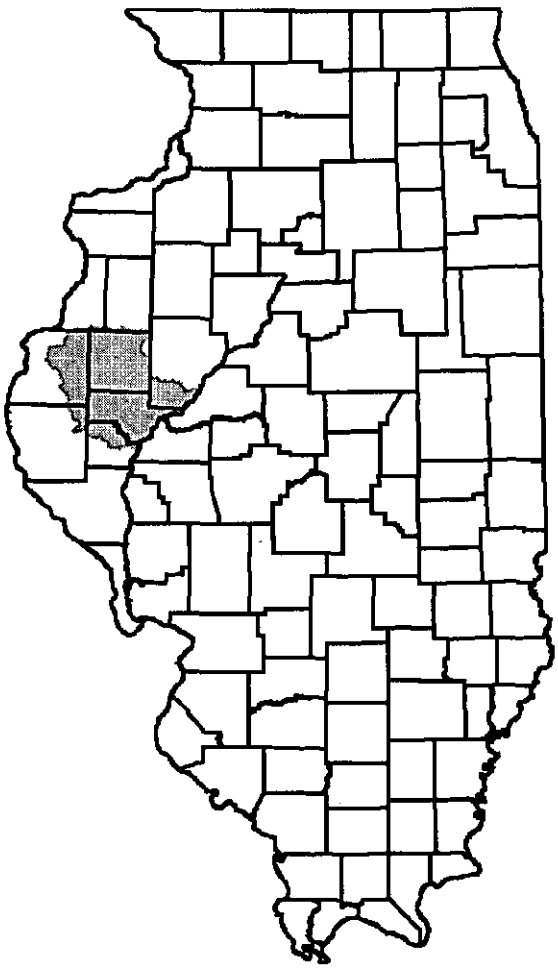
Volume 4

Socio-Economic Profile
Environmental Quality
Archaeological Resources

La Moine River Area Assessment



ILLINOIS
DEPARTMENT OF
NATURAL
RESOURCES

LA MOINE RIVER AREA ASSESSMENT

VOLUME 4

Part I: Socio-Economic Profile
Illinois Department of Natural Resources
Office of Realty and Environmental Planning
Division of Review and Coordination
524 South Second
Springfield, Illinois 62701
(217) 524-0500

Part II: Environmental Quality
Illinois Department of Natural Resources
Office of Scientific Research and Analysis
Illinois State Water Survey
2204 Griffith Drive
Champaign, Illinois 61820
(217) 244-5459
Waste Management and Research Center
One East Hazelwood Drive
Champaign, Illinois 61820
(217) 333-8940

Part III: Archaeological Resources
Steven R. Ahler
Illinois Department of Natural Resources
Office of Scientific Research and Analysis
Illinois State Museum
Spring & Edward Streets
Springfield, Illinois 62706
(217) 782-7387

March 2002

300
Printed by the authority of the State of Illinois

Other CTAP Publications

Assessments are also available for the following regions:

Cache River
Calumet Area
Chicago River/Lake Shore
Driftless Area
Du Page River
Embarras River
Fox River
Illinois Big Rivers
Illinois Headwaters
Illinois River Bluffs
Kankakee River
Kaskaskia River
Kinkaid Area
Kishwaukee River
Lower Des Plaines River
Lower Sangamon River
Lower Rock River
Mackinaw River
Prairie Parklands
Sinkhole Plain
Spoon River
Sugar-Pecatonica Rivers
Thorn Creek
Upper Des Plaines River
Upper Sangamon River
Vermilion River
Vermilion River (Illinois River Basin)

Also available:

Critical Trends in Illinois Ecosystems
Illinois Land Cover, An Atlas, plus CD-ROM
Inventory of Ecologically Resource-Rich Areas in Illinois
Illinois Geographic Information System, CD-ROM of digital geospatial data

All CTAP and Ecosystems Program documents are available from the DNR Clearinghouse at (217) 782-7498 or TTY (217) 782-9175. Selected publications are also available on the World Wide Web at http://dnr.state.il.us/orep/inrin/ctap, or http://dnr.state.il.us/orep/c2000.

For more information about CTAP, call (217) 524-0500 or e-mail at ctap2@dnrmail.state.il.us; for information on the Ecosystems Program call (217) 782-7940 or e-mail at ecoprog@dnrmail.state.il.us.

About This Report

The *La Moine River Area Assessment*, part of a series of statewide regional assessments, examines approximately 1,855 square miles in west-central Illinois. The report provides information on the natural and human resources of the area as a basis for managing and improving its ecosystems. The development of ecosystem-based information and management programs in Illinois are the result of three processes — the Critical Trends Assessment Program, Conservation Congress, and Water Resources and Land Use Priorities Task Force.

Background

The Critical Trends Assessment Program (CTAP) documents changes in ecological conditions. In 1994, using existing information, the program provided a baseline of ecological conditions.[1] Three conclusions were drawn from the baseline investigation:

1. the emission and discharge of regulated pollutants over the past 20 years has declined, in some cases dramatically,
2. existing data suggest that the condition of natural ecosystems in Illinois is rapidly declining as a result of fragmentation and continued stress, and
3. data designed to monitor compliance with environmental regulations or the status of individual species are not sufficient to assess ecosystem health statewide.

Based on these findings, CTAP has begun to develop methods to systematically monitor ecological conditions and provide information for ecosystem-based management. Five components make up this effort:

1. identify resource rich areas,
2. conduct regional assessments,
3. publish an atlas and inventory of Illinois landcover,
4. train volunteers to collect ecological indicator data, and
5. develop an educational science curriculum that incorporates data collection

At the same time that CTAP was publishing its baseline findings, the Illinois Conservation Congress and the Water Resources and Land Use Priorities Task Force were presenting their respective findings. These groups agreed with the CTAP conclusion that the state's ecosystems were declining. Better stewardship was needed, and they determined that a voluntary, incentive-based, grassroots approach would be the most appropriate, one that recognized the inter-relatedness of economic development and natural resource protection and enhancement.

---

[1] See *The Changing Illinois Environment: Critical Trends*, summary report and volumes 1-7.

From the three initiatives was born Conservation 2000, a program designed to reverse ecosystem degradation, primarily through the Ecosystems Program, a cooperative process of public-private partnerships that merge natural resource stewardship with economic and recreational development. To achieve this goal, the program provides financial incentives and technical assistance to private landowners.

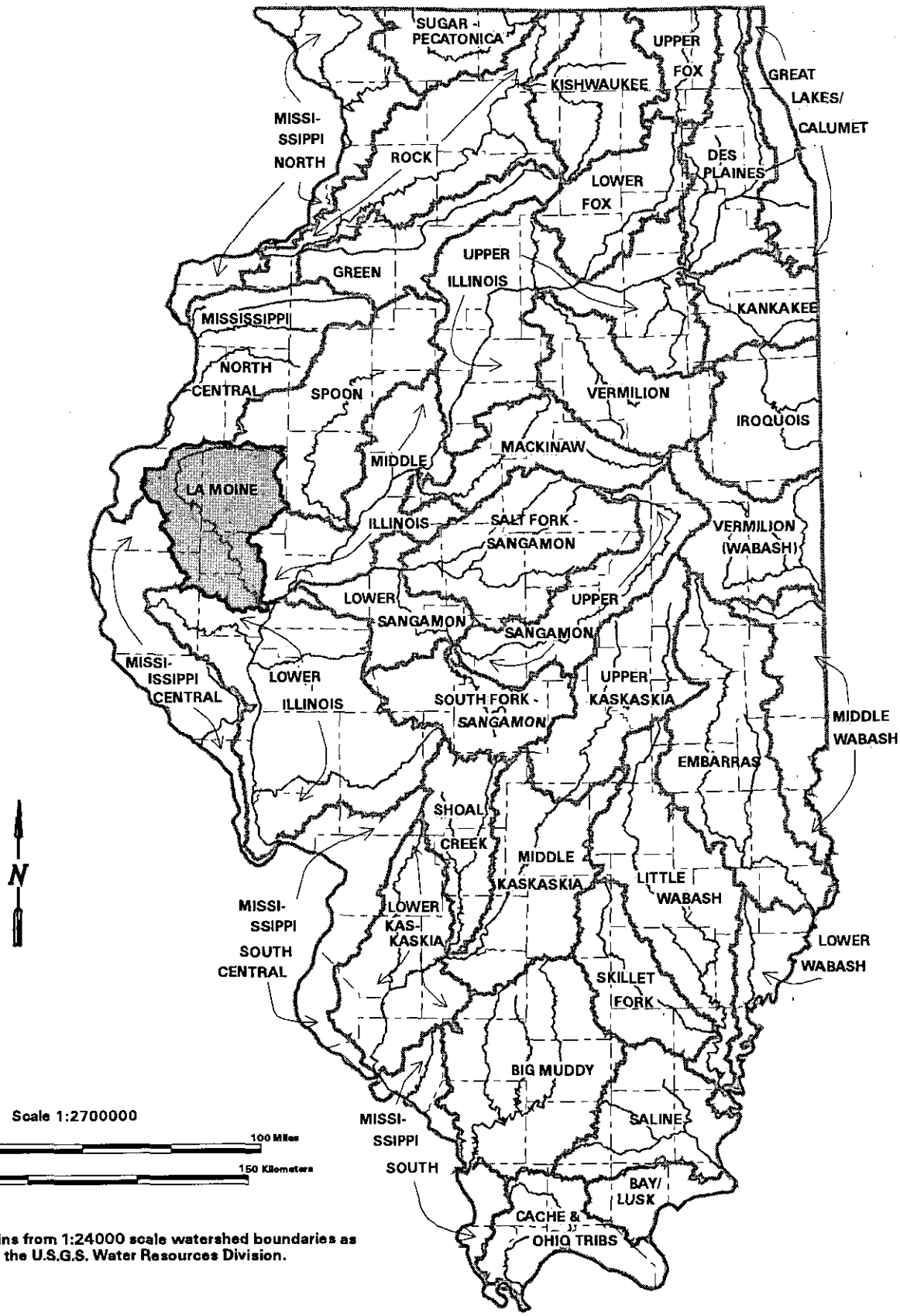
At the same time, CTAP identified 30 Resource Rich Areas (RRAs) throughout the state. In RRAs and other areas where Ecosystem Partnerships have been formed, CTAP is providing an assessment of the area, drawing from ecological and socio-economic databases to give an overview of the region's resources — geologic, edaphic, hydrologic, biotic, and socio-economic. Although several of the analyses are somewhat restricted by spatial and/or temporal limitations of the data, they help to identify information gaps and additional opportunities and constraints to establishing long-term monitoring programs in the partnership areas.

La Moine River Assessment Area

The La Moine River Assessment Area is defined by the watershed of the La Moine River, along with an additional area bordering on the west side of the Illinois River that lies between the Spoon River watershed and the La Moine watershed. The La Moine area covers approximately 1,855 square miles, falling within portions of eight counties: Adams, Brown, Fulton, Hancock, Henderson, McDonough, Schuyler, and Warren. The La Moine is the sixth largest tributary to the Illinois River and has a drainage area of 1,350 square miles and a total length of 126 miles.

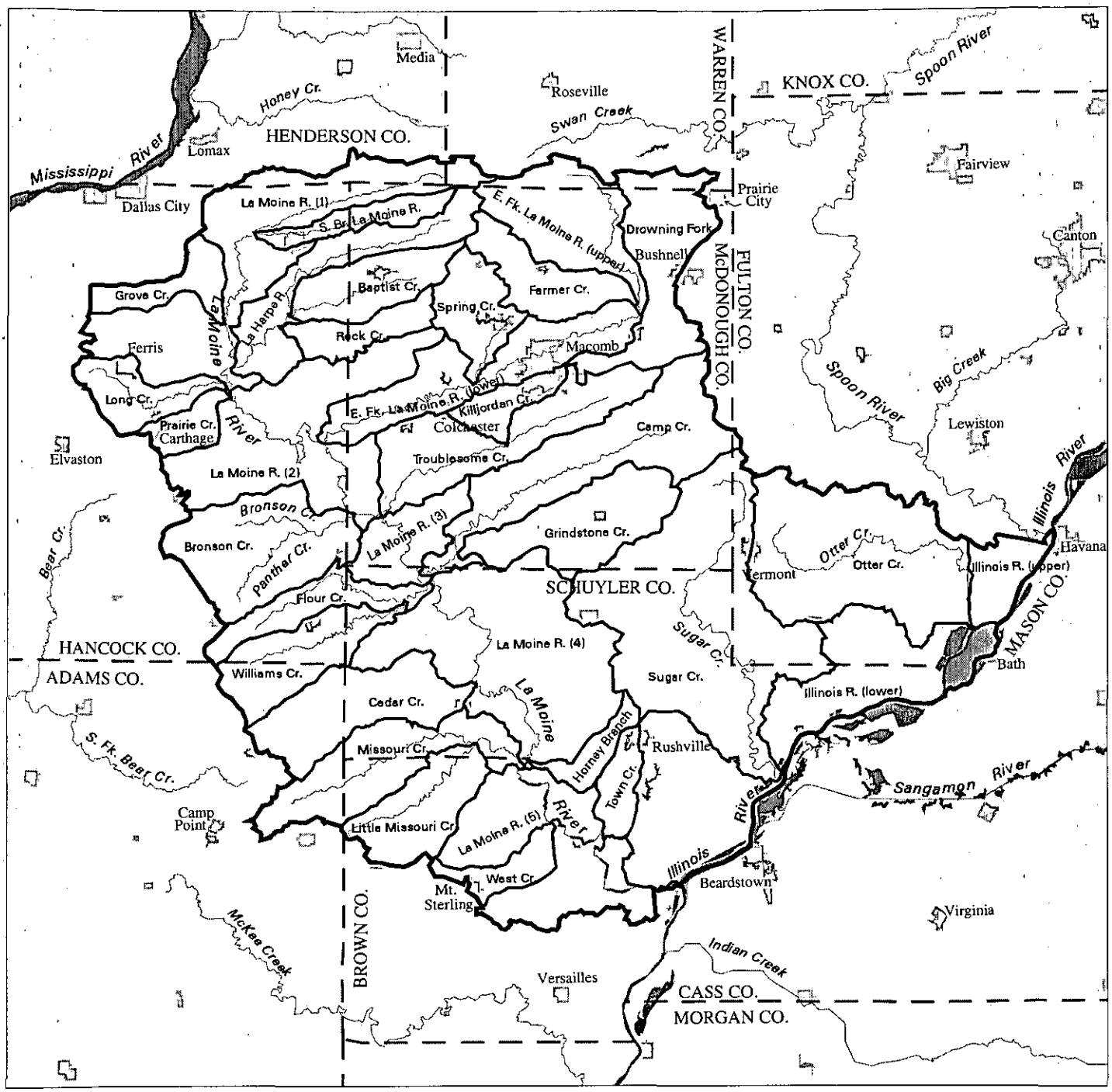
The basin falls within the physiographic division called the Galesburg Till Plain. The present topography is characterized by rolling upland prairies, interspaced by well-established streams that have eroded steep-walled valleys that are as much as 50 to 150 feet below the general level of the adjacent uplands.

This assessment is comprised of four volumes. In Volume 1, *Geology* discusses the geology, soils, and minerals in the assessment area. Volume 2, *Water Resources*, discusses the surface and groundwater resources and Volume 3, *Living Resources*, describes the natural vegetation communities and the fauna of the region. Volume 4 contains three parts: Part I, *Socio-Economic Profile*, discusses the demographics, infrastructure, and economy of the area; Part II, *Environmental Quality*, discusses air and water quality, and hazardous and toxic waste generation and management in the area; and Part III, *Archaeological Resources*, identifies and assesses the archaeological sites known in the area.



Drainage basins from 1:24000 scale watershed boundaries as delineated by the U.S.G.S. Water Resources Division.

Major drainage basins of Illinois and location of the La Moine River Assessment Area



Subbasins in the La Moine River Assessment Area. Subbasin boundaries depicted are those determined by the Illinois Environmental Protection Agency.

Table of Contents

Part I: Socio-Economic Profile

Summary 1-1
Demographic Trends 1-3
The Regional Economy 1-17
Agriculture 1-29
Outdoor Recreation 1-39
Transportation Infrastructure 1-45
Property Taxes 1-49
References 1-55

Part II: Environmental Quality

Air Quality 2-1
Surface Water Quality 2-9
Hazardous and Toxic Waste Generation and Management 2-23

Part III: Archaeological Resources

Introduction 3-1
Archaeological Investigations in the La Moine River Area 3-11
Summary of Archaeological Resources 3-15
Selected References 3-24

PART I

SOCIO-ECONOMIC PROFILE

Contributors

Project Coordinator	David Baker
Editors	David Baker, Karen Miller
Maps	Will Hinsman
Summary	David Baker
Demographic Trends	Karen Miller
The Regional Economy	Mark Bonardelli
Agriculture	Nick Silveri
Outdoor Recreation	Karen Miller
Transportation Infrastructure	Mark Bonardelli
Property Taxes	Wayne Hartel

Table of Contents

Summary 1-1
Demographic Trends 1-3
Population 1-3
Population Characteristics 1-7
Households and Housing 1-13
Conclusion 1-16
The Regional Economy 1-17
Structural Change in the Economy 1-18
Economic Characteristics by County 1-19
Conclusion 1-27
Agriculture 1-29
Agricultural Lands 1-29
Agricultural Cash Receipts and Production 1-33
Conclusion 1-37
Outdoor Recreation 1-39
State Recreation Areas 1-39
Boating, Fishing, and Hunting 1-41
Conclusion 1-43
Transportation Infrastructure 1-45
Auto Traffic 1-45
Other Traffic 1-48
Conclusion 1-48
Property Taxes 1-49
Tax Revenues 1-49
Property Tax Base 1-51

Tax Rates 1-52
Property Tax Distribution 1-53
Conclusion 1-53
References 1-55

List of Figures

Demographic Trends

Figure 1-1. Population Trends 1-3
Figure 1-2. Municipalities and Major Highways 1-4
Figure 1-3. Urban Land Use 1-7
Figure 1-4. Age Distribution, La Moine River Area 1-7
Figure 1-5. Estimated Mean Age by 1990 Census Block Group 1-9
Figure 1-6. Educational Attainment by 1990 Census Block Group 1-10
Figure 1-7. Education Trends 1-11
Figure 1-8. Per Capita Income 1-11
Figure 1-9. Per Capita Income by 1990 Census Block Group 1-12
Figure 1-10. Percent of Population Living in Poverty 1-13
Figure 1-11. Median Value of Owner-Occupied Housing 1-15

The Regional Economy

Figure 1-12. Percent Change in Employment and Personal Income 1-17
Figure 1-13. Employment Distribution in the La Moine River Area 1-18
Figure 1-14. Earnings Distribution in the La Moine River Area 1-19
Figure 1-15. Major Employers in the La Moine River Area 1-21
Figure 1-16. Brown County Employment, by Sector 1-22
Figure 1-17. Brown County Earnings, by Sector 1-22
Figure 1-18. Hancock County Employment, by Sector 1-23
Figure 1-19. Hancock County Earnings, by Sector 1-23
Figure 1-20. McDonough County Earnings, by Sector 1-24
Figure 1-21. McDonough County Earnings, by Sector 1-25
Figure 1-22. Schuyler County Earnings, by Sector 1-26
Figure 1-23. Schuyler County Earnings, by Sector 1-26

Agriculture

Figure 1-24. The Number of Farms in the Region 1-29
Figure 1-25. Agricultural Land Cover 1-30
Figure 1-26. Value of Farmland 1-31
Figure 1-27. Total Cash Receipts 1-33
Figure 1-28. Area Crop Receipts by Type 1-33

Figure 1-29. Percentage of Receipts by Crop 1-34
Figure 1-30. Corn Production 1-34
Figure 1-31. Soybean Production 1-35
Figure 1-32. Area Livestock Receipts by Type 1-35
Figure 1-33. Percentage of Receipts by Livestock 1-36
Figure 1-34. Cattle Inventory 1-36
Figure 1-35. Hogs and Pigs Inventory 1-37

Outdoor Recreation

Figure 1-36. State Recreation Areas 1-40
Figure 1-37. Attendance at State Sites 1-41
Figure 1-38. Boat Registrations 1-42
Figure 1-39. Fishing License Sales 1-42
Figure 1-40. Hunting License Sales 1-43

Transportation Infrastructure

Figure 1-41. Major Airports, Roads and Railroads 1-46
Figure 1-42. Annual Vehicle-Miles Traveled 1-47

Property Taxes

Figure 1-43. Property Tax Revenues 1-49
Figure 1-44. Major Property Tax Districts 1-50
Figure 1-45. Property Tax Base 1-51
Figure 1-46. 1981 Property Tax Base by Class of Property 1-51
Figure 1-47. 1997 Property Tax Base by Class of Property 1-52
Figure 1-48. Average Property Tax Rate 1-52
Figure 1-49. 1997 Property Tax Distribution 1-54

List of Tables

Demographic Trends

Table 1-1. Population 1-5
Table 1-2. Population Density 1-5
Table 1-3. Incorporated Municipalities, 1990 1-6
Table 1-4. Urban Acreage 1-6
Table 1-5. Median Age 1-8
Table 1-6. 1990 Educational Attainment 1-8
Table 1-7. Number of Households 1-14
Table 1-8. Median Household Income 1-14
Table 1-9. Housing Units 1-15

The Regional Economy

Table 1-10. 1998 Employment and Personal Income 1-18
Table 1-11. Composition of Total Personal Income 1-18
Table 1-12. Major Employers, La Moine River Area 1-20
Table 1-13. Brown County 1998 Employment and Earnings 1-22
Table 1-14. Hancock County 1998 Employment and Earnings 1-24
Table 1-15. McDonough County 1998 Employment and Earnings 1-25
Table 1-16. Schuyler County 1998 Employment and Earnings 1-27

Agriculture

Table 1-17. Agricultural Land Cover 1-29
Table 1-18. Number of Conservation Reserve Contracts 1-32
Table 1-19. Number of Acres in Conservation Reserve Program 1-32

Transportation Infrastructure

Table 1-20. Miles of Roads in the La Moine River Region 1-45

Summary

The 126 mile-long La Moine River and its tributaries drain about 1,350 square miles of western Illinois into the Illinois River. The La Moine River Assessment area encompasses this watershed as well as the nearby drainages of Sugar Creek and Otter Creek, which themselves flow directly into the Illinois. This report profiles the socio-economic characteristics of the four primary counties — McDonough, Schuyler, Hancock and Brown[1] — through which the La Moine River and nearby creeks flow.[2] It provides a historical perspective as well as a current picture of the human-related resources of the region.

The La Moine River area is home to 67,000 people, with 0.5% of the state's population living on 3.8% of its land. Its largest city, Macomb, the home of Western Illinois University, has a population of about 20,000. The area is predominantly rural in character with less than half of the population living in urban areas and only 1.6% of the land in urban use. The area's population is actually 27% less than it was 130 years ago, falling by 8,000 during the past 30 years alone.

Like the rest of the state (and nation), the population in the La Moine area is aging; in 1970 the elderly made up 13.5% of the population, in 1990 they reached 16.1%, and by 2025 are expected to approach 20%. The age distribution varies across the four-county area, however, with a median age of only 27 in McDonough (home of WIU) compared to greater than 37 in Schuyler and Hancock counties. Per capita income was about one-third less than the state average in 1990 and the poverty rate a third higher, 16.1% compared to 11.9% statewide. The percentage of the adult population that has graduated from high school is similar to the rest of the state — greater than 75% — but again the percent that are college educated varies across the area, from 23% in McDonough to less than 10% in Brown County.

The La Moine River area supports 39,000 jobs and generates $1.4 billion in income. McDonough County accounts for 57% of the employment and 48% of income. Wholesale/retail trade, government and services are the largest sectors. Manufacturing has grown somewhat, unlike in many other parts of Illinois, while farm employment has dropped significantly, from 19% to 9% of the total between 1970 and 1998. The largest

---

[1] The watershed of the La Moine River and Sugar and Otter creeks also includes small parts of Adams, Fulton, Henderson, and Warren counties.

[2] While the accompanying natural resources assessments emphasize the watershed as its unit of analysis, socio-economic data are displayed geographically using the 85 census block groups defined by the U.S. Census Bureau to encompass the four counties. Census block groups are small, sub-county level areas delineated by the U.S. Census Bureau for purposes of the decennial census. They are designed to be relatively homogeneous with respect to population characteristics, economic status, and living conditions. In practice they vary considerably in population and size. In the four-county area, the census block groups range from 262 to 2,503 in population and from 67 acres to 88,309 acres in land area.

employers are Western Illinois University in Macomb, Methode Electronics in Carthage, and Dot Foods in Mount Sterling.

While the La Moine River area has no interstate highways or major airports, its transportation infrastructure is important to the economic development of the region. Two high-density rail freight lines and two light density lines cross the area. The Illinois River connects the area to the entire commercial navigable waterway system of the continental U.S. The area also has three general aviation airports and access to Amtrak passenger rail service.

Property tax revenues have decreased by 14% in the La Moine River area during the past 25 years. Tax rates have more than doubled, but have not kept pace with the declining tax base in the region. Farm property makes up the largest share of the tax base, except in McDonough County where residential property contributes more.

More than three-fourths of the land in the La Moine River area is agricultural; in McDonough County the amount is even higher — 85%. The number of farms has declined by 30% during the past two decades as in most of Illinois, and the amount of farm acreage has dropped by about 7%. The region produces 3.4% of the state's farm cash receipts, averaging $240 million from crops and $77 million from livestock over a recent five-year period. Corn, soybeans, hogs, and cattle dominate the farm economy like in much of Illinois.

The La Moine River area is home to two state parks and a conservation area — Argyle Lake State Park, Weinberg-King State Park, and Anderson Lake Conservation area. These areas offer opportunities for fishing, hunting, camping, hiking, horseback riding and wildlife viewing. The half million annual visitors to these sites generate about $7 million in economic activity annually and about 68 jobs.

The human resources of the La Moine River area provide an important context for future plans to manage and preserve the unique and ample natural resources of the area. This report is part of an overall assessment of the area's natural and human resources.

Demographic Trends

The character of an area is determined not only by its natural environment, but also by its human environment — the size, growth, density, distribution and characteristics of the population living there. The following section describes population growth and distribution, and trends in age, income, education, households, and housing.

Population

La Moine River Area
Square miles: 2,127.01
Population (2000): 67,173
Density: 31.6 persons per sq. mi.
Urban population (1990): 46.3%
Incorporated municipalities: 32

In 2000, the four-county La Moine River area accounted for only 0.5% of the state's population on 3.8% of the state's land. Over a 130-year period between 1870 and 2000 the area's population actually fell 27%, compared to a 389% increase statewide, reflecting its continued rural character.[1]

Schuyler County has lost three out of five residents since 1870, followed by Brown and Hancock, which lost a little more than two of five residents. The only county to grow was McDonough County, up 24% over the 130 years, with the greatest growth occurring between 1960 and 1970 when population climbed 26.7%. Much of the growth can be attributed to the baby boom generation attending college at Western Illinois University in

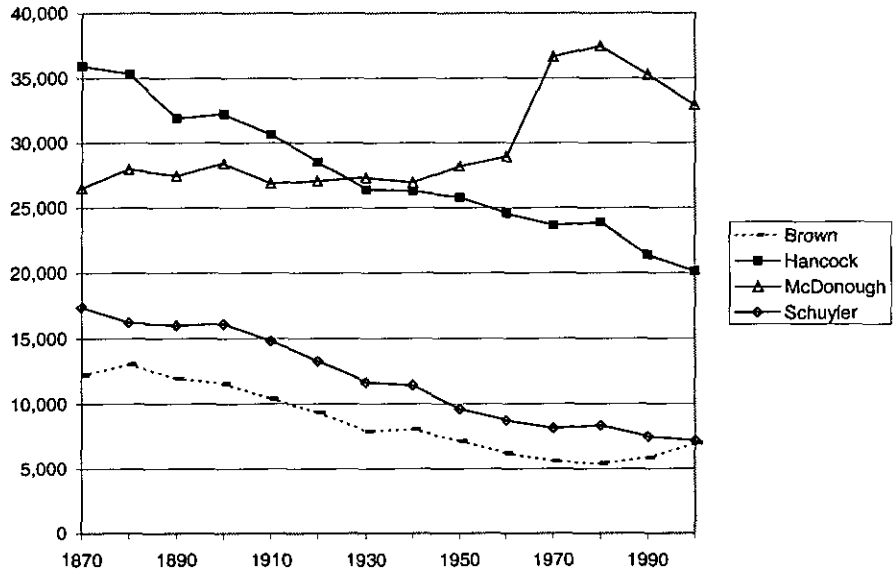


Figure 1-1. Population Trends

[1] Population data was taken from the *1993 Illinois Statistical Abstract* and *Illinois Census 2000.*

Figure 1-2. Municipalities and Major Highways

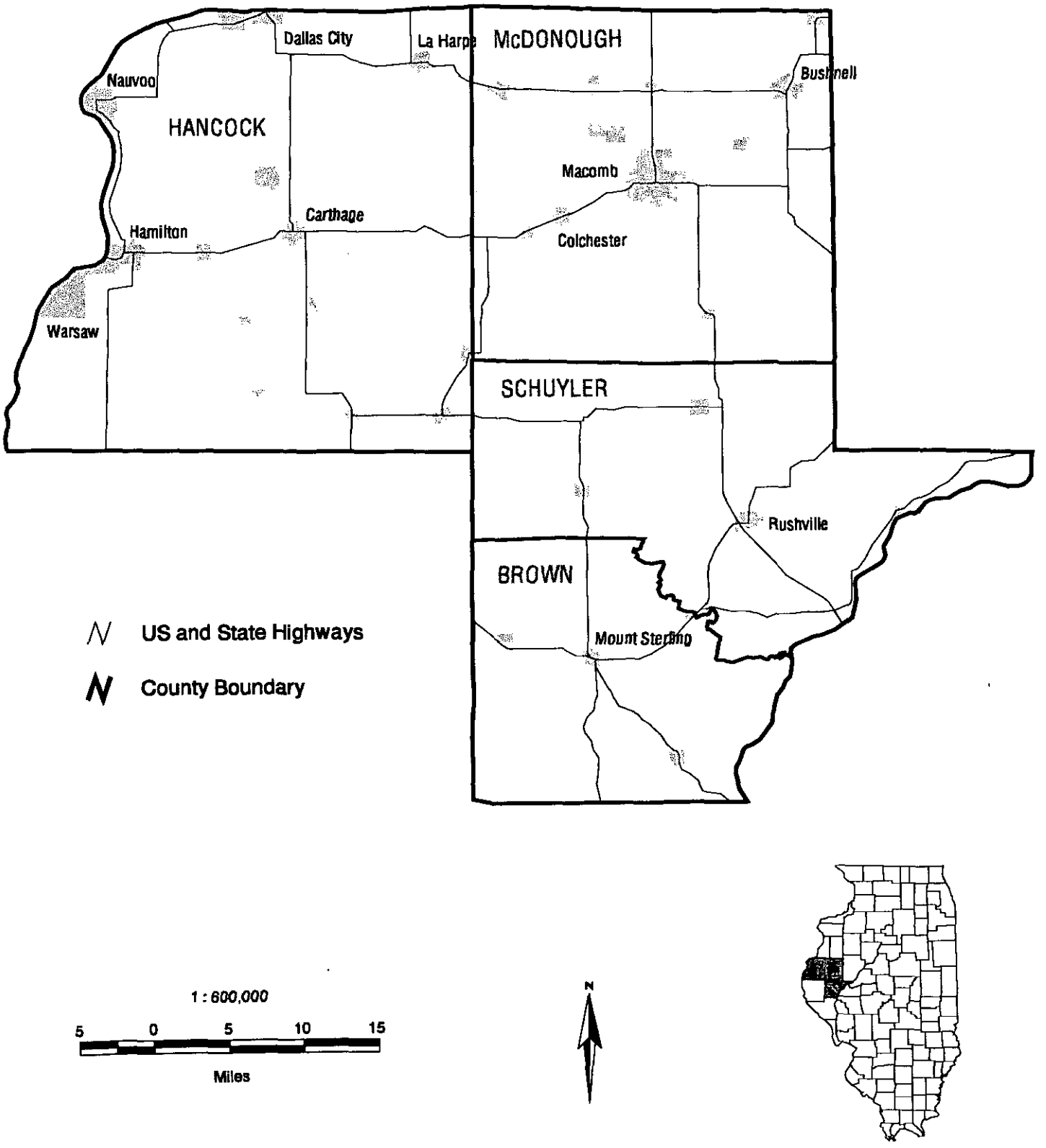


Table 1-1. Population

	2000 Population	% of Illinois Population	County Rank	% change, 1970-2000
Brown	6,950	0.1%	95	24%
Hancock	20,121	0.2%	59	-15%
McDonough	32,913	0.3%	47	-10%
Schuyler	7,189	0.1%	93	-12%
Region	67,173	0.5%	--	-9%
Illinois	12,419,293	100.00%	--	12%

Macomb. Since 1980, however, population has fallen 12% in McDonough County as the college population has shrunk. At the same time, population increased 28% in Brown County when the Western Illinois Correctional Center opened in 1989. Brown and McDonough counties are both expected to grow by the year 2020, whereas Hancock and Schuyler are projected to continue losing population.[2]

Urbanization

The four area counties range from 66% urban in McDonough County to zero urban in Brown County. Overall, less than one-half (46.3%) of the population lives in urban areas (communities greater than 2,500 population), far below the statewide average of 85%.[3] Between 1970 and 1990, the proportion of urban residents increased slightly, about 5%, while density rose from 32.2 persons per square mile to 32.9. Density fell — to 31.6 — along with population during the next 10 years. Macomb, with more than 20,000 residents, is the largest community in the area.

According to satellite imagery taken between 1991 and 1995, 1.6% of the land in the area is used for urban purposes, far less than the statewide percentage of 5.8%.[4] (As used here,

Table 1-2. Population Density*

	1870	1910	1950	1990	2000
Brown	39.9	34.0	20.3	19.1	22.7
Hancock	45.2	38.6	30.9	26.9	25.3
McDonough	45.0	45.6	49.1	59.8	55.9
Schuyler	39.8	34.0	20.0	17.1	16.4
Region	43.3	38.9	32.2	32.9	31.6
Illinois	45.7	101.5	156.8	205.7	223.5

* persons per square mile

[2] *Illinois Population Trends 1990 to 2020*, State of Illinois, 1997 Edition.
[3] Urbanization data from 1990 and 1993 *Illinois Statistical Abstract*.
[4] *Illinois Landcover, An Atlas*, IL Department of Natural Resources, June 1996.

Table 1-3. Incorporated Municipalities, 1990[5]

	1990 Population
Brown Co.	
Mound Station	147
Mount Sterling	1,922
Ripley	103
Versailles	480
Hancock Co.	
Basco	99
Bently	36
Bowen	462
Carthage	2,657
Dallas City	1,037
Elvaston	198
Ferris	177
Hamilton	3,281
LaHarpe	1,407
Nauvoo	1,108
Plymouth	521
Pontoosuc	264
Warsaw	1,882
West Point	214
McDonough Co.	
Bardolph	301
Blandinsville	762
Bushnell	3,288
Colchester	1,645
Good Hope	416
Industry	571
Macomb	20,129
Prairie City	497
Sciota	68
Tennessee	127
Schuyler Co.	
Browning	193
Camden	115
Littleton	181
Rushville	3,229

urban land includes low, medium and high-density urban land, transportation, and urban grasslands.) McDonough and Hancock counties have the highest percentage of urban land as well as the most urban acreage.

Land use information is also available from the U.S. Department of Agriculture Soil Conservation Service, which has conducted a National Resources Inventory (NRI) in 1982, 1987, 1992, and 1997. (Because different methodologies are used and the data are collected from representative sample points in each state, the NRI data vary slightly from the satellite data.) According to the NRI, between 1982 and 1997 urban land use grew 27% in the four-county area, the same as statewide. Most of the increase occurred in McDonough and Hancock counties.

Table 1-4. Urban Acreage

	Urban acres	% of county
Brown	1,779	0.9%
Hancock	8,351	1.6%
McDonough	8,609	2.3%
Schuyler	2,657	0.9%
Region	21,396	1.6%
Illinois	2,087,390	5.8%

[5] *Illinois Counties & Incorporated Municipalities,* December 1, 1993, Illinois Secretary of State.

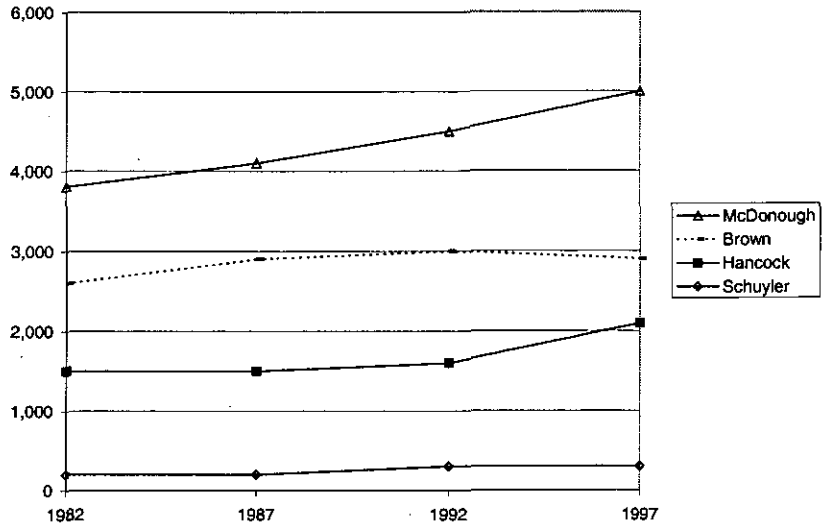


Figure 1-3. Urban Land Use (acres)

Population Characteristics

Age

The age distribution varies across the four-county area. Overall in 1990, the area had a slightly lower proportion of residents younger than age 19 compared to statewide, 27.9% versus 29%, and a higher proportion of those aged 65 and older, 16.1% versus 12.5%. However, because of the large number of students attending Western Illinois University in Macomb, the median age was 31.9 years compared to 32.8 statewide. McDonough County (home

1990
La Moine River area
Age 0-19: 27.9%
Age 65+: 16.1%
Median age: 31.9
Per capita income: $15,021
Persons in poverty: 16.1%
Minorities: 4.1%
High school education: 77.0%
College education: 17.4%

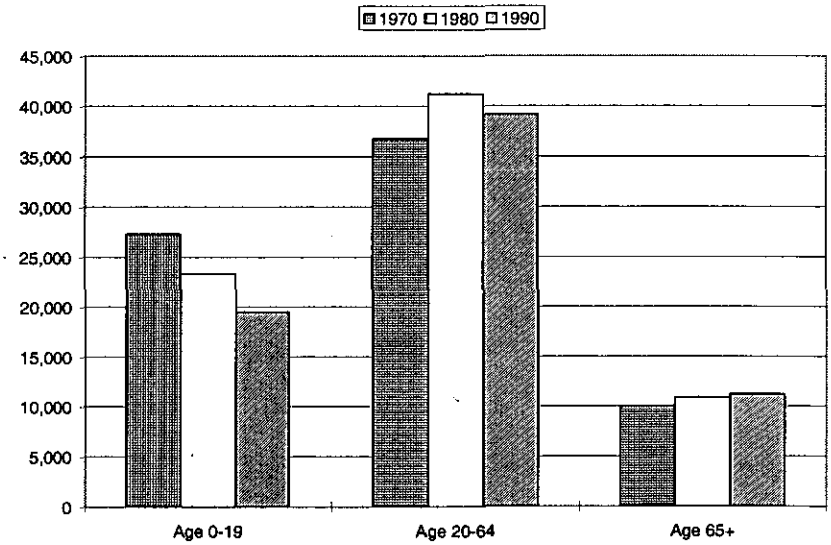


Figure 1-4. Age Distribution, La Moine River Area

Table 1-5. Median Age

	1970	1980	1990
Brown	38.2	35.8	33.8
Hancock	32.4	32.8	37.2
McDonough	22.4	24.6	27.3
Schuyler	36.9	34.3	37.4
Region	28.3	29.1	31.9
Illinois	28.4	29.9	32.8

of WIU) had a median age of only 27.4 compared to greater than 37 in Schuyler and Hancock counties.

Like the rest of the state (and nation), the population in the La Moine River area is aging — in 1970, the young made up 36.9% of the population and the elderly only 13.5%.[6] The percentage of elderly residents is projected to increase in all four counties as the "baby boom" generation passes age 65 during the next 20 years or so.

Figure 1-5 shows age distribution by census block group. Not surprisingly the predominantly younger populations are concentrated in McDonough County, which has a high population of college students. The older populations also live in McDonough County on the outskirts of Macomb, as well as in Hancock County.

Education

More than three-fourths of area residents aged 25 and older had completed high school in 1990 — about the same as statewide — and a little more than one in eight had finished college. Not surprisingly, McDonough County has the largest percentage of college educated residents, 23.2% compared to a low of 9.8% in Brown County. The census map in Figure 1-6 shows that the more educated populations live in McDonough County, particularly in Macomb and the surrounding area.

Table 1-6. 1990 Educational Attainment
(persons age 25 and over)

	Not Completing High School	Completing High School Only	Completing Four or More Years of College
Brown	31.1%	59.1%	9.8%
Hancock	22.5%	63.1%	14.4%
McDonough	19.7%	57.1%	23.2%
Schuyler	30.6%	58.7%	10.7%
Region	23.0%	59.5%	17.4%
Illinois	23.8%	55.2%	21.0%

[6] Age, race and education data from the *2000 State Profile*, Woods & Poole Economics, Inc.

Figure 1-5. Estimated Mean Age by 1990 Census Block Group

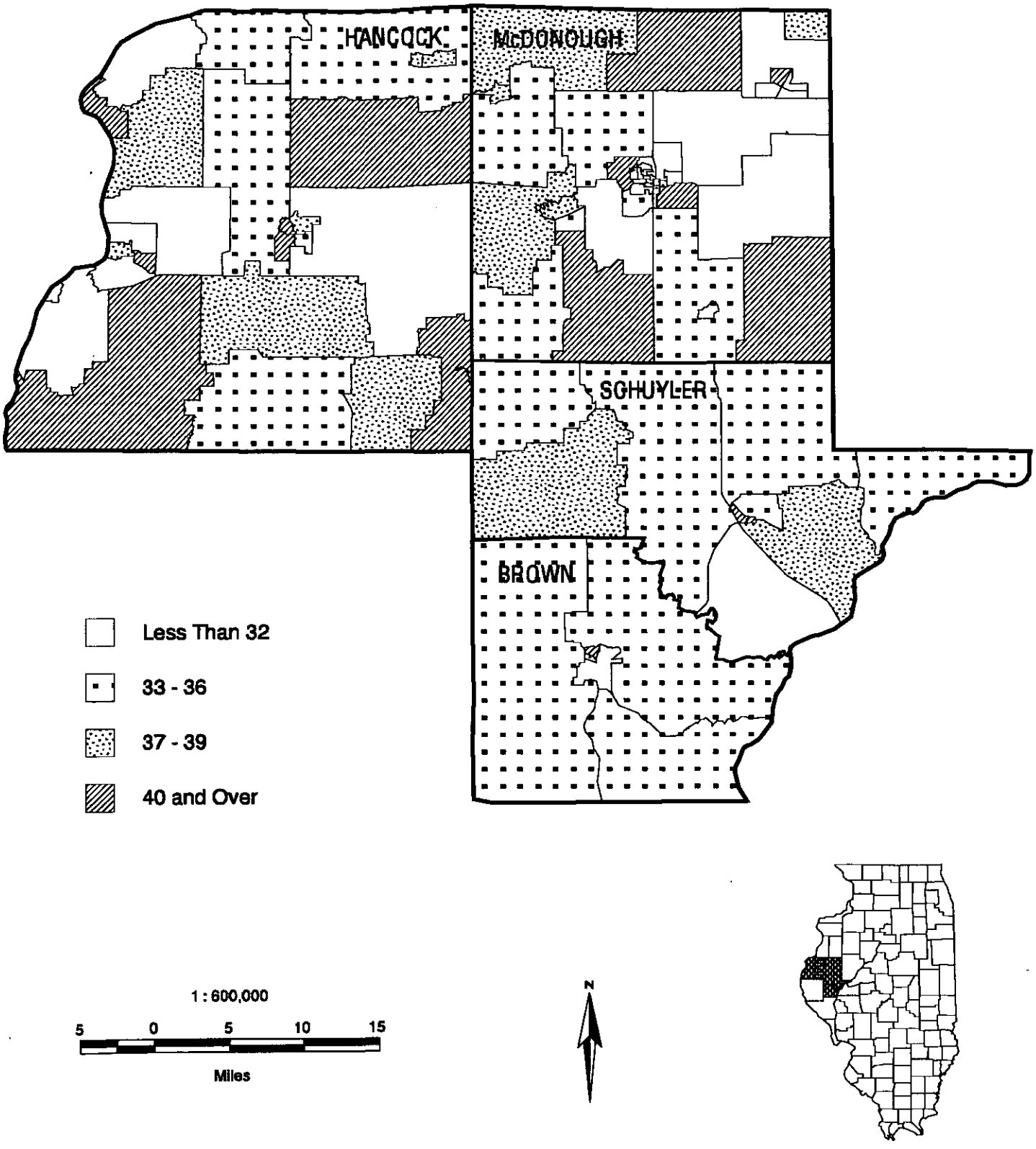
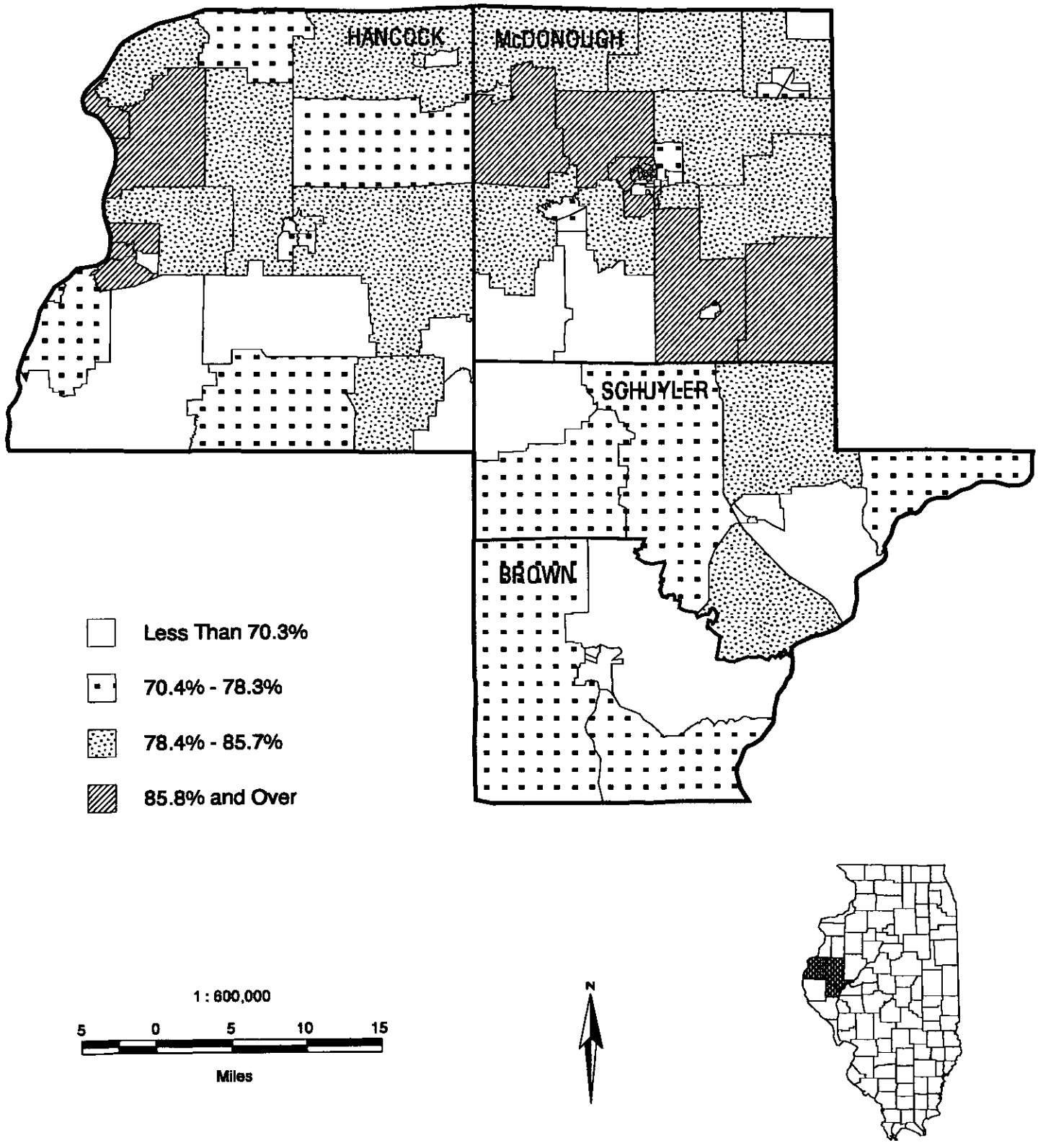


Figure 1-6. Educational Attainment by 1990 Census Block Group

Percentage of those over 25 who are high school graduates or higher.



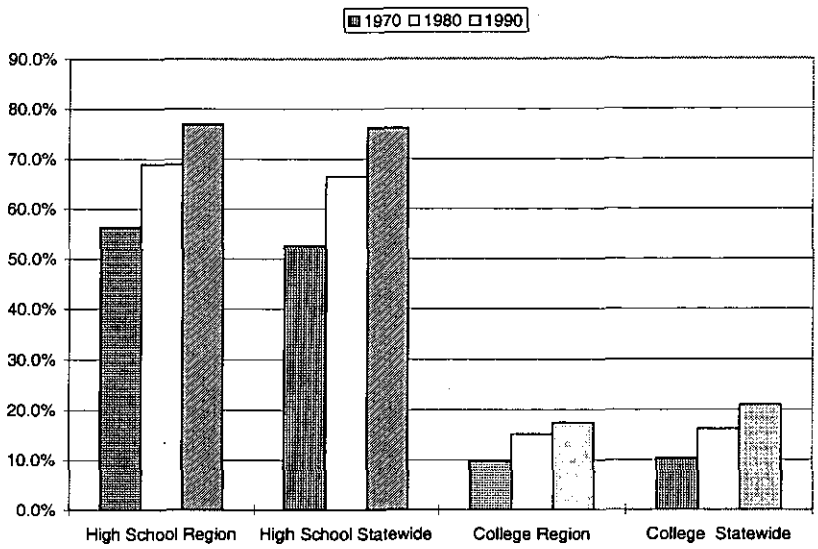


Figure 1-7. Education Trends

Per Capita Income

In 1990 per capita income was lower in the La Moine River area than it was statewide, $15,021 compared to $23,566.[7] Even so, between 1970 and 1990 per capita income rose 37% in the four-county area, with the greatest increase occurring in Hancock County, which led the area in per capita income. The map in Figure 1-9 shows that the areas with the highest per capita income occur in Hancock County, primarily around Hamilton and Carthage, and in the areas surrounding Macomb in McDonough County.

