocky Glen	Dry-mesic upland forest	BC	100	Peoria
Sandy Branch Woods	Southern flatwoods	B	20	Marion
Sargent's Woods	Dry-mesic upland forest	BC	87	Coles
Scheller Flatwoods[2]	Southern flatwoods	AB	25	Jefferson
Sielbeck Forest Tract	Wet-mesic floodplain forest	BC	166	Massac
Silver Creek Woods	Wet/Wet-mesic floodplain forest	AB	120	St. Clair
Sipple Slough Woods/Chip O Will	Southern flatwoods	BD	155	Washington
Solomon Creek Woods	Dry-mesic upland forest	A	32	Macoupin
Sommer Property	Wet-mesic floodplain forest	BC	38	Mason
Sonneman Woods	Dry-mesic upland forest	AC	94	Fayette
Sonneman Woods	Southern flatwoods	AC	1,990	Fayette
Spitler Woods Nature Preserve	Mesic upland forest	AC	64	Macon
Spitler Woods Nature Preserve	Dry-mesic upland forest	AC	79	Macon
Spring Lake Seeps	Mesic sand forest	BC	20	Tazewell
Starved Rock State Park	Dry upland forest	BD	254	LaSalle
Starved Rock State Park	Dry-mesic upland forest	BD	752	LaSalle
Starved Rock State Park	Mesic upland forest	AC	134	LaSalle
Steber's Woods	Wet floodplain forest	B	40	Jasper
Stemler Cave Woods Nature Preserve/Harry's Hideaway	Dry/Mesic/Dry-mesic upland forest	AC	157	St. Clair
St. Francis Boys Camp	Dry-mesic upland forest	AC	43	Lake
Sullivan Woods	Dry-mesic upland forest	BC	38	Moultrie
Tangley Oaks Woods	Dry-mesic upland forest	BD	77	Lake
Thorn Creek Woods	Dry-mesic upland forest	BD	33	Will
Thornton–Lansing Road Nature Preserve/Zanders Woods	Sand flatwoods	BD	210	Cook
Tomlin Timber Nature Preserve/Mattson Woods	Dry sand forest	AD	20	Mason
Trelease Woods	Mesic upland forest	AD	60	Champaign
W.B. Wallace Woods	Dry-mesic upland forest	B	20	Mason
Walnut Point State Park	Dry-mesic upland forest	BC	139	Douglas
Wards Grove Nature Preserve	Dry-mesic upland forest	CD	400	Jo Daviess
West End Sportsman's Club Woods/Recker Woods	Southern flatwoods	AB	47	Washington

Location	Natural community	Grade[1]	Acres	County
White Oak Creek Woods	Dry sand forest	BD	78	Mason
White Pines State Park	Dry-mesic upland forest	B	54	Ogle
Williams Creek Woods	Southern flatwoods	AC	72	Washington
Wirth Island	Wet/Wet-mesic floodplain forest	AC	51	St. Clair
Wise Ridge	Dry-mesic upland forest	BD	183	Johnson
Woodlawn Woods[2]	Southern flatwoods	B	40	Marion

[1]Grade indicates grade or range of grades found at a given location. For example, AD indicates that grades A through D are found on the site, with Grade A indicating the best condition.
[2]This site is known to have been destroyed since the original Illinois Natural Areas Inventory (White 1978).
Source: Illinois Department of Conservation data base of Illinois Natural Areas, John Buhnerkempe, manager. Original data of the Illinois Natural Areas Inventory (White 1978) has been updated to reflect additions and deletions since the original survey.

Appendix V
Bibliography: Illinois Forest Research 1818–1988

The more than 1,550 citations that follow along with those in the Literature Cited are a compilation of research conducted in or about Illinois forests from 1818 through 1988. Although the list is not complete, especially regarding invertebrates, soil and water quality, wildlife, and recreation, it does provide a basic review of the literature. Many citations were taken from *Bibliography of Illinois Vegetation* (Risser 1984), which includes studies prior to 1983 but does not include such topics as forest diseases and insects, recreation, silviculture, arboriculture, wildlife, and forest products. To simplify the use of this bibliography, a category code precedes each citation:

A Arboriculture. Cultural practices associated with growing trees in predominately urban areas.

B Botany. Primarily vegetative surveys of forested areas, including distribution studies.

D Disease. Studies of tree diseases.

E Ecology. Plant ecological studies, including physiological ecology and studies related to the vegetative condition of Illinois prior to European colonization.

I Invertebrates. Invertebrate (especially insect) studies, primarily forest pests.

L Leisure and recreation. Studies pertaining to the recreational use of Illinois forests.

M Management. Studies related to the management of Illinois forests, including natural areas and nature preserves and economic factors affecting management decisions.

O Other. Miscellaneous studies, primarily atlases or maps depicting Illinois forests or climate, and including bibliographies, historical descriptions, and anatomical studies.

P Products. Processing and utilization of forest products, including the use of fuelwood.

Q Quality and quantity of water and soil resources. Impact of forests on the quality and quantity of water and soil resources.

R Restoration. Studies associated with the reforestation of disturbed ecosystems.

S Silviculture. Cultural practices associated with growing trees in rural areas.

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