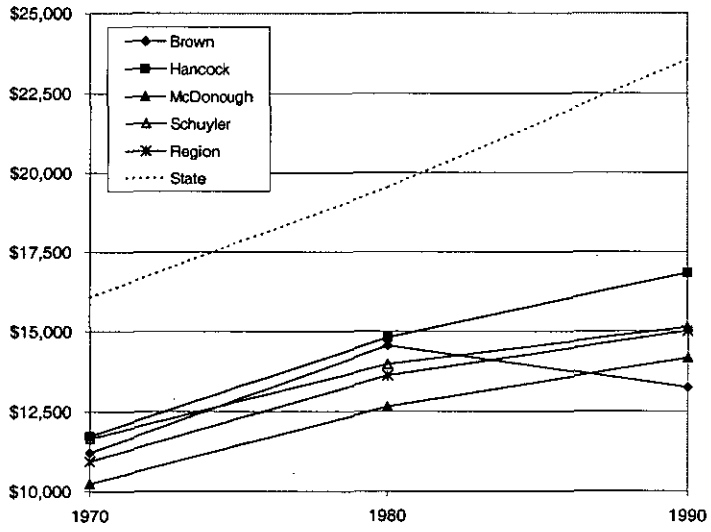
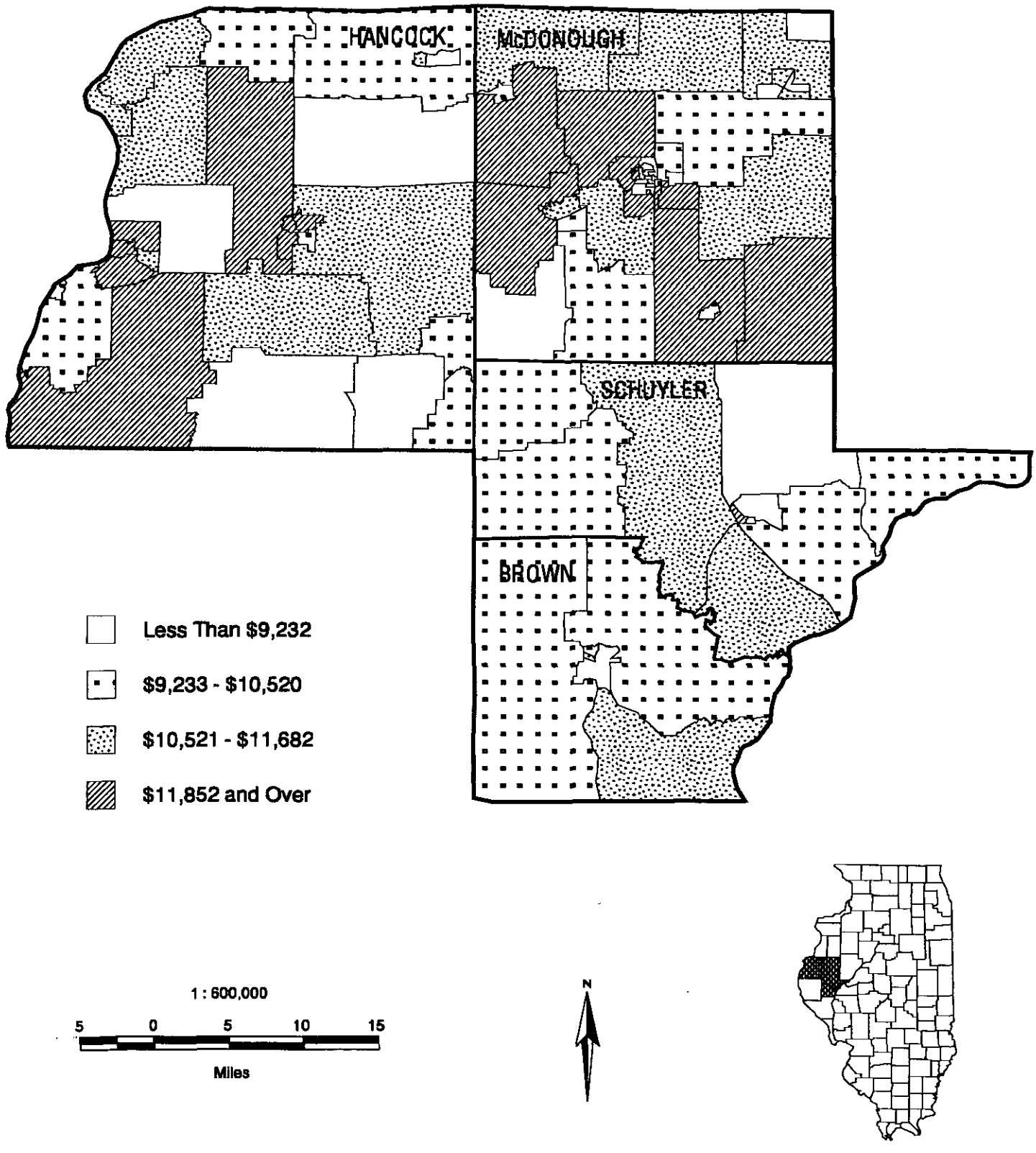


Figure 1-8. Per Capita Income

[7] Per capita income data from *2000 State Profile.*

Figure 1-9. Per Capita Income by 1990 Census Block Group



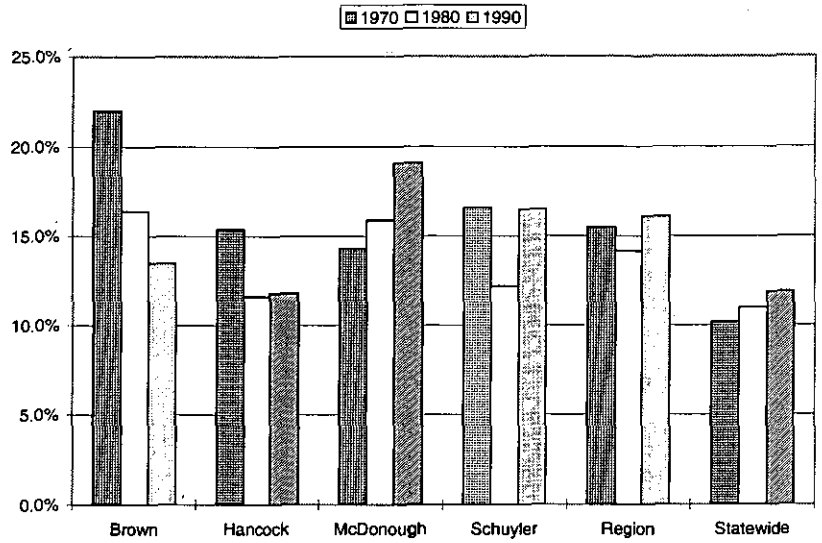


Figure 1-10. Percent of Population Living in Poverty

In 1990 the area poverty rate was higher than the statewide average — 16.1% compared to 11.9%.[8] McDonough County, with its large population of college students, had the highest poverty rate at 19.1%. Not surprisingly, Hancock County, with the highest per capita income, had the lowest poverty rate at 11.8%.

Race and Gender

The area has a small minority population — 4.1% of the total population in 1990 compared to 17.8% statewide. Brown County leads the region with a 9.8% minority population, while Schuyler County has only 0.1%. The ratio of men to women has increased slightly over the past 20 years, from 48.6% to 49.5% male.

Households and Housing

Households

Between 1970 and 1990, while total population fell 6%, the number of households in the four-county area increased 11.1%, less than statewide (up 19%). All of the growth, however, occurred between 1970 and 1980; after 1980, the number of households decreased in all four counties.[9]

1990
La Moine River area
Households: 25,720
Persons Per Household: 2.4
Median Household Income: $26,863
Housing Units: 28,572
Vacancy Rate: 10.4%
Median Value: $40,198

[8] Poverty data from 1970, 1980, and 1990 *Census*.
[9] Household data from *2000 State Profile*.

Table 1-7. Number of Households
(in thousands)

	1970	1980	1990
Brown	1,970	2,100	2,000
Hancock	7,940	8,890	8,430
McDonough	10,380	12,550	12,280
Schuyler	2,850	3,190	3,010
Region	23,140	26,730	25,720
Statewide	3,531,600	4,052,920	4,211,430

The greatest growth in the number of households occurred in McDonough County, which added 1,900 new households, up 18% from 1970. Households in Brown County increased the least, up only 1.5%. The number of persons per household dropped from 2.8 to 2.4 persons; statewide it dropped from 3.1 to 2.7 (Table 1-7).

Although per capita income increased 10% between 1980 and 1990, median household income fell almost 4% during a similar time frame. Brown County recorded the only increase in the four-county area. Statewide, median household income grew 2.8% ($1,075). [10]

Table 1-8. Median Household Income
(in 1994 Dollars)

	1979	1989	% change
Brown	$23,141	$24,651	6.5%
Hancock	$29,640	$28,980	-2.2%
McDonough	$27,628	$26,253	-5.0%
Schuyler	$27,810	$25,416	-8.6%
Region	$27,965	$26,863	-3.9%
Statewide	$37,811	$38,886	2.8%

Housing

Between 1970 and 1990, the number of area housing units increased by almost two-fifths, while the percentage of vacant units rose from 8.5% to 10.4%. Statewide, units were up by more than one-fifth while vacancies rose from 5.4% to 6.7%. McDonough County experienced the greatest increase in housing units, up by more than one-fifth, while the number of vacant units were up by more than half.[11]

[10] Median household income data from 1980 and 1990 *Census*
[11] Housing units and vacancies from 1990 and 1993 *Illinois Statistical Abstract*.

Table 1-9. Housing Units

	1970		1980		1990	
	Units	Vacancies	Units	Vacancies	Units	Vacancies
Brown	2,226	12.5%	2,385	12.0%	2,357	15.5%
Hancock	8,738	9.5%	10,005	11.3%	9,629	13.3%
McDonough	10,909	5.9%	13,935	10.1%	13,257	7.6%
Schuyler	3,223	11.9%	3,608	11.8%	3,329	9.8%
Region	25,096	8.5%	29,933	10.9%	28,572	10.4%
Illinois	3,703,367	5.4%	4,319,672	6.3%	4,506,275	6.7%

The median value of owner-occupied housing units (in 1994 dollars) increased 51% from 1970 to 1980, from $37,381 to $56,314 (compared to $93,641 statewide).[12] Values dropped 29%, however, between 1980 and 1990. Over the 20-year period (1970-1990), area values rose only 8%, far less than the 34% increase statewide. Brown County experienced the greatest regional increase during the 20-year period, up 27%.

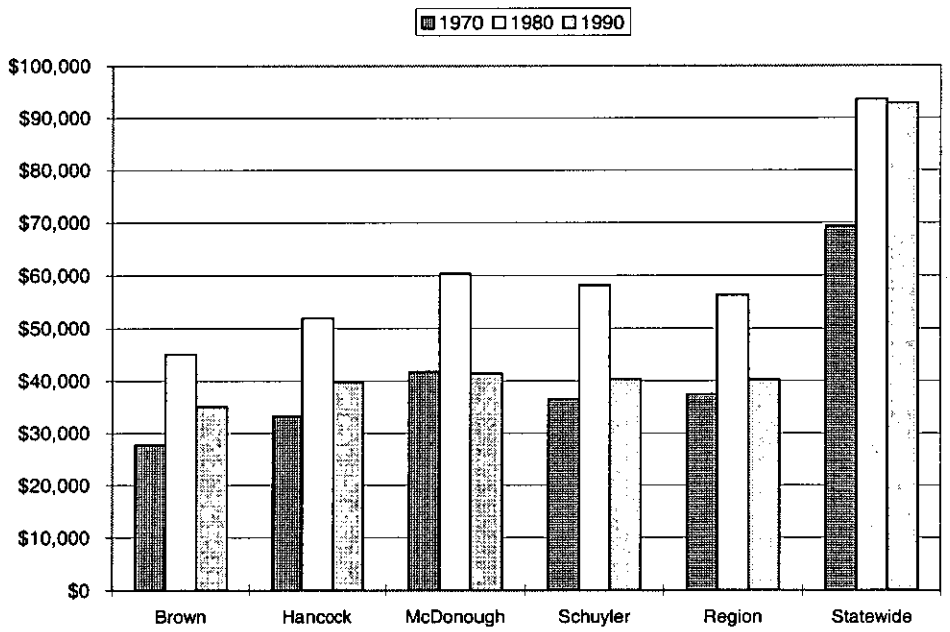


Figure 1-11. Median Value of Owner-Occupied Housing, in 1994 Dollars

[12] Data on median value of housing from 1970, 1980 and 1990 *Census* and 1993 *Illinois Statistical Abstract*.

Conclusion

The four-county La Moine River area is largely rural, although the population ranges from 66% urban in McDonough County to completely rural in Brown County. Overall, less than half of residents live in urban areas and only 1.6% of the land is put to urban uses. Unlike most of the state, population here fell 27% since 1870 and in 2000 accounted for 0.5% of the state's population.

The area has a larger elderly population than statewide; in 1990 16.1% of the population was over the age of 65 compared to 12.5% statewide. The median age was 31.9 years compared to 32.8 years statewide, primarily because of the large number of students attending Western Illinois University. More than three out of four residents aged 25 and older had completed high school and about one in eight finished college, compared to one in five statewide.

In 1990 per capita income was $15,021, $8,545 lower than the statewide average, but still 37% more than in 1970. During this time period, the percentage of people living in poverty increased slightly from 15.5% to 16.1%. Similarly, median household income dropped 4% between 1979 and 1989. The number of households in the area grew 11% between 1970 and 1990, a little less than statewide, with McDonough County experiencing the greatest growth.

The Regional Economy

In 1998, the La Moine River area had 39,149 people employed with $1.4 billion total personal income.[1] The area includes four counties: Brown, Hancock, McDonough, and Schuyler. McDonough County accounted for more than 57% of employment and 48% of income.

During the period 1970-1998, area employment grew at an annual average rate of 1.0%, compared to 1.2% statewide. McDonough and Brown counties experienced growth similar to the statewide average while Hancock and Schuyler counties experienced much slower growth, 0.06% and 0.04% respectively. Income growth, on the other hand, was lower than the 2.2% statewide rate in all four counties.

Table 1-11 shows that Brown and McDonough counties have a negative residence adjustment to personal income,[2] meaning that residents from neighboring counties commute there for work.

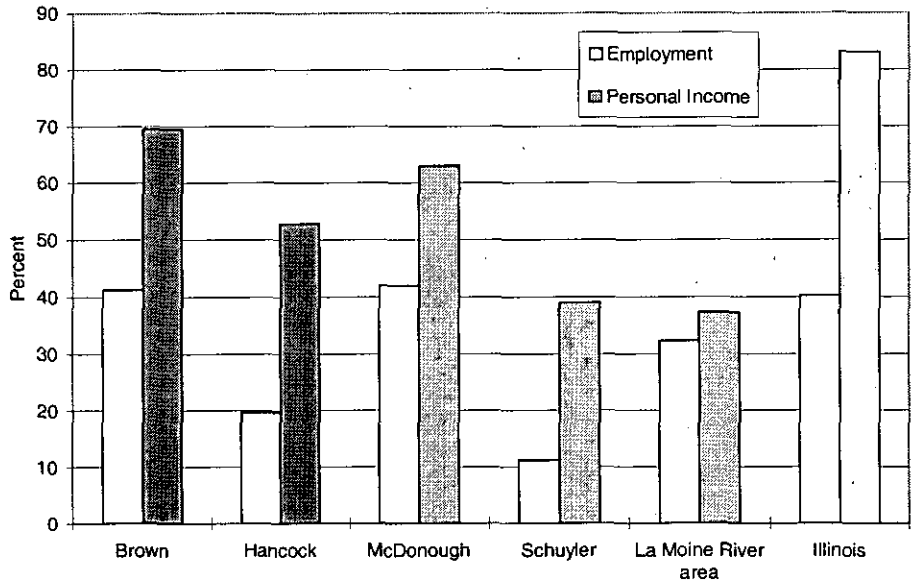


Figure 1-12. Percentage Change in Employment and Personal Income, 1970-1998

[1] Income and earnings discussed in this chapter are reported in 1998 dollars. Total personal income includes the earnings (wages and salaries, other labor income, and proprietor's income); dividends, interest, and rent; and transfer payments received by the residents of the area.
Source: Regional Economic Information System, 1969-1998, US Department of Commerce, Bureau of Economic Analysis.

[2] Adjustments are made in earnings to transfer 'place-of-work' income to 'place-of-residence' income. A negative adjustment means that more people commute to the county for work; a positive adjustment means that more people commute out of the county.

Table 1-10. 1998 Employment and Personal Income

	Employment	% of Illinois Employment	Income (million $)	% of Illinois Income
Brown	3,364	0.05%	119.6	0.03%
Hancock	10,049	0.14%	470.7	0.13%
McDonough	22,212	0.31%	689.0	0.19%
Schuyler	3,524	0.05%	146.5	0.04%
Region	39,149	0.54%	1,425.8	0.39%
Illinois	7,212,394	--	366,735.0	--

Table 1-11. Composition of Total Personal Income (1998)
(in millions)

	Brown	Hancock	McDonough	Schuyler	Region	Illinois
Earnings	87.5	205.8	491.5	66.5	851.3	268,089.9
less contributions	4.1	11.3	21.6	3.6	40.6	15,500.3
plus residence adjust.	-4.3	95.9	-39.5	25.1	77.2	-970.2
Adjusted Earnings	79.2	290.4	430.3	88.0	887.9	251,619.3
Div., Int., & Rent	21.2	103.2	151.3	31.8	307.5	72,809.8
Transfer Payments	19.2	77.2	107.4	26.7	230.5	42,305.9
Total Personal Income	119.6	470.7	689.0	146.5	1,425.8	366,735.0

Structural Change in the Economy

Economic development in the region is concentrated in the government, services, and wholesale/retail trade sectors, and to a lesser extent in the manufacturing sector. Since the early 1970s, the farming sector's share of area employment has shrunk from 19% to 9% while services' has grown from 13% to 18%. The region has escaped the national trend of losing manufacturing jobs; this sector has increased its share of jobs from 9% to 11%.

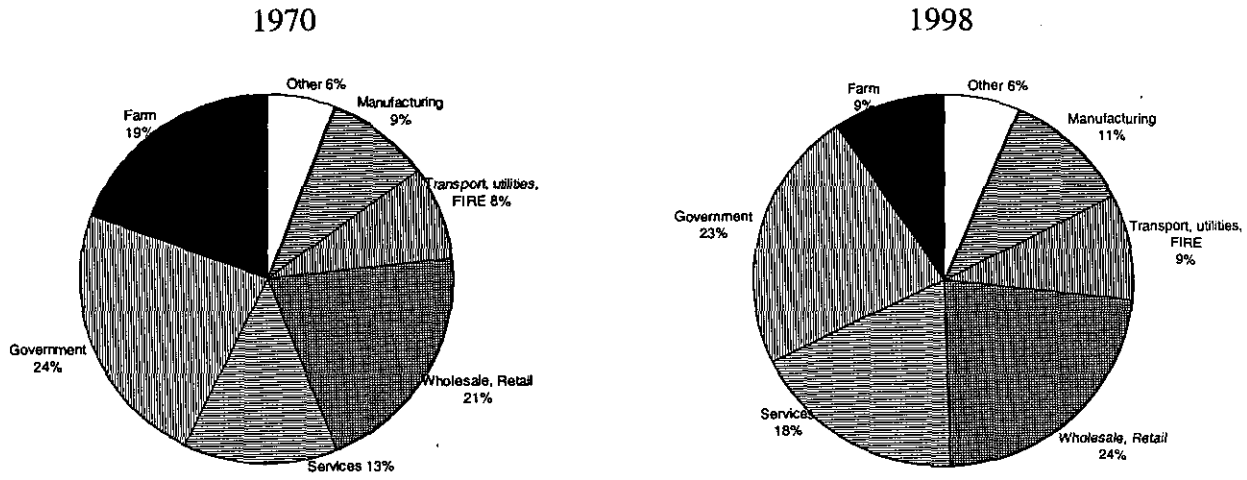


Figure 1-13 . Employment Distribution in the La Moine River Area, 1970 and 1998
("other" in the charts includes construction, mining, and agricultural and forestry services)

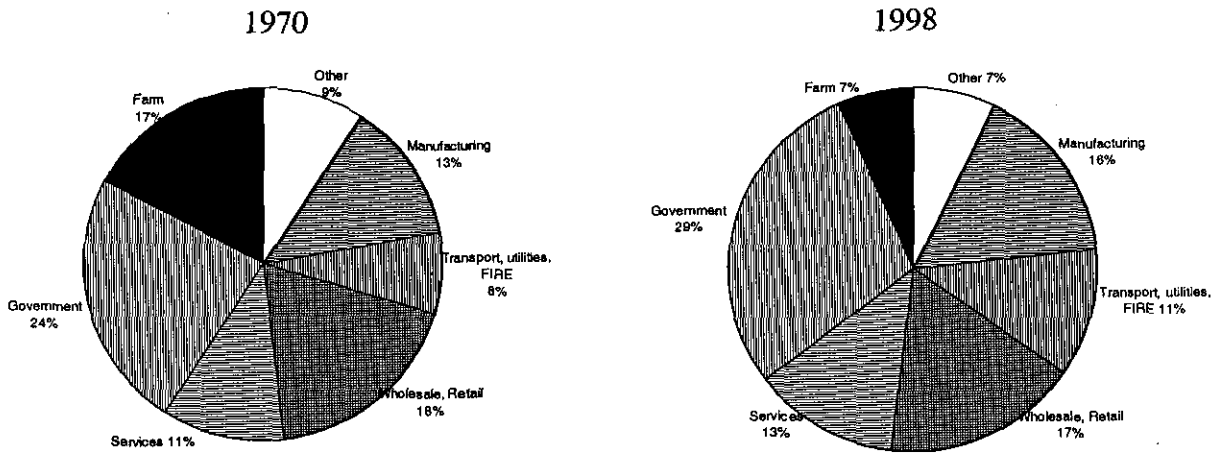


Figure 1-14. Earnings Distribution in the La Moine River Area, 1970 and 1998

In 1970, the government sector led the area in employment, followed by the wholesale/retail and farm sectors. By 1998, the wholesale/retail sector led, followed by the government and services sectors. Farming's share of employment fell to just 9%.

The government sector continues to generate the most area earnings, 29% in 1998. Wholesale/retail remained second in earnings, but the farm sector dropped out of the top three — providing only 7% of area earnings — and was replaced by manufacturing, which provided 16% of earnings. Even though the farm sector declined overall, it continues to play a significant role in Brown, Hancock, and Schuyler counties.

Economic Characteristics by County

Brown County

Over the 28-year period, employment in Brown County grew at an average annual rate of 1.2%, the same as statewide, while earnings grew at 2.0%, slightly above the state rate of 1.7%. The transportation, utilities and FIRE sector grew significantly in the 1990s and is now the largest employer, providing one-third of total employment. Its growth is primarily due to the warehouse and transportation facilities of Dot Foods, a wholesale grocer that is the county's largest employer. Growing sectors also included services and government. The Illinois Department of Corrections is the second largest employer in the county. Manufacturing is almost nonexistent, with only 17 workers in 1998, a drop of 50% since 1970. Also losing jobs were the wholesale/retail, farming and "other"[3] sectors.

Transportation, utilities, and FIRE led in earnings with close to one-half of the county's total. A far second was the government sector, providing one-fifth of earnings. Despite its loss of jobs and decline in earnings, the farm sector is the third largest contributor to county earnings, providing more than one-tenth of the total.

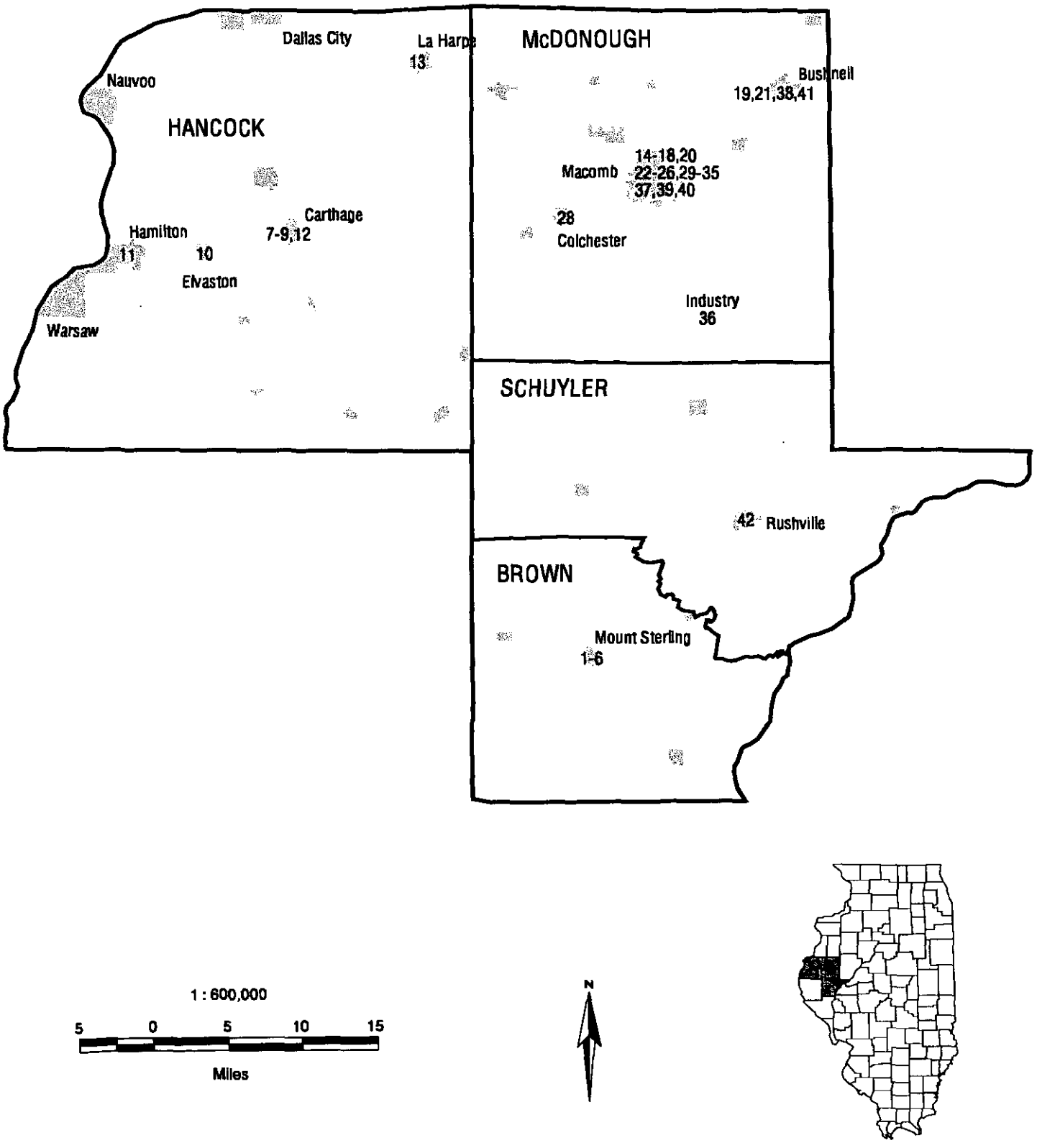
[3] "Other" consists of the construction, mining, and agricultural and forestry services sectors.

Table 1-12. Major Employers, La Moine River Area

	City	Map Legend	Business Classification	SIC	Employees
Brown County					
Dot Foods	Mount Sterling	1	Warehouse & Storage	422	788
Illinois Dept. of Corrections	Mount Sterling	2	Prison	922	450
Dot Transportation	Mount Sterling	3	Trucking	421	429
Afscme Local	Mount Sterling	4	Labor Organization	863	400
Knights of Columbus	Mount Sterling	5	Fraternal Organization	862	150
Parent Child Together	Mount Sterling	6	Child Day Care Services	832	100
Hancock County					
Methode Electronics	Carthage	7	Electronic Components	367	1,570
Memorial Hospital	Carthage	8	Medical & Surgical Hospital	806	123
Carthage School 338	Carthage	9	Elementary/Secondary School	821	120
Elvaston Presbyterian Church	Elvaston	10	Religious Organization	866	90
W. L. Miller Company	Hamilton	11	Highway Construction Contractor	161	80
Hancock County Health Dept.	Carthage	12	Public Health Programs	808	70
La Harpe Hospital	*La Harpe*	13	*Long Term Care Nursing Home*	805	70
McDonough County					
Western Illinois University	Macomb	14	College/University	822	1,700
McDonough Co. Hospital	Macomb	15	Medical & Surgical Hospital	806	600
Ntn-Bower Corporation	Macomb	16	Ball/Roller Bearings Manufacturer	356	550
Zeta Consumer Products	Macomb	17	Polyethylene Bags	306	340
Bridgeway Inc.	Macomb	18	Individual/Family Services	832	250
Vaughan & Bushnell Co.	Bushnell	19	Hand/Edge Tools Manufacturer	342	225
County of McDonough	Macomb	20	Legislative Body	912	150
Norforge & Machining Co.	Bushnell	21	Steel Forgings Manufacturer	346	145
Hy-Vee Inc. (1420)	Macomb	22	Grocery Store	541	144
Haeger Industries	Macomb	23	Pottery Manufacturing	326	130
City of Macomb	Macomb	24	City Government	911	150
The Elms	Macomb	25	Skilled Nursing Home	805	125
Macomb School District	Macomb	26	Elementary/Secondary Schools	821	125
Yetter Manufacturing	Colchester	28	Farm Equipment Manufacturer	352	110
Bethphage	Macomb	29	Individual/family Services	832	110
Porcelain Products Company	Macomb	30	Porcelain Electric Supplies	326	100
YMCA	Macomb	31	Membership Organization	833	100
McDonald's	Macomb	32	Eating Place	581	90
Kmart Corporation (4781)	Macomb	33	Department Store	531	88
PHI Sigma Sigma	Macomb	34	Civic Social Organization	864	85
Union Bank West	Macomb	35	State Commercial Bank	602	85
Freeman Energy	Industry	36	Bituminous Coal Extraction	122	80
Lincoln Elementary School	Macomb	37	Elementary School	821	80
Heartland Placement	Bushnell	38	Help Supply Services	736	75
Citizens National Bank	Macomb	39	Chartered Commercial Bank	602	75
Spoon River College	Macomb	40	Junior College	822	75
Bushnell Prairie School	Bushnell	41	Elementary School	821	70
Schuyler County					
Snyders Vaughn-Haven	Rushville	42	Skilled Nursing Home	805	90

Source: Dun and Bradstreet, Dun's Direct Access Business Database, New York, 1995

Figure 1-15. Major Employers in the La Moine River Area



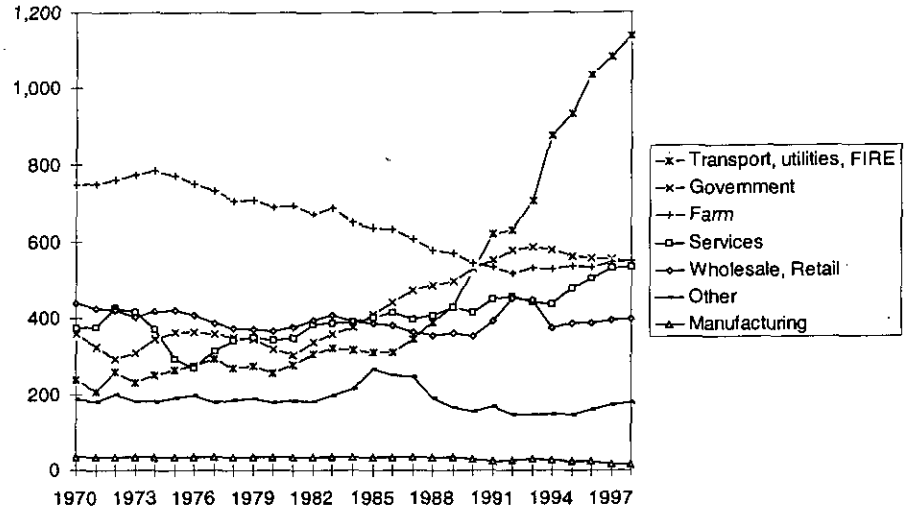


Figure 1-16. Brown County Employment, by Sector

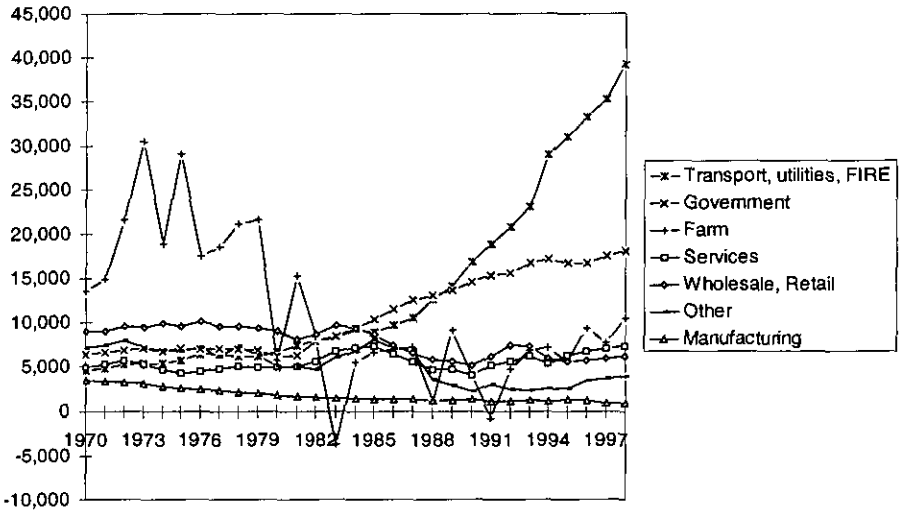


Figure 1-17. Brown County Earnings, by Sector

Table 1-13. Brown County 1998 Employment and Earnings

	1998 Employment	% Change 1970-98	Average Annual Change	% of Workforce	1998 Earnings (million $)	% Change 1970-98	Average Annual Change	% of Total Earnings
Manufacturing	17	-50.0	-2.5%	0.6	0.9	-74.8	-4.8%	1.0
Transportation, Utilities, FIRE	1,136	377.3	5.7%	33.8	39.3	757.6	8.0%	45.6
Wholesale, Retail	399	-9.5	-0.4%	11.9	6.1	-32.4	-1.4%	7.1
Services	535	42.7	1.3%	15.9	7.3	48.5	1.4%	8.5
Government	547	51.9	1.5%	16.3	18.1	181.5	3.8%	21.0
Farming	551	-26.1	-1.1%	16.4	10.5	-22.9	-0.9%	12.2
Other	179	-3.8	-0.1%	5.3	3.9	-45.1	-2.1%	4.6
TOTAL	3,364	41.3	1.2%	100.0	86.1	74.8	2.0%	100.0

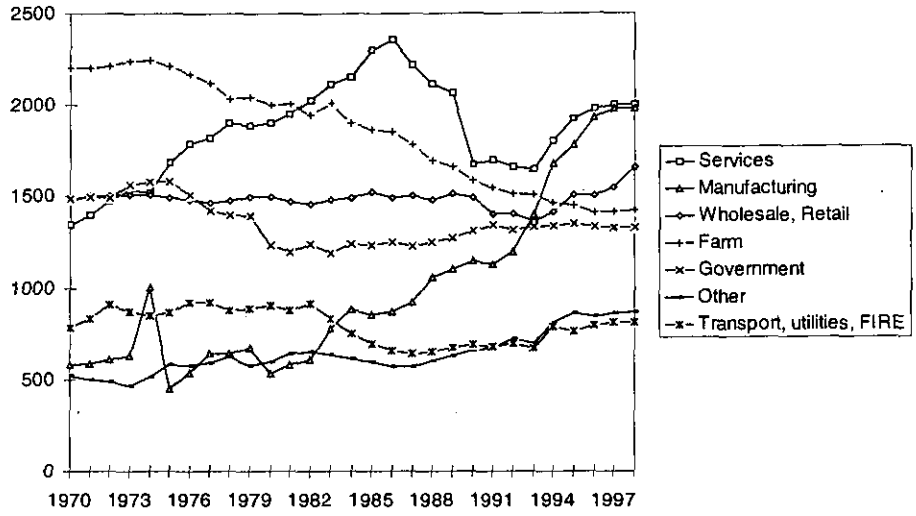


Figure 1-18. Hancock County Employment, by Sector

Hancock County

Hancock County's economy grew far slower than the state economy over the 28-year period. Employment grew an average of 0.6% per year while earnings grew only 0.7%, compared to the statewide averages of 1.2% and 1.7% respectively.

Services employment grew 1.4% annually over the period to almost 2,000 workers. Bolstering this sector are the two hospitals in Carthage and LaHarpe. However, the success story in Hancock County is manufacturing, which more than doubled since 1970 to become the second largest employer (only 23 employees less than services) and the largest contributor to county earnings. The largest employer is Methode Electronics employing 1,570 workers. The "other" sector grew slightly over the period but remains a small sector in the county. The Millier Company, a highway contractor, represents this

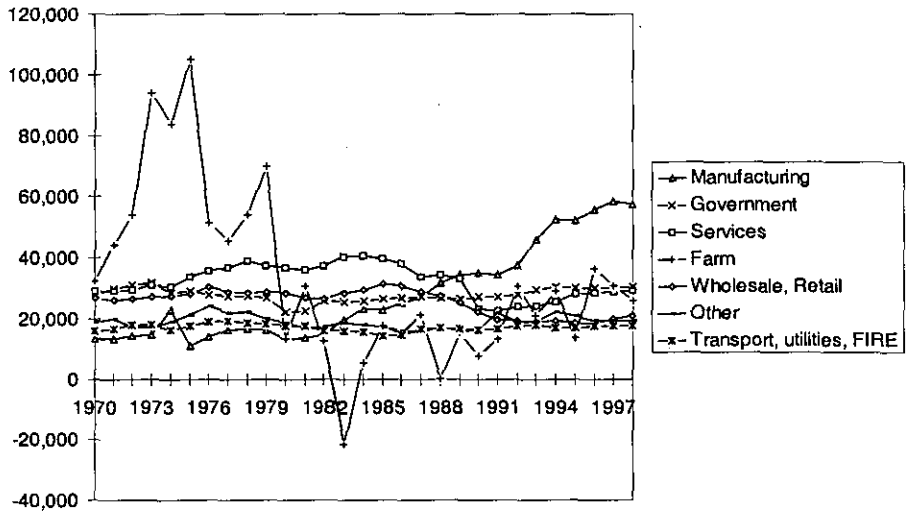


Figure 1-19. Hancock County Earnings, by Sector

Table 1-14. Hancock County 1998 Employment and Earnings

	1998 Employment	% Change 1970-98	Average Annual Change	% of Workforce	1998 Earnings (million $)	% Change 1970-98	Average Annual Change	% of Total Earnings
Manufacturing	1,976	237.2	4.4%	20.0	57.5	327.2	5.3%	28.6
Transportation, Utilities, FIRE	813	3.3	0.1%	8.0	17.7	10.6	0.4%	8.8
Wholesale, Retail	1,654	12.3	0.4%	16.5	20.9	-21.8	-0.9%	10.4
Services	1,999	48.7	1.4%	20.0	29.3	0.5	0.02%	14.6
Government	1,324	-10.9	-0.4%	13.2	30.6	8.8	0.3%	15.2
Farming	1,417	-35.6	-1.6%	14.1	26.0	-20.2	-0.8%	12.9
Other	866	65.6	1.8%	8.6	19.3	1.8	0.07%	9.6
TOTAL	10,049	19.7	0.6%	100.0	201.2	22.0	0.7%	100.0

sector. Employment in both the government and the farm sector declined over the period but still remain important sources of work.

Earnings remained quite flat over the period, except for manufacturing. Overall, earnings performance was mediocre in the 28-year period.

McDonough County

Employment grew an average of 1.3% per year in McDonough County and earnings grew 1.4%. Historically, government has always been the largest employer and greatest contributor to earnings and remained so in 1998. Government employs 30% of the county's workers and generates more than one-third of earnings. Wholesale/retail, which grew almost 70% during the 28-year period, is the second largest employer and earnings generator. Macomb has several large retailers, such as Wal-Mart and Kmart.

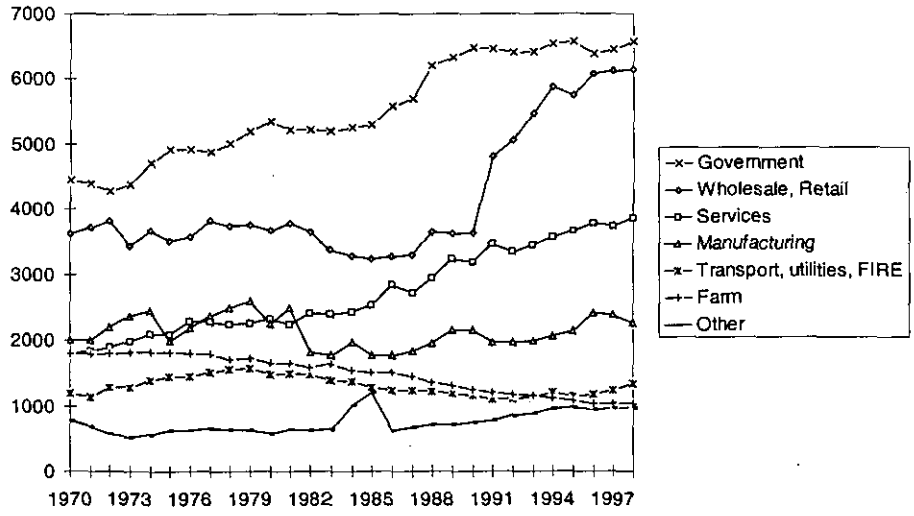


Figure 1-20. McDonough County Employment, by Sector

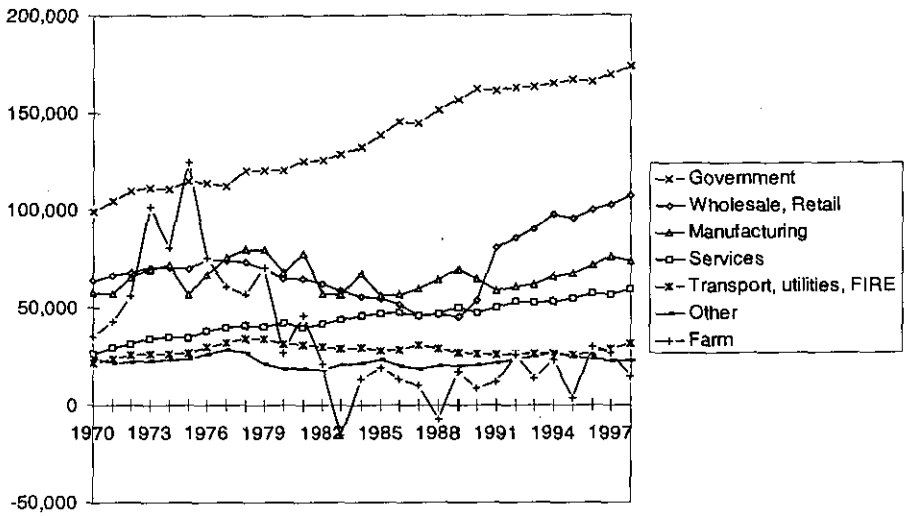


Figure 1-21. McDonough County Earnings, by Sector

The services sector more than doubled over the period and is the third largest employer. Western Illinois University is the largest service employer, and other schools such as Spoon River College contribute to the size of the sector.

Contrary to national and statewide trends, manufacturing employment increased in this county by almost 13%, to 2,257 workers, and earnings increased to $74 million by 1998. Manufacturing generates the third largest amount of earnings in the county. The largest manufacturer is Ntn-Bower, which employed 550 employees in 1995.

Table 1-15. McDonough County 1998 Employment and Earnings

	1998 Employment	% Change 1970-98	Average Annual Change	% of Workforce	1998 Earnings (million $)	% Change 1970-98	Average Annual Change	% of Total Earnings
Manufacturing	2,257	13.0	0.4%	10.2	73.7	28.1	0.9%	15.3
Transportation, Utilities, FIRE	1,347	13.4	0.5%	6.1	31.0	42.6	1.3%	6.4
Wholesale, Retail	6,139	69.4	1.9%	27.6	107.7	68.9	1.9%	22.3
Services	3,871	114.9	2.8%	17.4	59.2	127.1	3.0%	12.3
Government	6,579	48.0	1.4%	29.6	174.0	75.7	2.0%	36.0
Farming	1,040	-42.3	-2.0%	4.7	14.5	-58.5	-3.1%	3.0
Other	979	25.7	0.8%	4.4	22.8	-6.3	-0.2%	4.7
TOTAL	22,212	42.0	1.3%	100.0	482.9	48.5	1.4%	100.0

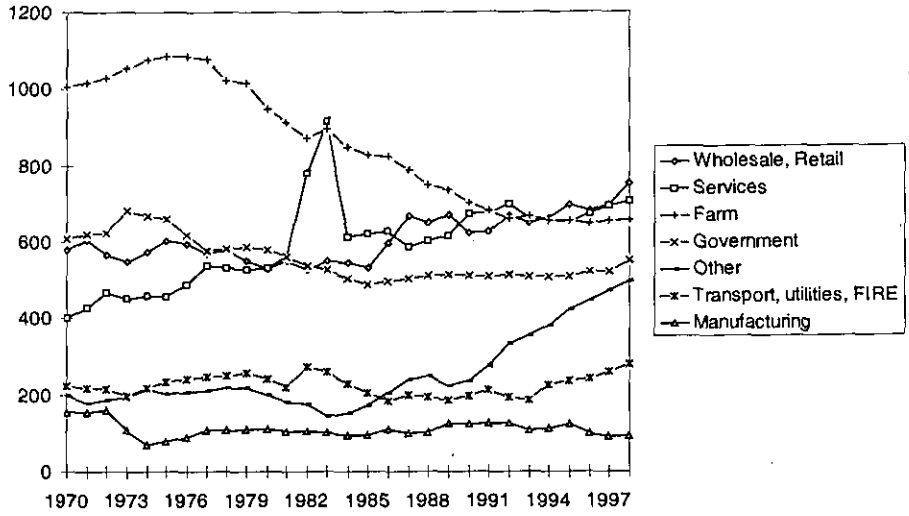


Figure 1-22. Schuyler County Employment, by Sector

Schuyler County

Schuyler County employment grew an average of 0.4% per year while earnings fell 0.8%. In 1998, the wholesale/retail sector remained the largest employer with 21.3% of all workers in the county. The service sector was a close second with 20% of employment.

Employment and earnings fell in the manufacturing and farm sectors, and earnings fell in the wholesale/retail sector despite a 30% increase in employment. Even with the loss of employment, the farm sector provides the third largest share of employment in the county. In the government sector, employment dropped while earnings rose.

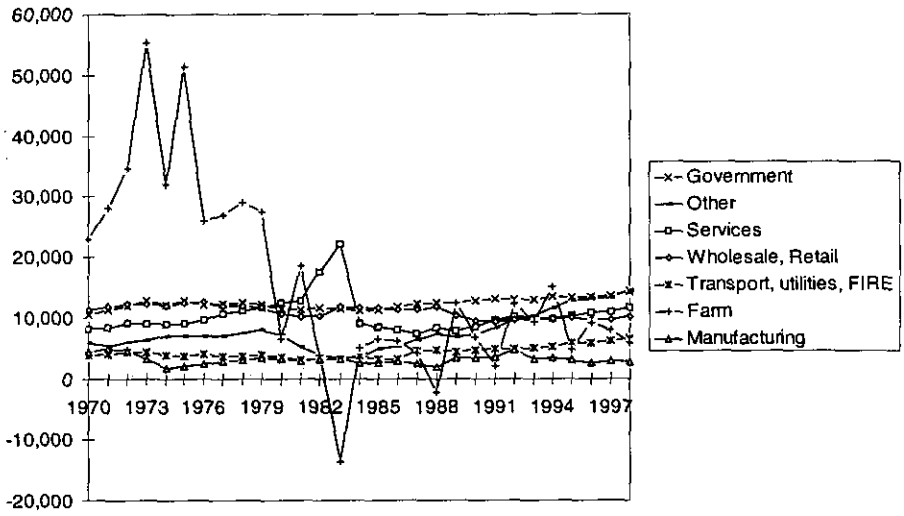


Figure 1-23. Schuyler County Earnings, by Sector

Table 1-16. Schuyler County 1998 Employment and Earnings

	1998 Employment	% Change 1970-98	Average Annual Change	% of Workforce	1998 Earnings (million $)	% Change 1970-98	Average Annual Change	% of Total Earnings
Manufacturing	91	-40.9	-1.8%	2.6	2.7	-37.4	-1.7%	4.1
Transportation, Utilities, FIRE	278	24.7	0.8%	7.9	6.5	68.2	1.9%	10.0
Wholesale, Retail	751	29.9	0.9%	21.3	10.2	-9.9	-0.4%	15.5
Services	704	75.6	2.0%	20.0	11.6	42.5	1.3%	17.7
Government	550	-9.7	-0.4%	15.6	14.2	36.2	1.1%	21.7
Farming	656	-34.8	-1.5%	18.6	5.9	-74.5	-4.8%	9.0
Other	494	149.5	3.3%	14.0	14.4	142.7	3.2%	22.0
TOTAL	3,524	11.2	0.4%	100.0	65.4	-2.3	-0.8%	100.0

Conclusion

The economy of the La Moine River area is dominated by McDonough County, which accounts for more than 57% of employment and 48% of income. Government, wholesale/retail, and services dominate the area economy. Area employment growth has been slightly slower than statewide — only in McDonough County is employment growing faster.

Agriculture

Illinois possesses some of the richest agricultural resources in the world and agriculture continues to be a key component of the state's economy and character. Information about agriculture coupled with demographic and economic information can be strong indicators of a region's development and its suitability for various resource management strategies.

Agricultural Lands

More than 76% of the land in the La Moine River region is considered agricultural, just slightly lower than statewide, where 78% of land is agricultural.[1] Crops are grown on most (77%) of the agricultural land. The percentage of agricultural landscape ranges from 66% in Brown County to 85% in McDonough County.

Table 1-17. Agricultural Land Cover

	Agricultural Acres	% of County
Brown	129,875	66%
Hancock	423,349	81%
McDonough	321,423	85%
Schuyler	187,324	66%
Region	1,061,971	77%
State	27,928,797	77%

The number of farms in the region declined 31% between 1978 and 1997, similar to the statewide decline of 30%. Over this same period,

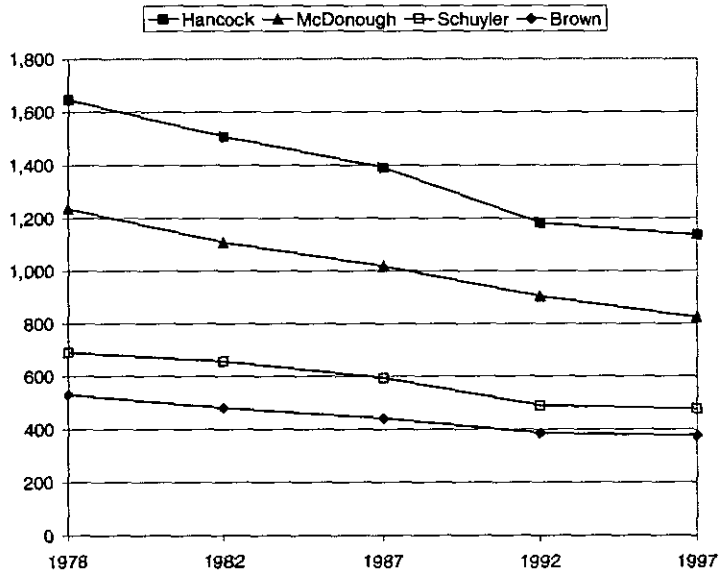
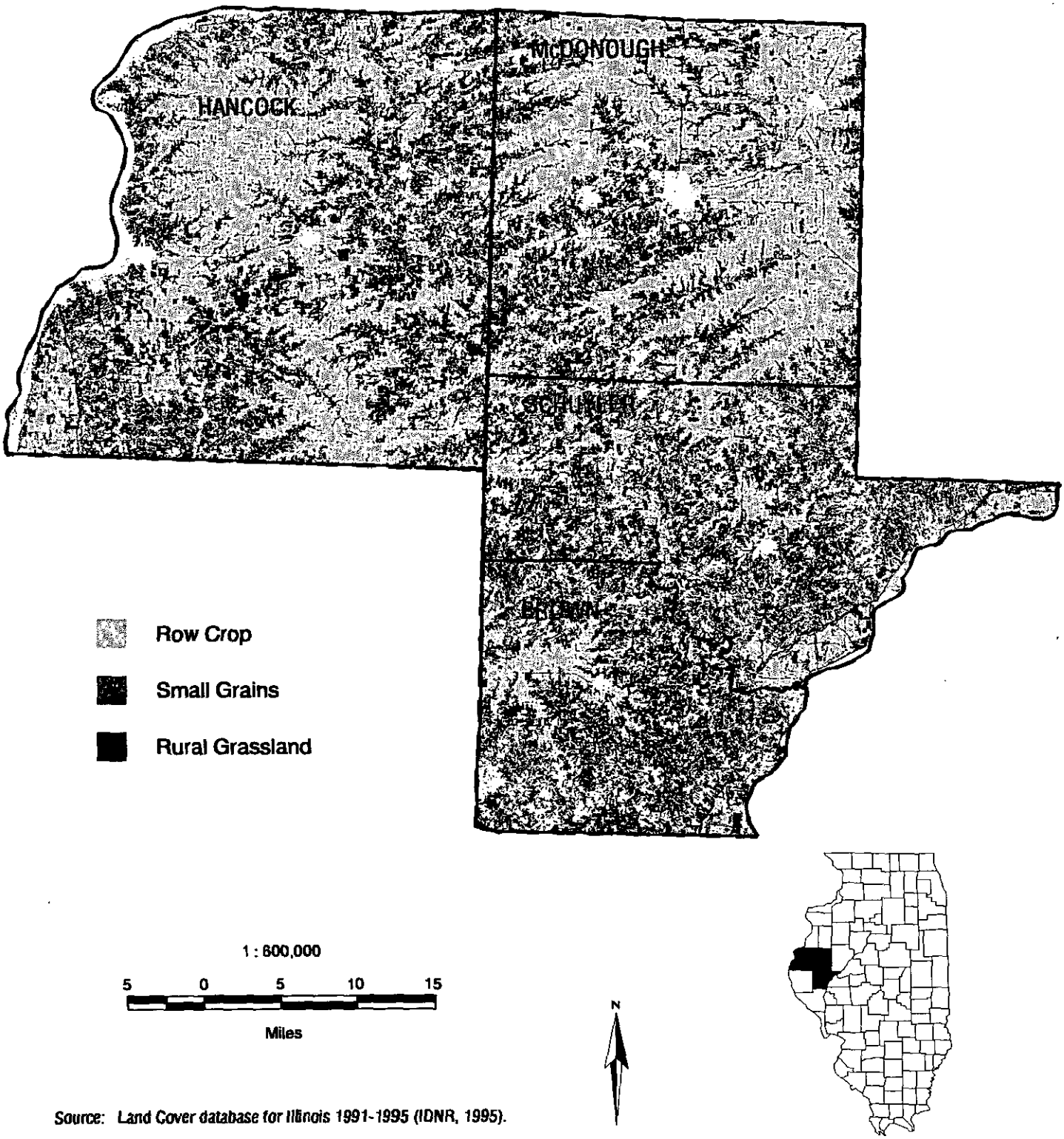


Figure 1 -24. The Number of Farms in the Region

[1] Department of Natural Resources. *Illinois Land Cover, An Atlas*, June 1996. Agricultural land is defined as cropland (planted in row crops, small grains orchards, and nurseries) and rural grasslands (fallow fields, pasture, and greenways) and may include a small amount of non-farm grasslands.

Figure 1-25. Agricultural Land Cover



Source: Land Cover database for Illinois 1991-1995 (IDNR, 1995).

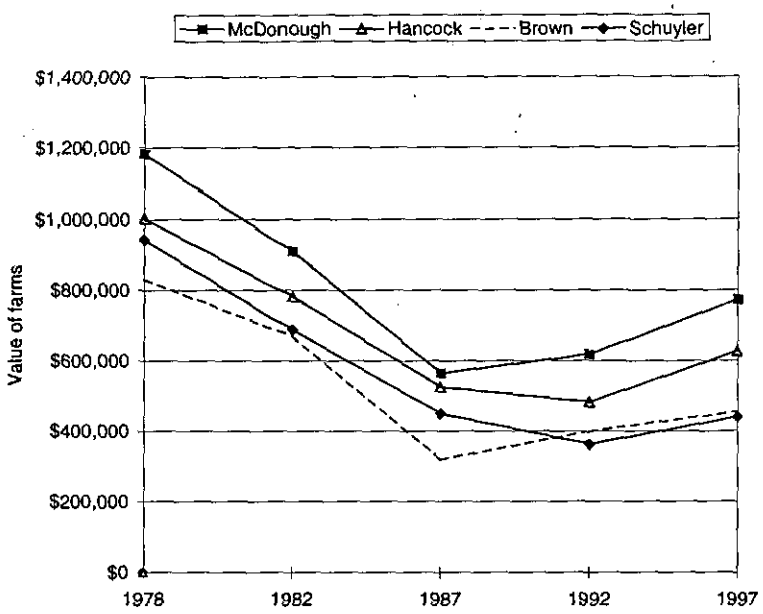


Figure 1-26. Value of Farmland (1998 dollars)

the amount of farm acreage fell 7.3%, about the same as statewide. Schuyler County experienced the greatest drop in acreage, down 12.3%.[2]

The value of the region's agricultural land and buildings also fell between 1978 and 1997, although land values stabilized after 1987 on a per acre basis (Figure 1-36), just as statewide.

Conservation Practices

Soil erosion has long been a major issue in Illinois, but recent trends show an improvement in the number of agricultural acres meeting "T."[3] Survey data show that 85% of the region's farm acreage was meeting "T" in 1999 (up from 79% in 1997), 12% was between 1-2 "T" (between three and ten tons), and 3% was greater than 2 "T" (more than ten tons soil loss).[4] This is just a little lower than statewide, where 87% of the surveyed acreage is at "T." In the region, Hancock County leads with 89% of the surveyed acres meeting "T."

Tillage practices play a large role in achieving "T." In 1999, 43% of the area's acreage was farmed with conservation tillage methods, 19% with reduced till and 38% with

[2] Information taken from *Agricultural Statistics*, Illinois Department of Agriculture, various years and *Census of Agriculture,* U.S. Department of Census, 1982, 1987, and 1997.

[3] "T" denotes tolerable soil loss levels, typically between three and five tons per acre per year. This is estimated--theoretically--to be the amount of soil loss than can occur and be replaced by natural soil building processes.

[4] Data is taken from the *Illinois T by 2000 Transect Survey Summary*, by the Illinois Department of Agriculture. The survey is done in cooperation with 98 Soil and Water Conservation Districts, and the USDA Natural Resources Conservation Service.

Table 1-18. Number of Conservation Reserve Contracts*

	1986	1987	1988	1989	1991	1992	1995	1997	1998
Brown	18	20	46	24	62	53	51	102	142
Hancock	57	102	53	47	84	39	44	169	107
McDonough	14	36	17	24	27	10	18	30	30
Schuyler	20	44	44	50	46	30	41	88	102
Region	109	202	160	145	219	132	154	389	381
State	2,043	5,028	3,517	4,234	2,754	2,265	2,647	7,211	8,139

*Contracts are reported during federal fiscal periods; no listing is available for 1993, 1994, 1996.

conventional methods. Statewide 41% of farm acreage was tilled with conservation methods, 22% with reduced tillage, and 36% with conventional methods. (The percentages will not always total 100% since some of the survey acreage data were unavailable). Regionally, conservation tillage is used on 61% of the soybean acreage, 73% of small grain acreage, and 25% of corn acreage. As of the 1999 survey, Schuyler County led the region with 61% of its acres planted using conservation methods.

Also helping to conserve soil is the Conservation Reserve Program[5] (CRP), which as authorized by the Food Security Act of 1985 and amended in 1990. The Act pays landowners to remove highly erodible and environmentally sensitive land from agricultural production. It provides incentives and assistance to farmers to plant grasses or tree cover on highly erodible land or to address other environmental concerns. A new provision of the Act also encourages farmers to enroll and restore cropped wetland acreage.[6]

Tables 1-18 and 1-19 present the number of contracts and the number of acres in the conservation reserve program per year per county, region and statewide. A farm can have more than one contract and, while contracts vary, most land is set aside for an average of 10 years (totals are the sum for the period 1986-1999 and may be less as some contracts may have expired). The region has almost 5% of the state's CRP contracts and acreage.

Table 1-19. Number of Acres in Conservation Reserve Program*

	1986	1987	1988	1989	1991	1992	1995	1997	1998
Brown	968	656	1,485	1,085	3,044	2,423	1,501	2,125	2,520
Hancock	2,746	4,042	2,222	1,875	3,850	1,488	1,175	5,170	1,497
McDonough	581	1,155	356	658	735	190	211	642	451
Schuyler	474	1,731	1,088	1,489	923	636	520	1,660	1,714
Region	4,769	7,585	5,150	5,107	8,551	4,737	3,407	9597	6,182
State	91,015	239,729	133,910	168,812	107,832	80,852	62,037	308,170	137,325

*Contracts are reported during federal fiscal periods; no listing is available for 1993, 1994, 1996.

[5] Data provided from Lisa Manning of the Federal Farm Service Agency, Springfield IL.
[6] United States Department of Agriculture, Farm Service Agency, *The Conservation Reserve Program.* May 1997.

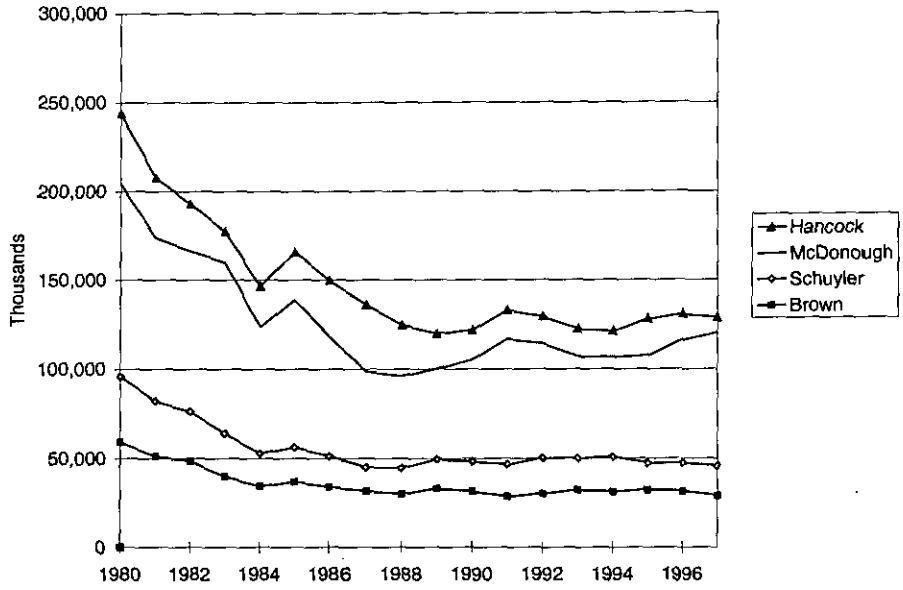


Figure 1-27. Total Cash Receipts (1998 dollars)

Agricultural Cash Receipts and Production

Total Cash Receipts

Between 1980 and 1997, farm cash receipts[7] (the amount received from the sale of crops and livestock) varied due to market prices, weather, and acres planted, but declined overall. In 1997, area receipts of $324 million represented 3.4% of Illinois farm receipts. Hancock County had the highest receipts with $129 million but McDonough County was a close second with $120 million. Of the region's total receipts, 80% were from crops and 20% were from livestock.

Crop Cash Receipts

In recent years, the region's crop receipts (five-year average) were $240 million, or about 4% of the state's $6.4 billion total crop receipts.[8] Crop receipts include the sale of corn, soybeans, wheat and 'other' crops such as sweet corn, other vegetables, melons, and other fruits.

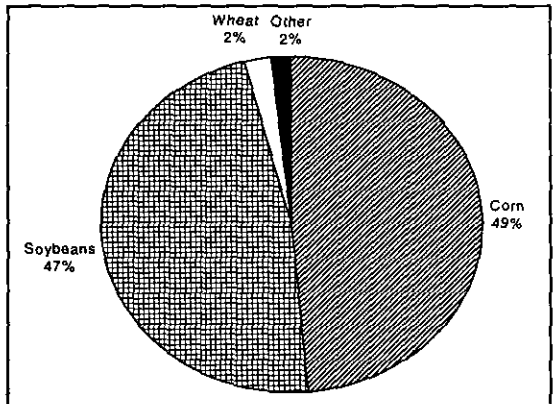


Figure 1-28. Area Crop Receipts by Type (1993-1997 five-year average)

The major contributors to receipts in the

[7] Dollars are adjusted to 1998

[8] Due to fluctuations in seasonal production, comparisons are based on a five-year average from 1990-1994. This average was calculated for both crop and livestock cash receipts and is often used instead of the last year of data (1994).

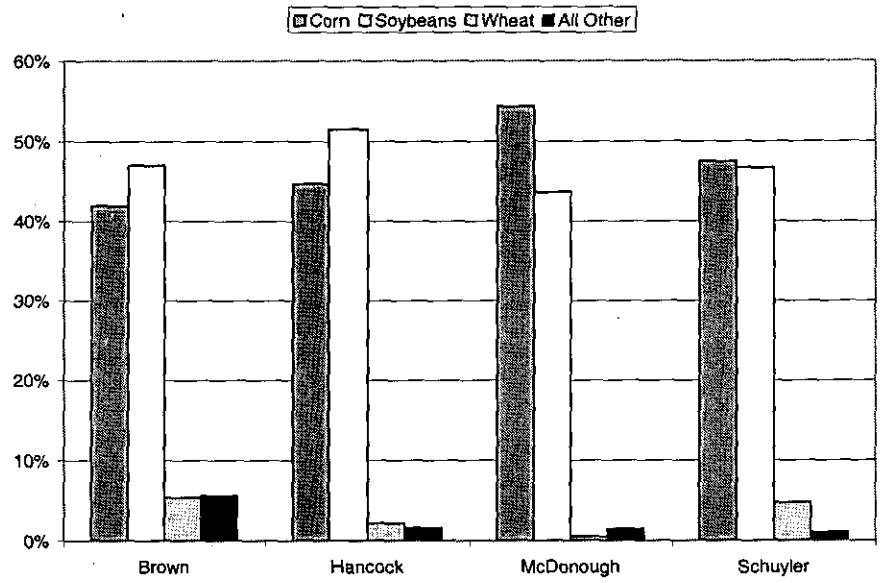


Figure 1-29. Percentage of Receipts by Crop (1993-1997 five-year average)

region were corn and soybeans. Corn brings in slightly more receipts than soybeans, 49% compared to 47%. McDonough and Hancock counties contribute 38% and 37% of the region's crop receipts while Schuyler County accounts for 16% and Brown County provides the remaining 9%.

Crop Production

Production of both corn and soybeans fluctuated significantly between 1980 and 1998 due to factors such as weather and market price. Regional corn production ranged from 17

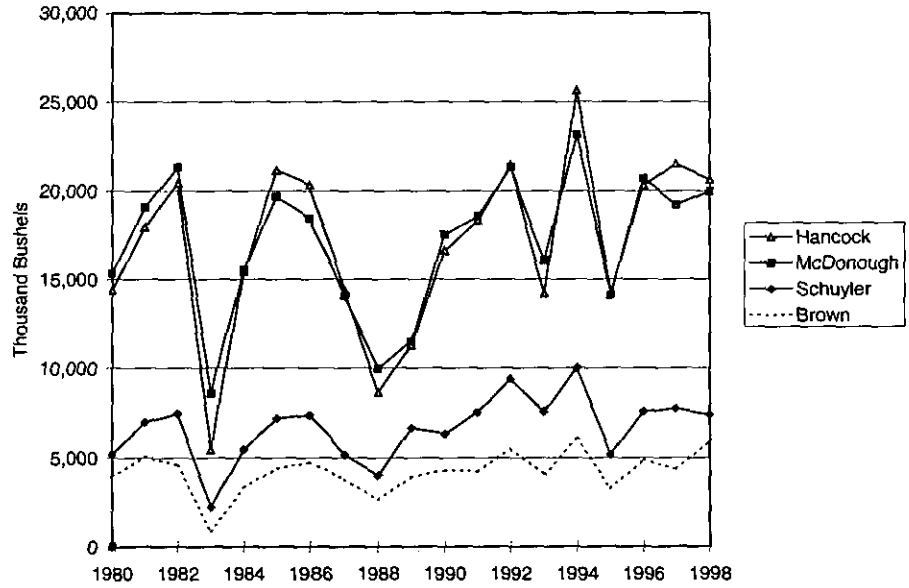


Figure 1-30. Corn Production

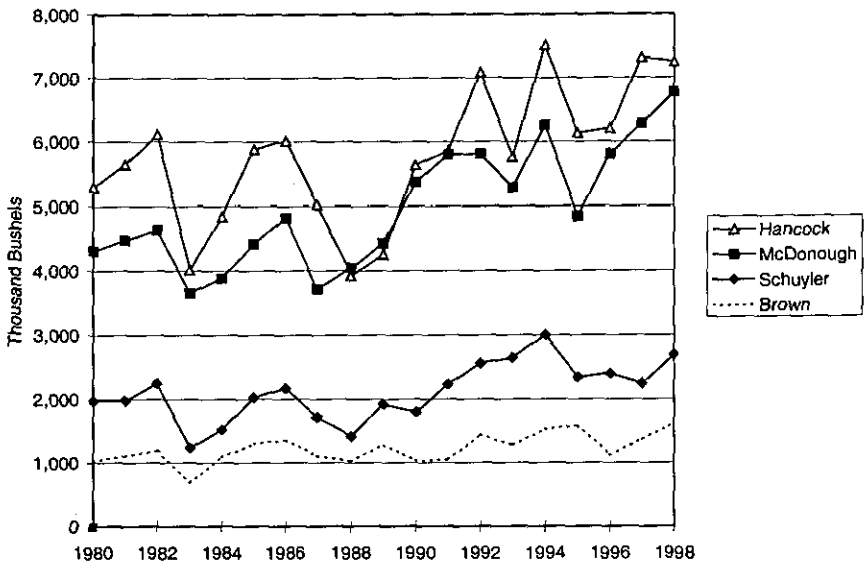


Figure 1-31. Soybean Production

million bushels during 1983 to a high of 58 million bushels in 1992. Hancock and McDonough counties are the region's largest corn producers. Regionally soybean production hit a low of 9.6 million bushels in 1983 and a high of 18.3 million bushels in 1998. Hancock County is the region's leading soybean producer.

Livestock Cash Receipts

The La Moine River region contributes $77 million (3.5%) of the state's $1.9 billion livestock cash receipts.[9] Livestock receipts come from the sale of cattle, hogs, and 'other' livestock such as dairy cattle, poultry, and sheep. Statewide, hogs provide 49% of livestock cash receipts, cattle provide 30% and 'other' livestock, 21%. In the La Moine area, hogs provide 53%, cattle 40%, and 'other' livestock 7% of the receipts. Hancock County has the highest livestock receipts, averaging $37 million, and produces 40% of the region's cattle receipts and 56% of the hog receipts. Brown County contributed most of the region's 'other' livestock cash receipts.

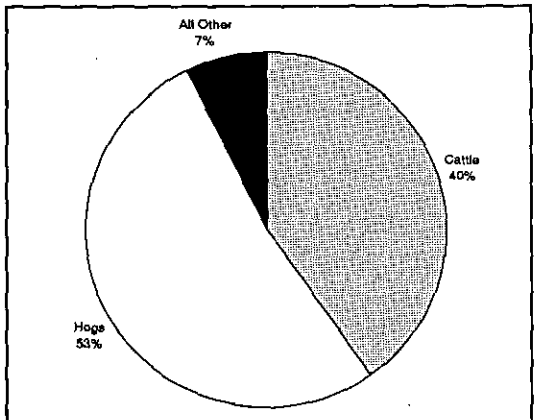


Figure 1-32. Area Livestock Receipts by Type (1993-1997 five-year average)

[9] Due to fluctuations in seasonal production, comparisons are based on a five-year average from 1993-1997. This average was calculated for both crop and livestock cash receipts and is often used instead of the last year of data or 1997.

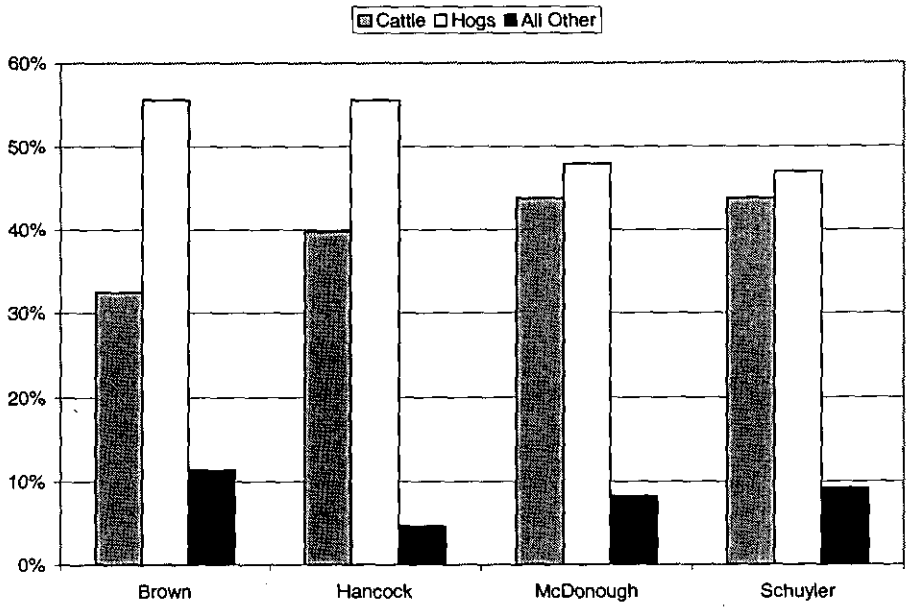


Figure 1-33. Percentage of Receipts by Livestock (1993-1997 five-year average)

Livestock Production

The region's livestock inventory accounts for 4.9% of cattle statewide and 3.6% of hogs. The average inventory between 1993 and 1999 was 179,000 hogs and 102,000 head of cattle with Hancock County leading in both. Since the mid-1980s, livestock production has declined in the region. Production estimates are not available for the 'other' category.

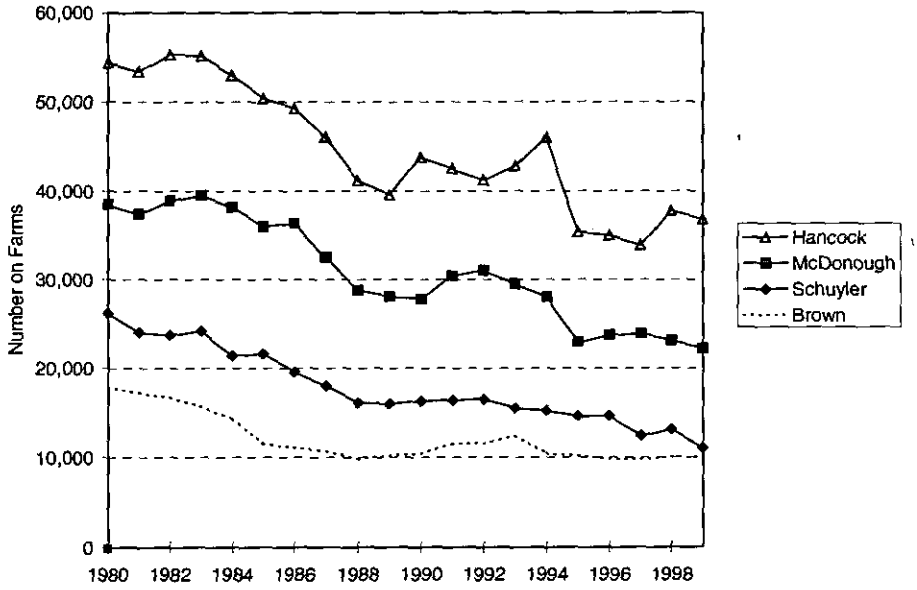


Figure 1-34. Cattle Inventory

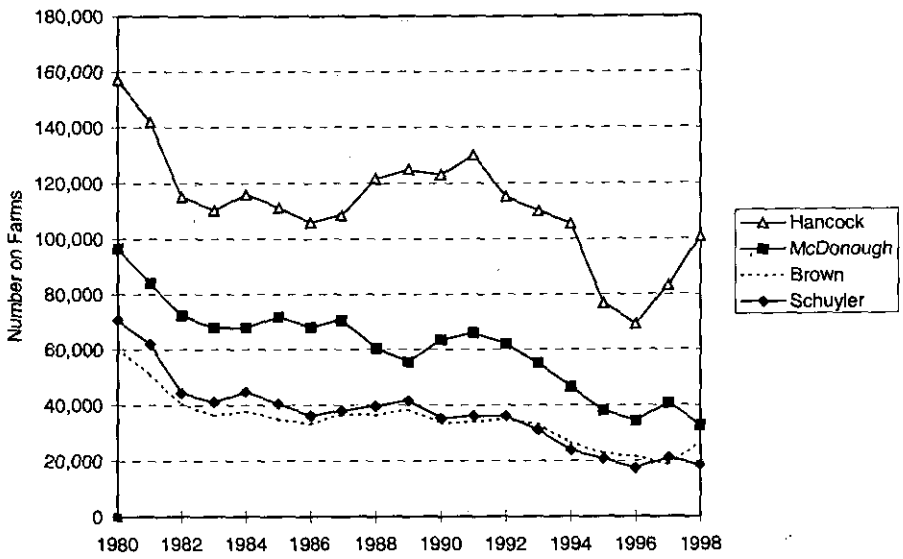


Figure 1-35. Hogs and Pigs Inventory

Conclusion

Agriculture in the La Moine River region produces primarily corn, beans, hogs, and cattle. From 1993 through 1997, the region averaged $240 million in annual crop cash receipts and $77 million in livestock receipts. The value of area farms is less than the statewide average, and as in the rest of the state, the number of farms is declining.

Highlights of the region's agriculture include: 58 million bushels of corn in 1992 and 18 million bushels of soybean in 1998; an annual average (1993-99) inventory of 179 thousand hogs and 102 thousand head of cattle.

Outdoor Recreation

Outdoor recreational opportunities such as hiking, boating, fishing, and hunting are concentrated at two state parks, Argyle Lake and Weinberg-King, and one conservation area, Anderson Lake.[1] This chapter briefly describes these three state sites, trends in site attendance, and trends in boat registrations and fishing and hunting licenses in the four main area counties. Nature preserves, natural areas, and federal and county land are described in Volume 3, *Living Resources*.

State Recreation Areas

Anderson Lake Conservation Area

During the early 1900s, the 2,247-acre conservation area was a private shooting grounds for one of the many duck clubs that dotted the Illinois River Valley. Since 1947 it has been operated as a public hunting and fishing area. It is located on Hwy. 100 about 11 miles north of Browning and provides fishing, hunting, boating, picnicking, and camping. It is a picturesque bottomland setting with timber species dominated by silver maple, cottonwood, and willow. Waterfowl abounds, with large numbers of bald eagles in the winter and white pelicans during the spring on their migration north.

Argyle Lake State Park

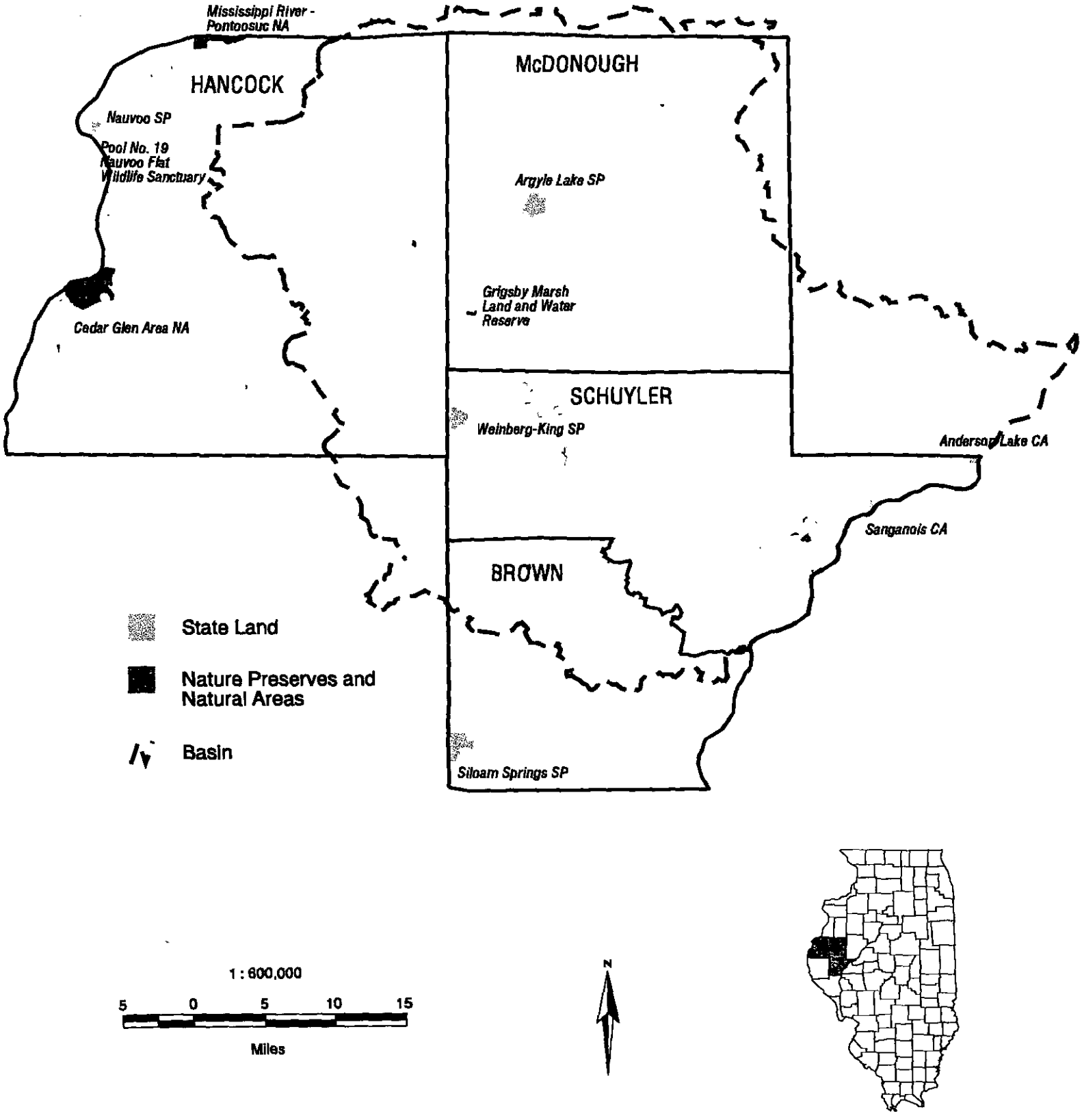
Located along an old stage route between Galena and Beardstown, the 1,700-acre park is home to rough terrain, beaver dams and more than 200 bird species. Located seven miles west of Macomb, it was known as Argyle Hollow until 1948 when the state bought the land and flooded the hollow to create a fishing lake, now the 93-acre Argyle Lake. The park offers fishing, camping, boating, hiking, day use, nature programs, and hunting.

Weinberg-King State Park

Set on 770 acres of rolling terrain and steep hillsides, this park is popular in winter for cross-country skiing and snowmobiling. It is located three miles east of Augusta on Highway 101 and also provides opportunities for fishing, hunting, camping, hiking, and horseback riding. William Creek, which meanders through the park, and a 3.8-acre pond provide habitat for an abundance of wildlife.

[1] Unless otherwise noted, information in this chapter is from IDNR promotional materials, internal documents, and discussions with IDNR personnel.

Figure 1-36. Significant Natural Resource Areas in the LaMoine River Area



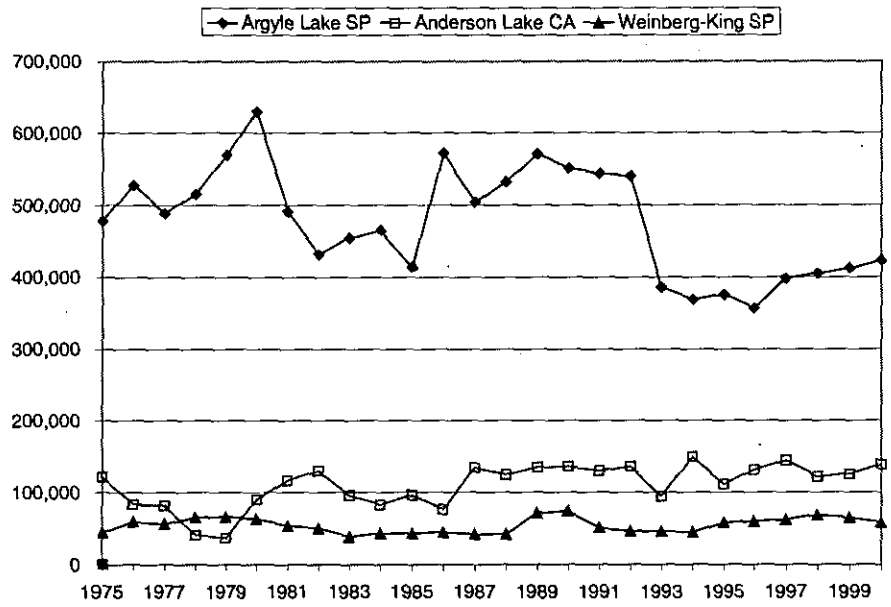


Figure 1-37. Attendance at State Sites, 1975-2000

Economic Impact

During 2000, approximately 618,966 people visited the three state sites, accounting for 1.4% of all state site attendance that year. Compared to attendance in 1975, the number of visitors at Argyle Lake, the area's most popular site, was 12% less in 2000. However, at both Weinberg-King and Anderson Lake attendance was about 15% higher.

State parks contribute to the local economy mostly through increased local tourism. To examine the impact of visitor spending[2] at area sites, IDNR uses IMPLAN, an input-output model built on county level data.[3] Based on the estimated 618,966 park visitors in 2000, these state sites generate about $7 million in total economic output, $1.3 million in personal income, and about 68 jobs. The retail and wholesale trade sectors account for 75% of the increase in employment and 71% of the increased income.

Boating, Fishing, and Hunting

Boat Registrations

Although boat registrations have increased 15% in the region since 1988, its portion of statewide registrations has fallen from .95% to .89%. Statewide, registrations grew 23.6%. In 2000, area residents registered 3,570 recreational boats — roughly 34 registrations per

[2] Spending estimates are based on "Economic Impacts of Expenditures at Selected Recreation-Sites in Illinois," a report submitted to IDNR by the Center for Regulatory Studies (December 1996).
[3] IMPLAN is designed to trace the ultimate impacts of a stimulus (such as increased and decreased tourism) as it flows through the economy.

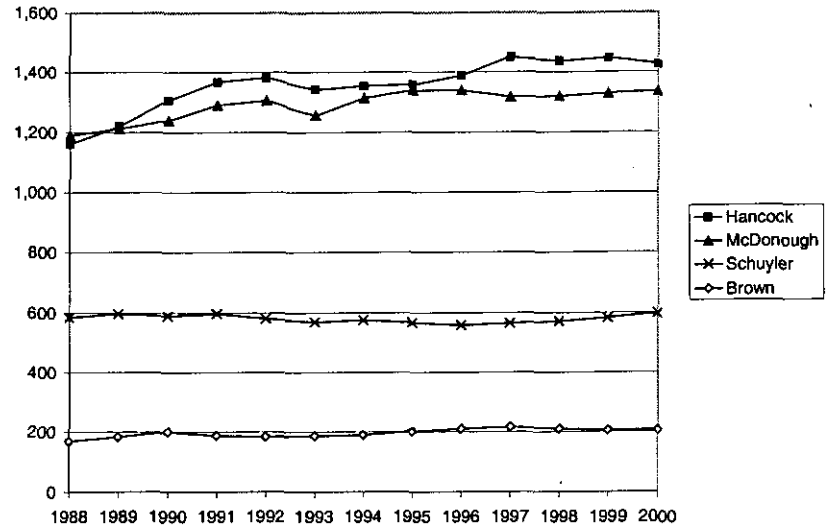


Figure 1-38. Boat Registrations

1,000 residents, still higher than the 32 per 1,000 statewide.[4] Registrations in Brown County grew the most, up 23% from 169 boats to 208, while Hancock County — bordered on the west by the Mississippi River — had the largest number of registrations, 1,427.

Fishing Licenses

In 1999, 7,385 fishing licenses were purchased in the four counties,[5] a decline from previous years that is consistent with statewide trends. License sales declined in Hancock, Brown and Schuyler counties between 1987 and 1999, while sales in McDonough County almost doubled. Area sales accounted for 1.1% of the state

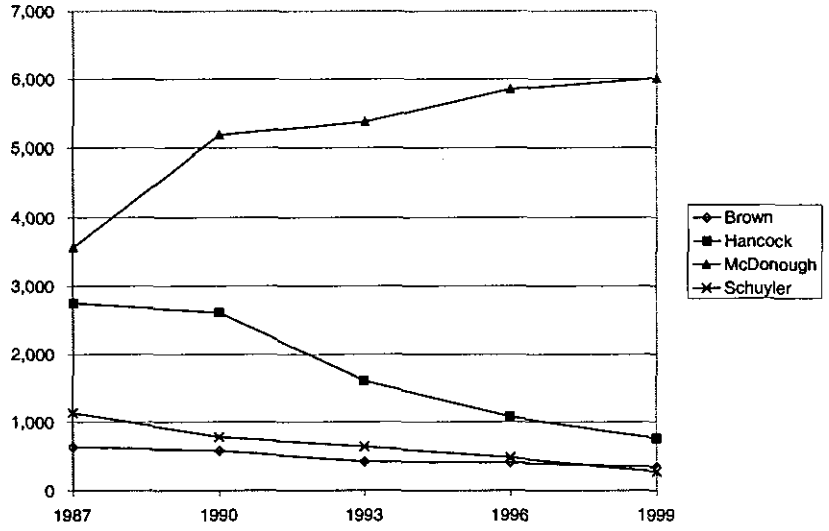


Figure 1-39. Fishing License Sales

[4] Boating registration data obtained from internal DNR files.
[5] Includes combination hunting/fishing, resident, non-resident, and 10-day non-resident fishing licenses.

total, above the area's 0.5% share of the state's population. Out-of-state anglers accounted for 2.6% of licenses sold locally, about one-half of the state average.

Hunting Licenses

Sales of hunting licenses also fell in Brown, Hancock, and Schuyler counties, while they doubled in McDonough County. Overall, 6,278 hunting licenses were purchased in the area in 1999, accounting for 2.3% of the state total. Out-of-state residents purchased 1.1% of the licenses, compared to 4.9% statewide. [6]

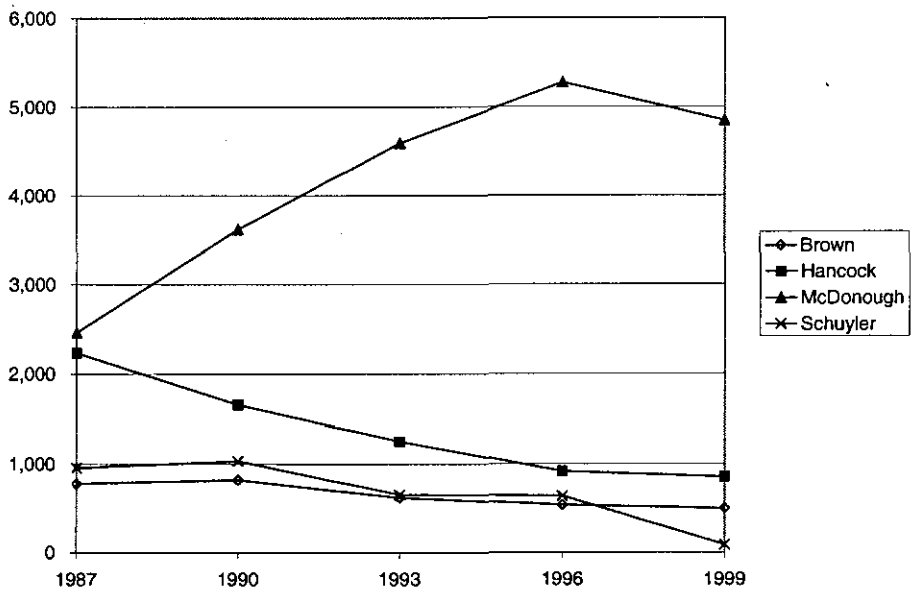


Figure 1-40. Hunting License Sales

Conclusion

The major state-owned recreational area in the La Moine River area is Argyle Lake State Park which, along with two other state sites, contribute an estimated 68 jobs to the area's economy. The overall numbers of hunting and fishing licenses have fallen in the area, as they have statewide, while the number of boat registrations has risen slightly. An exception is McDonough County where both hunting and fishing license sales have increased since 1987.

[6] Includes combination hunting/fishing, resident, non-resident and 5-day non-resident hunting licenses.

Transportation Infrastructure

A region's transportation infrastructure — its roadways, airports, waterways, and railways — enables businesses and residents to move goods and people. Coupled with information regarding demographics and economics, trends in transportation infrastructure and its usage are strong indicators of the nature of a region's development and its suitability for various resource management strategies.

Auto Traffic

Roads

While no major interstates traverse the La Moine River region, many smaller highways can be found here. Highways 67, 94, and 99 run north and south and Highways 136, 24, 101, and 9 run east-west.

Between 1973 and 1995, 13 miles of road were added in the La Moine River region, bringing the total to 4,204 miles, 3.0% of the state's total mileage. Since 1980 the area's road miles grew only 0.02% annually, less than the state's 0.19% annual growth rate.[1]

Of the four counties, Hancock has the largest road network, with about 38% of the road-miles, followed by McDonough County with 30%, Schuyler County with 19%, and Brown making up the remaining 13%.

Vehicle Registration

Area residents registered 33,753 passenger cars in 1996,[2] with 81% of those registered in Hancock and McDonough County. With population declining in the region, car registrations also fell, 4.2% below 1976 levels. Statewide, registrations increased 23%. Motorcycle registrations have also declined in the region, down 47% over the 20 years.

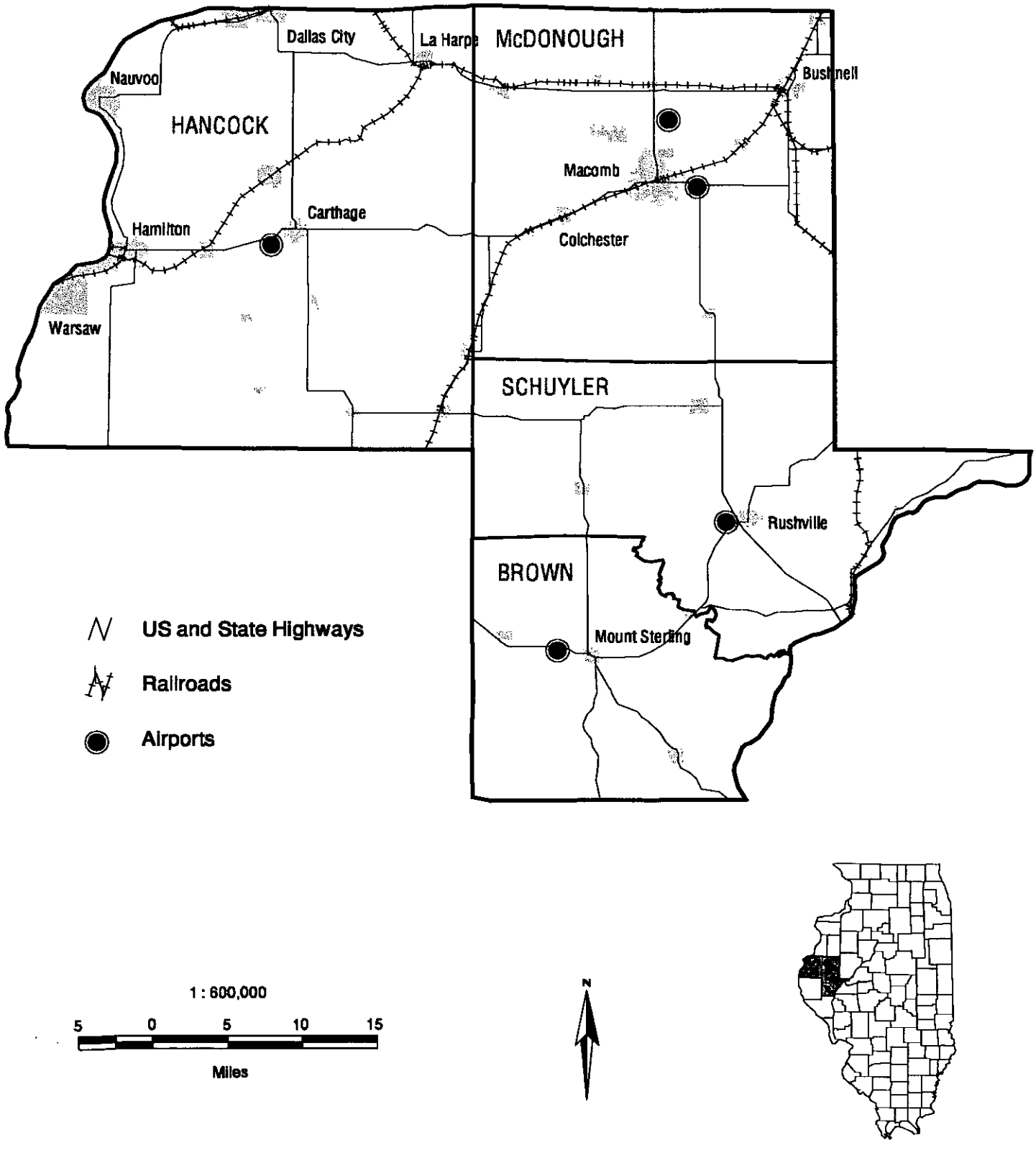
Table 1-20. Miles of Road in the La Moine River Region

	1975	1985	1995
Brown	528	527	529
Hancock	1,610	1,617	1,605
McDonough	1,270	1,272	1,272
Schuyler	785	785	799
Region	4,193	4,202	4,204

[1] Mileage data from Illinois Department of Transportation: Office of Planning and Programming; *Illinois Travel Statistics*, various years.

[2] Vehicle registration data from the State of Illinois Office of the Secretary of State, *County Statistical Report for Motor Vehicle License Units and Transactions Received*, various years.

Figure 1-41. Major Airports, Roads and Railroads



The downward trend was not steady, however, as there were a few significant increases in motorcycle registrations due to hikes in the price of gasoline. The overall decline is probably due to better fuel efficiency in cars, lower gas prices, changing lifestyles, and an aging population.

Registrations for trucks (excluding semis) and buses in the area increased from 15,699 to 17,734 between 1976 and 1996, an annual growth rate of 0.6%, lower than the state average of 1.9%. In 1996, roughly 83% of the vehicles in this category were pick-ups, which have been reported separately since 1988. The region has fewer cars compared to pick-up trucks (2.3 to 1), than statewide, (5.9 to 1).

Roughly 8,498 semis and trailers were registered in the four counties in 1996, about 3,000 more than the number registered in 1976.[3] Of course, semis usually function as long-distance haulers; locally registered semis may spend little time at "home," while out-of-town semis routinely drive through. How many miles semis drive locally is difficult to determine from available data.

Vehicle-Miles Traveled (VMT)

In 1995, the La Moine River region accounted for approximately 617 million vehicle-miles traveled (VMT), 0.65% of the state total. McDonough County had 41% of the region's VMT (253 million), Hancock County had 35% (213 million), Schuyler had 16% (97 million), and Brown had 9% (55 million).

Since 1973, annual VMT in the area has grown at an average annual rate of 1.3%, compared to a statewide average of 2%.[4] This growth level has not been constant.

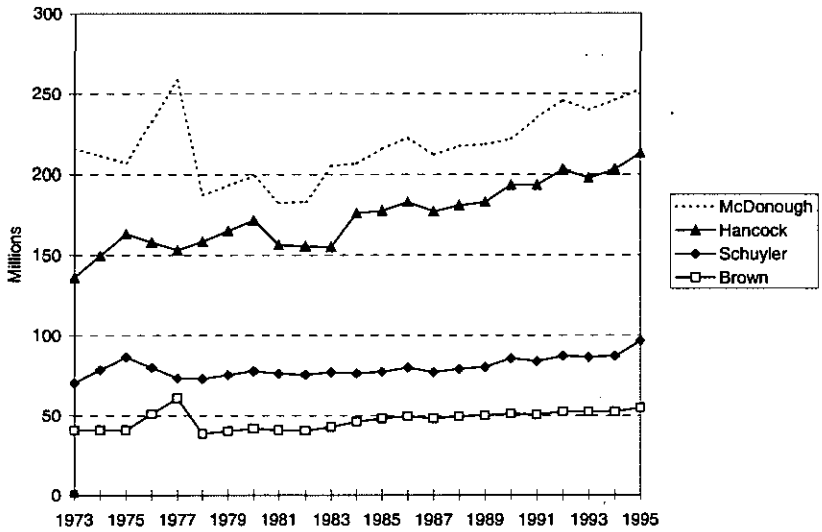


Figure 1-42. Annual Vehicle-Miles Traveled

[3] This figure includes roughly 1,690 "regional" trucks -- mostly semis -- registered through IDOT's IRP program, where licensees pay prorated fees based on the percentage of miles driven in Illinois.
[4] VMT data from *Illinois Travel Statistics*.

Between 1973 and 1980, an era marked by severe oil shortages in 1973 and 1978, the region's VMT increased only 0.81% annually. Clearly drivers adjusted to high gas prices by driving less. From 1980 to 1995 annual VMT growth was 1.54%.

Other Traffic

Bus Lines

Greyhound does not have a terminal for intercity bus service in the La Moine River region.

Air Traffic

The region has three general aviation airports — one in Brown County, one in McDonough County, and one in Schuyler County — as well as two private airports — one in Carthage, Hancock County and one in Macomb, McDonough County.

Water

Illinois has 1,119 miles of commercial navigable waterways and one of its six major waterways, the Illinois River, makes up the eastern border of Brown and Schuyler counties. The river supports significant commercial traffic, handling such products as dry chemicals, steel products, fly ash, coal, cement, grain, sand and gravel, petroleum products, and soybean oil.[5]

Rail

The La Moine River region has direct Amtrak passenger rail service in Macomb, heading north-northeast to Galesburg and Chicago, and southwest to Quincy.

Two high-density freight rail lines (transporting more than five million tons of freight per mile) run through this region, both traveling north-south. Two other lines handle light density freight (lines carrying less than five million tons). The light density freight lines typically serve agricultural businesses or connect industrial firms in urban areas to the high density freight network.[6]

Conclusion

The La Moine River region does not have any major interstate highways and only 13 miles of road were added between 1973 and 1995, a 0.3% increase compared to a 33% increase in vehicle-miles traveled (VMT). The area has access to Amtrak service and several airports.

---

[5] River terminal data from IDOT's *Illinois Directory of Lake and River Terminals 1994.*
[6] Rail Density data from IDOT's *Illinois Rail Plan: 1991-92 Update.*

Property Taxes

Property taxes are the major source of tax revenue for local government in Illinois, providing more than 75% of total revenue. These taxes finance the majority of local government services, including school districts, county, township, and municipal governments, and special districts such as fire, park, sanitary, library, and airport.

Property taxes depend primarily on the tax rates and the equalized assessed valuation[1] (i.e., tax base) of property in the county. The tax rate is dependent on the amount of revenue sought by the local governments (tax levy), the assessed value of the property (tax base), and the legal maximum tax rate. The tax base is based primarily on the assessed values, which are usually reassessed every four years, and the amount of residential, commercial, and industrial expansion.

Tax Revenues

Property tax revenues in Illinois have increased significantly in the last 15 years, after a steady decline during the 1970s and early 1980s. They went from more than $10.5 billion in 1971 to almost $14 billion in 1997. In the La Moine River area revenues fell from $54 million in 1971 to $46 million in 1997. The largest decline occurred in Hancock County.

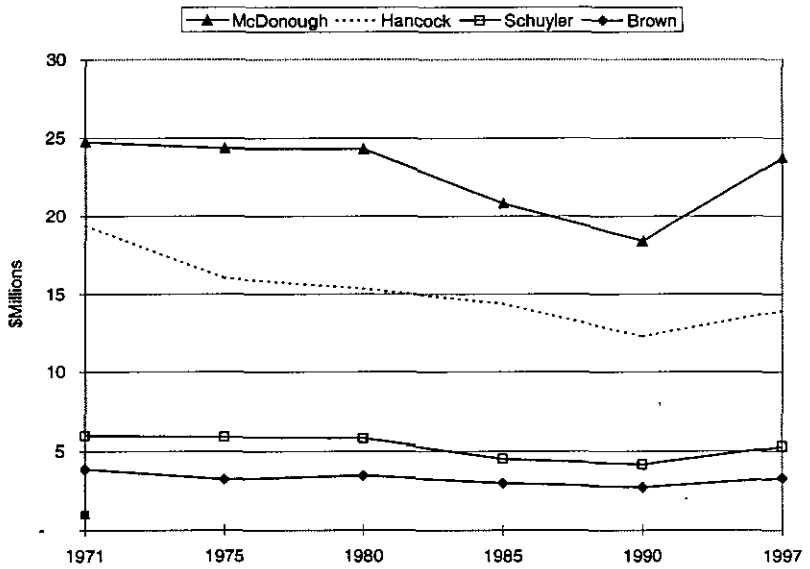
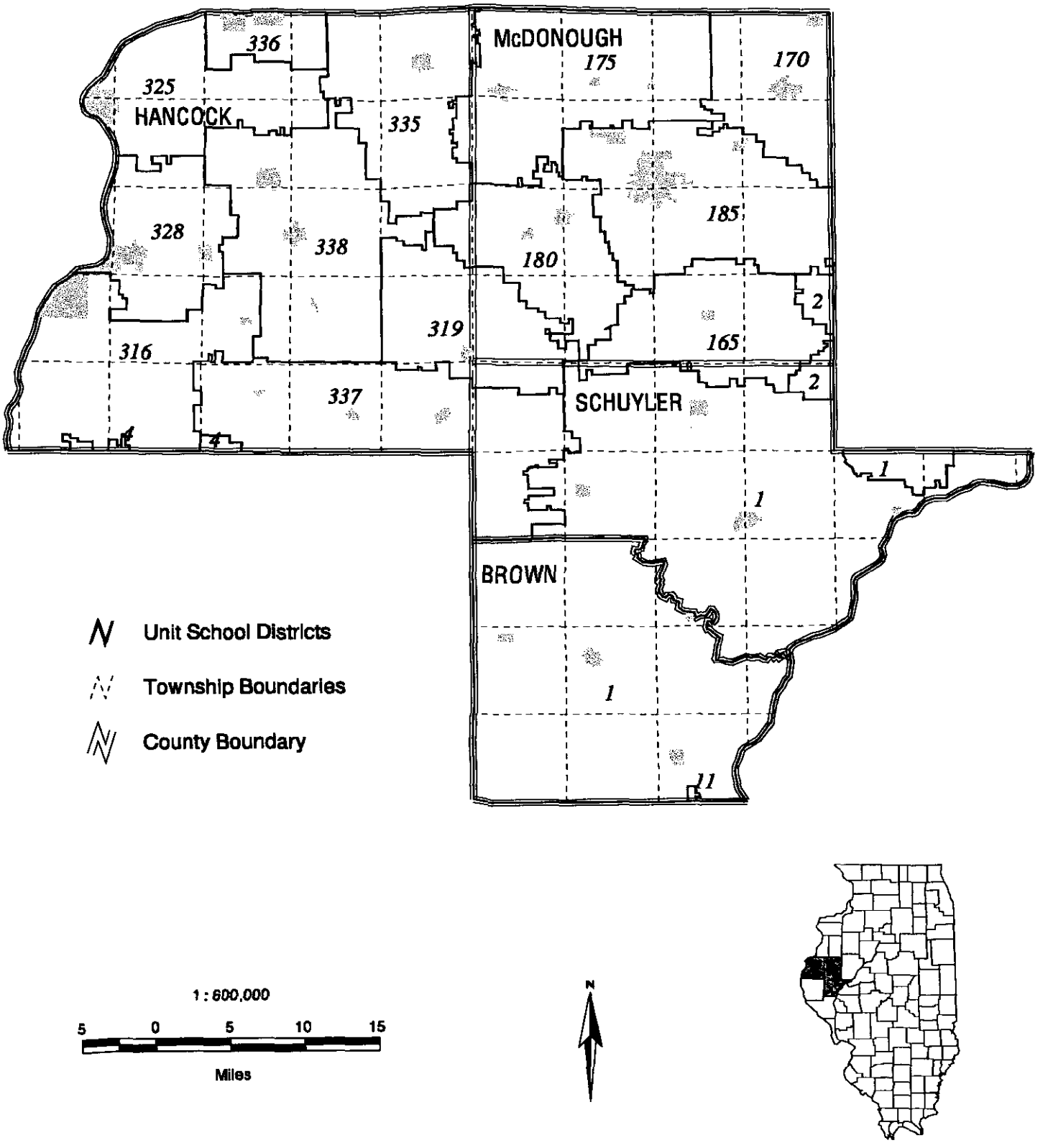


Figure 1-43. Property Tax Revenues (using 1998 dollars)

[1] Equalized assessed valuations are determined by several factors including: 1) property is assessed at 33.3% of fair market value (except where property is classified), 2) equalization process is to correct for counties which over- or under assess property, and 3) the amount of farmland in a county, which is assessed on productivity instead of market value.

Figure 1-44. Major Property Tax Districts



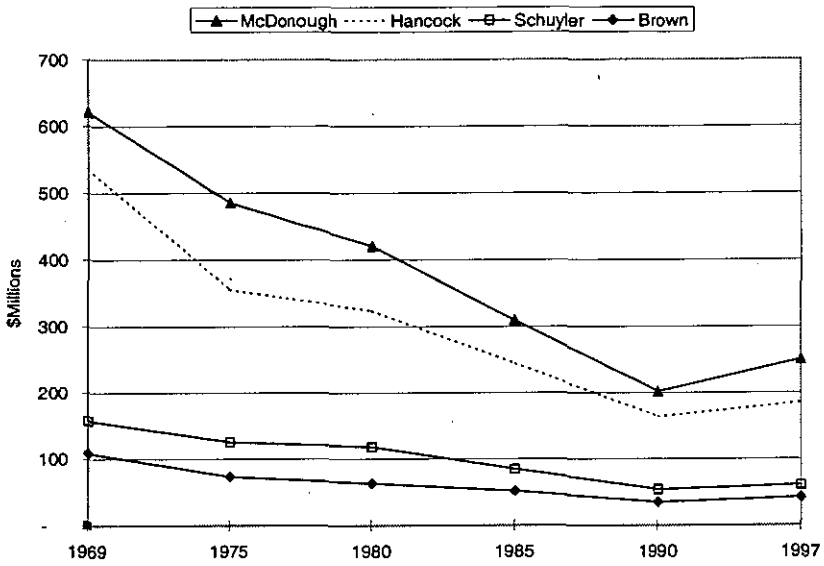


Figure 1-45. Property Tax Base (using 1998 dollars)

Property Tax Base

Although the state's property tax base declined 12% since 1969, it rebounded 31% from a low point in 1985. In the La Moine River area, the tax base declined 62% overall, rebounding 19% from a low in 1990. Hancock County had the largest decline (65%) in the region.

Figures 1-46 and 1-47 show the make-up of the tax base in 1981 and 1997 by the different classes of property. In 1997, residential property provided the largest chunk of the state's tax base (56%), followed by commercial (27%), industrial (13%), and farm property (4.5%). This was not much of a change from 1981 except that farm property

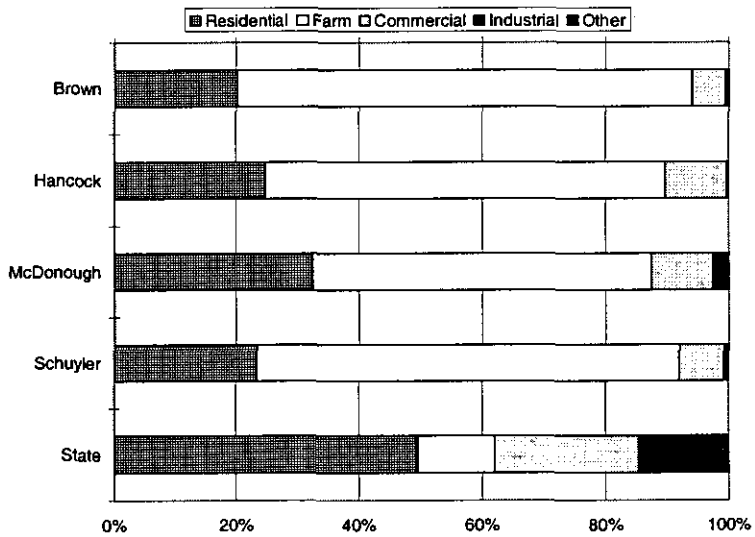


Figure 1-46. 1981 Property Tax Base by Class of Property

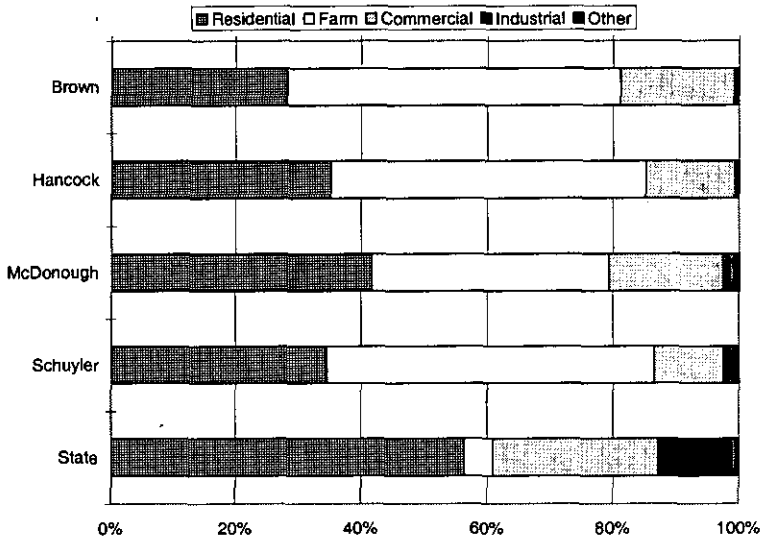


Figure 1-47. 1997 Property Tax Base by Class of Property

dropped from 12.4% to 4.5% of the tax base. Because of this decline, residential and commercial properties accounted for a higher proportion of the tax base in 1997 than in 1981. In the La Moine River counties, farm property provides the majority of the tax base, about half in each county, although since 1981 its share has declined slightly and residential and commercial property's share has increased.

Tax Rates

Over the past couple of decades the average property tax rate has risen in the state and in the four-county area. The tax rate is typically expressed in dollars collected per $100 dollars of tax base. Since 1966, the statewide average property tax rate has risen from

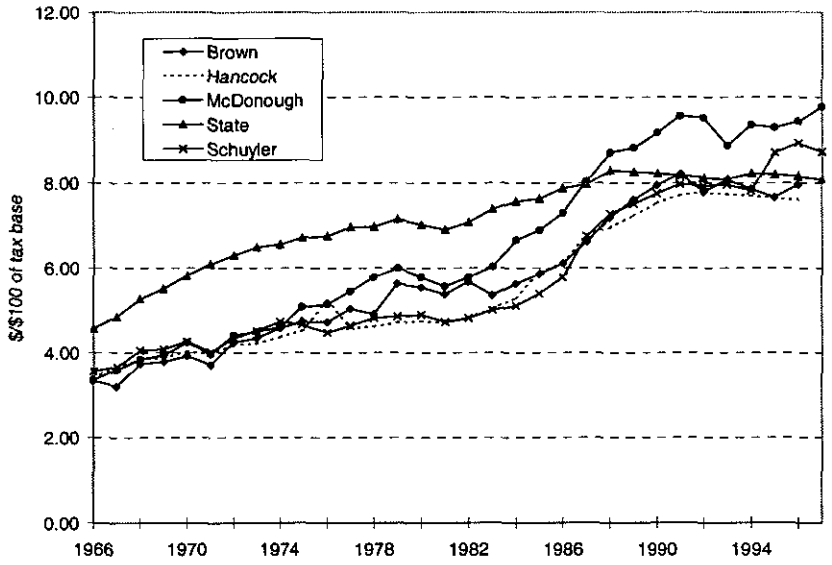


Figure 1-48. Average Property Tax Rate

$4.60 to $8.15 per $100 of tax base — up almost 78%. In the area, the tax rate has increased between 121% and 192%. McDonough County has the highest rate in the region, and both it and Schuyler County have higher rates that the statewide average.

Property Tax Distribution

In Illinois, property taxes are used to finance a variety of local government services, with the majority (61%) going to school districts. The remainder goes to municipal (16%), county (10%), and township governments (3%), and to other services (12%) such as fire, sanitary, park, library, and airport services.

A majority of the area's property tax revenue also goes to schools, ranging from 54% in Brown County to 62% in McDonough County. Most counties distribute a larger proportion of tax revenue to county and township than statewide, and less to cities.

Conclusion

During the past 25 years property tax revenue decreased 14% in the La Moine River area compared to a 35% increase statewide. Even though tax rates increased 121%-192%, it was not enough to compensate for the 62% decline in the tax base.

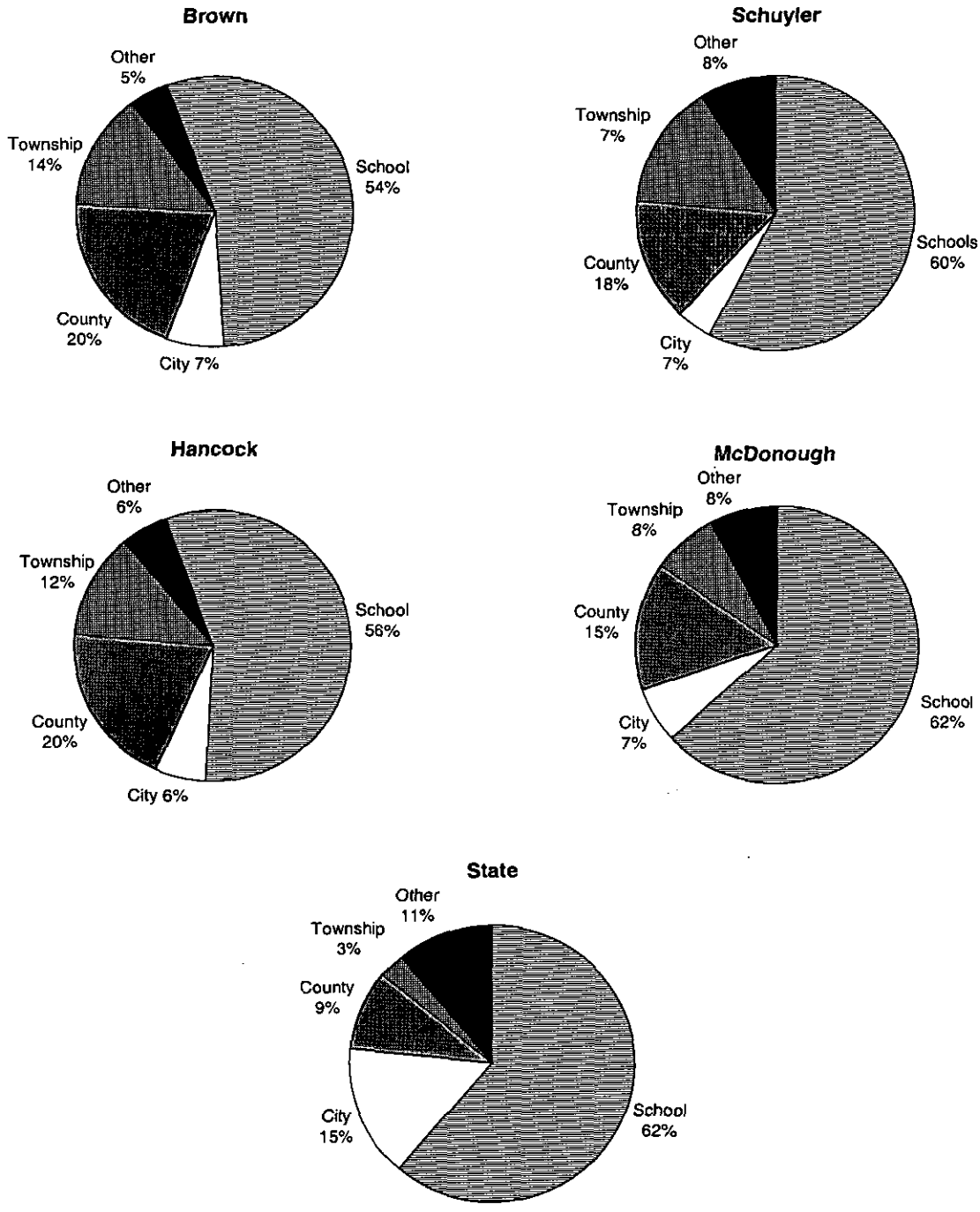


Figure 1-49. 1997 Property Tax Distribution[2]

[2] The property tax distributions are based on total property taxes extended, which is the dollar amount of taxes billed to property taxes extended. This is different from the amount collected due to charges against collections such as protest, delinquencies, certificates of error and other changes. The amount collected is typically more than 97% of the amount of taxes extended.

References

Demographics

Bureau of Economic and Business Research. 1990 and 1993. Illinois Statistical Abstract. Champaign, IL. University of Illinois at Urbana-Champaign.

Illinois Department of Natural Resources. 1996. Illinois Land Cover, An Atlas. Springfield IL.

Illinois Secretary of State. 1993. Illinois Counties & Incorporated Municipalities. Springfield, IL.

U.S. Department of Agriculture, Soil Conservation Service. 1982, 1987, 1992, and 1997. National Resources Inventory.

U.S. Department of Commerce, Bureau of the Census. 1970 Census of Population. General Social and Economic Characteristics: Illinois. Washington, D.C. U.S. Government Printing Office.

U.S. Department of Commerce, Bureau of the Census. 1970 Census of Housing. Volume 1. Housing Characteristics for State, Cities, and Counties. Part 15: Illinois. Washington, D.C. U.S. Government Printing Office.

U.S. Department of Commerce, Bureau of the Census. 1970 and 1980. Census of Population. General Population Characteristics: Illinois. Washington, D.C. U.S. Government Printing Office.

U.S. Department of Commerce, Bureau of the Census. 1980 Census of Population and Housing. Summary Characteristics for Governmental Units and Standard Metropolitan Statistical Areas: Illinois. Washington, D.C. U.S. Government Printing Office.

U.S. Department of Commerce, Bureau of the Census. 1990 Census of Population and Housing. Summary Population and Housing Characteristics. Washington, D.C. U.S. Government Printing Office.

U.S. Department of Commerce, Bureau of the Census. 1990 Census of Population and Housing. Summary Social, Economic , and Housing Characteristics. Illinois. Washington, D.C. U.S. Government Printing Office.

Woods & Poole Economics, Inc. 2000 State Profile: Illinois. Washington, D. C.

The Regional Economy

United States Department of Commerce, Bureau of Economic Analysis. 1997. Regional Economic Information System, 1969-1997. Washington, D.C.

Agriculture

Illinois Department of Agriculture. 1981-1999. Agricultural Statistics. Springfield IL.

Illinois Department of Natural Resources. 1996. Illinois Land Cover, An Atlas. Springfield IL.

Illinois Department of Agiculture. 1994-98. Illinois "T" by 2000 Transect Survey Summary. Springfield, IL.

United States Department of Agriculture, Farm Service Agency. 1999. The Conservation Reserve Program. Washington D.C.

United States Department of Commerce, Bureau of the Census. 1978, 1982, 1987, 1992, 1997. Census of Agriculture. Washington, D.C.

Outdoor Recreation

Bailey, Bill. 1995. Illinois State Parks: A Guide to Illinois State Parks. Saginaw, MI. Glovebox Guidebooks of America.

Center for Regulatory Studies. 1996. Economic Impacts of Expenditures at Selected Recreation Sites in Illinois. Springfield, IL. Illinois Department of Natural Resources.

Transportation Infrastructure

Greyhound Web Site. http://www.greyhound.com

Illinois Department of Transportation, Office of Planning and Programming. 1973-1995. Illinois Travel Statistics. Springfield, IL.

Illinois Department of Transportation. 1995. Illinois Airport Inventory Report 1995. Springfield, IL.

Illinois Department of Transportation. 1992. Illinois Rail Plan: 1991-1992 Update. Springfield, IL.

Illinois Secretary of State. 1970-1996. County Statistical Report for Motor Vehicle License Units and Transactions Received. Springfield, IL.

Property Taxes

Illinois Department of Revenue. 1966-1997. Illinois Property Tax Statistics. Springfield, Illinois.

PART II

ENVIRONMENTAL QUALITY

Contributors

Air Quality and Surface Water Quality

Project Coordinator ..... Nani Bhowmik

Report Production ..... Linda Dexter, Susan Shaw, Becky Howard

Maps ..... Kathleen Brown

Air Quality ..... Donald Gatz

Surface Water Quality ..... Shundar Lin

Hazardous and Toxic Waste Generation and Management

Project Coordinator ..... John Marlin

Hazardous and Toxic Waste Generation and Management ..... George Krumins

Table of Contents

Air Quality 2-1
- Air Pollutant Concentrations 2-1
- Air Pollutant Emissions Inventory 2-5
- Visibility 2-6
- Atmospheric Wet Deposition 2-7
- References 2-7

Surface Water Quality 2-9
- Designated Use Support 2-9
- Rivers and Streams 2-12
  - Use Support 2-12
  - Causes of Less than Full Support 2-13
  - Sources of Less than Full Support 2-13
  - Trends in River and Stream Water Quality 2-15
- Lakes and Reservoirs 2-15
  - Use Support 2-15
  - Causes of Less than Full Support 2-16
  - Sources of Less than Full Support 2-17
  - Trophic Status 2-17
- Targeted Watershed Approach 2-17
  - Streams 2-18
  - Inland Lakes 2-18
- References 2-20

Hazardous and Toxic Waste Generation and Management 2-23
- Assessment of Sites in the Region 2-23
  - Historical Hazards Database 2-23
  - Surface Impoundments Database 2-23
  - Superfund Sites Database 2-25
  - Landfills Database 2-25
  - TRI Database 2-25
- Additional Information 2-26
- References 2-26

List of Figures

Surface Water Quality

Figure 2-1. Major Streams and Subwatershed Boundaries in the La Moine River Assessment Area 2-10
Figure 2-2. Lakes and Subwatersheds in the La Moine River Assessment Area 2-11

Hazardous and Toxic Waste Generation and Management

Figure 2-3. Sites of Possible Environmental Concern in the La Moine River Assessment Area 2-24

List of Tables

Air Quality

Table 2-1. Air Quality Site Directory for the La Moine River Assessment Area 2-1
Table 2-2. Daily Maximum Ozone Concentrations, April through October 2-2
Table 2-3. Concentrations of Particulate Matter less than 10 µm diameter 2-3
Table 2-4. Concentrations of Particulate Matter less than 2.5 µm diameter 2-3
Table 2-5. Concentrations of Carbon Monoxide (CO) 2-4
Table 2-6. Sulfur Dioxide Concentrations 2-4
Table 2-7. Annual Mean Concentrations of Lead (Pb) 2-5
Table 2-8. Estimated Stationary Point Source Emissions in the Vicinity of the La Moine River Assessment Area, by County, 1999 2-6
Table 2-9. Concentrations and Deposition of Major Ions in Precipitation near the La Moine River Assessment Area 2-7

Surface Water Quality

Table 2-10. Designated Use Support for Rivers and Streams 2-13
Table 2-11. Causes of Use Impairment for Rivers and Streams in the La Moine River Assessment Area 2-14
Table 2-12. Sources of Use Impairment for Rivers and Streams in the La Moine River Assessment Area 2-14
Table 2-13. Use Support, Trophic State, and Trend for Lakes Studied in the La Moine River Assessment Area 2-16
Table 2-14. Causes of Use Impairment for Lakes in the La Moine River Assessment Area 2-16

Table 2-15. Sources of Use Impairment for Lakes in the La Moine River Assessment Area 2-17
Table 2-16. Prioritization of Targeted Watersheds 2-19
Table 2-17. Stream Priorities for Targeted Watershed Approach 2-20
Table 2-18. Lakes Evaluated for Targeted Watershed Approach 2-20

Hazardous and Toxic Waste Generation and Management

Table 2-19. Historical Hazards Towns in the La Moine River Assessment Area 2-25
Table 2-20. Superfund Sites in the La Moine River Assessment Area 2-25
Table 2-21. TRI Facilities in the La Moine River Assessment Area 2-26

Air Quality

Air Pollutant Concentrations

The La Moine River Assessment Area occupies portions of the U.S. Environmental Protection Agency's (USEPA's) Air Quality Control Region (AQCR) 65, the Burlington - Keokuk Interstate and the West Central Illinois Intrastate, AQCR 75. There are no air quality measurement stations within the La Moine River Assessment Area. The nearest measurement stations are four sites in Peoria County in AQCR 65 and one in Adams County in AQCR 75. These sampling sites should be more representative of urban locations than the mostly rural La Moine River Assessment Area, but they provide the only information we have near the La Moine River Assessment Area. Air quality data for 1995-1999 from these stations are summarized in Tables 2-2 – 2-7, and other tables list data on pollutant emissions and precipitation quality.

Table 2-1 lists the five air quality measurement locations, along with their Universal Transverse Mercator (UTM) coordinates, and the criteria pollutants measured at each (Illinois Environmental Protection Agency, IEPA, 2000). Criteria pollutants are those for which federal air quality standards have been set. Published annual reports from the IEPA (1996-2000) indicate that data for ozone (O_3) are available for three locations. Data for particulate matter with aerodynamic particle diameters smaller than 10 micrometers (PM_{10}), and sulfur dioxide (SO_2) are available for two locations each. Data for particulate matter with aerodynamic particle diameters smaller than 2.5 micrometers ($PM_{2.5}$), carbon monoxide (CO), and lead (Pb) are available from one location each. Nitrogen dioxide (NO_2) was not measured in or near the La Moine area.

Table 2-1. Air Quality Site Directory for the La Moine River Assessment Area
(Selected sampling sites from U.S. EPA Air Quality Control Regions 65 and 75)

City name (AIRS code)	Address	UTM Coordinates (km)		Criteria Pollutants
ACQR 65				
Peoria County				
Peoria (1430024)	Fire Station No. 8 MacArthur & Hurlburt	N. E.	4507.050 279.679	SO_2, O_3
Peoria (1430036)	Commercial Building 1005 N. University	N. E.	4508.585 279.196	CO
Peoria (1430037)	City Office Building 613 N.E. Jefferson	N. E.	4508.197 281.675	PM_{10}, $PM_{2.5}$, Pb
Peoria Heights (1431001)	Peoria Heights High School 508 E. Glen Ave.	N. E.	4513.476 281.660	O_3
AQCR 75				
Adams County				
Quincy (0010006)	St. Boniface Elementary School 732 Hampshire	N. E.	4421.290 636.353	PM_{10}, SO_2, O_3

Air quality standards are written to protect human health (*primary* standards) and welfare (*secondary* standards). Because health and ecological effects vary according to the nature of the pollutant, standards also vary in terms of averaging times and the metric (maximum or mean) of the measurement. For example, the current ozone standard (since July, 1997) is written in terms of the maximum daily 8-hour average concentration, while the particulate matter standards are written in terms of the maximum 24-hour average and the annual mean concentrations.

Table 2-2 gives ozone data for Peoria, Peoria Heights, and Quincy, Illinois. Note that ozone was only measured between April and October (the ozone season) of each year. The values listed are the highest 1-hour mean and 8-hour mean concentrations each year. Reporting of 8-hour means began in 1997. The 1-hour values are in the range of 0.083 (at Peoria, in 1997) to 0.105 (at Peoria, 1999) parts per million (ppm), and none exceeded the 1-hour standard for ozone. Maximum 8-hour concentrations ranged from 0.077 ppm, at Quincy in 1997, to 0.092 ppm, at Peoria, in 1999. Although all three sites had maximum 8-hour concentrations in excess of the 8-hour standard of 0.08 ppm, none of the sites exceeded the standard, since the appropriate statistic for comparison with the standard is the fourth-highest value each year, averaged over three years.

The maximum 1-hour ozone concentration at Peoria in 1999 stood at the 46th percentile of such measurements at all ozone sampling stations in the state. That is, the value was higher than the comparable values at 46% of the state's sampling stations, and lower than those at the remaining 54% of the stations. The highest 1-hour concentration for 1999 at Peoria Heights and Quincy stood at the 23rd and 14th percentiles, respectively. The highest 8-hour ozone concentrations at Peoria, Peoria Heights, and Quincy in 1999 stood at the 54th, 32nd, and 20th percentiles, respectively.

Table 2-2. Daily Maximum Ozone Concentrations, April through October
(in parts per million, ppm)

			Highest value				
Station	Address		1995	1996	1997	1998	1999
Peoria County							
Peoria	Fire Station No. 8	1-hr mean	0.093	0.087	0.083	0.086	0.105
	MacArthur & Hurlburt	8-hr mean	---	---	0.080	0.079	0.092
Peoria Heights	Peoria Heights High School	1-hr mean	0.102	0.096	0.089	0.094	0.097
	508 E. Glen Ave.	8-hr mean	---	---	0.083	0.087	0.088
Adams County							
Quincy	St. Boniface Elementary School	1-hr mean	0.088	0.100	0.086	0.102	0.095
	732 Hampshire	8-hr mean	---	---	0.077	0.089	0.086

Note: There were no exceedances of the 1-hour primary standard of 0.12 parts per million (ppm) or the 8-hour standard of 0.08 ppm. The appropriate statistic for comparison with the 8-hour standard is the fourth-highest value each year averaged over three years. Reporting of 8-hour means began in 1997.

Table 2-3 lists PM_{10} data at Peoria and Quincy for 1995-1999. The highest annual maximum 24-hour mean concentration observed was 93 micrograms per cubic meter ($\mu g/m^3$) at Quincy in 1995, and the lowest was 43 $\mu g/m^3$ at Quincy in 1997. Annual mean PM_{10} concentrations ranged from 20 $\mu g/m^3$ at Peoria in 1995 and Quincy in 1997 to 26 $\mu g/m^3$ at Peoria in 1997 and 1998.

The maximum 24-hour PM_{10} concentration at Peoria in 1999, 62 $\mu g/m^3$, stood at the 21st percentile, compared to such observations at all other PM_{10} measurement sites in Illinois that year. The highest 24-hour value at Quincy in 1999 was 54 $\mu g/m^3$, which corresponds to the 8th percentile statewide. The 1999 annual mean PM_{10} concentrations of 23 and 21 $\mu g/m^3$ at Peoria and Quincy stood at the 23rd and 6th percentiles statewide, respectively.

Table 2-3. Concentrations of Particulate Matter less than 10 µm diameter
(in micrograms per cubic meter, $\mu g/m^3$)

Station	Address		1995	1996	1997	1998	1999
Peoria County							
Peoria	City Office Building	Max 24-hr mean	50	52	76	57	62
	613 N.E. Jefferson	Annual mean	20	21	26	26	23
Adams County							
Quincy	St. Boniface Elementary School	Max 24-hr mean	93	58	43	49	54
	732 Hampshire	Annual mean	23	21	20	22	21

Note: There were no observed exceedances of the annual mean primary standard of 50 $\mu g/m^3$ or the 24-hour primary standard of 150 $\mu g/m^3$.

Table 2-4 shows results of the first year of $PM_{2.5}$ measurements reported for Illinois by the Illinois EPA. The maximum concentration observed at Peoria was 42.7 $\mu g/m^3$, which corresponds to the 36th percentile statewide. The data did not meet the minimum statistical criteria for reporting the annual mean $PM_{2.5}$ concentrations.

Table 2-4. Concentrations of Particulate Matter Less Than 2.5 µm Diameter
(in micrograms per cubic meter, $\mu g/m^3$)

Station	Address		1995	1996	1997	1998	1999
Peoria County							
Peoria	City Office Building	Max 24-hr mean	---	---	---	---	42.7
	613 N.E. Jefferson	Annual mean	---	---	---	---	+

Note: There were no observed exceedances of the 24-hour primary standard of 65 $\mu g/m^3$. Observations began at the Peoria site in 1999. A plus sign indicates that the site did not meet the minimum statistical selection criteria for the annual mean.

Table 2-5 lists concentrations of carbon monoxide (CO) for Peoria between 1995 and 1999. One-hour mean concentrations ranged from 7.3 ppm in 1996 to 8.4 ppm in 1995. Eight-hour mean concentrations ranged from 5.0 ppm in 1996 to 6.5 ppm in 1998. No exceedances of either standard were observed. In 1999 the highest 1-hour and 8-hour means at Peoria were 7.9 and 5.4 ppm, respectively, which both correspond to the 95th percentile statewide, and were the highest values measured anywhere in the state in 1999.

Table 2-5. Concentrations of Carbon Monoxide (CO)
(in parts per million, ppm)

			Highest value				
Station	Address		1995	1996	1997	1998	1999
Peoria County							
Peoria	Commercial Building	1-hr mean	8.4	7.3	7.7	8.0	7.9
	1005 N. University	8-hr mean	5.7	5.0	5.9	6.5	5.4

Note: There were no observed exceedances of the 1-hr primary standard of 35 parts per million (ppm), or the 8-hr primary standard of 9 ppm.

Table 2-6 shows sulfur dioxide (SO_2) data for Peoria and Quincy, including maximum observed 3-hour and 24-hour mean concentrations, as well as annual mean concentrations. The maximum 3-hour mean concentrations ranged from 0.098 ppm at Quincy in 1998 to 0.202 ppm in Peoria in 1997.

Table 2-6. Sulfur Dioxide Concentrations
(in parts per million, ppm)

			Highest value/Annual mean				
	Address		1995	1996	1997	1998	1999
Peoria County							
Peoria	Fire Station No. 8	3-hr mean	0.178	0.140	0.202	0.144	0.149
	MacArthur & Hurlburt	24-hr mean	0.081	0.077	0.057	0.048	0.045
		Annual mean	0.007	0.007	0.007	0.007	0.007
Adams County							
Quincy	St. Boniface Elementary School	3-hr mean	0.135	0.106	0.113	0.098	0.125
	732 Hampshire	24-hr mean	0.039	0.036	0.057	0.026	0.040
		Annual mean	0.005	0.004	0.004	0.004	0.005

Note: There were no observed exceedances of the annual mean primary standard of 0.03 ppm, the 24-hour primary standard of 0.14 ppm, or the 3-hr secondary standard of 0.50 ppm.

Maximum 24-hour mean concentrations ranged from 0.026 ppm at Quincy in 1998 to 0.081 ppm at Peoria in 1995. Annual mean concentrations ranged from 0.004 ppm at Quincy from 1996-1998 to 0.007 ppm all five years at Peoria. Neither of the sites recorded any exceedances of the primary standards for annual mean or 24-hour mean, or for the secondary standard for 3-hour mean SO_2, between 1995 and 1999.

In 1999, the observed 3-hour mean concentrations at Peoria and Quincy respectively, were at the 66th and 53rd percentiles, respectively, of the statewide observations. For the 24-hour mean the corresponding percentiles were the 64th and 52nd, and for the annual mean they were the 69th and 36th, respectively. Thus, Peoria's SO_2 concentrations were somewhat higher than the median at all three averaging times, while Quincy's were slightly above the median for the 3-hour average and 24-hour average, but below the median for annual averaging.

Table 2-7 reports annual mean lead (Pb) concentrations for Peoria. The values were constant at 0.02 $\mu g/m^3$ over the five years between 1995 and 1999. Peoria's observed annual mean concentration of 0.02 $\mu g/m^3$ for 1999 was equal to all statewide measured concentrations up to the 38th percentile. No exceedances of the quarterly concentration standard of 1.5 $\mu g/m^3$ were observed at Peoria.

Table 2-7. Annual Mean Concentrations of Lead (Pb)
(in micrograms per cubic meter, $\mu g/m^3$)

Station	Address	1995	1996	1997	1998	1999
Peoria County						
Peoria	City Office Building 613 N.E. Jefferson	0.02	0.02	0.02	0.02	0.02

Note: There were no observed exceedances of the quarterly mean primary standard of 1.5 $\mu g/m^3$.

Air Pollutant Emissions Inventory

Table 2-8 presents estimated 1999 annual emissions of five criteria pollutants for four counties included completely or substantially in the La Moine River Assessment Area (Illinois EPA, 2000). The basin also covers relatively small portions of four additional counties, not included in Table 2-8. The estimated emissions are for stationary point sources only; they do not include emissions from mobile or area sources. The table also shows the percentage of each pollutant's four-county total attributable to each county in 1999.

Hancock and McDonough Counties were the leading emitters of particulate matter, with contributions ranging from 41-44%. McDonough County also accounted for most of the emissions of the other four pollutants, with contributions ranging from 72-100% of the four-county totals. Compared with other basins in terms of total mass, emissions of all five pollutants in the La Moine River Assessment Area were relatively small.

Table 2-8. Estimated Stationary Point Source Emissions in the Vicinity of the La Moine River Assessment Area by County, 1999
(Source: Illinois EPA, 2000)

	Particulate Matter		Sulfur Dioxide		Nitrogen Oxides		Volatile Organic Material		Carbon Monoxide	
County	Tons/yr	Pct	Tons/yr	Pct	Tons/yr	Pct	Tons/yr	Pct	Tons/yr	Pct
Brown	8	1	0	0	2	1	0	0	0	0
Hancock	282	44	5	0	83	21	16	11	19	17
McDonough	262	41	1,572	100	278	72	115	80	94	83
Schuyler	89	14	0	0	25	6	12	8	0	0
Total	641	100	1,577	100	388	100	143	100	113	100

Visibility

Visibility can serve as an index of the concentration of airborne fine particles, especially ammonium sulfate, although atmospheric humidity also affects the visibility to some extent. The poorer the visibility, the higher the concentration of fine particles. A report of the National Acid Precipitation Assessment Program (NAPAP, 1990) reviewed spatial and temporal variations in visibility in the United States. A map of spatial variations of visibility during the mid-1970s shows that central Illinois had some of the poorest median midday airport visibility in the contiguous United States--about 10-11 miles. This contrasts with values of 20-45 miles in the Great Plains and values greater than 50 miles over most of the mountainous western United States.

The NAPAP (1990) report also documents seasonal and long-term temporal trends. In 1950, visibility in central Illinois was worse in the first calendar quarter (roughly during winter) than during the rest of the year. By 1980, however, the situation had changed significantly: winter visibility stayed roughly constant, but spring, fall, and especially summer visibility had decreased substantially in central Illinois and most of the eastern United States. These trends coincide with increased use of electric power for summer air conditioning and the trend at that time toward construction of tall stacks for dispersion of power plant plumes.

In addition, the NAPAP (1990) report documented the high correlation between sulfur emissions and haziness in the northeastern United States, and the trend toward decreasing sulfur emissions in the region since the 1970s. In view of the further reductions in sulfur emissions mandated by the 1990 Clean Air Act amendments, airborne fine sulfate concentrations should continue to trend downward, and this should translate into increased visibility in central Illinois in the future.

Atmospheric Wet Deposition

Deposition of materials in precipitation (i.e., wet deposition) is currently measured by the National Atmospheric Deposition Program/National Trends Network (NADP/NTN) at six locations in Illinois. One of these locations (NADP/NTN site IL-18) is at Monmouth, Illinois, about 30 km north of the La Moine River Assessment Area. Measured major ion depositions and weighted mean concentrations at this sites for 1998 and 1999 are given in Table 2-9. The table also shows the precipitation amounts for both years. In 1998 and 1999, Monmouth recorded 114 and 79 centimeters (cm) of precipitation, respectively.

Table 2-9. Concentrations and Deposition of Major Ions in Precipitation near the La Moine River Assessment Area
(Data source: National Atmospheric Deposition Program, 2000)

Year	Ca	Mg	K	Na	NH_4	NO_3	Cl	SO_4	H (lab)	pH (lab)	Precip. (cm)
	Monmouth, IL (site IL78) Concentrations (mg/L)										
1998	0.21	0.028	0.017	0.047	0.51	1.38	0.09	1.77	0.0195	4.71	113.6
1999	0.30	0.031	0.020	0.047	0.48	1.54	0.09	1.75	0.0191	4.72	78.6
2-yr precip. wtd mean	0.25	0.029	0.018	0.047	0.50	1.45	0.09	1.76	0.0193	4.71	96.1
	Monmouth Depositions (kg/ha)										
1998	2.36	0.318	0.193	0.534	5.75	15.69	1.05	20.14	0.22	---	113.6
1999	2.36	0.244	0.157	0.369	3.76	12.10	0.68	13.72	0.15	---	78.6
2-yr mean deposition	2.36	0.281	0.175	0.452	4.76	13.90	0.87	16.93	0.19	---	96.1

At Monmouth in 1998, five of the nine ions were equal to or higher in concentration than those in 1999, contrary to what might have been expected from the usual inverse relationship between concentration and precipitation amount.

In 1998 deposition fluxes of all nine ions were equal to or higher than those of 1999, in line with the greater precipitation of the earlier year.

References

Illinois EPA, 1996. 1995 Illinois Annual Air Quality Report. Illinois Environmental Protection Agency, Bureau of Air, P.O. Box 19276, Springfield, IL 62794-9276.

Illinois EPA, 1997. Illinois Annual Air Quality Report – 1996. Illinois Environmental Protection Agency, Bureau of Air, P.O. Box 19276, Springfield, IL 62794-9276.

Illinois EPA, 1998. Illinois Annual Air Quality Report – 1997. Illinois Environmental Protection Agency, Bureau of Air, P.O. Box 19276, Springfield, IL 62794-9276.

Illinois EPA, 1999. Illinois Annual Air Quality Report – 1998 . Illinois Environmental Protection Agency, Bureau of Air, P.O. Box 19276, Springfield, IL 62794-9276.

Illinois EPA, 2000. Illinois Annual Air Quality Report – 1999. Illinois Environmental Protection Agency, Bureau of Air, P.O. Box 19276, Springfield, IL 62794-9276.

National Acid Precipitation Assessment Program, 1990: Acidic Deposition: State of Science and Technology Report 24, Visibility: Existing and Historical Conditions – Causes and Effects. National Acid Precipitation Assessment Program, Washington, D.C.

National Atmospheric Deposition Program (NRSP-3)/ National Trends Network, 2000: NADP Program Office, Illinois State Water Survey, 2204 Griffith Dr., Champaign IL 61820. Data retrieved from the NADP/NTN home page, http://nadp.sws.uiuc.edu, 8-31-00.

Surface Water Quality

The Illinois Pollution Control Board (IPCB) has set the water quality standards to protect the designated uses of the water resources in Illinois. The Illinois Environmental Protection Agency (IEPA) has developed scientifically-based water quality standards and proposed them to the IPCB for adoption into state rules and regulations (IEPA, 1990). Surface waters in Illinois are classified for a variety of designated uses that include:

- **General Use** – Provides for the protection of indigenous aquatic life, primary (e.g., swimming) and secondary (e.g., boating) contact recreation, agricultural and industrial uses. Water quality standards designed to protect these general uses cover the majority of Illinois streams and lakes.
- **Public and Food Processing Water Supplies** – Provides for the protection of potable water supplies and water used for food processing purposes. These waters have a somewhat strict set of water quality standards that apply at any point from which water is withdrawn for these uses.
- **Lake Michigan** – Provides for protection of Illinois' portion of Lake Michigan with even more stringent water quality standards.
- **Secondary Contact and Indigenous Aquatic Life Use** – This is the least stringent designated use and applies only to a certain set of canals and streams in the Chicago area where physical and other limitations not directly related to water quality restrict available uses.

Water quality can be examined and reported using several different methods. For example, it can be described according to the IEPA's overall use attainment or overall and individual use support, as discussed in the *Illinois Water Quality Report, 2000* (IEPA, 2000). Other approaches to assessing water quality include examining trends in water quality and the IEPA's Targeted Watershed Approach (TWA) program.

This chapter describes the surface water quality of rivers and streams, lakes, and watersheds in the La Moine River Assessment Area. Figure 2-1 shows rivers and streams in the assessment area. Figure 2-2 shows the lakes assessed by the IEPA in the assessment area.

Designated Use Support

For the surface water uses assessed in this report, the General Use standards for total phosphorus (TP) of 0.05 mg/L have been used. The TP standard has been established for the protection of aquatic life, primary-contact (e.g., swimming) and secondary-contact (e.g., boating) recreation, agriculture, and industrial uses. In addition, lake-use support is

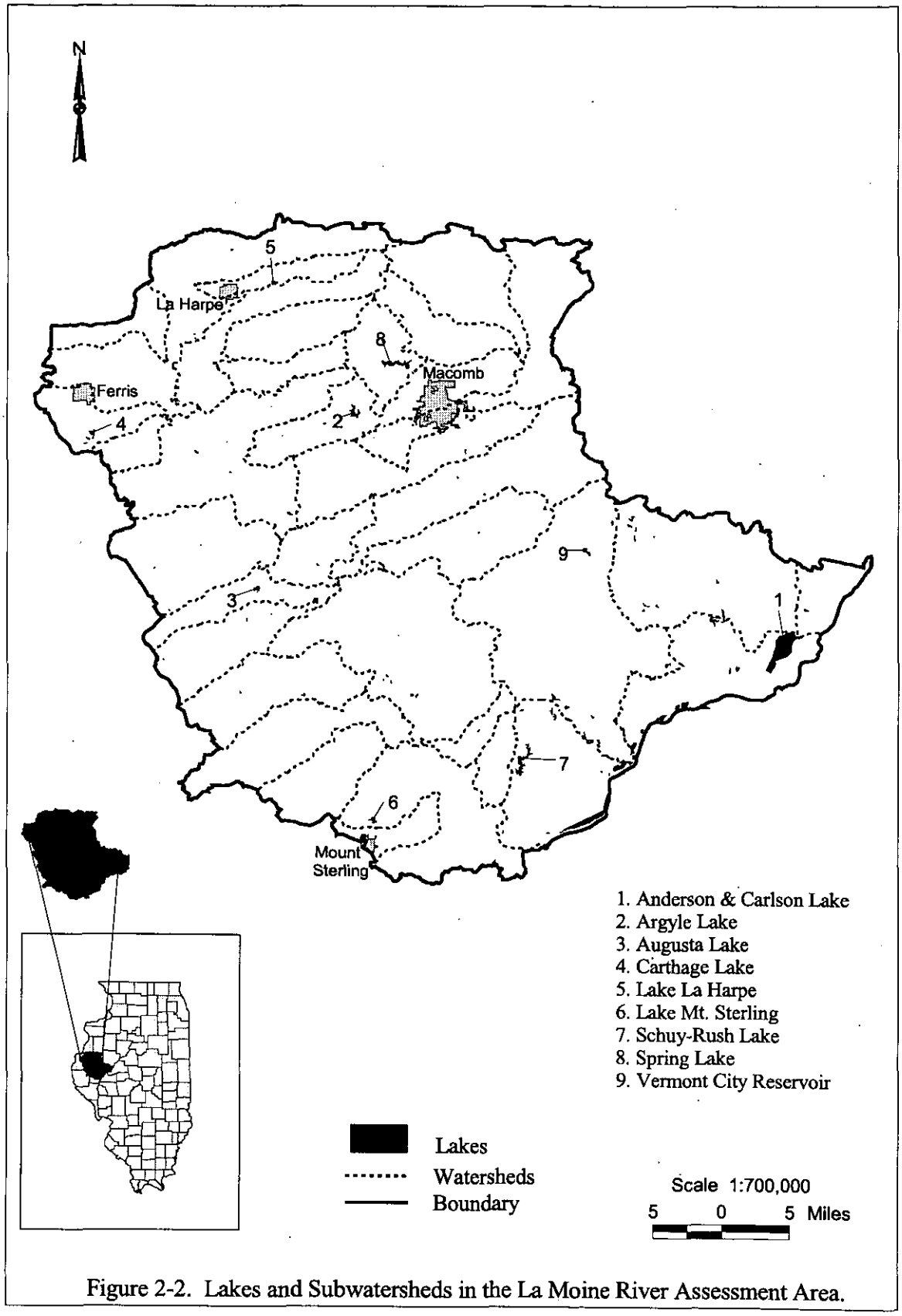


Figure 2-2. Lakes and Subwatersheds in the La Moine River Assessment Area.

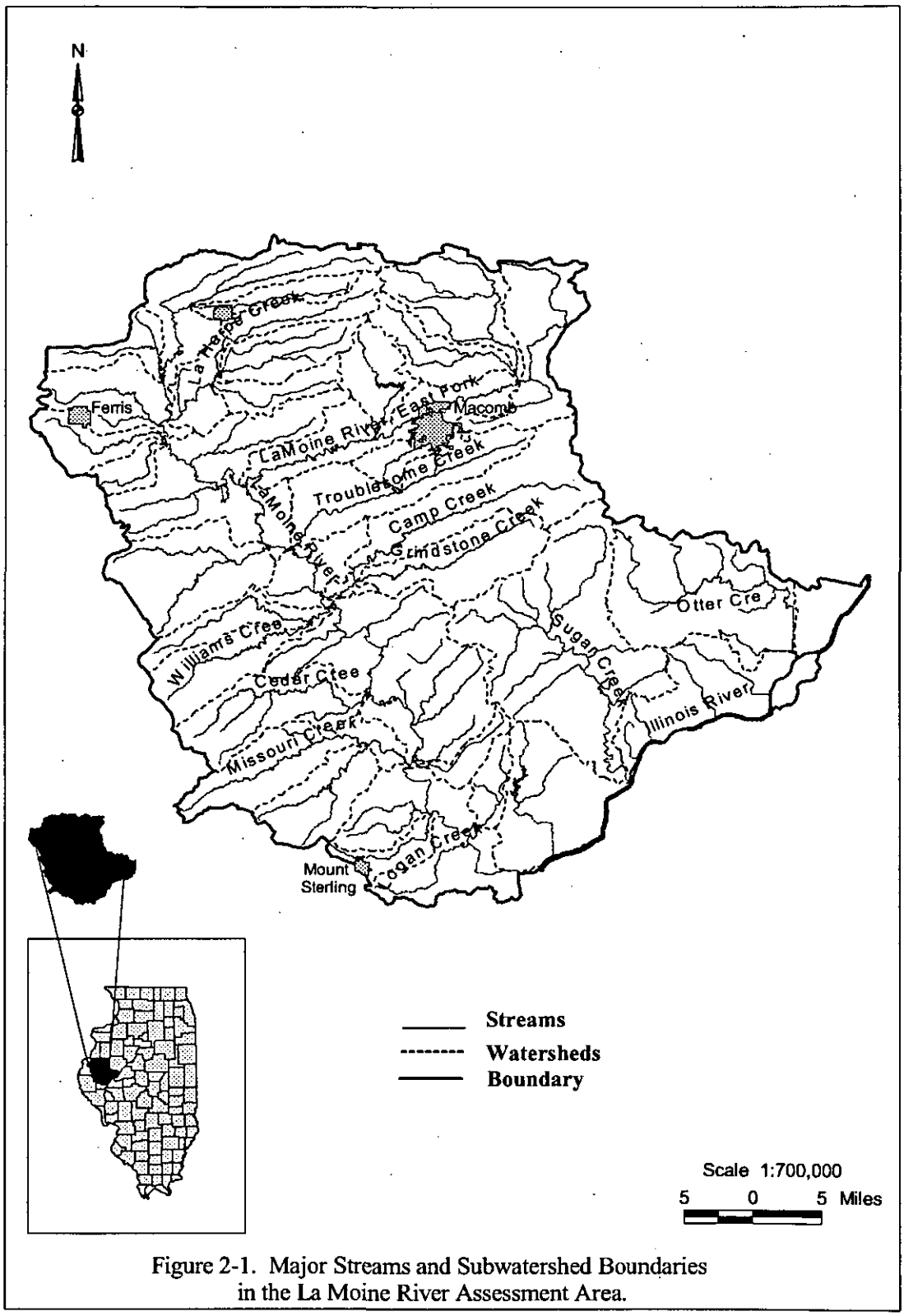


Figure 2-1. Major Streams and Subwatershed Boundaries in the La Moine River Assessment Area.

based in part on the amount of sediment, macrophytes, and algae in the lake and how these might impair designated lake uses. Following is a summary of the various classifications of use impairment (IEPA, 1998a):

- **Full Support** – The water quality meets the needs of all designated uses protected by applicable water quality standards.
- **Full Threatened** – The water quality is presently adequate to maintain designated uses, but if a declining trend continues, only partial support may be attained in the future.
- **Partial Support** – The water quality has been impaired and the waterbody is only partially meeting the needs for that designated use. Prior to 1999, Partial use support waters were separated into two categories i.e. Partial/Minor and Partial/Moderate. Beginning in 1999, Illinois EPA combined the two Partial Support categories into a single Partial use support to match the other states in the nation.
- **Non-Support** – The water quality is severely impaired and not capable of supporting the designated use to any degree.

Use support and level of attainment were determined for aquatic life, recreation, swimming, and overall surface water use, using methodologies described in the IEPA's *Illinois Water Quality Report,* (IEPA, 1996, 2000).

The assessment of swimming use for primary-contact recreation was based on available data using two criteria: 1) Secchi disc transparency depth data and 2) Carlson's TSI (Carlson, 1977). Finally, in addition to assessing individual aquatic life, recreation, and swimming uses, the overall use support of the lake or stream was also assessed.

Rivers and Streams

Waterbody specific information for rivers and streams in the La Moine River Assessment Area through 1998 is presented in the 2000 report by the IEPA (2000). Waterbody specific information includes subwatershed boundaries (see figure 2-1), year assessed, assessment level (monitored or evaluated), designated uses (overall use, fish consumption, aquatic life, swimming, secondary contact, and public water supply), and causes and sources of impairment.

Use Support

The La Moine River Assessment Area has a total of 2,520.36 river miles. Of these 2,520.36 river miles, 1,100.87 miles (43.7%) have been assessed by the IEPA up to the 1998 cycle (IEPA, 2000). Table 2-10 shows the overall use support, fish consumption, and drinking water supply for the rivers and streams assessed. Overall stream use was classified as full support for 40.7% (447.57 miles) of the streams, and the partial use supports for 5.9% of the river miles assessed. Over one-half of monitored river miles

Table 2-10. Designated Use Support for Rivers and Streams in the La Moine River Assessment Area
(Illinois EPA, 2000)

	Overall uses*		Fish consumption		Swimming	
Use support	River miles	Percent of assessed miles	River miles	Percent of assessed miles	River Miles	Percent of assessed miles
Full	447.57	40.7	233.11	21.2	39.28	3.6
Full/threatened	NA	NA	NA	NA	NA	NA
Partial	65.03	5.9	NA	NA	103.42	9.4
Nonsupport	NA	NA	NA	NA	NA	NA
Not evaluated	588.27	53.4	867.76	78.8	958.17	87.0
Total	1,100.87	100.0	1,100.87	100.0	1,100.87	100.0

Note: *Aquatic life use support is exactly the same as overall use support.
NA indicates not applicable or available.

were not assessed for particular designated uses. Aquatic life use support for the rivers and streams was found to be exactly as that for overall use support (Table 2-10, IEPA,1998a, 2000). Four segments of river water assessed (60.38 river miles) are used for public water supply (not shown in Table 2-10). The IEPA (1998b) rated river and stream water quality in this watershed as good and fair conditions.

Causes of Less than Full Support

Table 2-11 shows the causes of use impairment for rivers and streams (7 waterbodies) not fully supporting the designated uses. Not-fully-supporting causes include mainly metals and nutrients (nitrogen and phosphorus). Other causes are organic enrichment/low dissolved oxygen and siltation.

Sources of Less than Full Support

Table 2-12 shows the sources of use impairment for rivers and streams in the La Moine River Assessment Area not fully supporting the designated uses. The sources are mainly from agricultural activities that are crop related sources and grazing (pasture lands) related sources. The other main sources are from municipal point sources.

Additional water quality summary information for the river basin is available in a series of 33 fact sheets that can be obtained in the IEPA report (1996) and on the IEPA's homepage at www.epa.state.il.us/water/water-quality.

Table 2-11. Causes of Use Impairment for Rivers and Streams in the La Moine River Assessment Area
(Source: Illinois EPA, 2000)

Segment name/ID - miles	Metals	Am-monia	Nut-rients	Phos-phorus	Nitro-gen	Sil-tation	Org-enr.	Hab. alt.	SS
La Moine River/DG 09-7.42	NA	NA	Y	NA	Y	Y	Y	NA	NA
Killjordan creek/DGA01-3.85	NA	NA	Y	Y	Y	NA	NA	NA	NA
E. Fk. La Moine R./DGL-05-19.27	Y	NA	Y	NA	Y	Y	Y	NA	NA
E. Fk. La Moine R./TD 32-0.97	Y	NA	Y	NA	Y	Y	Y	NA	NA
Drowning Fork/DGLC 01-17.85	NA	NA	NA	NA	NA	Y	Y	Y	NA
Prairie Creek/DGZD 01-8.82	Y	Y	Y	Y	Y	NA	Y	NA	Y
S. Br. La Moine R./TD 27-6.85	Y	Y	Y	Y	Y	NA	Y	NA	NA

Note: Org. enr. – organic enrichment/low dissolved oxygen, TDS – salinity/total dissolved solids/chloride, Hab. alt. – habitat alternation, SS – suspended solids, NA – not applicable or available, Y – cause of impairment.

Table 2-12. Sources of Use Impairment for Rivers and Streams in the La Moine River Assessment Area
(Source: Illinois EPA, 2000)

Segment name/ID - miles	Muni.	Agri-culture	Crop prod.	Pas-ture	Urb.	Res. ext.	Hyd./ hab.	Chen.
La Moine River/DG 09-7.42	NA	Y	NA	NA	NA	Y	Y	NA
Killjordan creek/DGA01-3.85	Y	NA	NA	NA	Y	NA	NA	NA
E. Fk. La Moine R./DGL-05-19.27	NA	Y	Y	Y	NA	NA	NA	NA
E. Fk. La Moine R./TD 32-0.97	NA	Y	Y	Y	NA	NA	NA	NA
Drowning Fork/DGLC 01-17.85	NA	Y	Y	Y	NA	NA	Y	Y
Prairie Creek/DGZD 01-8.82	Y	Y	NA	NA	NA	NA	NA	NA
S. Br. La Moine R./TD 27-6.85	Y	NA	NA	NA	NA	NA	NA	NA

Notes: ID - segment identifier, R. - River, Muni. - Municipal point sources, Crop prod. - nonirrigated crop production Urb. - Urban runoff/storm sewers, Res. ext. - resources extraction; Hyd./hab. - Hydrologic/habitat modification, Chan. - Channelization, , NA - not applicable, Y - source of impairment.

Trends in River and Stream Water Quality

Another way to examine water quality is through trends of physical, chemical, and biological characteristics from long-term data evaluation. The IEPA analyzed rivers and streams using the Seasonal Kendall trend analysis on selected ambient stream assessment stations throughout the state.

During a 14-year time span, the Illinois EPA collected data at 40 stations for the water quality parameters such as specific conductance, dissolved oxygen (DO), total suspended solids (TSS), nitrite/nitrate nitrogen, total ammonia nitrogen, pH, and total phosphorus (TP). One station (DG 01) falls within the La Moine River Assessment Area and can be examined for the trend of water quality. At station DG 01, La Moine River near Ripley (drainage area of 1,293 square miles), specific conductivity, DO, TSS, nitrite/nitrate nitrogen, total ammonia nitrogen, and TP showed no trends. An upward trend in pH units was detected.

Lakes and Reservoirs

Rivers, streams, and inland lakes are vital resources of a basin needed for economic and social well-being. Most public-owned lakes with 20 acres or more in surface area have been assessed by the IEPA's Volunteer Lake Monitoring Program. There are 77 lakes (greater than 6 acres) covering a total area of 4,164 acres in the La Moine River Assessment Area. Of the 77 lakes in the assessment area, 9 lakes (Table 2-13) with a total surface area of 1,809.08 acres (43.5%) have been assessed for the *Illinois Water Quality Report, 2000 Update* (IEPA, 2000).

Use Support

Table 2-13 also shows the overall use support for the nine lakes studied in the assessment area. The IEPA (2000) used the aquatic life impairment index (ALI) and the recreation use impairment index (RUI) to arrive at these conclusions.

The degree of use support was determined for individual lakes by assessing the overall use, aquatic life, recreation, swimming, fish consumption use, and drinking water supply(Table 2-13). Overall use support for the nine lakes assessed was classified as: full support for 2 lakes (Argyle Lake and Lake La Harpe), partial use support for 4 lakes, and not assessed for 3 lakes.

Causes of Less than Full Support

Table 2-14 shows the causes of use impairment for the three assessed lakes in the La Moine River Assessment Area "not fully supporting uses." The main causes are

Table 2-13. Use Support, Trophic State, and Trend for Lakes Studied in the La Moine River Assessment Area
(Illinois Environmental protection agency, 1998a, 2000)

	Use support								
Lake name (code) – acres	Over-alll	Recre-ation	Aquatic life	Fish consump-tion	Swim-ming	Drinking water supply	Trophic state index	Trophic* state	Trend**
Anderson Lake (RDA) - 1360	P	P	F	F	P	X	74	H	+
Argyle Lake (RDE) - 95.1	F	P	F	F	P	X	58	E	F
Augusta Lake (RDZH) - 26.7	X	X	X	X	X	X	66	E	NA
Carthage (RLE) - 36.1	X	X	X	X	X	X	58	E	NA
Lake La Harpe - 9.2	F	P	F	X	P	F	63	E	F
Lake Mt. Sterling - (RDN) - 26.1	P	P	F	F	P	X	75	H	–
Schuy-Rush Lake - (SDZC) - 191.2	P	N	F	F	P	X	79	H	F
Spring Lake-(RDN) - 226.18	P	N	P	X	P	F	73	H	=
Vermont City Res. (RDM) - 38.5	X	X	X	X	X	X	74	H	NA

Note: F – full support, P – partial support, N – nonsupport, X – not assessed for a particular designated use, NA – not applicable; * Lake trophic status : O – oligotrophic, M – mesotrophic, E – eutrophic, H – hypereutrophic. ** Water quality trend: (+) – improving, (–) declining, (=) – stable, (F) – fluctuating.

Table 2-14. Causes of Use Impairment for Lakes in the La Moine River Assessment Area
(Source: Illinois Environmental Protection Agency, 1998a)

Lake name - acres	Metals	Nutri-ents	Phos-phorus	Nitro-gen	Nit-rate	Silta-tion	Org. enr.	SS	Nox. pl.	Exc. algal
Anderson Lake* (RDA) - 1360	Y	Y	Y	Y	Y	Y	NA	Y	Y	Y
Lake Mt. Sterling - (RDN) - 26.1	NA	NA	NA	NA	NA	NA	NA	NA	Y	NA
Schuy-Rush Lake (RDZC) - 191.2	NA	Y	Y	Y	Y	Y	Y	Y	Y	NA
Spring Lake-(RDN) - 226.18	NA	Y	Y	Y	Y	Y	NA	Y	NA	Y

Note: Org. enr. – organic enrichment/low DO, SS – suspended solids, Nox. pl. – noxious aquatic plants, Exc. algal – excessive algal growth, Y – cause, NA – indicates not applicable or available; * – Anderson and Carlson Lake.

nutrients, siltation, noxious aquatic plants, and suspended solids. The magnitude of impairment for each cause: threatened (T), high (H), moderate (M), and slight (S) are no longer used by the IEPA (2000).

Sources of Less than Full Support

Table 2-15 shows the sources of use impairment for the three assessed lakes in the La Moine River Assessment Area "not fully supporting uses." The magnitude of impairment for each source: threatened (T), high (H), moderate (M), slight (S), also are not be used by the IEPA (2000). The major sources of lake impairments are due to agriculture, crop related sources, irrigated crop production, contaminated sediment, on-site wastewater systems, hydraulic and habitat modifications, and forest/grassland/parkland.

Table 2-15. Sources of Use Impairment for Lakes in the La Moine River Assessment Area
(Source: Illinois EPA, 1998a)

Lake name	Agri-culture	Crop rel.	Non-irrig.	Land dis.	Sept. syst.	Hab. mod.	Eros.	Cont. sed.	Rec.	For./ gra.
Anderson Lake (RDA) - 1360	Y	Y	Y	NA	NA	Y	Y	Y	NA	NA
Lake Mt. Sterling - (RDN) - 26.1	Y	Y	Y	NA	NA	NA	NA	Y	NA	Y
Schuy-Rush Lake (RDZC) - 191.2	Y	Y	Y	Y	Y	Y	Y	Y	NA	Y
Spring Lake-(RDN) - 226.18	Y	Y	Y	NA	NA	Y	NA	NA	Y	NA

Note: Crop rel. – crop related sources, Nonirrig – nonirrigated crop production, Land disp. – land disposal/septic systems, Sept. syst. – On-site wastewater systems (septic tanks, etc.),. Hab. mod.. – habitat modification, Eros. – lake shoreline erosion and/or streambank modification/destabilization, Cont. sed.– contaminant sediments, Rec. – recreational activities, For./gra. – forests/grassland/parkland, Y – source of impairment, NA – not applicable or available.

Trophic Status

The trophic state index (TSI) and trophic state condition of the assessed lakes are also listed in the *Illinois Water Quality Report, 1998 Update* (IEPA, 1998a). The trophic state index values for lakes assessed ranged from 43 for Devils Kitchen Lake (mesotrophic) to 82 for Crab Orchard Lake (hypereutrophic) (IEPA,1998a). Trophic state conditions for all nine lakes are classified as either mesotrophic, eutrophic, or hypereutrophic (Table 2-13). As shown in Table 2-13, five lakes are hypereutrophic, and four lakes are eutrophic.

Table 2-13 also shows that the trend in lake water quality for three lakes are fluctuating. One lake is improving, and one is declining, and one lake is stable. The other three lakes are not evaluated.

Targeted Watershed Approach

Water quality conditions can also be examined from a watershed perspective. The IEPA's watershed monitoring program is known as the Targeted Watershed Approach. Following is an excerpt from *GIS Technology Support for the Targeted Watershed Approach* by Sinclair et al. (1996).

"The Targeted Watershed Approach (TWA) was developed to established a framework for prioritizing Bureau of Water program activities with targeted watersheds..."

"The TWA was conceived and developed primarily to facilitate water quality management planning. Objectives for the utilization of this approach are:

- Identify watersheds with the most critical water quality problems and direct programs and resources to the solution of those problems.
- Direct programs and resources to those watersheds considered to have the highest potential for improvement based on the State's Biological Stream Characterization (BSC) process, and other factors.
- Protect existing high-quality water resources considered to be threatened (i.e., those waters displaying declining water quality trends but still fully supporting overall use attainment).
- Integrate point and nonpoint source programs activities."

Streams

For streams, the TWA has four watershed priority categories from highest (Priority 1) to lowest (Priority 4). Table 2-16 breaks down the four categories of prioritization in the TWA.

There were 113 river segments monitored for water quality in the La Moine River Assessment Area (IEPA, 2000). Fourteen river segments in the assessment area were evaluated with TWA (IEPA, 1998c). River name, watershed identifier [corresponding to the waterbody identifier in the *Illinois Water Quality Report* (IEPA, 1996)], priority, and significant source of impairment are shown in Table 2-17. As shown in Table 2-17, eight river segments are classified as Priority 1.1; 5 segments are Priority 2.0; and one river segment is classified as Priority 3.0.

Inland Lakes

In Illinois, inland lakes were prioritized into three categories from highest (Priority 1) to lowest (Priority 3) based on the criteria listed in Table 2-16.

Table 2-16. Prioritization of Targeted Watersheds
(Source: Illinois EPA, 1997)

A. Streams

Category*	Criteria
Priority 1	– "A" rated streams based on BSC – Streams identified as "Threatened" in 305(b) – State protected streams – Streams with full drinking water use or SDWA MCL violations – 303(d) waters – Illinois Waterway upstream and inclusive of Lake Peoria
Priority 2	– Illinois Waterway downstream of Lake Peoria – Streams with high potential for improvement (Rank 1, 2, or 3 based on potential index of biotic integrity) – Partial drinking water use support streams
Priority 3	– Streams with lower potential for improvement (Rank 4 or 5 based on potential index of biotic integrity)
Priority 4	– Streams with suspected nonpoint source impacts based on an evaluated level of assessment.

Note: *Priorities 1-3 include point source impacts, combination point/ and nonpoint source, and nonpoint only, Priority 4 is nonpoint source only

B. Lakes

Priority	Criteria
Priority 1	All Full Overall Use Support Lakes – All PWS lakes with full drinking water use support or SDWA MCL violations – All 303(d) lakes – All oligotrophic lakes – All two-tiered fishery lakes
Priority 2	– All partial/minor or partial/moderate drinking Water use support lakes – Lakes with high lake improvement potential Not meeting any of the Priority 1 criteria
Priority 3	– Lakes with moderate lake improvement Potential not meeting any of the Priority 1 or Priority 2 criteria

Table 2-17. Stream Priorities for Targeted Watershed Approach
(Source: Illinois Environmental Protection Agency, 1997)

Subwatershed name	Watershed Identifier	Segment	Priority	Source of impairment
La Moine River	ILDG02	DG 02	1.1	NA
La Moine River	ILDG04	DG 07	1.1	NA
Troublesome Creek	ILDGJ01	DGJ 04	3.0	NPO
E. Fk. La Moine River	ILDGL01	DGL 04	1.1	NA
E. Fk. La Moine River	ILDGL01	DGL 03	1.1	NA
E. Fk. La Moine River	ILDGL01	TD 31	1.1	NP
Drowning Fork	ILDGLC01	DGLC01	1.1	NP
La Harpe River	ILDGP01	DGP	1.1	NA
S. Br. La Moine River	ILDGZR01	TD 28	1.1	NA
Illinois River	ILD03	TD 04	2.0	NP
Illinois River	ILD03	TD 05	2.0	NPO
Illinois River	ILD03	TD 06	2.0	NPO
Illinois River	ILD31	D 31	2.0	NP
Illinois River	ILD31	D 04	2.0	NPO

Note: NPO – nonpoint source impacts only, NP – nonpoint and point source impacts, and NA – not available or not applicable

Program priorities for four inland lakes and reservoirs in the La Moine River Assessment Area are presented in Table 2-18. In Table 2-18, Priority 1.0 indicates that the lake can be restored; and for the definitions of Priority 2 and 3, see Table 2-16. The table also includes use support 303(d) list, and water quality improvement potential.

Four lakes in the assessment area were evaluated with TWA. Table 2-18 indicates that two lakes are Priority 1.1 and two are Priority 2.0.

Table 2-18. Lakes Evaluated for Targeted Watershed Approach
(Source: Illinois Environmental Protection Agency, 1997)

Lake name	WSID	Priority	303(d) list	Public water supply use	Improvement Potential
Carthage Lake	ILDGZO01	2.0	NA	Partial	NA
La Harpe Lake	ILDGZR01	1.1	NA	Full	Medium
Spring Lake	ILDGL01	1.1	NA	Full	High
Vermont City Reservoir	ILDH01	2.0	NA	NA	High

Note: NA indicates not available or applicable.

References

Carlson, R.E. 1977. A Trophic State Index for Lakes. Limnology and Oceanography 22 (2): 361-369.

Illinois Environmental Protection Agency. 1990. Title 35: Environmental Protection, Subtitle C: Water Pollution. State of Illinois, Rules and Regulations, Springfield, IL.

Illinois Environmental Protection Agency. 1996. Illinois Water Quality Report 1994-1995. IEPA/BOW/96-060 a and b, Illinois Environmental Protection Agency, Springfield, IL.

Illinois Environmental Protection Agency. 1997. Targeted Watershed Approach – A Data Driven Prioritization. IEPA/BOW/97-004, Illinois Environmental Protection Agency, Springfield, IL.

Illinois Environmental Protection Agency. 1998a. Illinois Water Quality Report, 1998 Update. IEPA/BOW/98-014, Illinois Environmental Protection Agency, Springfield, IL, Aug. 1998.

Illinois Environmental Protection Agency. 1998b. The Condition of Illinois Water Resources 1998. IEPA/BOW/98-006, Illinois Environmental Protection Agency, Springfield, IL, Sept. 1998.

Illinois Environmental Protection Agency. 1998c. United Watershed Assessment and Watershed Restoration Priorities for Illinois. IEPA/BOW/98-017, Illinois Environmental Protection Agency, Springfield, IL, Sept. 1998.

Illinois Environmental Protection Agency. 2000. Illinois Water Quality Report, 2000. IEPA/BOW/00-005, Illinois Environmental Protection Agency, Springfield, IL, April 2000.

Sinclair, R.A., B.R. Ward, and IEPA. 1996. GIS Technology Support for the Targeted Watershed Approach. Illinois State Water Survey Contract Report 600, Champaign, IL.

Hazardous and Toxic Waste Generation and Management

This section of the Area Assessment examines sites within the Area that may contain environmental contaminants, and manufacturing facilities that may emit pollutants. The aim of the report is to help major stakeholders develop goals and strategies for the use and protection of natural resources in Areas where Ecosystem Partnerships have been formed.

The report draws upon the following environmental databases as resource material:

- Historical Hazards (HH)
- Surface Impoundment Inventory (SII)
- Landfills Database
- Superfund
- Toxics Release Inventory (TRI)

Assessment of Sites in the Region

Specific potential sources of waste generation and disposal in the LaMoine Area are discussed below. See the map, Figure 2-3, for geographic locations of these sites.

Historical Hazards Database

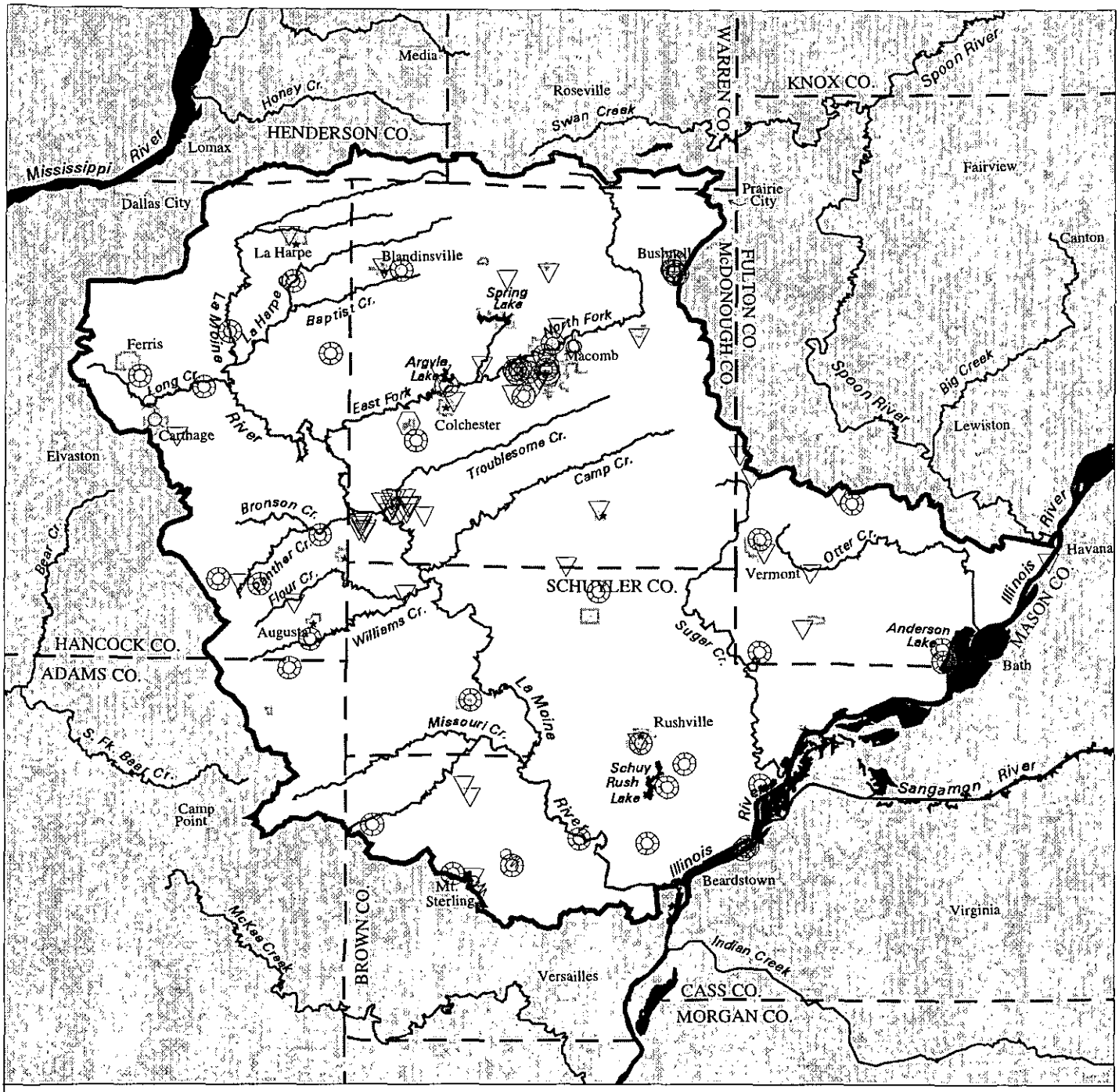
There are 10 towns in the Area in the Historical Hazards database (see Table 2-19). Each of these towns historically contained one or more industrial facilities which might have been a source of pollutants, and which may or may not still be in operation.

Surface Impoundments Database

A surface impoundment is a lined or unlined lagoon used for the storage of liquids alone or mixed with solids, usually uncovered.

In the area the Surface Impoundment Inventory shows 48 surface impoundment sites with a total of 87 impoundments. Of these sites, three are agricultural, six are industrial, 20 are municipal, and 19 are mining.

Figure 2-3. Sites of Possible Environmental Concern in the LaMoine Area



- Unpermitted Landfills
- Permitted Landfills
- "Other" Landfills*
- Superfund Sites
- TRI Facilities
- Towns in Historical Hazards Database
- Surface Impoundments

*There is no information about permissions in the source tables - see text

Scale 1:601920

0 5 10 15 20 Miles

0 10 20 30 Kilometers

Table 2-19. Historical Hazards Towns in the LaMoine Area

Augusta	Colchester	Macomb	Rushville
Blandinsville	Industry	Mount Sterling	
Browning	La Harpe	Plymouth	

Superfund Sites Database

There are two Superfund sites in the Area for 1996 (see Table 2-20). No sites are on the National Priority List (NPL).

Landfills Database

Landfills have been by far the most common means of disposal for solid waste, and historically liquid wastes have also been landfilled. There are 50 landfills in the area — five permitted, 43 unpermitted and two "other." The "other" landfills have no information in the "permit" and "illegal" columns in the source table.

TRI Database

The Toxics Release Inventory (TRI) covers year-by-year releases of chemicals from manufacturing facilities to air, land, water, and underground injection, as well as transfers of chemicals. Transfers are of six types: to publically owned treatment works (POTWs), to treatment, to disposal, to recycling, to energy recovery, and to "other" facilities. Other information, most notably on pollution prevention, is also contained in the database.

The chemical industry, as defined by SIC (standard industrial classification) code, was the single largest emitter of TRI chemicals nationwide in 1996 (see Table 2-21). Of the four TRI facilities in the Area, none have a chemical primary SIC code. Illinois ranked 6th in the country for TRI total on- and off-site releases in 1996.

Table 2-20. Superfund Sites in the LaMoine Area

EPA ID	Site Name	City	NPL Status
ILD000810507	Estes Industrial Center	Macomb	No
ILD984836700	Tennessee Thermo Gas Co.	Tennessee	No

Table 2-21. TRI Facilities in the LaMoine Area

Continental Grain Co. Inc.	NTN-Bower Corp.
Haeger Potteries of Macomb	Vaughan & Bushnell Mfg. Co.

Additional Information

See the *Headwaters Area Assessment, Volume 4* (DNR, 1997), and *Vermilion Area Assessment, Volume 4* (DNR, 1998) for more detailed information on the databases used in this report, and a list of contacts for further information. Alternatively, additional information can be obtained from the WMRC GIS Program at One East Hazelwood Drive, Champaign, IL 61820, telephone number 217-333-8940.

The reader is encouraged to review *The Changing Illinois Environment: Critical Trends, Volume 5* (ENR, 1994), which provides in-depth background information about waste generation and management trends in Illinois.

References

DNR, 1997. *Headwaters Area Assessment, Volume 4.* Illinois Department of Natural Resources.

DNR, 1998. *Vermilion Area Assessment, Volume 4.* Illinois Department of Natural Resources.

ENR, 1994. *The Changing Illinois Environment: Critical Trends, Volume 5: Waste Generation and Management.* Illinois Department of Energy and Natural Resources. ILENR/RE-EA-94/05(5).

PART III

ARCHAEOLOGICAL RESOURCES

Table of Contents

Introduction 3-1
Archaeological Resources of the La Moine River Assessment Area 3-11
Summary of Archaeological Resources in the La Moine River Assessment Area 3-15
Acknowledgments 3-23
Selected References 3-24

List of Figures

Figure 3-1. Archaeological Survey Areas 3-33
Figure 3-2. All archaeological components 3-34
Figure 3-3. Unidentified Prehistoric archaeological components 3-35
Figure 3-4. Paleo-Indian archaeological components 3-36
Figure 3-5. Unidentified Archaic archaeological components 3-37
Figure 3-6. Early Archaic archaeological components 3-38
Figure 3-7. Middle Archaic archaeological components 3-39
Figure 3-8. Late Archaic archaeological components 3-40
Figure 3-9. Unidentified Woodland archaeological components 3-41
Figure 3-10. Early Woodland archaeological components 3-42
Figure 3-11. Middle Woodland archaeological components 3-43
Figure 3-12. Late Woodland archaeological components 3-44
Figure 3-13. Mississippian archaeological components 3-45
Figure 3-14. Upper Mississippian archaeological components 3-46
Figure 3-15. Protohistoric archaeological components 3-47
Figure 3-16. Unidentified Historic archaeological components 3-48
Figure 3-17. Historic Native American archaeological components 3-49
Figure 3-18. Historic Colonial archaeological components 3-50
Figure 3-19. Historic Pioneer archaeological components 3-51
Figure 3-20. Historic Frontier archaeological components 3-52
Figure 3-21. Historic Early Industrial archaeological components 3-53
Figure 3-22. Historic Urban Industrial archaeological components 3-54
Figure 3-23. Historic Postwar archaeological components 3-55

List of Tables

Table 3-1. Chronological Framework for Illinois Culture History 3-3
Table 3-2. Archaeological Resources in the La Moine River Assessment Area 3-16

Archaeological Resources in the La Moine River Assessment Area

Introduction

The major river drainages of Illinois have long been the subject of archaeological research. This interest stemmed initially from recognition of a rich and complex record of human settlement and cultures in and near the major river valleys in the state. However, not all areas within the state have an equal distribution of archaeological resources, and even within a single major stream drainage, such as the La Moine River, archaeological resources can be highly uneven in their distribution. As a result, the investigation of archaeological resources may be concentrated disproportionately in a few resource-rich zones, while other reaches of the same drainage receive less systematic investigation. Portions of the La Moine River drainage have received comparatively little archaeological attention in spite of the high probability that these areas contain abundant prehistoric and historic archaeological resources. However, the potential biases resulting from this uneven attention to cultural resources has been offset somewhat by systematic survey of large highway and pipeline corridors that transect the drainage, providing a representative sample of the cultural resources that are likely present in the drainage (see Figure 3-1). The following summary and interpretations of the cultural resources present in the La Moine River drainage will take advantage of these systematic surveys.

The La Moine River Assessment Area (LRAA) is relatively extensive, and it includes all or portions of Adams, Brown, Fulton, Hancock, Henderson, McDonndough, Schuyler, and Warren counties. The headwaters of the La Moine River are in northeastern Hancock and southernmost Henderson counties, northwest of the city of Macomb. Near the headwaters, the divide between the La Moine River and Mississippi River drainages is only about 9-10 km from the Mississippi River trench (near the towns of Dallas City and Lomax). From its juncture with LaHarpe and Long creeks, west of Macomb, the La Moine River flows generally southeastward to its confluence with the Illinois River between Beardstown and Versailles. This assessment area includes the entire main branch of the La Moine River and its tributaries, as well as the minor drainages of Sugar Creek and Otter Creek. Both of these streams are located northeast of the main stem of the La Moine River and join the Illinois River southwest of the Spoon River confluence at Havana. The La Moine drainage and the Sugar and Otter creek drainages included in this study contains a total of approximately 4,300 square kilometers.

The natural environment within the LRAA is relatively uniform; it falls almost entirely within the Galesburg Section of the Western Forest-Prairie Division (Schwegman et al. 1986:25-27). The Western Forest-Prairie Division is a strongly dissected glacial till plain of Illinoian age, which is covered by a relatively thin mantle of later Wisconsin-age loess deposits. The underlying bedrock is composed largely of Pennsylvanian and Mississippian series sandstones, shales, limestones, and coal which outcrop in most of the more deeply dissected valleys of major streams. Several major

coal seams are present in these deposits, and coal mining has been an important industry in the area for many years. Soils in this area are fairly well developed, originating in either loess or glacial drift. The flatter upland interfluves often supported prairie vegetation at the time of Euro-American settlement, while forest communities dominated in flood plains and on the dissected valley margins. Before Euro-American settlement, the uplands were partially covered with mesic and wet prairies, with wet prairies much less common than in other portions of the state. Upland forests consisted of an oak-hickory association dominated by black oak, white oak, and several species of thick- and thin-shelled hickories. Hickory nuts were a staple food for prehistoric hunter-gatherers that inhabited the region. This food continued to be used after prehistoric subsistence practices shifted toward food production and was even used extensively by early Euro-American immigrants. Terrestrial animal species of economic importance to the inhabitants of the region include white-tailed deer, turkey, raccoon, and beaver; elk and bison were present in low numbers late in the prehistoric period. Flood plain forests were dominated by silver maple, elm, ashes, and box elder (Schwegman et al. 1986:26).

A small area along the southeastern margin of the LRAA falls within the Illinois River Section of the Upper Mississippi River and Illinois River Bottomlands Division (Schwegman et al. 1986:21-23). This section is dominated by late Pleistocene and Holocene alluvial sediments that have been reworked by fluvial processes into a variety of geomorphic landforms of varying ages. The Illinois River flood plain was distinctive in that it contained extensive backwater lakes and spring-fed bogs with peat deposits. Wet and mesic prairies were also present prior to Euro-American settlement and land clearing. White-tailed deer, raccoon, and beaver were terrestrial animals of economic importance to both prehistoric and early historic inhabitants of the region. Fish and mollusk species in the Illinois River and its backwater lakes were also major contributors to subsistence in both the prehistoric and historic eras.

The abundance and variety of natural resources in the LRAA should result in a rich and diverse record of prehistoric and historic use of the region. However, the density of archaeological resources in the region is variable–they are more abundant in the lower reaches of the drainage near the Illinois River valley and are less numerous in the till plain and upland interfluves. Large numbers of sites also have been recorded along the bluffs of the Illinois River and near Otter and Sugar creeks and along some of the major tributaries of the La Moine River (East Fork, North Fork, Long Creek). Whether these differences in site density are due to actual prehistoric and historic use of the region, or whether the apparent differences in site densities within the study area are the result of variation in archaeological survey coverage, will be explored further in subsequent discussions.

Over the past century, archaeologists have documented and developed a framework of cultural history for the past 12,000 years of human occupation in the state of Illinois (Table 3-1). In the process of constructing this cultural-historical framework, archaeologists have developed and contributed to a still-growing body of knowledge about human cultural processes and earth history. Using interdisciplinary approaches, archaeological research has contributed to our understanding of both present and past climate, plant and animal communities, and landscapes.

Table 3-1. *Chronological Framework for Illinois Culture History.*

Period	Subperiod	Calendar Years (Dates indicate beginning of period)
	Postwar	A.D. 1946
	Urban Industrial	A.D. 1901
	Early Industrial	A.D. 1871
	Frontier	A.D. 1841
	Pioneer	A.D. 1781
	Colonial	A.D. 1650
	Native American	A.D. 1650
Historic	Unidentified	A.D. 1650
Protohistoric		A.D. 1500
Upper Mississippian	Oneota	A.D. 1300
Mississippian		A.D. 900
	Late Woodland	A.D. 300
	Middle Woodland	200 B.C.
	Early Woodland	1000 B.C.
Woodland		1000 B.C.
	Late Archaic	3000 B.C.
	Middle Archaic	6000 B.C.
	Early Archaic	8000 B.C.
Archaic		8000 B.C.
Paleo-Indian		10000 B.C.
Prehistoric	Indeterminate	10,000 B.C. - A.D. 1650

Within our present theoretical framework, Illinois culture history has been divided into a series of temporal periods. Each period is associated with fundamentally different cultures and ways of life, as indicated by the artifacts that are the remains of human habitation. The basic unit of study in archaeological research is the site–a location where artifacts are found. Some sites offer evidence of occupation by more than one group or occupation at different times in the past. When these units of occupation are identified on a site, they are referred to as temporal "components" of that site. A very favorable location might have been used over several millennia and would be referred to as a multicomponent site. Documentation of sites associated with various temporal periods and study of the distribution of sites on the landscape provide opportunities to refine our understanding of the

past and to investigate how human cultures have developed and adapted to changing environmental and social conditions.

The Paleo-Indian Period

Our present knowledge suggests that human history in Illinois began with the arrival of Native Americans during the terminal stages of the last glaciation. The Paleo-Indian period includes the earliest firmly dated and generally accepted archaeological finds in eastern North America (Anderson et al. 1996; Griffin 1967:175-176). This period encompasses the end of the Pleistocene Epoch, and it dates from slightly before 10,000 B.C. to about 7,800 B.C. With deglaciation substantial changes in climate and vegetation patterns occurred. As the climate warmed, deciduous forests expanded northward and replaced pine and spruce parkland (Anderson et al. 1996:3-6). These environmental changes also must have stimulated shifts in human adaptive strategies. The most characteristic Paleo-Indian artifact types are fluted projectile points. Artifacts of this style have been found in association with extinct Pleistocene megafauna at a number of sites in the Great Plains and Western North America (Wormington 1964). Primarily as a result of these finds, Paleo-Indian peoples have come to be regarded as specialized big game hunters (Mason 1962; Wormington 1964), although some authorities, such as Griffin (1967), have questioned this interpretation.

Fluted projectile points have been reported from a number of sites in eastern North America (Anderson et al. 1996; Griffin 1967; Mason 1962), but few eastern sites have preserved faunal remains that can be reliably associated with Paleo-Indian artifacts. However, recent studies in the southeast have provided a firmer association between Paleo-Indians and extinct megafauna (Anderson 1996:33; Anderson et al. 1996). Throughout much of eastern North America, the evidence for Paleo-Indian occupation consists largely of surface finds. Consequently, Paleo-Indian subsistence patterns are not well understood. Common Midwestern and Southeastern Paleo-Indian projectile point styles includ the fluted Clovis and Cumberland types, as well as a variety of unfluted lanceolate forms such as Agate Basin, Beaver Lake, Dalton, Plainview, and Quad points. Frequently, the bases and sides of the unfluted lanceolate points have ground edges to facilitate hafting (Justice 1987:30-44). The unfluted points are thought to be later than the fluted points, and they are assigned to the Early Archaic Period by some researchers, such as Luchterhand (1970). However, for purposes of this study they will be categorized as late Paleo-Indian. Other artifacts common on Paleo-Indian sites in the Southeastern and Midwestern United States are end scrapers with graver spurs adjacent to the beveled working edge, chipped stone tools made from specially produced elongated flakes or blades, spokeshaves, gravers, and occasional chopping and core tools. A prepared core and prismatic blade industry, typical of some Old World Upper Paleolithic cultures, has been identified at some early Paleo-Indian sites (Griffin 1967; Mason 1962).

Many researchers divide the Paleo-Indian period into two subperiods. Early Paleo-Indian, dated to 11,500 to 10,800 BP, was marked by the appearance of fluted Clovis points. The dating of eastern Clovis points is still based largely on the radiocarbon chronologies of sites in the Southwest and the southern Plains, because there are still very few reliable Paleo-Indian dates from the eastern United States. The Late Paleo-Indian subperiod (circa. 10,500 to 10,000 B.P.) is marked by the

presence of unfluted lanceolate forms, including Dalton, Beaver Lake, Agate Basin, and Scottsbluff points. Early Paleo-Indian sites are rare, but sites associated with the Dalton culture are relatively common throughout Illinois (Koldehoff and Walthall 2000).

Paleo-Indians appear to have been organized into small, highly mobile bands that typically left small, rather ephemeral campsites as evidence for their occupation of a site (Koldehoff and Walthall 2000). Following a model of hunter-gatherer subsistence strategies developed by Binford (1980), Early Paleo-Indians, if their subsistence was focused strongly on the now-extinct megafauna, are assumed to have had a logistically organized or collector pattern of settlement adaptation. Hunter-gatherers employing this settlement strategy maintain central base camps and send task groups from the central bases for extended periods of time to exploit particular resources. The tasks groups frequently establish temporary camps near the targeted resources, from which the partially processed resources are brought back to the central base for consumption. The locations of base camps are shifted periodically as resources in a particular area are depleted. Logistically organized hunter-gatherers usually have formalized tool kits that are made from high- quality lithic materials. Tools are carefully made and are curated, or carried about and reused until they are broken or exhausted (Anderson et al. 1996:6). Paleo-Indian lithic technology seems to be consistent with this model. Some investigators have emphasized the importance of high-quality lithic materials to the Paleo-Indians and have suggested that sources of high quality chert were important loci in their settlement systems (Anderson and Sassaman 1996). However, it is unknown whether Paleo-Indians in the eastern United States (including Illinois) had a subsistence base that was focused primarily on megafauna. If Paleo-Indians practiced a more generalized subsistence base, this would substantially alter the interpretation of settlement strategies for this time period.

The Archaic Period

The Archaic refers to the period of the Holocene Epoch during which the eastern United States was occupied by hunting and gathering cultures that did not produce pottery. The lithic technologies of this period differed from the Paleo-Indian period in that they included a variety of ground and polished stone tool types, many of them relating to plant food processing and wood working (Griffin 1967; Wiant and Berkson 2000). These developments are thought to reflect adaptation to warming climatic conditions and the expanding deciduous forests in post-glacial times. Also, by the beginning of the Archaic, the Pleistocene megafauna that presumably had been exploited by the earlier Paleo-Indians were extinct, and the ranges of extant tundra-adapted herd animals, such as caribou, shifted far to the north. Resources critical to human subsistence economy were distributed more homogeneously in the early post-glacial forests. Following Binford's (1980) model of hunter-gatherer adaptive strategies, a shift toward a forager adaptive strategy is predicted (Anderson et al. 1996:6-7; Anderson and Sassaman 1996:27-28). Typically, foragers exploit a relatively broad range of plant and animal resources that are found in the immediate vicinity of their residential camps and shift their residential bases as these resources are exhausted. A shift in technology occurred along with the change in settlement and subsistence strategies. Fewer formal tools were made and there was more use of expedient flake tools and other artifacts that could be

quickly made when needed and abandoned as tasks were completed (Anderson et al. 1996:6-7; Anderson and Sassaman 1996:27-28). Fluted and lanceolate projectile point types disappeared, and they were replaced by corner-notched, side-notched, and stemmed projectile point forms. Burials became common for the first time during the Archaic period, along with artifacts that can be considered to have social or ritual significance, rather than reflecting purely utilitarian use. Both of these developments reflected population growth and increases in social complexity. In the Eastern United States, the Archaic period covers a long span of time – more than six millennia. It has become customary to divide it, often rather arbitrarily, into three subperiods, designated simply as Early, Middle, and Late Archaic (Wiant and Berkson 2000). Excavations at the Koster site in the lower Illinois River valley, along with other stratified sites near the La Moine drainage, have provided important information on Archaic chronology and adaptations (see Brown and Vierra 1983; Neusius 1982).

The Early Archaic Subperiod

The Early Archaic subperiod, dated from 8,000 B.C. to 6,000 B.C., is recognized by a series of corner-notched, side-notched, and stemmed projectile point forms that typically display beveling or serration on the blades and grinding on the stems or bases (Anderson et al. 1996; Fowler 1959; Klippel and Maddox 1977). Occasionally, these projectile point forms have been found in the lower levels of deeply stratified sites, such as Graham Cave (Klippel 1971) in Missouri, Modoc Rock Shelter in southern Illinois (Fowler 1959), the St. Albans site in West Virginia (Broyles 1971). However, typical Early Archaic sites tend to be small and shallow. Frequently, they have been disturbed by plowing. Early Archaic sites are often distributed well into the uplands in what was later prairie-vegetated areas. Paleoenvironmental studies based on faunal, botanical, and pollen remains indicate that a closed-canopy deciduous forest covered much of the state of Illinois during the Early Archaic subperiod. Settlement strategies were likely based on a forager model with many small groups moving frequently among seasonally abundant resource patches.

The Middle Archaic Subperiod

A Middle Archaic subperiod, dating from 6,000 B.C. to 3,000 B.C., is somewhat arbitrarily distinguished in the states of the Midsouth and Midwest. Some authorities, such as Griffin (1967:178), prefer to end this period at 4,000 B.C. The Middle Archaic is characterized technologically by an increase in the number of ground and polished stone tools. Grooved axes, pestles, gorgets, and ground stone atlatl weights appeared during this time period. An expansion of the bone, antler, and shell industries also occurred (Griffin 1967:178). Burials are common at some sites in the Midwest that date to this period. The burials tend to be flexed and sometimes have grave goods of a utilitarian or personal/ornamental nature. Domestic dog burials also are common at some Middle Archaic sites. Shell mound sites dating in part to the Middle Archaic period occur along some major rivers in the Midsouth, including the Green River in western Kentucky and portions of the Tennessee River drainage (Jefferies 1987:35-37).

The Middle Archaic corresponds to a period of drying climatic conditions (the Hypsithermal) and the eastward expansion of the Prairie Peninsula into the Midwest (King 1981; Wright 1968). Some researchers have suggested that the drier climate may have affected human settlement

strategies as well as resource distributions in west-central Illinois (see Brown and Vierra 1983; Stafford 1991). Evidence suggests that in many regions human settlement shifted toward a more logistically organized system (collector strategy) as economically important resources were concentrated near major river valleys in response to the expansion of prairie vegetation in the uplands. Another major Middle Archaic development was the earliest evidence of horticulture. Domesticated plants, including squash (*Cucurbita pepo*) and sumpweed (*Iva annua*), have been reported from Middle Archaic contexts dated to before 3,000 B.C. at the Koster and Napoleon Hollow sites in western Illinois (Asch 1994:28-32).

The Late Archaic Subperiod

The Late Archaic subperiod is dated from 3,000 B.C. to roughly 1,000 B.C. The ending date corresponds to the approximate time of the introduction of ceramic production technology into the Midwest. In many of the major river valleys of the Midsouth and Midwest, the Late Archaic was characterized by noticeable population increases and evidence of cultural elaboration. These developments were reflected in the formation of extensive shell middens along many of the major river systems of the Southeast, an apparent regional diversification of culture content, and the development of widespread exchange networks for the transfer of various exotic goods between different regions (Griffin 1967:178-180; Jefferies 1987).

Current archaeobotanical evidence indicates early horticulture was widely practiced in the Midwest during the Late Archaic period (Asch 1994:28-32; Yarnell 1976). Remains of squash and bottle gourd have been found in Late Archaic contexts at a number of sites, including Peter Cave, Salts Cave, Mammoth Cave, and several shell middens on the Green River in central Kentucky (Gremillion 1994). Previously, it was assumed that squash and bottle gourd (*Lagenaria siceraria*) were Mesoamerican cultigens, but some ethnobotanists now think that they were independently domesticated in the eastern United States (Asch 1994; Gremillion 1994:87; Smith 1987). The domestication of two indigenous eastern North American crop plants, the sunflower (Helianthus annuus) and the sumpweed, also was underway by the end of the second millennium B.C. (Gremillion 1994, Yarnell 1976).

Late Archaic occupations in western Illinois are recognized by the presence of various stemmed projectile point forms, in particular, the Etley, Williams, and Saratoga projectile point types. Data for the Late Archaic period were recovered in the course of excavations carried out at several sites in western Illinois, including the Koster site (Brown and Vierra 1983). With the end of the Hypsithermal climatic interval, settlement expanded somewhat into upland areas, but in the Late Archaic and all subsequent temporal periods, human settlement remained focused on stream valleys and margins. This focus is reflected in site distributions as well as the more frequent recovery of aquatic faunal resources in subsistence assemblages.

The Woodland Period

The Woodland period in western Illinois, as in most of the eastern United States, spans about two millennia between 1,000 B.C. and A.D. 900. The beginning of the Woodland period is marked by the appearance of burial mounds and grit-tempered pottery (Griffin 1967). By convention, the Woodland period is divided into three subperiods (Farnsworth 2000). Griffin (1967) suggested dates of 1000 B.C. to 200 B.C. for Early Woodland, 200 B.C. to A.D. 400 for Middle Woodland, and A.D. 400 to A.D. 900 for Late Woodland. These dates and subdivisions were based primarily on data from Ohio and central Illinois. There was considerable regional diversity during Woodland times. For some regions of the eastern United States, the standard chronological scheme described by Griffin (1967) must be modified substantially both with respect to dating and to internal division.

The Early Woodland Subperiod

The Early Woodland subperiod (1,000 to 200 BC) in the Ohio Valley and central Illinois was marked by the appearance of crudely made, thick, grit-tempered vessels with wide mouths and flattened or sometimes rounded bases. Frequently, both the inner and outer surfaces displayed marks that were made with a cord-wrapped paddle. These early grit-tempered ceramics are classified as Fayette Thick in Ohio and Marion Thick in Illinois (Griffin 1967:180). In Ohio and eastern Kentucky, the Adena Culture, an elaborate mortuary cult featuring large earthen mounds, developed at this time. In Illinois, straight-stemmed Kramer points typically occurred on sites that produced Marion Thick pottery. Several contracting-stem forms, including Gary Contracting Stemmed, Dickson Contracting Stemmed, Adena Stemmed, Little Bear Creek, and Cypress Stemmed, occur in Early Woodland contexts across much of the Midsouth (Justice 1987:189-198). Sites of this time period are often difficult to detect, as settlement patterns appear to include mainly small sites in low-lying flood plain areas. Subsistence remains recovered from Early Woodland sites and components suggests a continuation of trends evident in the Late Archaic subperiod–increasing reliance on domesticated plants and aquatic resources.

The Middle Woodland Subperiod

Middle Woodland (200 B.C. to A.D. 300) throughout much of the Midwest and Midsouth was characterized by the development of Hopewellian culture (Griffin 1967:180-186). In some regions large burial mounds and elaborate earthworks with presumed ceremonial functions were constructed during this period. Associated with mound construction was a pan-regional exchange system, called the Hopewell Interaction Sphere, which facilitated the distribution of exotic materials–including marine shell from the Gulf Coast, copper from the upper Great Lakes, and obsidian from Wyoming–among Hopewell sites across much of the midcontinent. A variety of specialized ceremonial artifacts also were exchanged (Struever and Houart 1972). Hopewell culture reached its greatest elaboration in southern Ohio and, secondarily, in west-central Illinois. Typical Illinois Hopewell-related pottery is thinner and better fired than Early Woodland pottery, and grit temper is eventually replaced by limestone. The exterior surfaces of these vessels are decorated by incising and by zones filled with rocker, dentate-stamped, or other impressions. Much of the utilitarian ware shows cordmarked or plain exterior surfaces. Considerable regional variation in Middle Woodland subsistence patterns now is suspected, with varying combinations of intensive

plant collecting, small-scale gardening, and the use of tropical cultigens present in different areas (Asch et al. 1979; Yarnell 1976). Struever (1968b) defined Middle Woodland settlement patterns for the lower Illinois River valley, but it is unclear whether this system of regional and local mound centers, mortuary sites, processing sites, and habitation sites continues into the central Illinois River valley (and the LRAA).

The Late Woodland Subperiod

The Late Woodland subperiod (A.D. 300 to A.D. 900) often has been described in negative terms–burial ceremonialism declined in elaboration, exotic trade goods became less common, and many of the aesthetically pleasing Hopewell artifact types disappeared. In some localities there seems to have been a reversion to a more dispersed settlement pattern involving greater seasonal mobility. Ceramic decoration became less elaborate, but technical improvements occurred which permitted the manufacture of thinner, better-fired wares. In some regions within the eastern United States, cultures with a Late Woodland style of cultural adaptation persisted until European contact, while in the Mississippi Valley and the adjoining major drainages, Late Woodland culture formed the substratum out of which the more elaborate Middle Mississippi cultures later developed (Griffin 1967:186-189). Intensive maize agriculture became common near the end of the Late Woodland period and, along with fish and other aquatic resources, formed the economic basis for the Mississippian fluorescence that followed. Use of the bow and arrow became widespread in eastern North America during Late Woodland times. Its introduction was marked by the development of small, notched projectile point forms that were suitable for use as arrow tips (Justice 1987). In some regions, the beginning of the Late Woodland period is marked by a dispersal of settlements into upland and headwater areas that had not been intensively used for several millennia. This settlement dispersal is sometimes attributed to the breakdown of the cohesive social effects of the Hopewell Interaction Sphere, but it also corresponds closely with the introduction of the bow and arrow and the beginnings of more intensive maize agriculture. By the end of the Late Woodland period in Illinois, populations are beginning to re-aggregate in major river valleys.

Mississippian Period

The Mississippian period, dating from about A.D. 900 to A.D. 1300, was the latest part of the prehistoric sequence over much of the Midwest and the Southeast. Mississippian sites include some of the most visible and spectacular prehistoric cultural resources in the region. During this period large stockaded towns developed. They often contained flat-topped earthen mounds that were arranged around plaza areas. The largest Mississippian towns clearly were central places for ranked, chiefdom-level societies. The flat-topped mounds supported structures that either had special ceremonial functions or were the dwellings of the elite. Typical Mississippian houses were rectangular to square, between 4 meters and 12 meters long, and usually of wattle-and-daub construction. Frequently, the wall posts were set in narrow trenches (Emerson 2000; Griffin 1967:189-190; Milner et al. 1984).

Although the major temple-towns have received the most attention from archaeologists,

investigations at several Midwestern localities suggest that the bulk of the Mississippian population lived in small hamlets or farmsteads situated near pockets of good agricultural soils or productive lakes and marshes (Fowler 1978, Muller 1986; Smith 1978). Mississippian societies were predominantly agricultural. Maize was the primary crop, but it was supplemented by a variety of starchy seed crops, including maygrass (*Phalaris caroliniana*), little barley (*Hordeum pusillum*), chenopod (*Chenopodium berlandieri*), and erect knotweed (*Polygonum erectum*), all of which had been used in increasing amounts throughout the Woodland period. In some localities, such as the American Bottom, beans were not an important crop until late in the Mississippian period (Lopinot 1994). In many parts of the Southeast and Midwest, the intensive collection of starchy seeds, as well as fishing and the hunting of deer, turkeys, and waterfowl, continued to be important elements of the Middle Mississippian subsistence base (Smith 1978).

The material culture of Middle Mississippian societies displays a number of distinctive features. Relative to Late Woodland ceramic assemblages, Middle Mississippian ceramics are more abundant and diverse. In addition to the basic jar and simple bowl forms, a variety of new and specialized ceramic forms appeared during the Mississippian period. Included among these were bottles, beakers, plates, salt pans, funnels or juice presses, pottery trowels, and spindle whorls. Effigy adornos and handles were added to some vessels. Mississippian potters used a variety of techniques to decorate their pottery, including filming or slipping, polishing, incising, engraving, punctuating, and negative painting. Most frequently, crushed shell, rather than crushed rock or sherds, was used as a tempering agent in Mississippian pottery.

Small projectile point forms that were specialized for use as arrow tips were common at many Mississippian sites. Characteristic Mississippian projectile points include small unnotched triangular points (Madison points), small side-notched or basally notched points (Cahokia points), and small expanding-stem points (Scallorn points). Large, bifacially chipped stone tools that were used as hoes and spades were important items in Middle Mississippian lithic assemblages. The use of these artifacts as digging tools is indicated by the presence of heavy polish on the working edges. Hoe chips, re-sharpening flakes with heavy polish on their dorsal surfaces, are common finds at Middle Mississippian habitation sites. Extensive exchange systems developed in parts of the Southeast and Midwest during this period. Among the materials exchanged were salt, copper, marine shell, and high-quality chert. The Crescent Hills quarries near St. Louis (Holmes 1919:195), the Mill Creek quarries of southern Illinois (Holmes 1919:187-194; Phillips 1900), and the Dover quarries near the Cumberland River in Stewart County, Tennessee (Gramly 1992) were the source areas for several different distinctive chert types that were traded widely throughout the Midwest and Mid-south. These special chert types were used to make bifacial hoes and spades, as well as the large bifacial knives, axes, and maces that are sometimes found at Mississippian sites in mortuary and ceremonial contexts (Gramly 1992; Griffin 1967; Milner et al. 1984).

By between A.D. 1300 and 1400, the large population centers that characterized the Middle Mississippian period were abandoned throughout most of Illinois, including the LRAA. In their place are the scattered remains of what archaeologists call Upper Mississippian or Oneota cultures. Oneota subsistence practices and settlement patterns are very similar to the Middle Mississippian

in that there is a continued emphasis on maize and fish as primary staple foods, and the majority of the populations apparently lived in scattered small hamlets with occasional larger villages. Ceramics continue to be made with shell tempering, and often there are decorated vessels. Lithic technology is also very similar to the Middle Mississippian period. However, the elaborate burial ceremonialism and production/display of sumptuary goods by a social elite are not characteristics of Oneota, and temple-town mound centers are not associated with this time period. Overall, population appears to be lower compared to the preceding Middle Mississippian period. By A.D. 1600, the beginning of the protohistoric period, there are apparently few occupied sites in the western Illinois region, which creates difficulties when attempting to link historically described Native American groups with prehistoric sites, settlement systems, or cultural patterns.

Historic Period

The arrival of the French in the late 17th century provides the first written accounts of Native American lifeways in Illinois. With this record comes the identification of specific Native American tribes and more detailed documentation of everyday life. Historic Native American sites are generally rare but provide important information on lifeways that were in rapid transition as a result of cultural contact and conflict. Historical documents also provide information about European and Euro-American lifeways on the frontier. Few sites are recognized for the Colonial Historic subperiod (Warren 2000), but increasing European and Euro-American influences and settlement provide more cultural material and sites associated with the Pioneer Historic subperiod. The increasing Euro-American presence also resulted in more conflicts between Native Americans and European settlers. The conflicts culminated in 1832 with the Black Hawk War, after which the remaining Native American tribes in Illinois were required to move west across the Mississippi River. By the beginning of the Frontier Historic subperiod in A.D. 1841, Native American settlements in Illinois are generally absent, and Euro-American settlement spread throughout the state (McCorvie and Wagner 2000).

Written history does not adequately record many aspects of daily life; instead, written histories often focus on singular events or persons. We have learned that archaeological investigation can provide insight into past cultural behavior that supplements and expands the written historic records. Increasingly, archaeologists are exploring the combined written and material record of the past two centuries to provide a more comprehensive interpretation of human history, including both Native American and Euro-American cultures.

Archaeological Resources of the La Moine River Assessment Area

When compared with some other regions in Illinois, the amount of previous archaeological work in the La Moine River Assessment Area (LRAA) is relatively great. Figure 3-1 shows the distribution of previous systematic archaeological surveys in the study area. These survey areas include linear tracts that follow water lines or highway corridors and larger contiguous blocks such

as areas around proposed coal mines and reservoirs. In contrast to many regions within the state, surveyed areas in the LRAA include two broad highway corridors (US 67, running generally north-south through Schuyler and McDonough counties and the Central Illinois Expressway, running east-west across McDonough and Hancock counties) which provide transect samples of many upland and flood plain settings within the study area. Additional block surveys were conducted for coal mines in Schuyler, Brown, and McDonough counties and on portions of the Illinois River bluffs in Brown, Schuyler, and Fulton counties. Comparison of Figures 3-1 and 3-2 clearly shows that regardless of whether surveys have focused on upland or flood plain settings, archaeological resources are abundant. Wherever surveys have been systematically conducted in the LRAA, high densities of archaeological sites have been documented.

Much, but not all, of the archaeological work within in LRAA has stemmed from requirements for compliance with Federal and State cultural resource management laws that may require survey, or in some cases excavation, of sites affected by development and construction projects. In addition, research-oriented archaeological investigations, including large-area systematic surveys as well as site-specific targeted excavations, serve to complement the projects conducted solely for the purpose of compliance with Federal or State regulations. Still, much of the research to date in this region has consisted of identifying and documenting sites through systematic and nonsystematic surveys, which is a necessary first stage in conducting either research-oriented investigation or compliance-related work. Survey projects provide valuable information about site distributions and long-term trends in human landscape use throughout history and prehistory. Excavation projects have been much fewer in number than the surveys. However, they provide qualitatively different information about prehistoric lifeways that is not obtainable from survey data alone. The following discussion of archaeological resources in the LRAA summarizes both survey and excavation data.

One factor affecting our current state of understanding of archaeological resources is that not all watershed regions have received equal attention. Even within a single watershed region, both industrial development and archaeological research interests--the two major factors that provide impetus to study of cultural resources--have waxed and waned over time. The record of archaeological research in the LRAA largely reflects the impact of Federally mandated cultural resource management studies that post-date the 1960s. The construction of new or expanded transportation routes, the development of coal mines, the construction of reservoirs, and systematic survey of state parks and conservation areas for the purpose of long-term cultural resource management have all resulted in documentation of numerous sites within the LRAA. Some of these sites have been excavated and provide more information about past lifeways. Major recent sources of information about sites within the LRAA include: 1) relatively unsystematic surveys conducted under the auspices of the Historic Sites Surveys during the early 1970s (Holstein et al. 1975; Shields 1971, 1974; Stephens 1972); 2) shoreline surveys conducted along the Illinois River (Esarey 1988); 3) highway corridor surveys, including survey portions of a 2-mile-wide corridor for the Central Illinois Expressway (Conrad 1981) and survey and test excavations for the US Route 67 corridor expansion (Cross 1998); 4) survey at excavations at various coal mines (Bevitt and Neal 1997; Conrad 1978; Dwyer 1983; Esarey et al. 1982; Howe et al. 1996; Neal 1992a, 1992b; Neal and

McNerney 1994; Wiant and Barr 1983). Collectively, these sources provide considerable information about site distributions within the entire La Moine River drainage. However, survey coverage still appears to be very limited in the northern third of the drainage, where few block surveys have been conducted, and surveys are generally confined to narrow utility corridors (e.g., Babson 1991; Conrad 1990, 1992, 1994, 1995, 1997, 1998, 1999a, 1999b; Howe 1992).

However, compliance with Federal and State regulations is not the only factor that affects archaeological survey and excavation within a region. Scholarly research has also provided an impetus for collecting site distributional data as well as excavations. The La Moine River basin has a long history of archaeological research, beginning with John Francis Snyder's (1895, 1909a, 1909b, 1962) and Otis Mason's (1880) excavations into mound sites of various ages and the Smithsonian Institution's explorations into other mound sites in the Illinois River valley and its tributaries in the late 19th century (Thomas 1887, 1894). These early investigations focused almost exclusively on burial and platform mounds–the most highly visible remains of Native American prehistoric occupation on the landscape. Though the methods used in these excavations are not congruent with modern standards, they provided valuable information on a class of sites that were rapidly being destroyed through nonsystematic excavation and relic hunting.

Sites in Schuyler, Brown, and Fulton counties were partially excavated and described briefly by Cole (1929), and some of these sites were also described in *Rediscovering Illinois: Archaeological Explorations in and around Fulton County* (Cole and Deuel 1937). Perhaps the most important excavations from this period were carried out by the University of Chicago at the Crable site, a Middle Mississippian and Oneota mound and village center located in southern Fulton County (Morse 1960, 1969; Smith 1951). Faunal remains recovered from several sites in the study area were incorporated into Baker's (1930, 1941) studies of ethnozoology. However, during the first half of the 20th century, most of the archaeological work undertaken in the La Moine drainage was conducted by private individuals rather than scientific research institutions or museums (see Ellis 1940; Harris 1938; Knoblock 1956; MacDonald 1950; Morse et al. 1961; Titterington 1950; Wadlow 1949, 1953). Archaeological investigations carried out the LRAA prior to World War II showed that this is a region that is relatively rich in important archaeological resources. These resources have provided information on regional chronology, as well as a variety of other research issues, and they have the potential to continue to contribute to our understanding of the past.

From the 1940s through 1970, only sporadic work was conducted in the LRAA, and much of this was conducted by nonprofessional archaeologists. However, survey data from the central Illinois River valley that focused on Middle Woodland sites was incorporated into Struever's (1968a) dissertation, Struever's (1968b) analysis of Woodland subsistence and setlement systems, and Struever and Houart's (1972) examination of Middle Woodland Hopewell regional exchange and settlement organization. Also during this period, multiple nonprofessional excavations were conducted at the larger Middle Mississippian and Oneota sites in the region (MacDonald 1950; Morse et al. 1953, Morse et al. 1961).

Relatively large tracts were systematically surveyed in Brown and Schuyler counties under the auspices of the Historic Sites Surveys in the early 1970s (Holstein et al. 1975; Shields 1971, 1974; Stephens 1972). These surveys documented over 300 sites, most of them located near the Illinois River bluffs in the southeastern part of the study area.

After implementation of Federal cultural resource management legislation in the 1960s, archaeological information from the region increased significantly. These laws often require archaeological surveys or site evaluations of areas to be affected by federally funded development or construction projects such as highways or reservoirs. Some of the institutions that have been major contributors to the archaeological data base through contract archaeology projects in the LRAA include the Illinois Transportation Archaeology Research Program and its predecessors at the University of Illinois, the Illinois State Muiseum, the University of Chicago, Western Illinois University, and American Resources Group, Ltd (Carbondale). Most of the contractual archaeological work in the region has been required because of expansion of existing highways or construction of new roads, coal mining, water line and utility corridor emplacements, and various small-scale development projects. In addition to the contractual archaeological work conducted in the study area, several scholarly studies have been conducted that continue to enhance and synthesize our knowledge of the prehistoric cultures of the region. These studies include use of the Historic Sites Surveys results in development of predictive models for the region (Lewis 1978; Lewis and Murphy 1981), systematic investigation of Late Woodland settlement and social organization (Green 1977, 1987), and a recent synthesis of Mississippian and Oneota cultural manifestations in the region (Conrad 1991).

As a result of these and other projects, current records maintained with the Illinois Archaeological Survey site files indicate nearly 8% of the total LRAA area has been subjected to systematic archaeological survey (Figure 3-1). This is a relatively high percentage relative to other assessment areas that have been studied, but it is still a small part of the total area within the La Moine drainage. The high level of survey coverage reflects the presence of large block tracts surveyed for coal mining operations, and the 2-mile-wide highway corridor transect that crosses Hancock and McDonough counties.

Because the surveys shown in Figure 3-1 are the result of many individual projects conducted for a variety of compliance and research purposes, their distribution and the corresponding distribution of known archaeological sites in the LRAA (Figure 3-2) is notably uneven. However, all large-area systematic surveys that have been conducted in the region have documented many sites. The composite result of these efforts are several major clusters of sites (Figure 3-2) that generally correspond to the locations of larger survey tracts. However, the site clusters provide potentially complementary information about adaptations within the LRAA, because the composite result of the survey coverage is a representation of major landform settings that include upland, Illinois River bluff/valley, La Moine River valley, and tributary valley settings. The distribution of temporal components represented in the major site clusters can be compared to provide a more complete interpretation of human adaptations in the LRAA through time. It should be understood that the collective survey areas and site distributions do not necessarily comprise a statistically

representative sample of the region. However, these data do permit some tentative interpretations to be drawn regarding historic and prehistoric settlement patterns and landscape use in the LRAA region.

Summary of Archaeological Resources in the La Moine River Assessment Area

Based on information recorded in the electronic database of the Illinois Archaeological Site Files as of 1 May 2001, a total of 3,089 archaeological sites has been recorded in the LRAA (Figure 3-2). These sites range in age from Paleo-Indian through the Postwar Industrial periods (Figures 3-3 through 3-23). This number is large compared to the site frequency data in other drainages of comparable size in Illinois, reflecting the intensity of archaeological work in this region, the high density of archaeological resources along portions of the La Moine and Illinois rivers, and the relatively high proportion of land surface that has been surveyed. Several of the sites have more than one temporal period or component present. The total number of recorded components is 3,545 (Table 3-2), including 2,106 prehistoric components (Figure 3-3) and 244 historic components (Figure 3-16) that could not be assigned to more specific time periods (76.1 percent of sites). This high proportion of undifferentiated sites is due to the practice of reporting all locations where artifacts were found, even if only a single artifact was recovered, as sites. Though this reporting practice may inflate site numbers, it also affords an opportunity to evaluate all cultural resources regardless of the apparent richness of the deposits. Many time periods, including Paleo-Indian, Historic Native American, Colonial, and Pioneer, are characterized by sites that have very low artifact densities. Sites of these temporal periods are undeniably important to our understanding of the past, and it would be inappropriate to consider sites to be unimportant simply because of the low number of artifacts recovered.

Fifteen Paleo-Indian components (0.5 percent of the total prehistoric components and 1.6 percent of prehistoric components assignable to temporal periods [n=921]) have been formally identified in the LRAA (Figure 3-4). The Paleo-Indian components are widely scattered across the drainage and occur in a variety of landform settings (uplands, terraces, valley margins). There do not appear to be any clusters of these sites that would indicate a residential region for these mobile hunter-gatherers. Paleo-Indian sites are extremely difficult to locate because they often have very low artifact densities, a factor that may help to account for their apparent absence in some regions. In addition, they may be buried in flood plains by later Holocene deposits, or their presence may be masked by the reoccupation of sites later in time.

Sites with components assignable to the undifferentiated Archaic period (Figure 3-5) are more numerous. These sites produced artifacts identifiable to the Archaic period (8000 to 1000 B.C.), but were not assigned to a more specific subperiod within this broad time span. One hundred twenty were listed in the site files. They account for 4.0 percent of the total recorded prehistoric components in the study area and 13.0 percent of the prehistoric components assignable to some temporal period. These sites are scattered across the drainage, but are concentrated in the southeastern third of the study area. Many of these sites were reported as a result of the Historic

Table 3-2. Archaeological Resources in the La Moine River Assessment Area.

Period	Subperiod	Calendar Years (Dates indicate beginning of period)	Number of Components
	Postwar	A.D. 1946	45
	Urban Industrial	A.D. 1901	101
	Early Industrial	A.D. 1871	96
	Frontier	A.D. 1841	31
	Pioneer	A.D. 1781	4
	Colonial	A.D. 1650	0
	Native American	A.D. 1650	0
Historic	Unidentified	A.D. 1650	244
Protohistoric		A.D. 1500	0
Total Historic Components			521
Upper Mississippian	Oneota	A.D. 1400	0
Mississippian		A.D. 900	54
	Late Woodland	A.D. 300	185
	Middle Woodland	200 B.C.	70
	Early Woodland	1000 B.C.	44
Woodland	Unidentified	1000 B.C.	87
	Late Archaic	3000 B.C.	136
	Middle Archaic	6000 B.C.	24
	Early Archaic	8000 B.C.	186
Archaic	Unidentified	8000 B.C.	120
Paleo-Indian		10000 B.C.	15
Prehistoric	Unidentified	10000 B.C.	2,106
Total Prehistoric Components			3,027
Total Components			3,548
Total Sites			3,089

Sites Surveys of the 1970s; at that time, the reporting institutions did not differentiate temporal subperiods within the Archaic. Clusters of undifferentiated Archaic sites are evident at the locations of these project area. A few widely undifferentiated Archaic sites are present elsewhere in upland locations as well as near streams. After about 1980, finer temporal affiliation was provided for Archaic period sites, and components were assigned to one of three subperiods.

A total of 186 sites (6.1 percent of the prehistoric components and 20.2 percent of components assigned to temporal period) with Early Archaic components (Figure 3-6) have been identified within the study area. This is the largest number of components of any prehistoric period. The high frequency reflects both the distinctive artifact styles of this temporal period and the use of the all portions of the landscape by small, mobile groups. Sites of this time period are present on all available landforms–even at the divides between watersheds–though they may be deeply buried in larger stream valleys by more recent alluvial deposits. This distribution in all portions of the landscape also reflects the ubiquitous distribution of subsistence resources during the early Holocene, prior to the expansion of extensive prairies in the region. Early Archaic sites are found wherever larger surveys have been carried out, and the distribution shown in Figure 3-6 mirrors the distribution of surveyed areas in general.

In sharp contrast to the Early Archaic period, only 24 sites (0.8 percent of the prehistoric components and 2.6 percent of prehistoric components assignable to temporal periods) with Middle Archaic components (Figure 3-7) have been reported in the study area. Most of the Middle Archaic occupations are located near the larger, more permanent streams in the study area, and there are few sites in upland settings, compared to the previous temporal period. None are reported at watershed divides. This reduction in the number of components cannot be attributed to the length of the time period, since the Middle Archaic is comparable to the duration of both the Early Archaic and Late Archaic periods. However, this temporal period coincides strongly with the Hypsithermal climatic episode–a period of warmer and drier climatic conditions during which extensive prairies became established in the state. It is likely that the reduction in the number of Middle Archaic components and their tendency to be located near permanent streams reflects changing environmental conditions. With the establishment of prairies, the upland till plain of western Illinois was likely relatively poor in resources suited to human consumption. The distribution of sites dating to this time period reflects changes in human settlement patterns that were effected in response to these altered environmental conditions.

Late Archaic occupations are much more numerous that Middle Archaic components within the LRAA. One hundred thirty-six sites (4.5 percent of the prehistoric components and 14.8 percent of components assignable to temporal perio) with Late Archaic components (Figure 3-8) have been identified. The distribution of sites of this period reflects partial reoccupation of upland settings and continued use of areas within and near the major stream valleys. Though there are more sites in the uplands with Late Archaic components, the watershed divides were not reoccupied (except in the southernmost margin of the study area, close to the Illinois River valley). The reoccupation of many upland settings may reflect a reduction in the extent of prairies in western Illinois. Most paleoenvironmental reconstructions of the region suggest that by the middle of the Late Archaic period (about 2,000 BC) environmental conditions and resource distributions approached their modern baselines. For the La Moine River drainage, this would have meant a relatively even mixture of forests and prairies, which might have facilitated reoccupation of upland settings. Even though climatic and environmental conditions may have ameliorated, human settlement and subsistence remained oriented toward riverine locations and resources–a trend that continued throughout the remainder of the prehistoric era.

Sites with undifferentiated Woodland period components (Figure 3-9) account for 87 (2.9 percent) of the recorded prehistoric components (9.4 percent of components assignable to time periods). Their distribution is comparable to the undifferentiated Archaic period sites, but more Woodland sites are concentrated in the Illinois River bluffs portion of the study area. The vase majority of these sites were reported as part of the Historic Sites Surveys of the 1970s. Few Woodland sites have been reported from the uplands or small tributary stream drainages, reflecting an increased focus of subsistence and settlement on main river valleys in the later prehistoric periods.

Early Woodland sites (Figure 3-10) are difficult to identify, and this time period is less well-represented in many regions of the state. However, Early Woodland components are fairly abundant in the LRAA, and they account for 44 (1.5 percent) of the recorded prehistoric components (4.8 percent of components assigned to specific time periods). Many of the Early Woodland components are located on the Illinois River bluffs and on low Holocene terraces in the Illinois River and La Moine River flood plains. Only a few Early Woodland sites are located in upland settings, but sites of this age are clearly distributed throughout the drainage, albeit unevenly.

Middle Woodland components (Figure 3-11) are more numerous, accounting for 70 (2.3 percent) of the reported prehistoric components (7.6 percent of components assigned to specific temporal periods). A good percentage of these sites are mound sites, especially those located near the Illinois River. However, habitation sites and special-purpose or short-term Middle Woodland sites are also recorded. As with the Early Woodland period, sites with Middle Woodland components tend to cluster along the Illinois River bluffs and valley. However, Middle Woodland sites are also distributed farther up the La Moine River valley, along its major tributaries, near the La Moine River headwaters, and even in upland settings relatively far removed from permanent streams. The Friendly Neighbor site in McDonough County has Middle and Late Woodland components. Recent excavations conducted at the site revealed evidence of human burials, so the site is now protected under state and federal laws. The Carter Creek site (also in McDonough County) is a ring-midden site with evidence for both Middle and Late Woodland period occupation. It has been determined to be eligible for listing on the National Register of Historic Places (Esarey et al. 1984).

Late Woodland components (Figure 3-12) are the second most numerous of all time periods, with 185 Late Woodland components (6.1 percent of all prehistoric components; 20.1 percent of components assigned to temporal periods) listed in the site files. Aside from the increase in numbers, the overall distribution of Late Woodland components is broadly similar to the distribution of Middle Woodland sites. They are in greatest abundance along the Illinois River valley, but are also found in the La Moine River valley, its major and minor tributaries, and scattered throughout the uplands. There are even Late Woodland sites on the major drainage divides in settings that have not been inhabited since Early Archaic times. One large cluster of Late Woodland sites is located in the Bauer Branch drainage, a minor tributary of Sugar Creek (Figure 3-12). This cluster of sites was the result of intensive survey of the Bauer Branch drainage by Green (1977). The results of this survey and of limited excavations in the Bauer Branch drainage became the focus of Green's (1987) dissertation. He found that in the early part of the Late Woodland period, there was an expansion

of settlement into upland areas and minor tributary valleys like Bauer Branch. Locations on the landscape that had not been occupied for several millennia were settled by Late Woodland groups, usually creating small sites that may represent hamlets or seasonal occupations. This expanded settlement may have been due in part to a breakdown of regional social cohesion that followed the dissolution of the Middle Woodland Hopewell Interaction Sphere and its possible pan-regional integrative effects. It appears to predate the introduction of maize into the region, so changes in subsistence probably did not play a substantial role in the settlement shifts. However, the settlement pattern changes may coincide with the introduction of the bow-and-arrow into the region, which may have made individual hunters and households more economically autonomous. Later in the Late Woodland period, settlements again become more nucleated and populations are again concentrated in larger stream valleys. This pattern of expansion of Late Woodland settlement into upland areas and subsequent contraction of settlement is not unique to the La Moine drainage. It has been documented by general site distribution data in many other drainages in Illinois, but the Bauer Branch data document these settlement trends better than many other regions.

The Middle Mississippian period (Figure 3-13) is fairly well represented in the LRAA, with 54 components identified, accounting for 1.8 percent of the prehistoric total (5.9 percent of components assigned to temporal periods). As one might expect, Middle Mississippian sites are most densely concentrated along the Illinois River valley within the LRAA, with scattered sites occurring along the main trench of the La Moine River and the North Fort of the La Moine. Only a few sites are located in upland settings. Many upland sites are seasonal camps, but some Mississippian hamlets and farmsteads are present in the LRAA. In addition, some of the larger sites along the Illinois River are extensive mound-village Mississippian complexes, some of which contain multiple burial and platform mounds (e.g., Rose mound groups [Griffin and Morgan 1941]; Crable site [Morse 1960, 1969; Smith 1951]; Emmons site [Morse et al. 1961]; Brown County ossuary [Snyder 1962]). Conrad (1991) has synthesized the Mississippian culture history of both the Spoon and La Moine drainages, and he has defined attributes that differentiate the La Moine drainage from other nearby Mississippian groups. He interprets these regional variants as representing the archaeological remains of distinct social/political entities, that have slightly different methods of decorating and making pottery, slightly different mortuary programs, and slightly different settlement systems. Clearly, the Mississippian period social and political landscape was highly complex, and this complexity is only partially reflected in the site distributions.

No sites within the LRAA are listed as containing definite Upper Mississippian components (Figure 3-14). However, Oneota components have been documented at a few sites in the region (Crable, Emmons, Rose mound groups, Norris Farms No. 36 cemetery [Santure et al. 1990]), which has resulted in a more formal recognition of these sites as a distinct archaeological phase (see Conrad 1991; Conrad and Esarey 1983). Given that the Oneota components have been defined only at sites with large excavated assemblages, and given the general similarity of material culture attributed to the Oneota and Mississippian traditions, it is not surprising that reported Oneota/Upper Mississippian sites have gone unreported in the LRAA. However, it is also likely that additional Upper Mississippian period sites are present, and that they will be recorded in the future as our knowledge of the culture history of the region becomes more refined.

No sites have been reported as containing protohistoric components (Figure 3-15). This is not surprising, since the material culture of this period just prior to the historic era remains extremely poorly known in all areas of the state and in much of the Midwest in general.

Collectively, Historic period components are not very abundant in the LRAA. They account for only 521 (14.6 percent) of the total recorded components (Table 3-2). However, many Illinois archaeologists did not systematically record historic Euro-American sites until the 1980s. Thus, it is likely that current site file data for historic sites primarily reflect the locations of CRM projects that were done after 1980, and they probably do not provide satisfactory information on site distributions or site density. Of the historic era components reported in the study area, 244 (46.8 percent) are undifferentiated and cannot be assigned to a specific temporal subperiod (Figure 3-16). The distribution of these undifferentiated historic sites conforms to the locations of larger survey tracts and linear corridors that were surveyed in the 1970s. Scattered unidentified historic sites are present in upland locations as well.

Historic Native American components have not been reported from the LRAA (Figure 3-17). The low representation of Native American occupations in the site files is most probably due to the combined effects of nonsystematic sampling and the lack of specific archaeological signatures for a time period that has a very sparse material expression. The area is known to have been inhabited or claimed by the Potawatomi (Clifton 1978) and some of the tribes that comprised the Illinois Confederacy (aka Peoria; see Callender 1978), and the Kickapoo, Sauk, and Fox may have moved through the area during the 18th and early 19th centuries. The La Moine drainage is not far from some of the larger Illinois villages that have been documented historically, but no named villages have been identified within the study area proper.

There is evidence for a rather high degree of territorial variation and movement of various segments of the loose confederation of up to 12 tribes that comprised the Illinois Confederacy during the 17th and 18th centuries (Bauxar 1978; Callender 1978). High tribal mobility may also have characterized the Protohistoric period and may contribute to the difficulty we have in identifying Protohistoric period sites. After 1800, the growing numbers of Euro-American settlers forced the remnant Native American groups to abandon the Illinois Territory and ultimately move west. This relatively large degree of tribal group movement during the early Historic period is attributed mainly to the twin influences of economic interactions induced by the fur trade and increasing conflict with Euro-American settlers (Temple 1977; Warren 2000).

No Historic Colonial components have been recorded within the LRAA (Figure 3-18), but Colonial sites are difficult to identify because of the ephemeral artifact signature that these sites display. Historic French or English settlements are not reported from the LRAA, but some sites could be present within the Illinois River valley portion of the study area.

Historic Pioneer components (Figure 3-19) also are very scarce. Only four (0.8 percent of the total historic components and 1.4 percent of historic components identified to time period) have been identified to date in the LRAA. All of these sites were occupied into the subsequent Frontier

subperiod. The small number of recorded Pioneer components within the study area is not surprising in view of the general pattern of early Euro-American settlement in Illinois. Many early settlers entered the state from the east and south by way of the Cumberland, Ohio, and Tennessee rivers, and then moved north along the Mississippi and Illinois rivers. The interior portions of western Illinois were not settled as part of early trade routes. It was only after the 1830s that the Federal government encouraged settlement in this part of the state by providing land grants to veterans of the War of 1812 and the Black Hawk War. In addition, is likely that Pioneer sites will contain less robust material assemblages than later historic sites (McCorvie and Wagner 2000). Thus, they will be more difficult to identify during survey. Pioneer components are widely scattered within the study area, but all occur in upland settings that were likely at the boundary between the forest and prairie--a favored landscape position for early settlement.

Historic Frontier components (Figure 3-20) are more numerous than Pioneer era sites, with 31 reported from the study area (6.0 percent of total historic components and 11.2 percent of historic components assignable to time periods). These sites are located in both valley and upland settings, with the majority of sites in upland settings. The distribution reflects the growing influence of overland transportation routes, especially the rail system, and the fact that the La Moine River is not a navigable waterway. By this time, Euro-American settlement was rapidly expanding in central and western Illinois, so it is likely that many Historic Frontier sites remain unrecorded. More sites have been recorded in the southeastern half of the study area, which may reflect either the relative intensity of archaeological survey or a pattern in historic settlement of the landscape.

Historic Early Industrial components (Figure 3-21) comprise 18.4 percent of the total number of historic components (n = 96), and 34.7 percent of the historic components that can be assigned to temporal periods. By the end of this period, most of the state was densely settled, so Early Industrial sites are relatively numerous. Historic Urban Industrial components (Figure 3-22) number 101 (19.4 percent of total components and 36.5 percent of components assigned to time periods). Sites associated with both the Early and Urban Industrial subperiods show the same spatial distribution. This is not surprising since many of the reported sites have both of these components represented. The sites are widely scattered and no concentrations or clear patterns are apparent. This likely reflects longer occupation of established farmsteads and residences. Few sites of these time periods have been investigated more intensively than the survey or documentation level.

Historic Postwar components (Figure 3-23) are less frequent (n = 45; 8.6 percent of historic components and 16.2 percent of components assigned to time periods). Sites of this age only recently have been systematically recorded, and their distribution strongly coincides with the locations of more recently surveyed tracts and corridors. Many of the sites of this period have extant structures, and some may be significant to local community histories. More recently, archaeologists have recognized the contribution that these relatively recent historic sites can make to our understanding of historical and social processes, and they have been more systematically documented.

Little formal study has been carried out for the La Moine Basin as a whole using site

distribution data, either in terms of Historic or Prehistoric era settlement pattern analysis. The site distribution data from the Historic Sites Surveys and other surveys formed the basis of a predictive model for prehistoric settlement for part of this region (Lewis and Murphy 1981), and settlement systems for specific prehistoric time periods have been proposed. The most detailed and frequently discussed settlement pattern study was Struever and Houart's (1972) model for Middle Woodland Hopewell Interaction Sphere sites in the lower and central Illinois River valley. Streuver and Houart documented several site types, including regional distribution centers, mortuary locations, and population centers, all of which were strongly correlated with favorable environmental settings. Another major contribution to our understanding of prehistoric settlement systems was Green's (1987) synthesis of Late Woodland settlement and social organization, which was based primarily on site distribution and excavation data from the La Moine drainage. Green documented a period of early Late Woodland settlement expansion into upland and headwaters areas, followed by nucleation into fewer but larger villages during the latter half of the Late Woodland period. This nucleation sets the stage for later Mississippian settlement and social organization, which was strongly hierarchical. Finally, Conrad (1991) has synthesized Mississippian period material culture, settlement, and social organization trends in the La Moine and adjacent Spoon drainages.

In spite of a lack of comprehensive analysis for all time periods, this brief examination of the gross site distribution data suggests possible avenues for future investigation. Within this assessment area, site distribution patterns partially reflect the distribution of surveys as well as the artifact classification and site reporting procedures practiced by archaeologists in the past. However, there are three main trends that are readily apparent in the distributional data when viewed through time. First is the apparent change in settlement patterns and site location preferences associated with the Middle Archaic period. These changes have been linked in other regions of the state with the effects of the Hypsithermal climatic episode on resource distributions that were important for human subsistence, particularly the expansion of prairies into the uplands of central and western Illinois. The La Moine drainage shows a marked decrease in site numbers during this temporal period, and a virtual abandonment of upland and drainage divide areas; both of these site distribution patterns may be linked to the effects of environmental changes during this same time span. A second trend is the increasing focus on riverine settings--major stream valleys and their immediate margins--that begins in the Middle Archaic period and continues throughout the remainder of the prehistoric era. This settlement trend clearly shows the importance of aquatic resources to both Archaic hunter-gatherers and to later horticultural and agricultural groups. The only major exception to this trend occurs in the Late Woodland period, when settlement expands into upland and headwater landforms that have not been occupied since the Early Archaic period. This brief but strongly documented upland expansion of settlement is the third major trend that is visible in the La Moine site distribution data. As mentioned above, these trends are not unique to the La Moine drainage, but their expression is more clearly defined in this study area than in many other parts of the state. However clearly expressed, these trends are based on relatively small numbers of sites documented through nonsystematic surveys. The distributional changes that are apparent at this scale of analysis should be investigated more formally through future research in the region.

Future archaeological site surveys are needed to correct for potential biases in the current

database resulting from nonsystematic survey. Also, the data recorded during some of the early surveys need to be updated to reflect the results of the subsequent Phase II and Phase III work as well as changing site reporting procedures. Finally, future surveys need to account for the potential effects of site burial in alluvial settings. Few of the surveys conducted in the LRAA have employed deep testing field methods, and the Holocene alluvial-geomorphic history of the La Moine and Illinois river basins is extremely complex. Many sites dating to the late Pleistocene and to the early and middle Holocene (Paleo-Indian through Middle Archaic periods) may be buried by later alluvium and thus be transparent to our present survey database. If these difficulties can be overcome, the archaeological resources of the LRAA can continue to make significant contributions to our understanding of Illinois history and prehistory.

Acknowledgments

The illustrations were prepared by Erich Schroeder using the ARC/INFO Geographic Information System program and data from the Illinois State Archaeological Site files. Thomas E. Emerson (Illinois Transportation Archaeology Research Program, University of Illinois at Urbana-Champaign) graciously allowed me to make use of their copy of the electronic site files. Nicholas Klobuchar, site file manager, provided additional information on specific sites and their attributes, site distributions, archaeological projects, and surveyed areas. Marjorie Schroeder and Michael Wiant edited this report. I fully acknowledge their assistance, without which this report could not have been completed. Errors of omission or fact in this report, however, are the sole responsibility of the author.

Selected References for Archaeological Resources in the La Moine River Assessment Area

Anderson, David G. 1996. Models of Paleoindian and Early Archaic Settlement in the Lower Southeast. In *The Paleoindian and Early Archaic Southeast*, edited by David G. Anderson and Kenneth E. Sassaman, pp. 29-57. University of Alabama Press, Tuscaloosa.

Anderson, David G., and Kenneth E. Sassaman 1996. Modeling Paleoindian and Early Archaic Settlement in the Southeast: A Historical Perspective. In *The Paleoindian and Early Archaic Southeast*, edited by David G. Anderson and Kenneth E. Sassaman, pp. 16- 28. University of Alabama Press, Tuscaloosa.

Anderson, David G., Lisa D. O'Steen, and Kenneth E. Sassaman. 1996. Environmental and Chronological Considerations. In *The Paleoindian and Early Archaic Southeast*, edited by David G. Anderson and Kenneth E. Sassaman, pp. 3-15. University of Alabama Press, Tuscaloosa.

Asch, David L. 1994. Aboriginal Specialty-Plant Cultivation in Eastern North America: Illinois Prehistory and a Post-Contact Perspective. In *Agricultural Origins and Development in the Midcontinent*, edited by William Green, pp. 25-86. Report 19, Office of the State Archaeologist, University of Iowa, Iowa City.

Asch, David L., Kenneth B. Farnsworth, and Nancy B. Asch. 1979. Woodland Subsistence and Settlement in West Central Illinois. In *Hopewell Archaeology*, edited by David S. Brose and N'omi Greber, pp. 80-85. Kent State University Press, Kent, Ohio.

Babson, David W. 1991. ABS Water–Phase I Survey of Right-of-Way for Rural Water Distribution System. Archaeological Survey Short Report on file with the Illinois Historic Preservation Agency, Springfield.

Baker, Frank C. 1930. The Use of Animal Life by the Mound-Building Indians of Illinois. *Transactions of the Illinois State Academy of Science* 23:231-235.

----- 1941. A Study in Thenozoology of the Prehistoric Indians of Illinois. In *Contributions to the Archaeology of the Illinois River Valley*, edited by J. B. Griffin and R. G. Morgan. *Transactions of the American Philosophical Society* 32(1):51-71.

Bauxar, J., Joseph. 1978. History of the Illinois Area. In *Handbook of North American Indians*, Volume 15, Northeast, edited by B. G. Trigger, pp. 594-601. Smithsonian Institution, Washington D.C.

Bevitt, C.T., and Wesley Neal. 1991. *Phase I Cultural Resources Investigation within Freeman United Coal Mining Company's Industry Mine, McDonough and Schuyler Counties, Illinois.* Cultural Resources Management Report No. 329. American Resources Group, Ltd. Carbondale, IL.

Binford, Lewis R. 1980. Willow Smoke and Dogs' Tails: Hunter-Gatherer Settlement Systems and Archaeological Site Formation. *American Antiquity* 45(1):4-20.

Brown, James A., and Robert K. Vierra. 1983. What Happened in the Middle Archaic: Introduction to an Ecological Approach to Koster Site Archaeology. In *Archaic Hunters and Gatherers in the American Midwest*, edited by J. L. Phillips and J. A. Brown, pp. 165-196. Academic Press, New York.

Broyles, Bettye J. 1971. *Second Preliminary Report: The St. Albans Site, Kanawha County, West Virginia, 1964-1968.* Report of Archaeological Investigations No. 3, West Virginia Geological and Economic Survey, Morgantown.

Callender, Charles. 1978. Miami. In *Handbook of North American Indians*, Volume 15, Northeast, edited by B. G. Trigger, pp. 681-689. Smithsonian Institution, Washington D.C.

Clifton, James A. 1978. Potawatomi. In *Handbook of North American Indians, Volume 15, Northeast*, edited by B. G. Trigger, pp. 725-742. Smithsonian Institution, Washington D.C.

Cole, Fay-Cooper. 1929. Archaeological Field Work in North America during 1928: Illinois. *American Antiquity* 31:344-345.

Cole, Faye-Cooper, and Thorne Deuel. 1937. *Rediscovering Illinois: Archaeological Explorations in and around Fulton County.* Archaeological Series, University of Chicago Press.

Conrad, Lawrence A. 1978. Final Report of an Archaeological Survey of the Freeman United Coal Mining Companies Properties in McDonough and Schuyler Counties, near Industry, Illinois. Report submitted by Western Illinois University Archaeological Research Laboratory to Freeman United Coal Mining Company.

----- 1981. *An Introduction to the Archaeology of Upland West Central Illinois: A Preliminary Archaeological Survey of the Canton to Quincy Corridor for the Proposed FAP 407 Highway Project.* Report submitted to the Illinois Department of Transportation. Western Illinois University Archaeological Research Laboratory Report of Investigations 2.

----- 1990. South Fulton Water District Pipeline. Archaeological Survey Short Report on file with the Illinois Historic Preservation Agency, Springfield.

----- 1991. The Middle Mississippian Cultures of the Central Illinois River valley. In *Cahokia and the Hinterlands: Middle Mississippian Cultures of the Midwest*, edited by T. E. Emerson and R. B. Lewis, pp. 119-157. University of Illinois Press, Urbana.

----- 1992. Hickory-Kerton Water Cooperative Phase III Construction. Archaeological Survey Short Report on file with the Illinois Historic Preservation Agency, Springfield.

----- 1994. ABS Water Cooperative Phase 3. For: Meco Engineering, Hannibal, Missouri. Archaeological Survey Short Report on file with the Illinois Historic Preservation Agency, Springfield.

----- 1995. ABS Water Cooperative Phase 3. For: Meco Engineering, Hannibal, Missouri. Archaeological Survey Short Report on file with the Illinois Historic Preservation Agency, Springfield.

----- 1997. *Dallas Rural Water District Waterline.* For: Klinger and Associates, Quincy, IL. Archaeological Survey Short Report on file with the Illinois Historic Preservation Agency, Springfield.

----- 1998. *Marietta Water Distribution System.* For: McClure Engineering Associates. Archaeological Survey Short Report on file with the Illinois Historic Preservation Agency, Springfield.

----- 1999a. *Camden Littleton Waterline Expansion.* For: Klinger & Associates, Quincy, IL. Archaeological Survey Short Report on file with the Illinois Historic Preservation Agency, Springfield.

----- 1999b. *South Fulton Water Coop Extension Phase 3.* For: Klinger and Associates, Quincy, IL. Archaeological Survey Short Report on file with the Illinois Historic Preservation Agency, Springfield.

Conrad, Lawrence A., and Duane Esarey. 1983. Oneota in West Central Illinois. Paper presented at the 28th Midwest Archaeological Conference, Iowa City, Iowa.

Cross, Paula G. 1998. Phase I Archeological Survey for the FAP 310 North Project, Vol. 1 and 2. Center for American Archeology, Contract Archeology Program. Report of Investigations 225. Report prepared for the Illinois Department of Transportation by the Center for American Archeology, Kampsville, IL.

Dwyer, James. 1983. An Archaeological Survey for the Freeman United Coal Mining Company: Fulton, McDonough, Perry, and Jackson Counties, Illinois. Report prepared for the Freeman United Coal Mining Company by the Illinois State Museum Society, Springfield.

Ellis, H. Holmes. 1940. The Possible Cultural Affiliation of Flint Disk Caches. *Ohio State Archaeological and Historical Quarterly* 49:111-120.

Emerson, Thomas E. 2000. The Mississippian Period. *Illinois Antiquity* 35(3):10-11.

Esarey, Duane. 1988. Preliminary Low-Water Site Survey of the Illinois River from Pekin to Grafton. Maps and preliminary survey notes on file with the Illinois Historic Preservation Agency, Springfield.

Esarey, Duane, Lawrence A. Conrad, and William Green. 1982. Final Report on Phase II Archaeologicl Investigations on Portions of Amax's Proposed Littleton Mine Field and Littleton Field Haul Road, Schuyler, McDonough, and Fulton Counties, Illinois. Report submitted to Amax Coal Company. Western Illinois University Archaeological Research Laboratory, Report of Investigations 4. Macomb.

Esarey, Duane, Kelvin Sampson, and Charles Suchy. 1984. The Carter Creek Site: A Weaver Phase Ring Midden in the Interior Uplands of West Central Illinois. *The Wisconsin Archaeologist* 65:131-144.

Farnsworth, Kenneth B. 2000. The Woodland Period. *Illinois Antiquity* 35(3):8-9.

Fowler, Melvin L. 1959. *Summary Report of Modoc Rock Shelter: 1952, 1953, 1955, 1956.* Report of Investigations No. 8, Illinois State Museum, Springfield.

----- 1978. Cahokia and the American Bottom: Settlement Archeology. In *Mississippian Settlement Patterns*, edited by Bruce D. Smith, pp. 455-478. Academic Press, New York.

Gramly, Richard M. 1992. *Prehistoric Lithic Industry at Dover, Tennessee.* Persimmon Press Monographs in Archaeology, New York.

Green, William. 1977. Final Report of the Littleton Field Archaeological Survey, Schuyler County, Illinois. Report submitted to the Amax Coal Company. Upper Mississippi Valley Archaeological Research Foundation, Reports on Archaeology No. 1. Macomb.

----- 1987. Between Hopewell and Mississippian: Late Woodland in the Prairie Peninsula as Viewed from the Western Illinois Uplands. Unpublished Ph.D. dissertation, University of Wisconsin--Madison.

Gremillion, Kristen J. 1994. Evidence of Plant Domestication from Kentucky Caves and Rockshelters. In *Agricultural Origins and Development in the Midcontinent*, edited by William Green, pp. 87-104. Report 19, Office of the State Archaeologist, University of Iowa, Iowa City.

Griffin, James B. 1967. Eastern North American Archaeology: A Summary. *Science* 156 (3772):175-191.

Griffin, James B. and Richard G. Morgan (editors). 1941. Contributions to the Archaeology of the Illinois River Valley. *Transactions of the American Philosophical Society* 32(1):51-71.

Harris, Charles. 1938. Hut Rings in Fulton and Brown Counties. *Quarterly Bulletin of the Illinois State Archaeological Society* 1:11-12.

Holmes, William H. 1919. *Handbook of Aboriginal American Antiquities, Part I: Introductory, the Lithic Industries*. Bulletin 60, Bureau of American Ethnology, Smithsonian Institution, Washington, D.C.

Holstein, Harry O., Jerry Fairchild, and Wayne F. Shields. 1975. An Archaeological Survey of the Lower-Central Illinois and La Moine River Drainages. In *Preliminary Report of the 1974 Historic Sites Survey. Archaeological Reconnaissance of Selected Areas in the State of Illinois.* Part I, Summary, Section A, pp. 56-65. Report prepared by the Department of Anthropology, University of Illinois at Urbana-Champaign and submitted to the U.S. National Park Service and Illinois Department of Conservation.

Howe, W. Gordon. 1992. Waterline Survey, South Fulton Water District, Phase I. Archaeological Survey Short Report on file with the Illinois Historic Preservation Agency, Springfield.

Howe, W. Gordon, W. Neal, D. McConkey, and C. Baer. 1996. *Phase II Cultural Resources Investigation within Black Beauty Coal Company's Cedar Creek Mine, Schuyler County, Illinois.* Report submitted to Black Beauty Coal Company (Evansville, IN) by American Resources Group, Ltd, Carbondale. Cultural Resources Management Report No. 295.

Jefferies, Richard W. 1987. *The Archaeology of Carrier Mills, 10,000 Years in the Saline Valley of Illinois*. Southern Illinois University Press, Carbondale.

Justice, Noel D. 1987. *Stone Age Spear and Arrow Points of the Midcontinental and Eastern United States*. Indiana University Press. Bloomington.

King, James E. 1981. Late Quaternary Vegetational History of Illinois. *Ecological Monographs* 51(1):43-62.

Klippel, Walter E., 1971. *Graham Cave Revisited: A Reevaluation of Its Cultural Position During the Archaic Period.* Memoir No. 9, Missouri Archaeological Society, Columbia.

Klippel, Walter E., and James Maddox. 1977. The Early Archaic of Willow Branch. *Mid-Continental Journal of Archaeology* 2(1):99-130.

Knoblock, Byron W. 1956. Leaf-shaped Flint Blades from Illinois and Mexico--Similar in Design. *Central States Archaeological Journal* 3:26-29.

Koldehoff, Brad, and John Walthall. 2000. The Paleoindian Period. *Illinois Antiquity* 35(3):4-5.

Lewis, R. Barry. 1978. Archaeological Site Distributions and Densities in Central Illinois: Development of an Initial Model. In *Predictive Models in Archaeological Resource Management*, edited by M. K. Brown, pp. 37-47. Illinois State Museum Contributions No. 3. Springfield.

Lewis, R. Barry, and Susan A. Murphy. 1981. Central Illinois Unit (IV). In *Predictive Models in Illinois Archaeology: Report Summaries*, edited by M. K. Brown, pp. 33-40. Illinois Department of Conservation, Springfield.

Lopinot, Neal H. 1994. A New Crop of Data on the Cahokian Polity. In *Agricultural Origins and Development in the Midcontinent*, edited by William Green, pp. 127-153. Report 19, Office of the State Archaeologist, University of Iowa, Iowa City.

Luchterhand, Kubet. 1970. *Early Archaic Projectile Points and Hunting Patterns in the Lower Illinois Valley*. Reports of Investigations, No. 19. Illinois State Museum, Springfield.

MacDonald, Edgar S. 1950. The Crable Site, Fulton County, Illinois. *Illinois State Archaeological Society Journal* 7:16-18.

Mason, Otis T. (editor). 1880. Mound Relics from Illinois. *American Naturalist* 14:905.

Mason, Ronald J. 1962. The Paleo-Indian Tradition in Eastern North America. *Current Anthropology* 3(3):227-278.

McCorvie, Mary R., and Mark J. Wagner. 2000. The American Period. *Illinois Antiquity* 35(3):16-17.

Milner, George R., Thomas E. Emerson, Mark W. Mehrer, Joyce A. Williams, and Duane Esarey. 1984. Mississippian and Oneota Period. In *American Bottom Archaeology*, edited by Charles J. Bareis and James W. Porter, pp. 158-186. University of Illinois Press, Urbana.

Morse, Dan F. 1960. The Southern Cult: The Crable Site, Fulton County, Illinois. *Central States Archaeological Journal* 7:124-135.

----- 1969. The Crable Site. In *Ancient Disease in the Midwest*, edited by D.F. Morse, pp. 63-68. Illinois State Museum Reports of Investigations No. 15. Springfield.

Morse, Dan F., Phyllis Morse, and Merrill Emmons. 1961. The Southern Cult: The Emmons Site, Fulton County, Illinois. *Central States Archaeological Journal* 8:124-140.

Morse, Dan, George Schoenbeck, and Dan F. Morse. 1953. Fiedler Site. *Journal of the Illinois State Archaeological Society* 3:34-46.

Muller, Don D. 1986. *Archaeology of the Lower Ohio River Valley*. Academic Press, New York.

Neal, Wesley. 1992a. Phase II Testing of Site 11BR192. Report submitted to Black Beauty Coal Mining Company. Archaeological Survey Short Report on file with the Illinois Historic Preservation Agency, Springfield.

----- 1992b. A Phase I Cultural Resources Survey of Black Beauty Coal Mining Company's Cedar Creek Mine, Brown and Schuyler Counties, Illinois. Cultural Resources Management Report No. 185. American Resources Group, Ltd., Carbondale.

Neal, Wesley, and Michael J. McNerney. 1994. Phase II Archaeological Testing and Assessment at Sites 11-Md-44, 11-Md-45, 11Md-46, 11-Md-53, 11-Md-56, 11-Md-58, 11-Md-62, 11-Md-64, 11-Md-65, 11Md-66, 11-Md-69, and 11-Md-73 at Freeman United Coal Mining Company's Industry Mine, McDonough County, Illinois. Report prepared for Freeman United Coal Mining Company, Industry, Illinois. Cultural Resources Management Report No. 246. American Resources Group, Ltd., Carbondale.

Neusius, Sarah W. 1982. Early-Middle Archaic Subsistence Strategies: Changes in Faunal Exploitation at the Koster Site. Ph.D. dissertation, Department of Anthropology, Northwestern University. Evanston

Phillips, W. A. 1900. Aboriginal Quarries and Shops at Mill Creek, Illinois. *American Anthropologist* 2(n.s.):37-52.

Santure, Sharron K., A.D. Harn, and D. Esarey 1990. *Archaeological Investigations at the Morton Village and Norris Frams 36 Cemetery*. Illinois State Museum Reports of Investigations. No. 45, Springfield.

Schwegman, J.E., G. D. Fell, M. Hutchison, G. Paulson, W. M. Shepherd, and J. White. 1986. The Natural Divisions of Illinois. In *Guide to the Vascular Flora of Illinois*, Robert H. Mohlenbrock, author and compiler, pp. 1-47. Southern Illinois University Press, Carbondale.

Shields, Wayne F. 1971. An Archaeological Survey of the Coal Region and Neighboring Areas of the Illinois River Valley in West-central Illinois. In *Preliminary Report of the 1971 Historic Sites Survey. Archaeological Reconnaissance of Selected Areas in the State of Illinois.* Part I, Summary, pp. 49-53. Report prepared by the Department of Anthropology, University of Illinois at Urbana-Champaign and submitted to the U.S. National Park Service and Illinois Department of Conservation.

----- 1974. An Archaeological Survey of the Lower-Central Illinois River Valley. In *Preliminary Report of the 1973 Historic Sites Survey. Archaeological Reconnaissance of Selected Areas in the State of Illinois.* Part I, Summary, Section A, pp. 50-57. Report prepared by the Department of Anthropology, University of Illinois at Urbana-Champaign and submitted to the U.S. National Park Service and Illinois Department of Conservation.

Smith, Bruce D. 1978. Variation in Mississippian Settlement Patterns. In *Mississippian Settlement Patterns*, edited by Bruce D. Smith, pp. 479-503. Academic Press, New York.

----- 1987. The Independent Domestication of Indigenous Seed-Bearing Plants in Eastern North America. In *Emergent Horticultural Economies of the Eastern Woodlands*, edited by William F. Keegan, pp. 3-47. Occasional Paper No. 7, Center for Archaeological Investigations, Southern Illinois University, Carbondale.

Smith, Hale G. 1951. *The Crable Site, Fulton County, Illinois: A Late Prehsitoric Site in the Cnetral Illinois Valley*. University of Michigan Museum of Anthropology, Anthropological Papers No. 7. Ann Arbor.

Snyder, John Francis. 1895. A Group of Illinois Mounds. *The Archaeologist* 3(3):77-81.

----- 1909a. Prehistoric Illinois: Certain Indian Mounds Technically Considered. Part Second: Sepuchral and Memorial Mounds. *Journal of the Illinois State Historical Society* 2(1):47-65.

----- 1909b. Prehistoric Illinois: Certain Indian Mounds Technically Considered. Part Third: Temple or Domiciliary Mounds. *Journal of the Illinois State Historical Society* 2(2):71-92.

----- 1962. Prehistoric Illinois: The Brown County Ossuary. In *John Francis Snyder: Selected Writings*, edited by C. C. Walton, pp 216-229. Illinois State Historical Society, Springfield.

Stafford, Russell G. 1991. Archaic Period Logistical Foraging Strategies in West-Central Illinois. *Mid-Continental Journal of Archaeology* 16(2):212-246.

Stephens, Jeanette E. 1972. An Archaeological Survey of the Coal Region and Neighboring Areas of the Illinois River Valley in West-central Illinois. In *Preliminary Report of the 1972 Historic Sites Survey. Archaeological Reconnaissance of Selected Areas in the State of Illinois.* Part I, Summary, Section A, pp. 49-56. Report prepared by the Department of Anthropology, University of Illinois at Urbana-Champaign and submitted to the U.S. National Park Service and Illinois Department of Conservation.

Struever, Stuart. 1968a. A Re-examination of Hopewell in Eastern North America. Ph.D. dissertation, Department of Anthropology, University of Chicago.

---- 1968b. Woodland Subsistence-Settlement Systems in the Lower Illinois Valley. In *New Perspectives in Archaeology*, edited by S. R. Binford and L. R. Binford, pp. 285-312. Aldine, Chicago.

Struever, Stuart, and Gail L. Houart. 1972. An Analysis of the Hopewell Interaction Sphere. In *Social Exchange and Interaction*, edited by Edwin M. Wilmsen, pp. 47-79. Anthropological Papers No. 46, Museum of Anthropology, University of Michigan, Ann Arbor.

Temple, Wayne C. 1977. *Indian Villages of the Illinois Country: Historic Tribes*. Scientific Papers, Vol. 2, Part 2, Illinois State Museum, Springfield.

Thomas, Cyrus. 1887. Burial Mounds of the Illinois or Upper Mississippi District. In Burial Mounds of the Northern Sections of the United States. *Bureau of American Ethnology Annual Report* 5:24-44.

----- 1894. Report on the Mound Explorations of the Bureau of Ethnology. *Twelfth Annual Report of the Bureau of Ethnology*. Government Printing House, Washington, D.C.

Titterington, Paul F. 1950. Some Non-pottery Sites in the East St. Louis Area. *Journal of the Illinois State Archaeological Society* 1(1):19-30.

Wadlow, Walter L. 1949. A Version of Illinois Hopewell. *Journal of the Illinois State Archaeological Society* 6(4):30-31.

----- 1953. Barter Objects. *Journal of the Illinois State Archaeological Society* 8:88-90.

Warren, Robert E. 2000. The Colonial Period. *Illinois Antiquity* 35(3):14-15.

Wiant, Michael D. and Keith Barr. 1983. An Archaeological Reconnaissance of the Proposed Cedar Creek Mine for Black Beauty Coal Company, Evansville, Indiana. Reports submitted to the Black Beauty Coal Company by the Illinois State Museum Society, Springfield.

Wiant, Michael D., and Alice Berkson. 2000. The Archaic Period. *Illinois Antiquity* 35(3):6-7.

Wormington, H. M. 1964. *Ancient Man in North America*. Fifth Edition, Popular Series No. 4, Denver Museum of Natural History, Denver, Colorado.

Wright, H.E., Jr. 1968. History of the Prairie Peninsula. In *The Quaternary of Illinois*, edited by Robert E. Bergstrom, pp. 78-88. Special Publication 14, College of Agriculture, University of Illinois, Urbana, Illinois.

Yarnell, Richard A., 1976. Early Plant Husbandry in Eastern North America. In *Cultural Change and Continuity: Essays in Honor of James Bennett Griffin*, edited by Charles E. Cleland, pp. 265-273. Academic Press, New York.

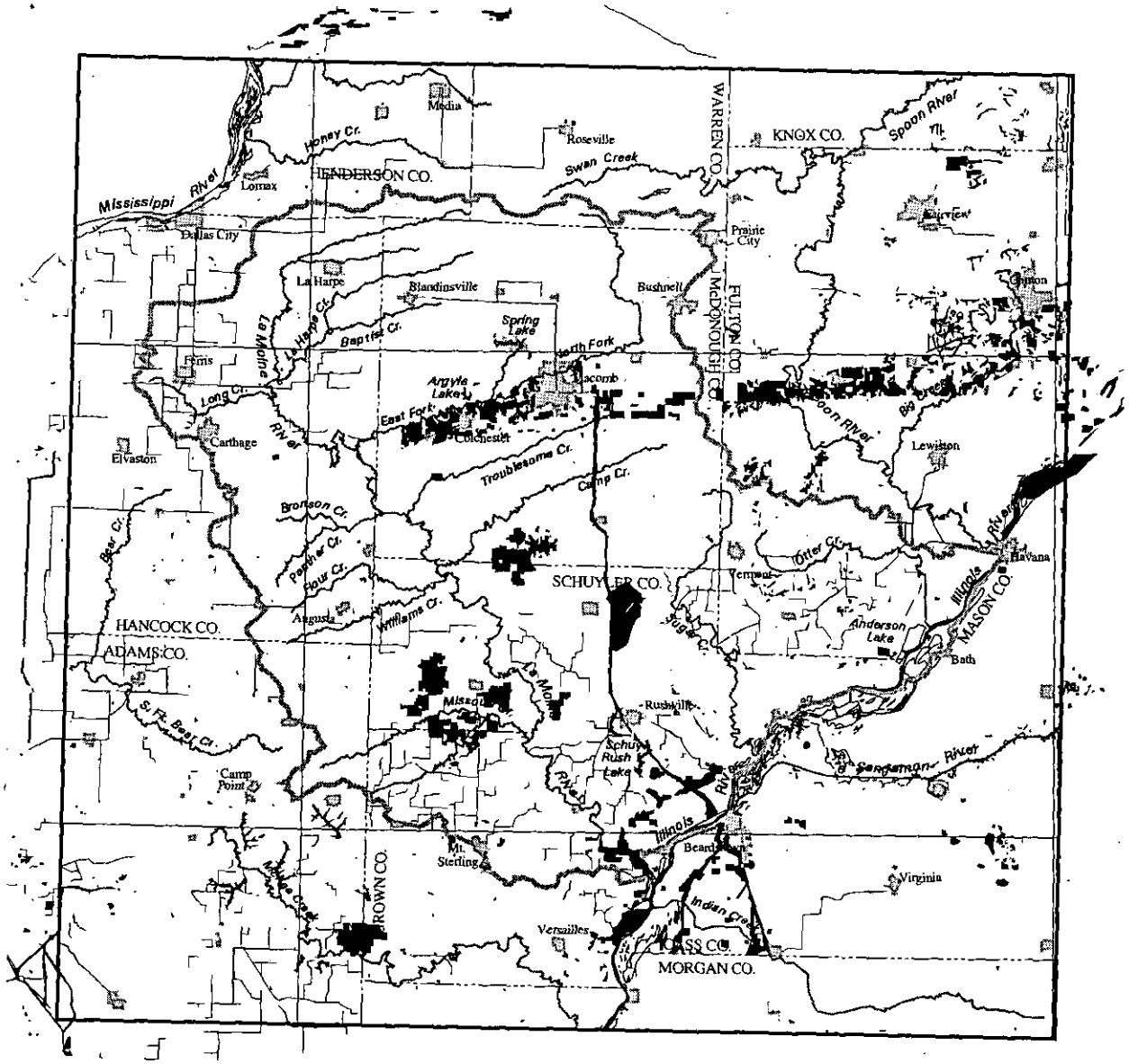


Figure 3 –1. Archaeological Survey Areas.

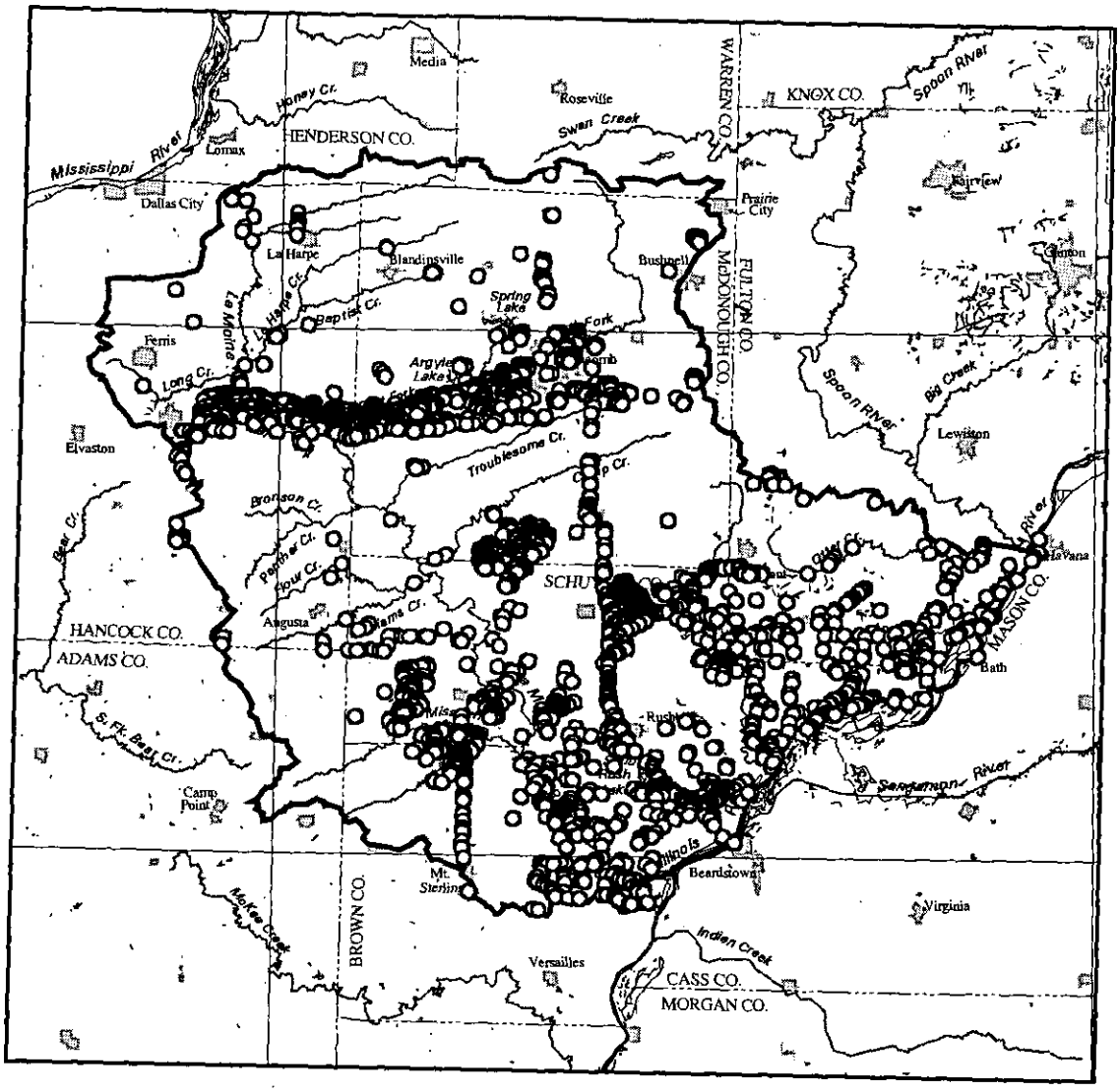
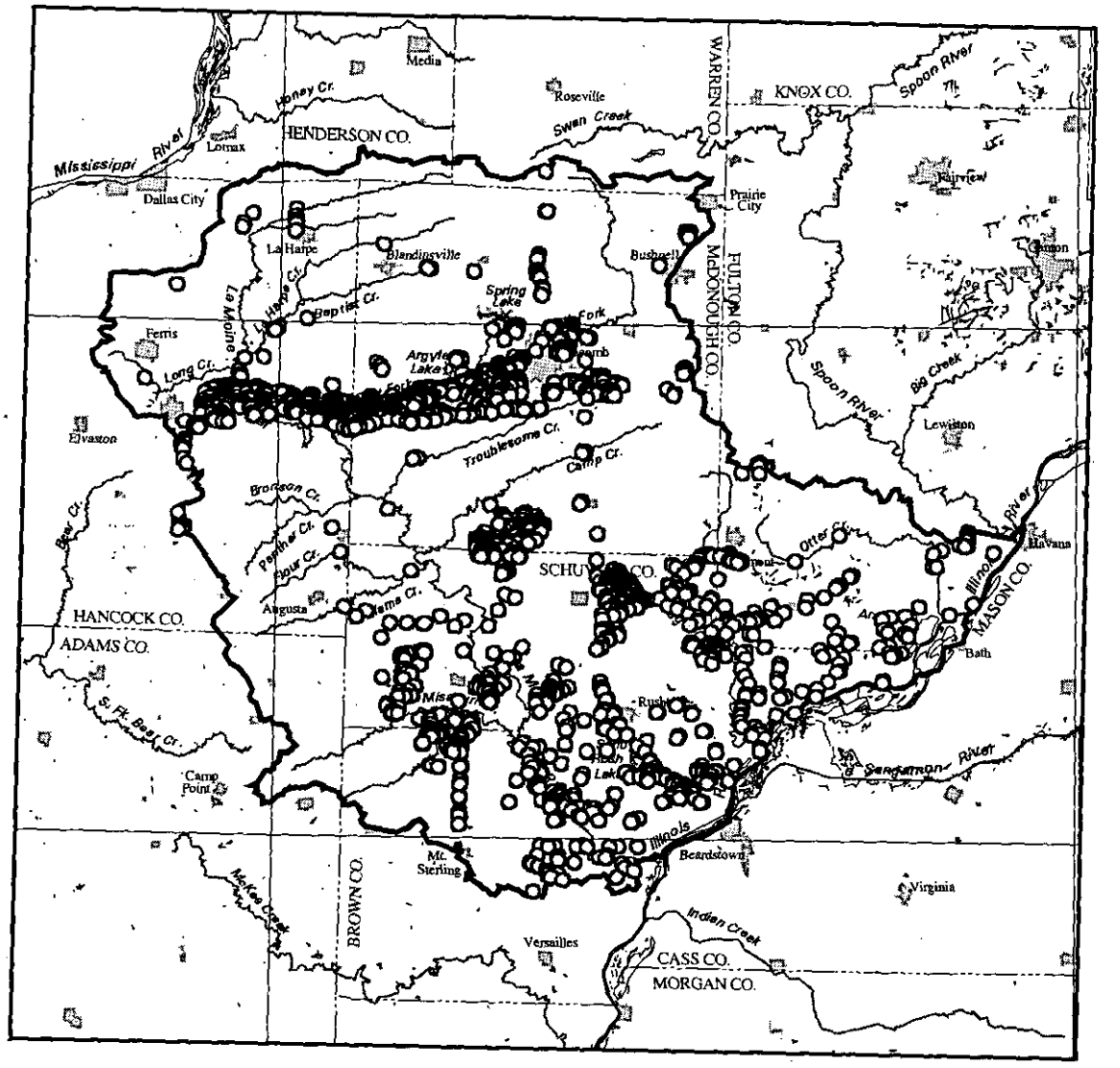


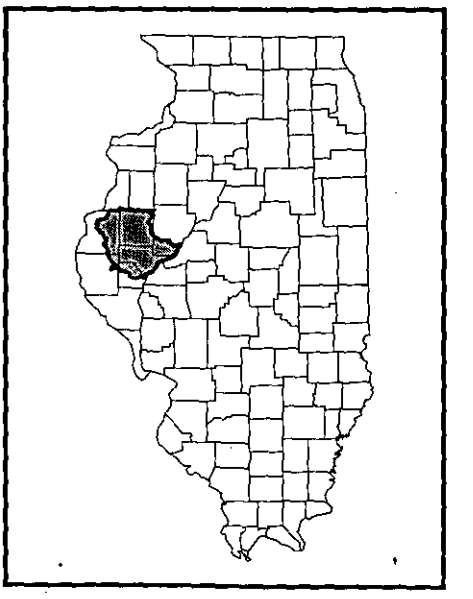
Figure 3-2. All archaeological components.



5 0 5 10 15 Miles

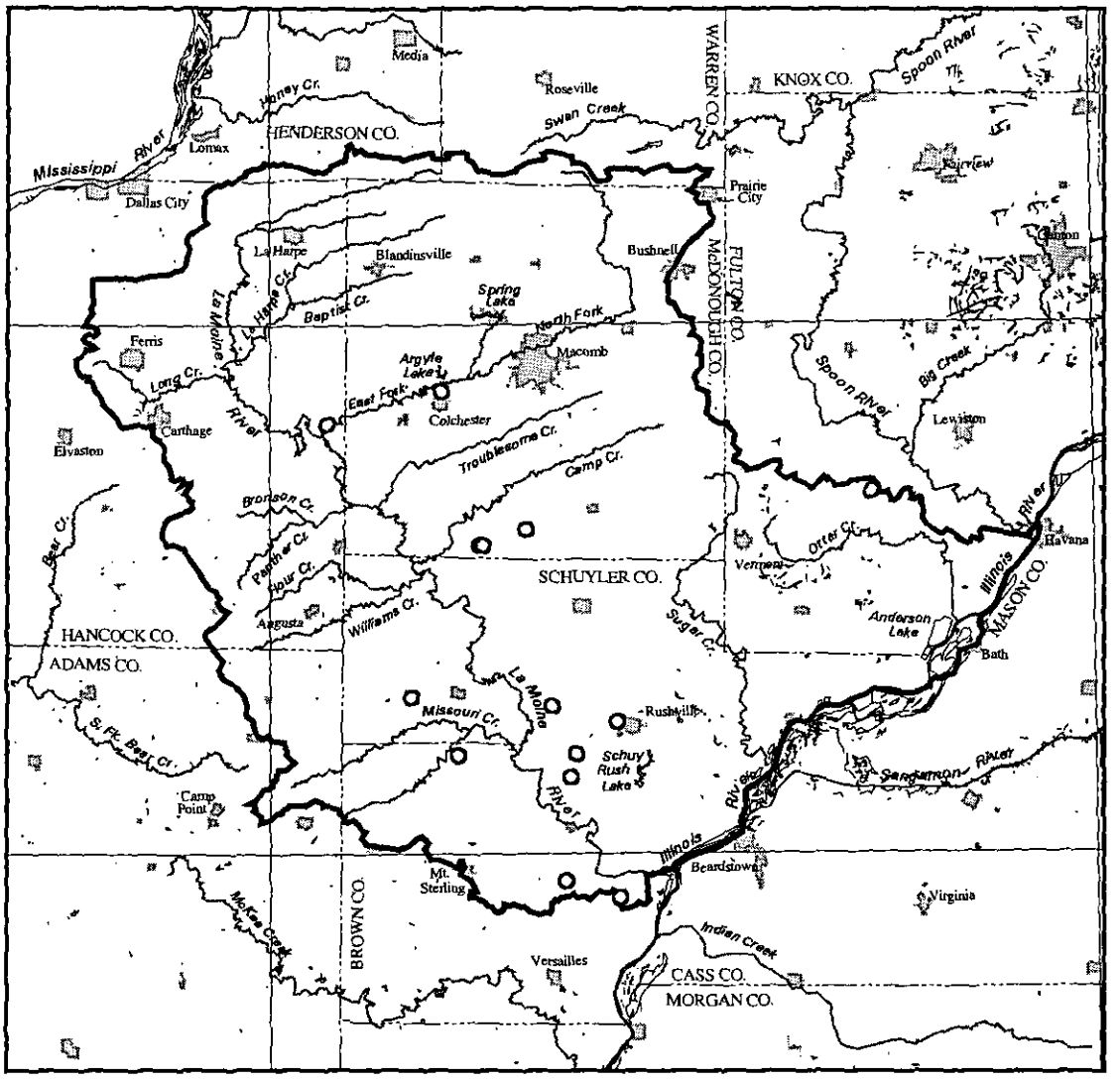
5 0 5 10 15 20 Kilometers

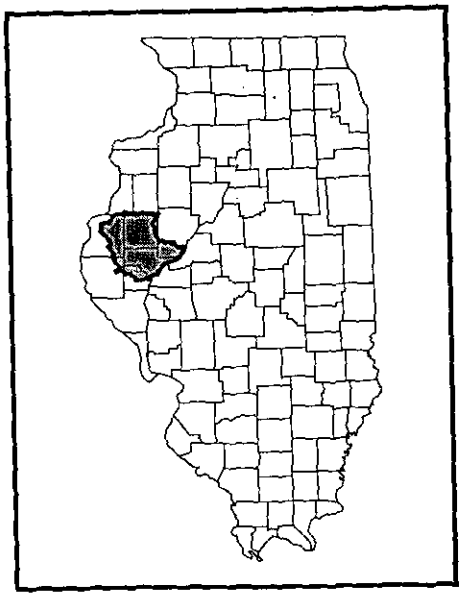
N



Archaeological sites

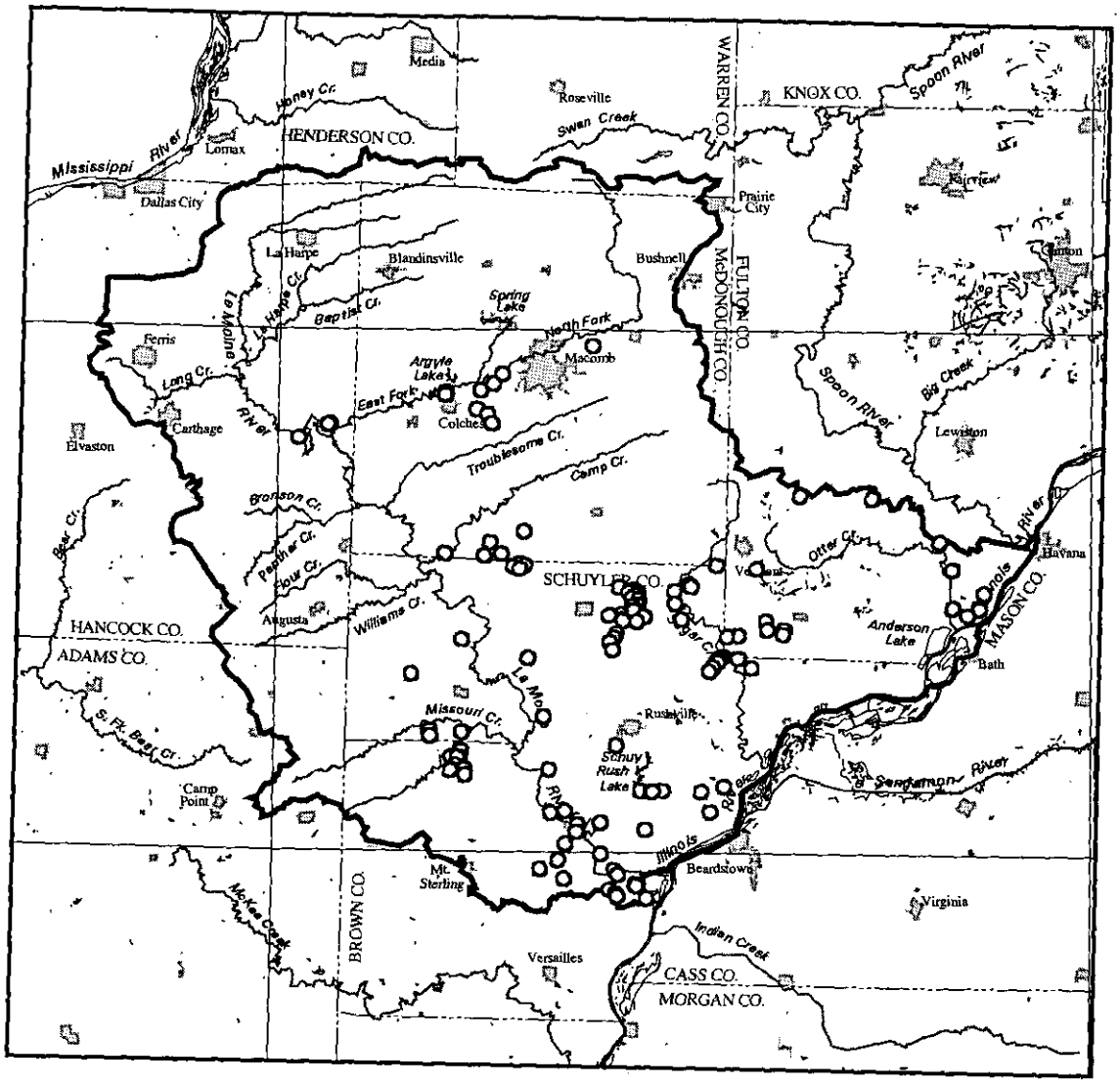
Figure 3-3. Unidentified Prehistoric archaeological components.





○ Archaeological sites

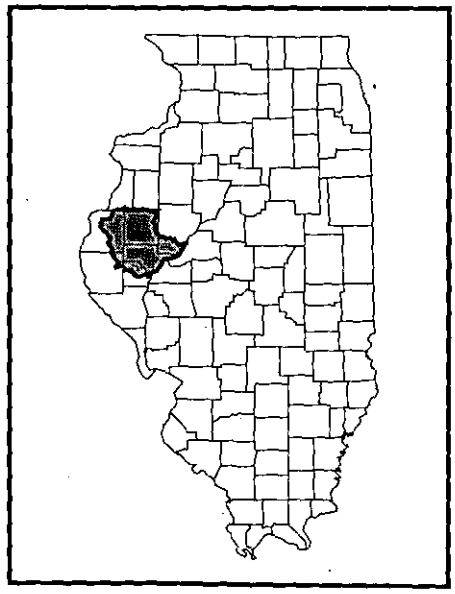
Figure 3-4. Paleo-Indian archaeological components.



5 0 5 10 15 Miles

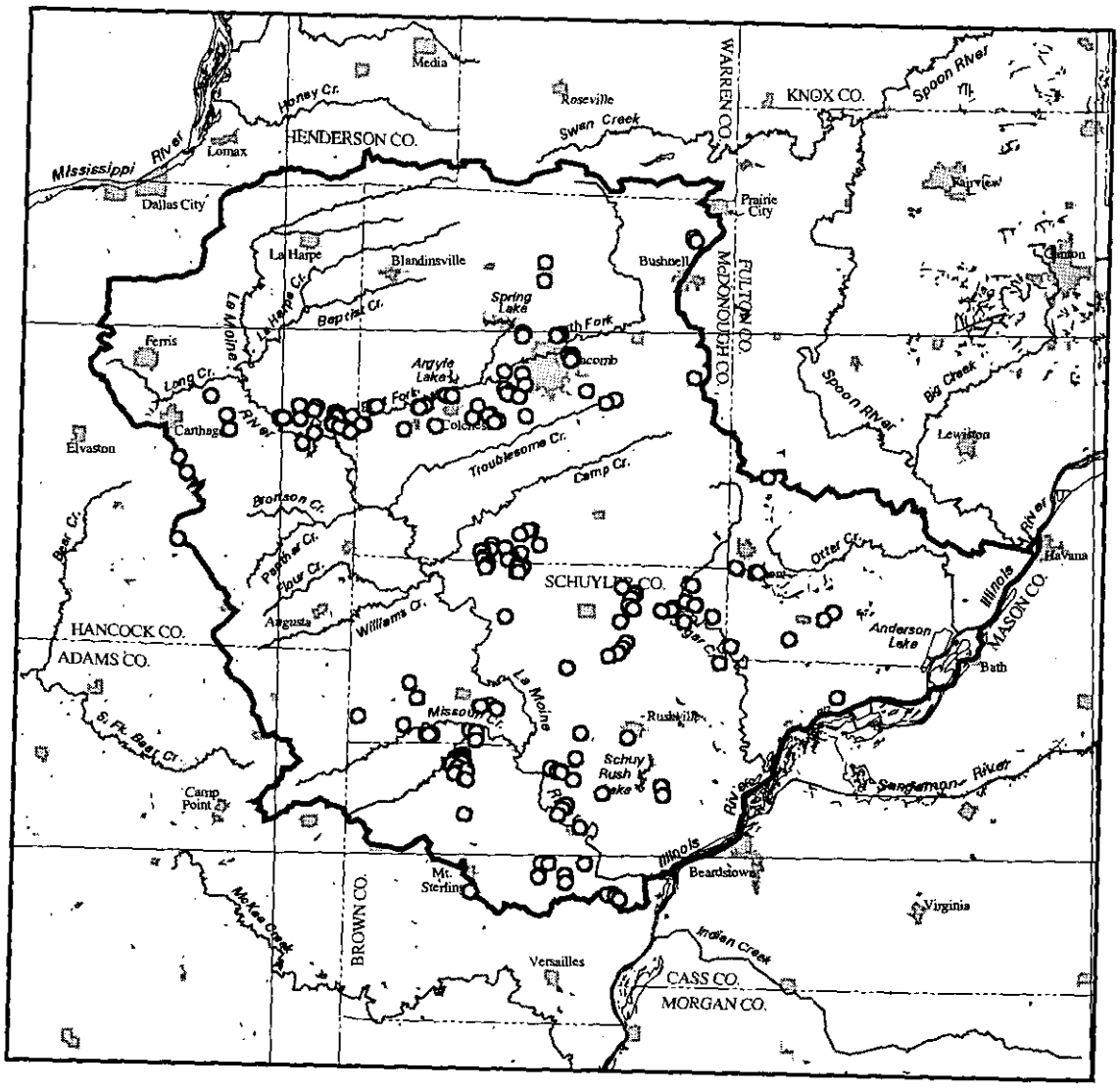
5 0 5 10 15 20 Kilometers

N



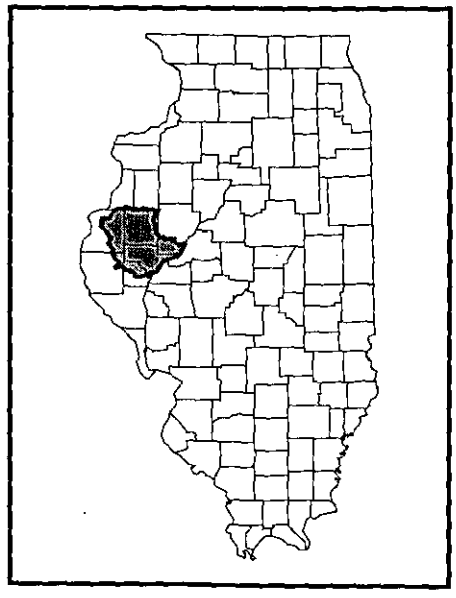
Archaeological sites

Figure 3-5. Unidentified Archaic archaeological components.



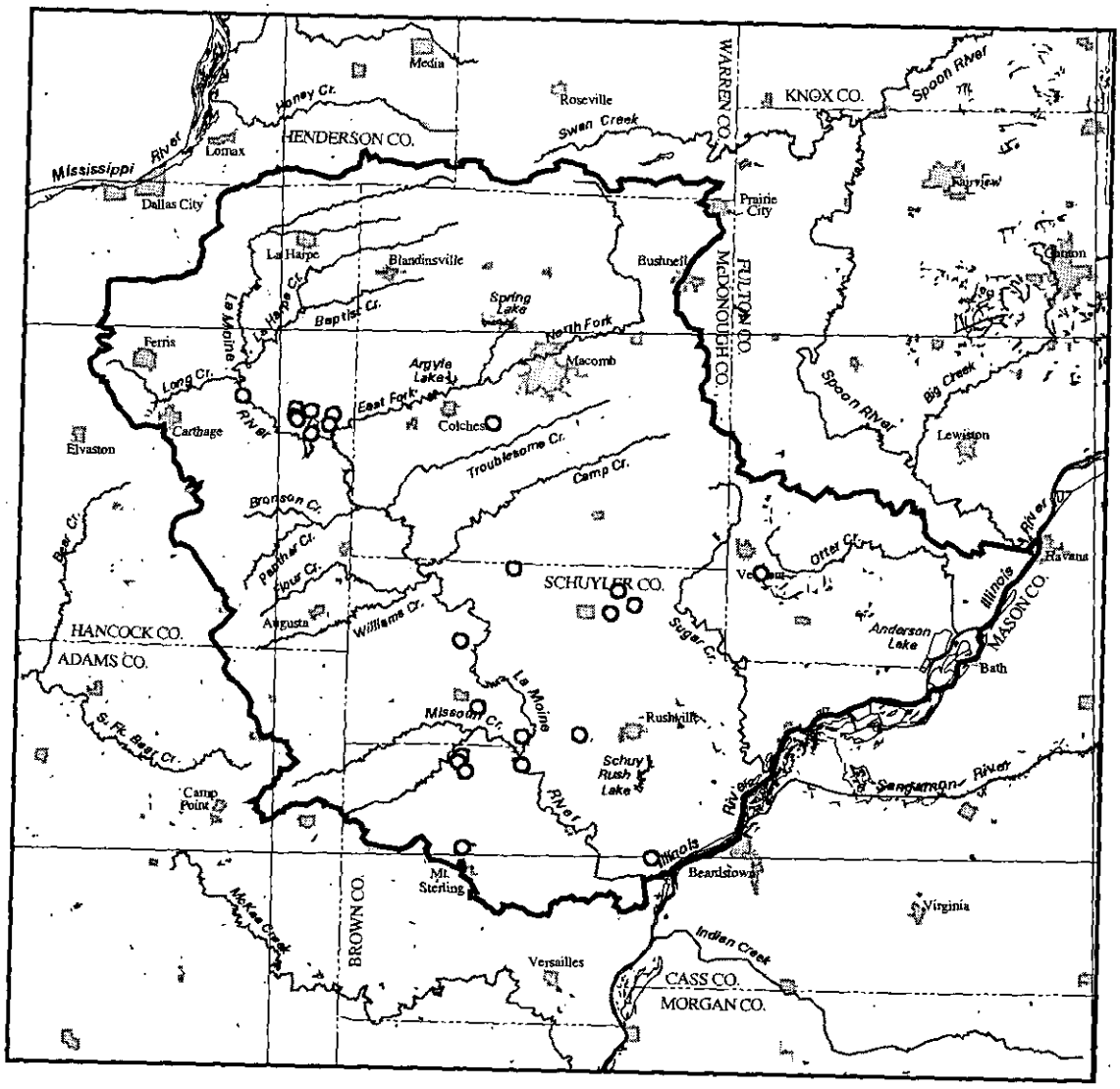
5 0 5 10 15 Miles
5 0 5 10 15 20 Kilometers

N



Archaeological sites

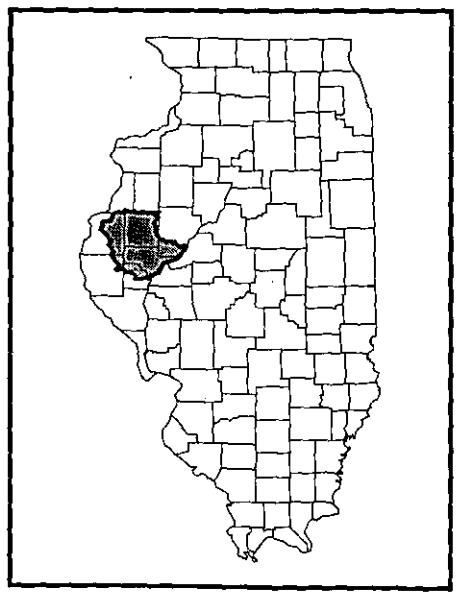
Figure 3-6. Early Archaic archaeological components.



5 0 5 10 15 Miles

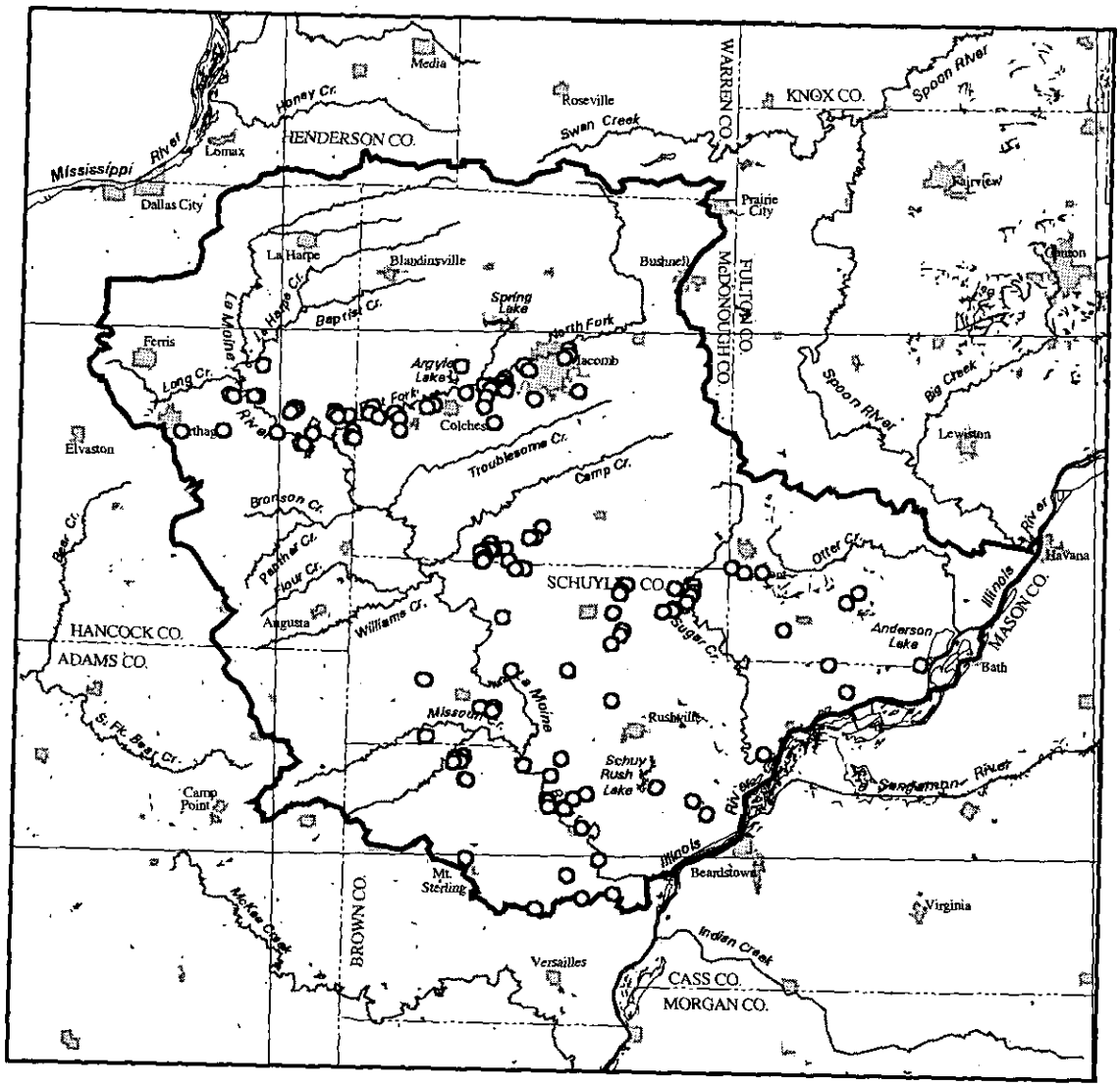
5 0 5 10 15 20 Kilometers

N



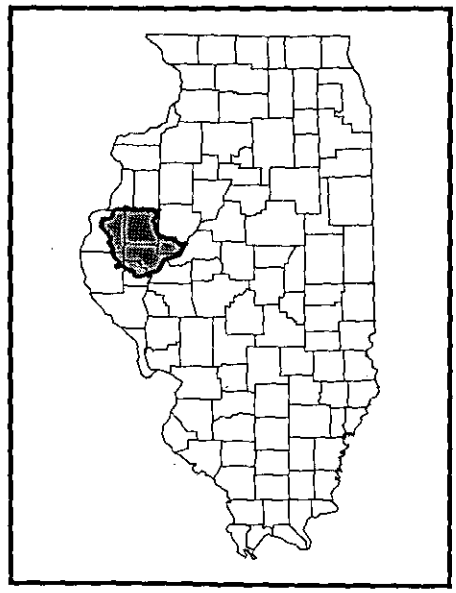
○ Archaeological sites

Figure 3-7. Middle Archaic archaeological components.



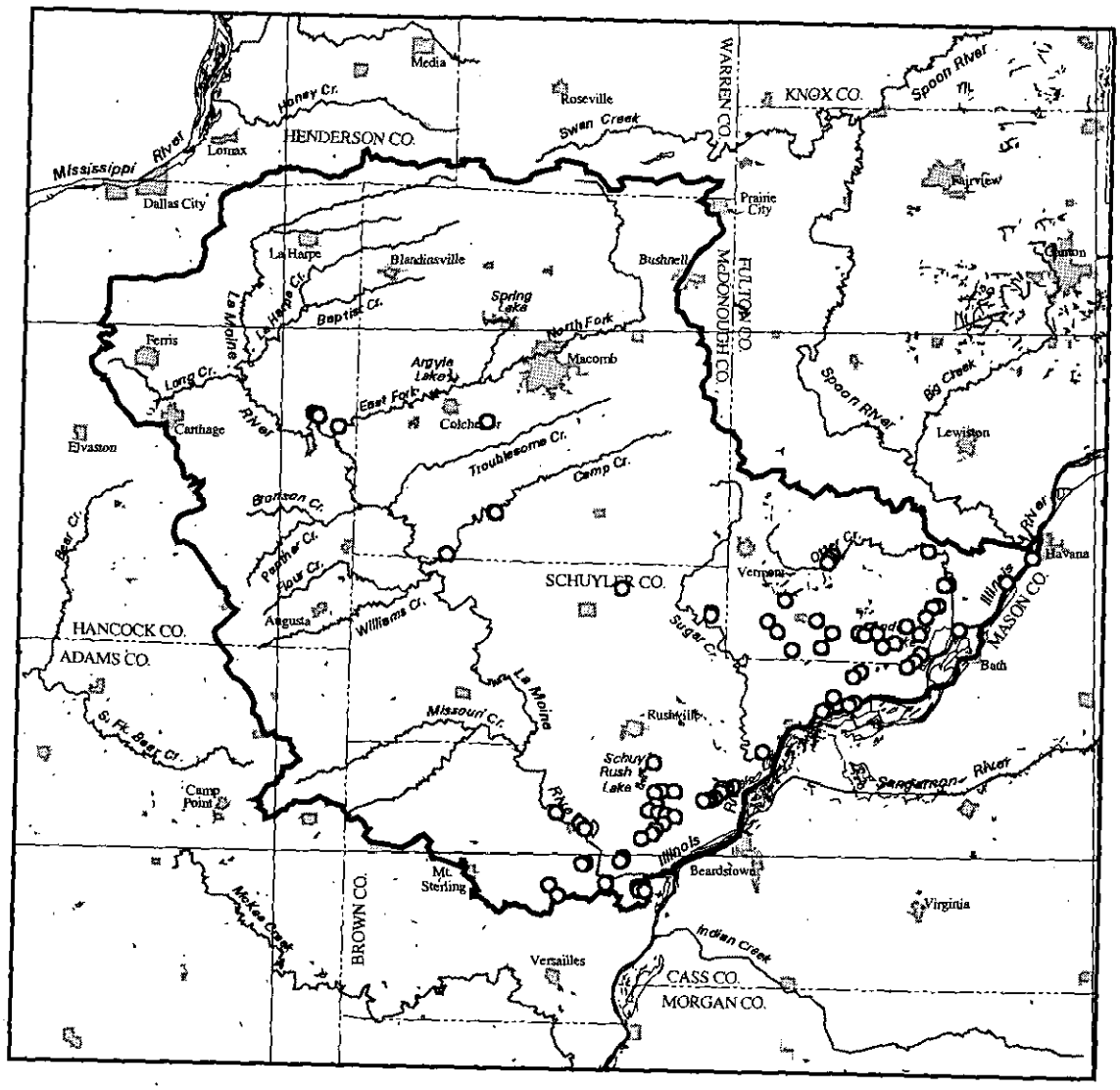
5 0 5 10 15 Miles
5 0 5 10 15 20 Kilometers

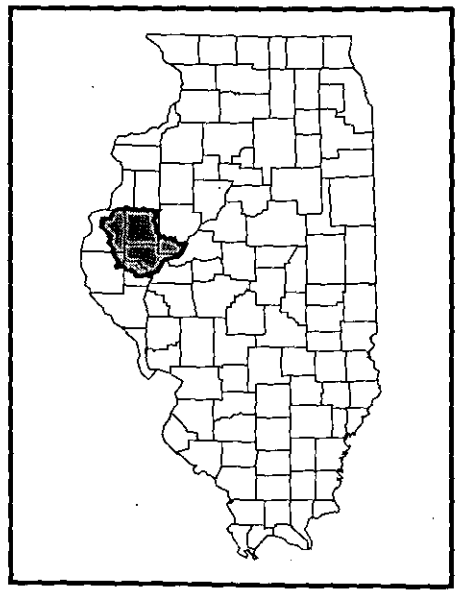
N



Archaeological sites

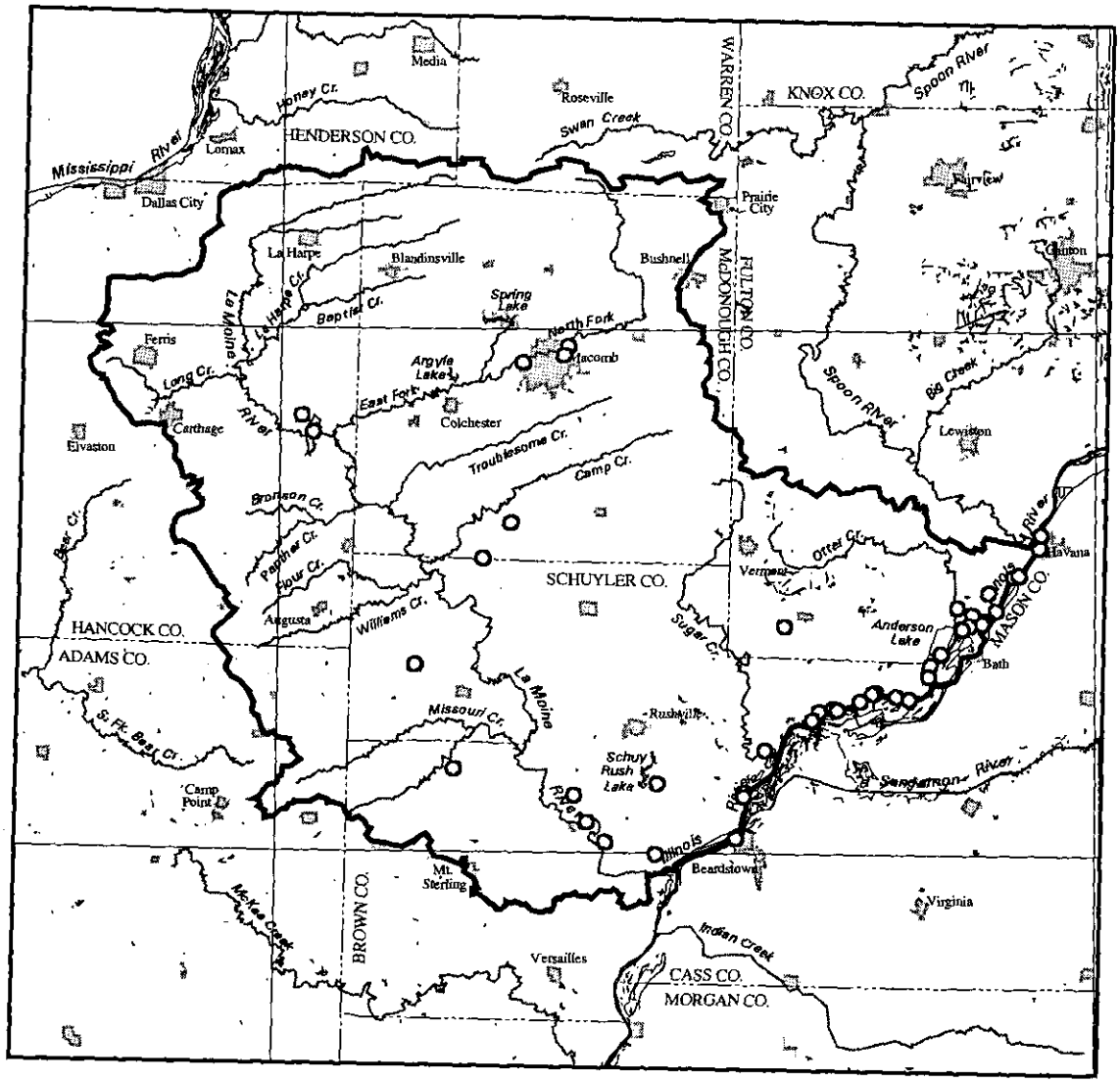
Figure 3-8. Late Archaic archaeological components.





o Archaeological sites

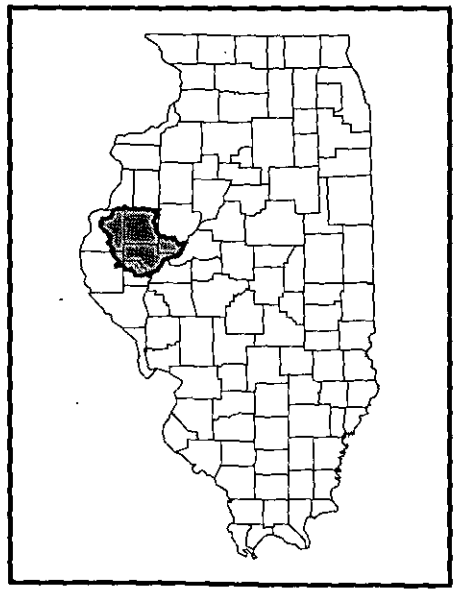
Figure 3-9. Unidentified Woodland archaeological components.



5 0 5 10 15 Miles

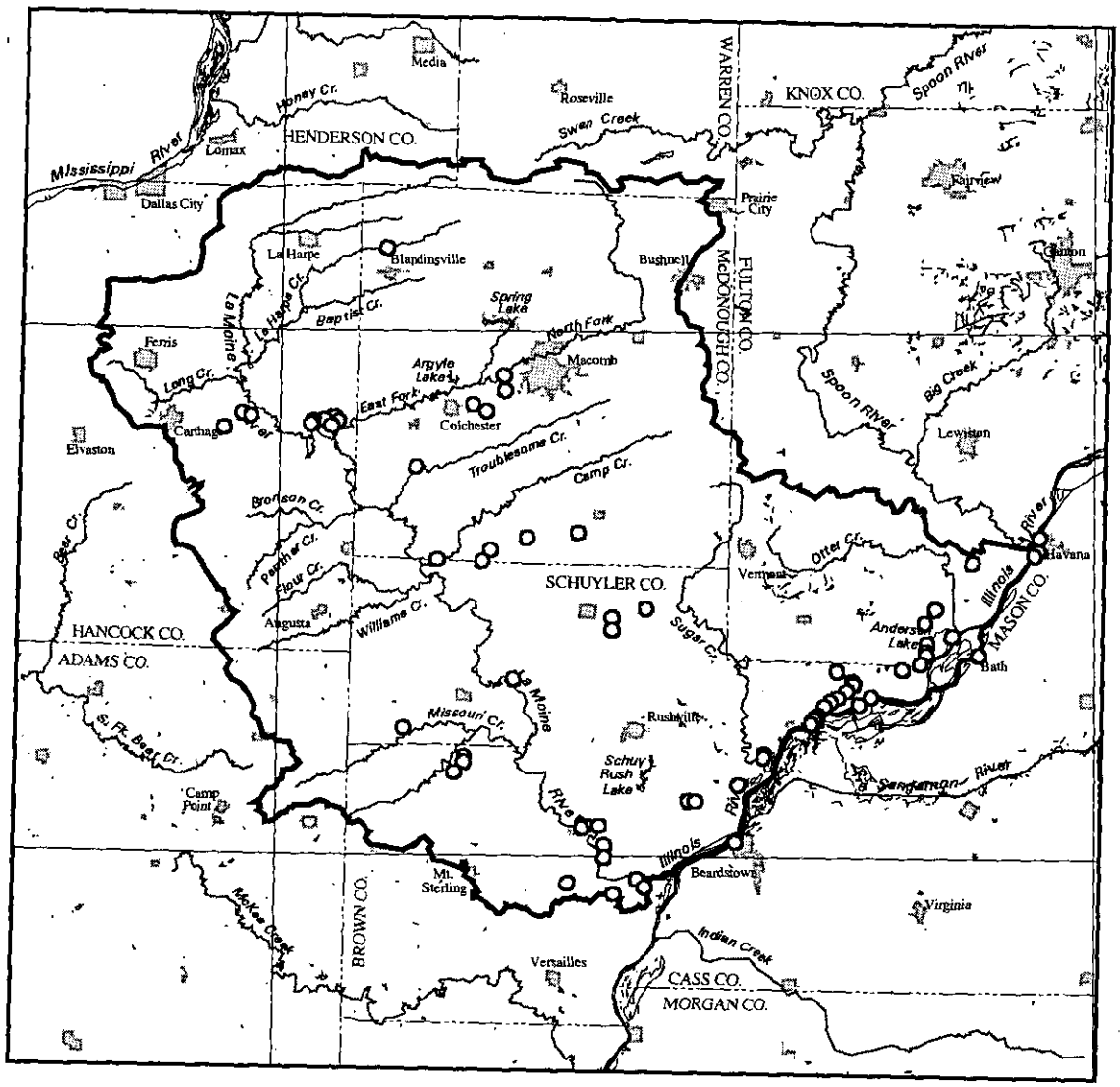
5 0 5 10 15 20 Kilometers

N



o Archaeological sites

Figure 3-10. Early Woodland archaeological components.



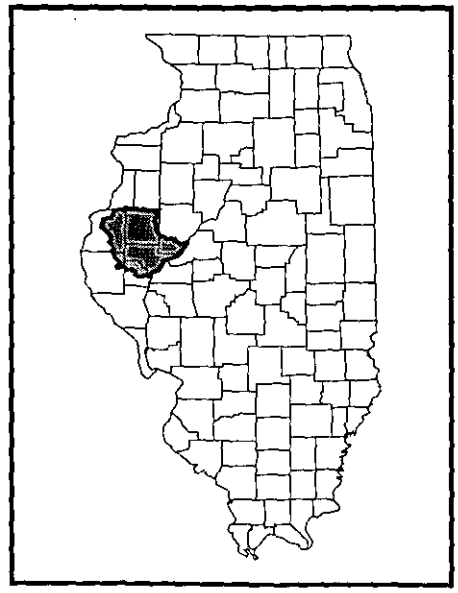
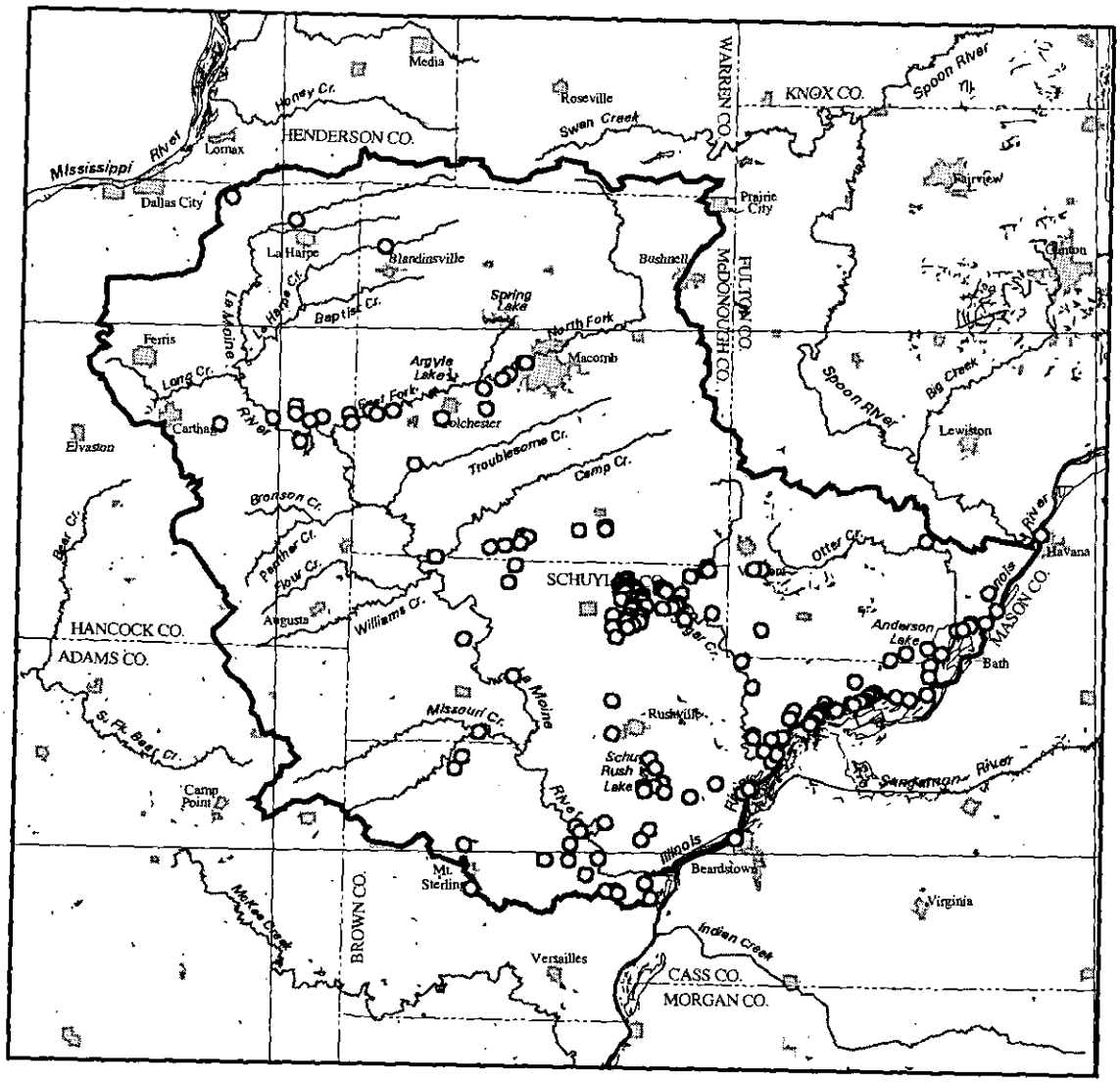
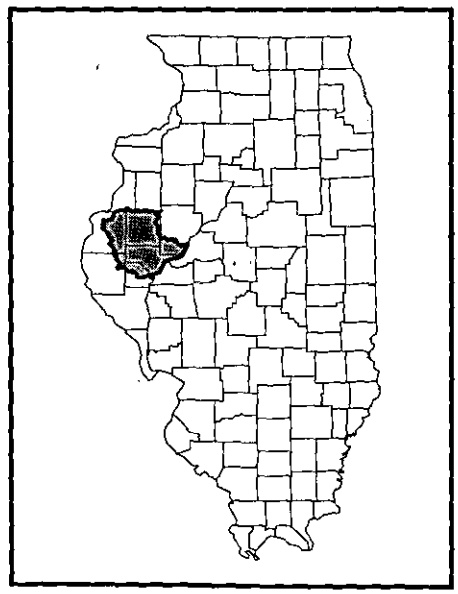


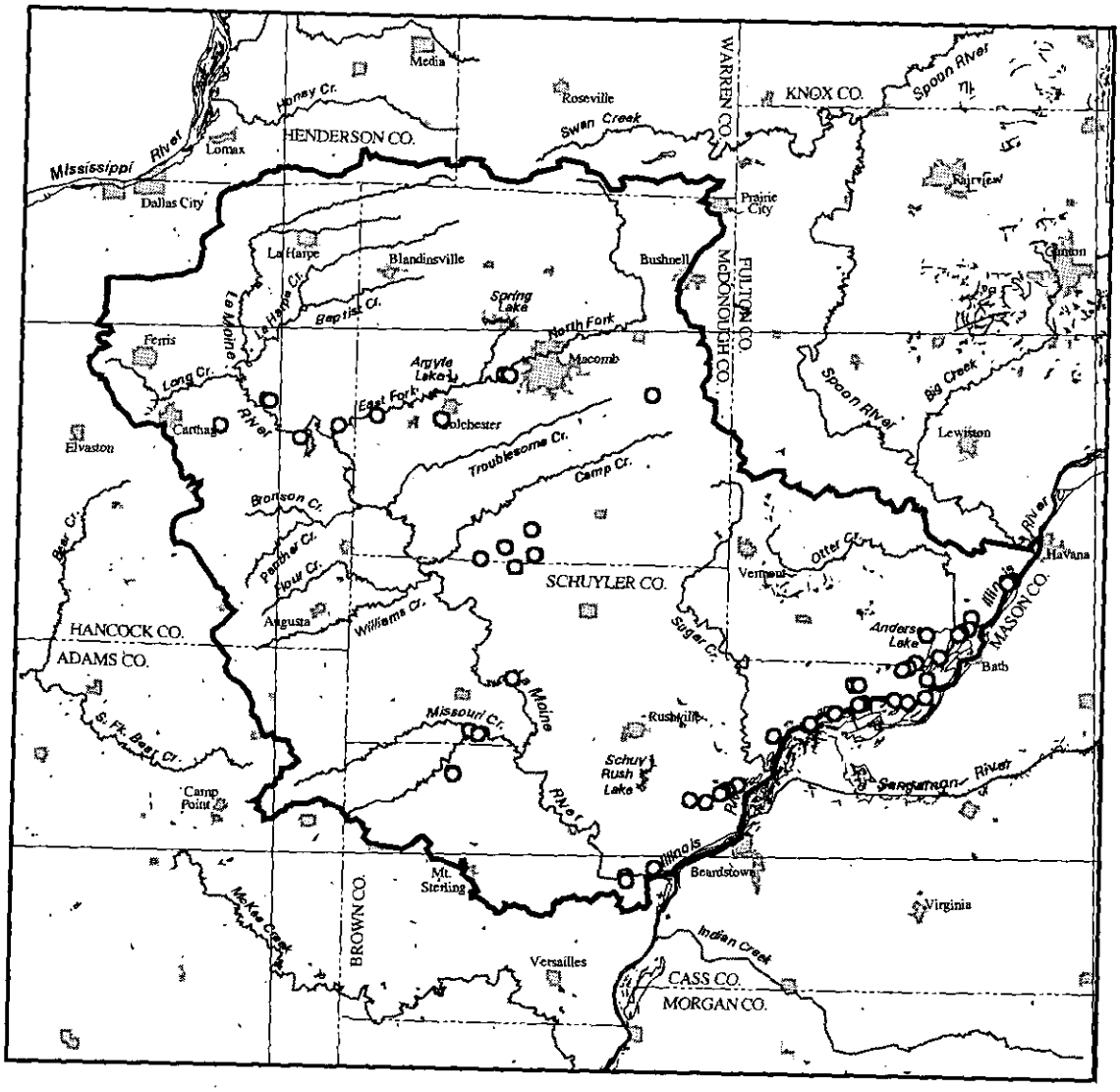
Figure 3-11. Middle Woodland archaeological components.





Archaeological sites

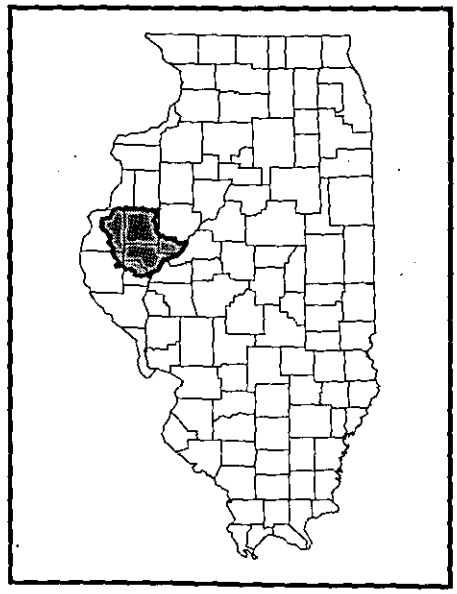
Figure 3-12. Late Woodland archaeological components.



5 0 5 10 15 Miles

5 0 5 10 15 20 Kilometers

N



o Archaeological sites

Figure 3-13. Mississippian archaeological components.

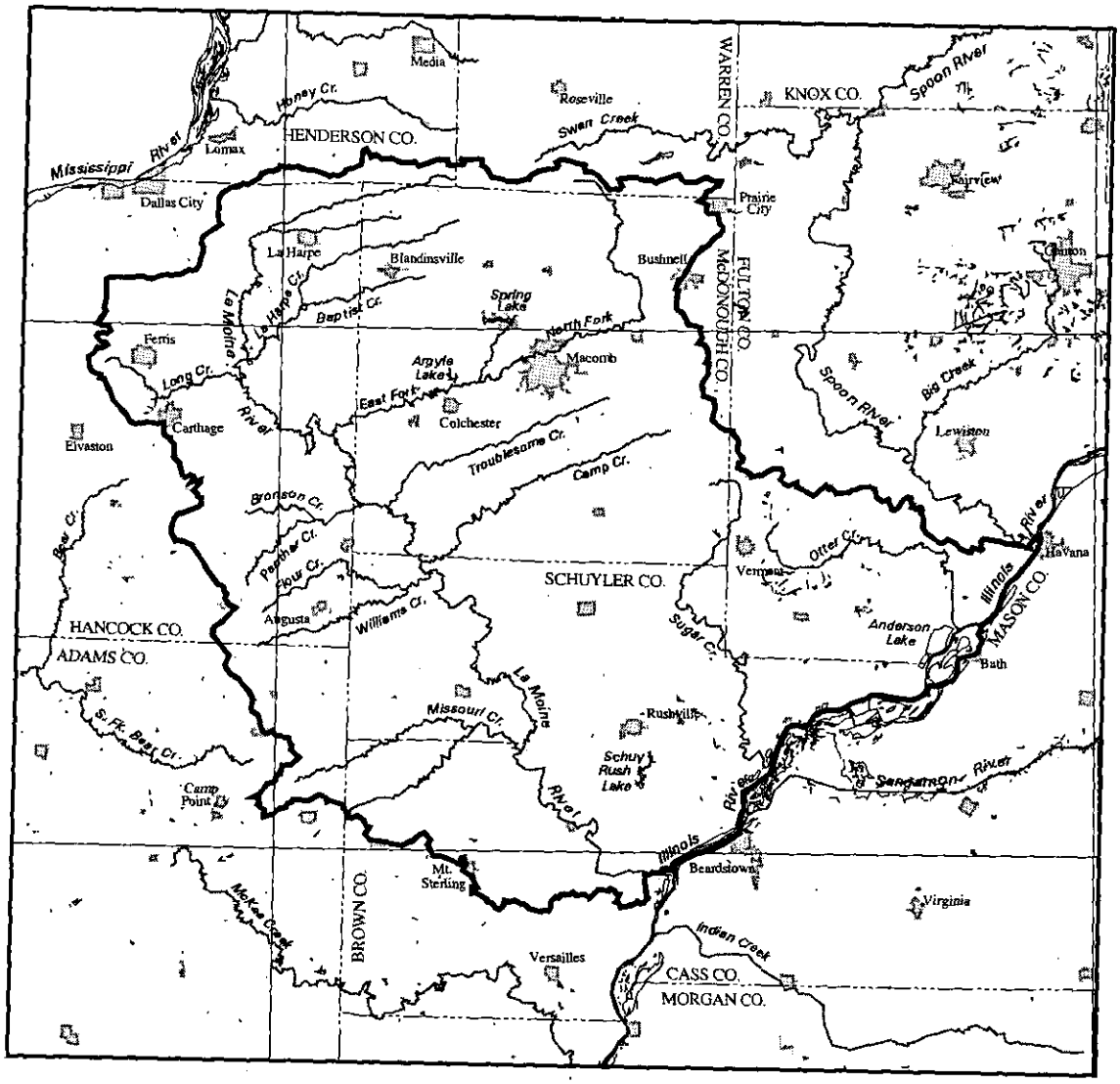
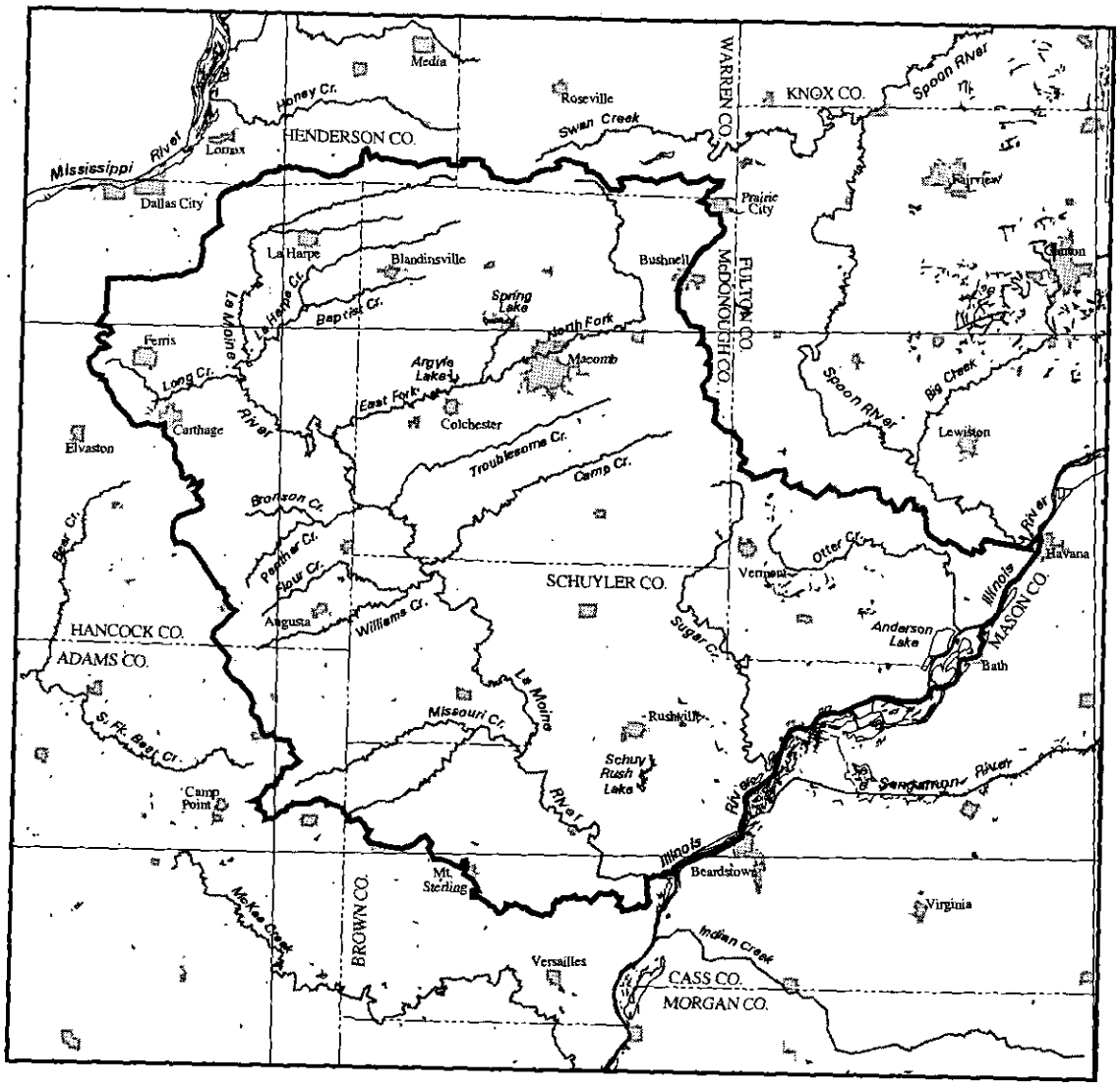
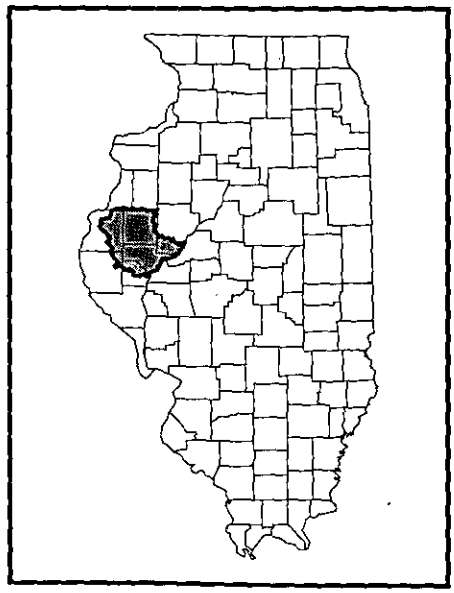


Figure 3-14. Upper Mississippian archaeological components.



5 0 5 10 15 Miles
5 0 5 10 15 20 Kilometers

N



o Archaeological sites

Figure 3-15. Protohistoric archaeological components.

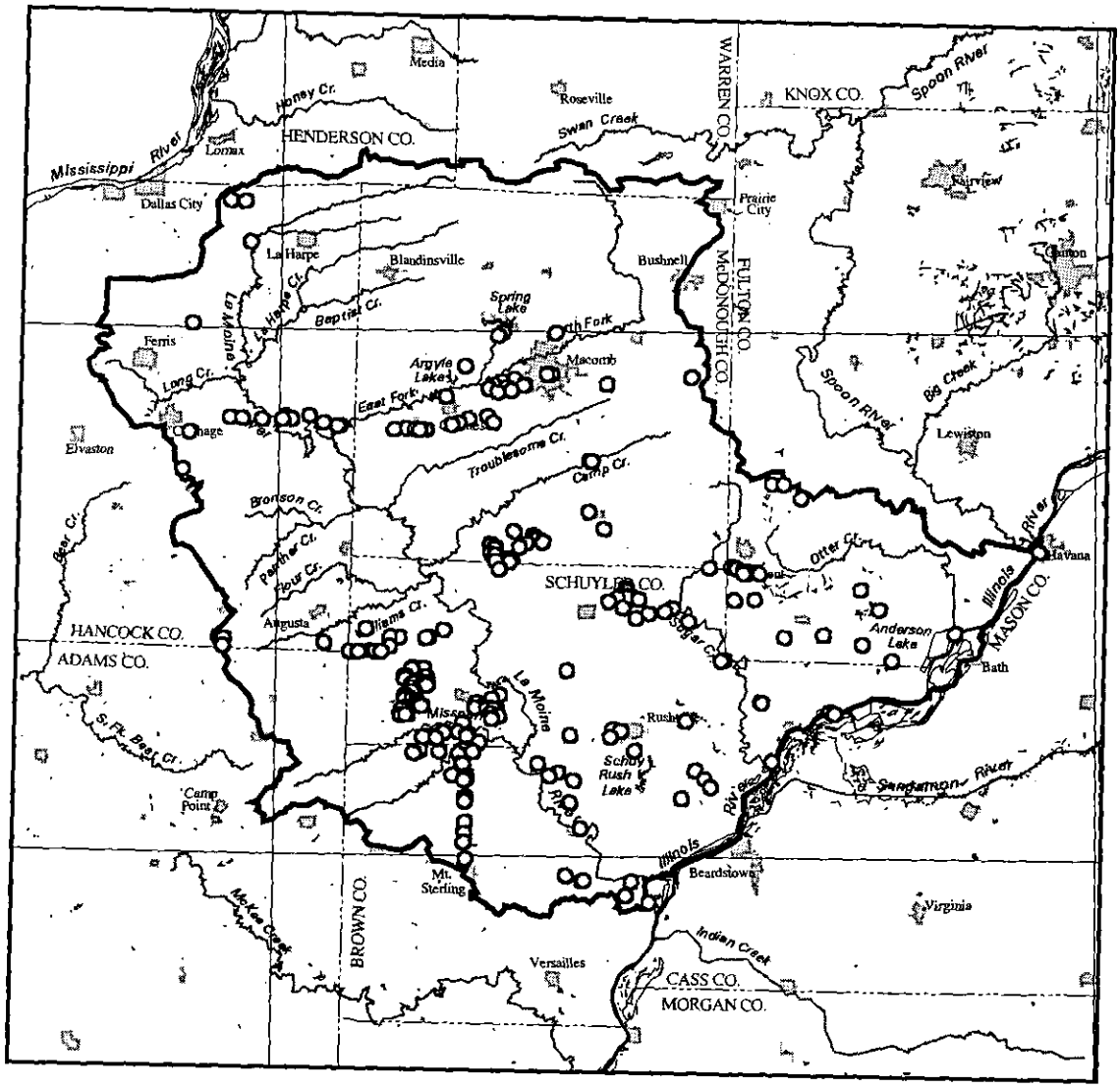
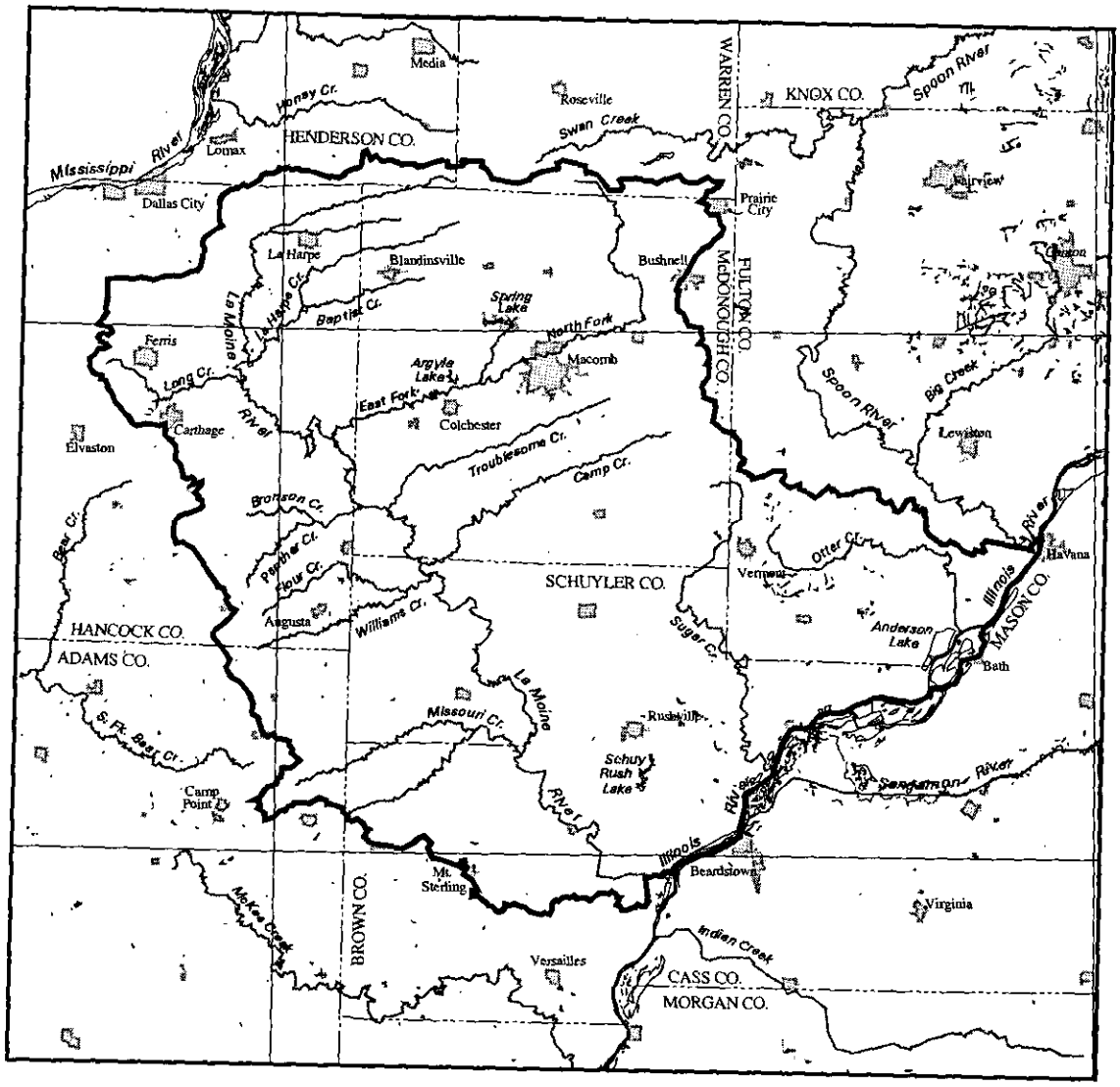
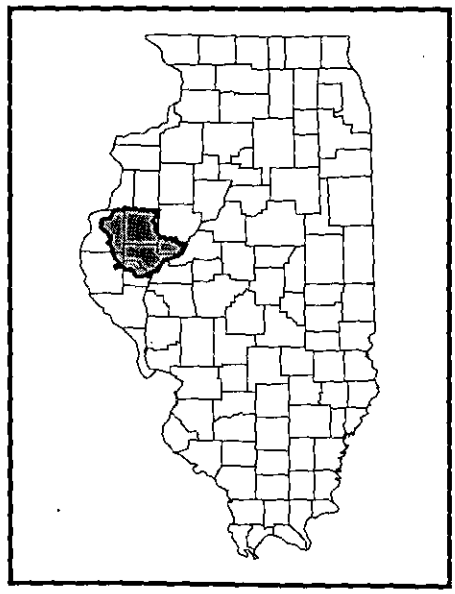


Figure 3-16. Unidentified Historic archaeological components.





o Archaeological sites

Figure 3-17. Historic Native American archaeological components.

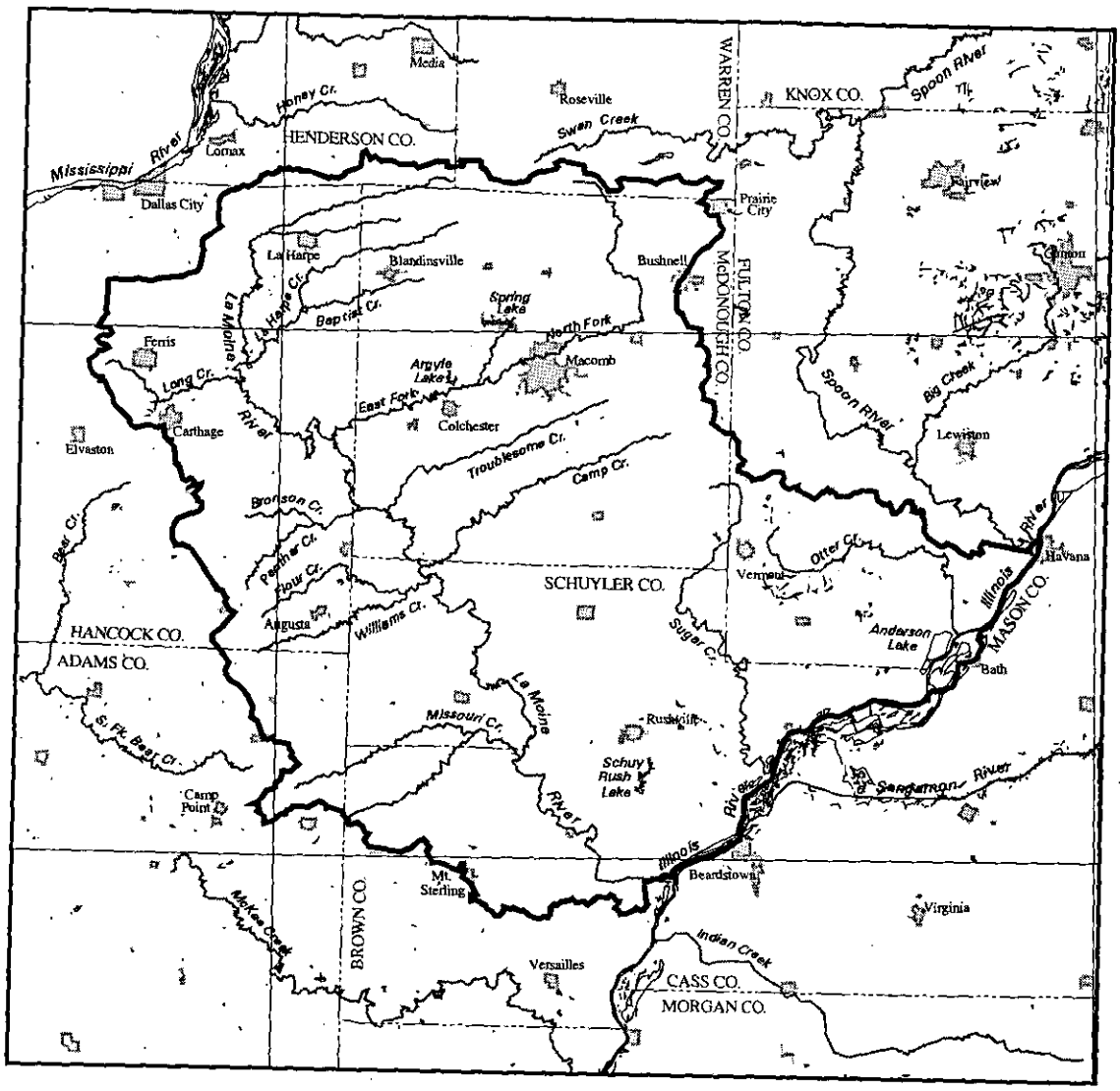


Figure 3-18. Historic Colonial archaeological components.

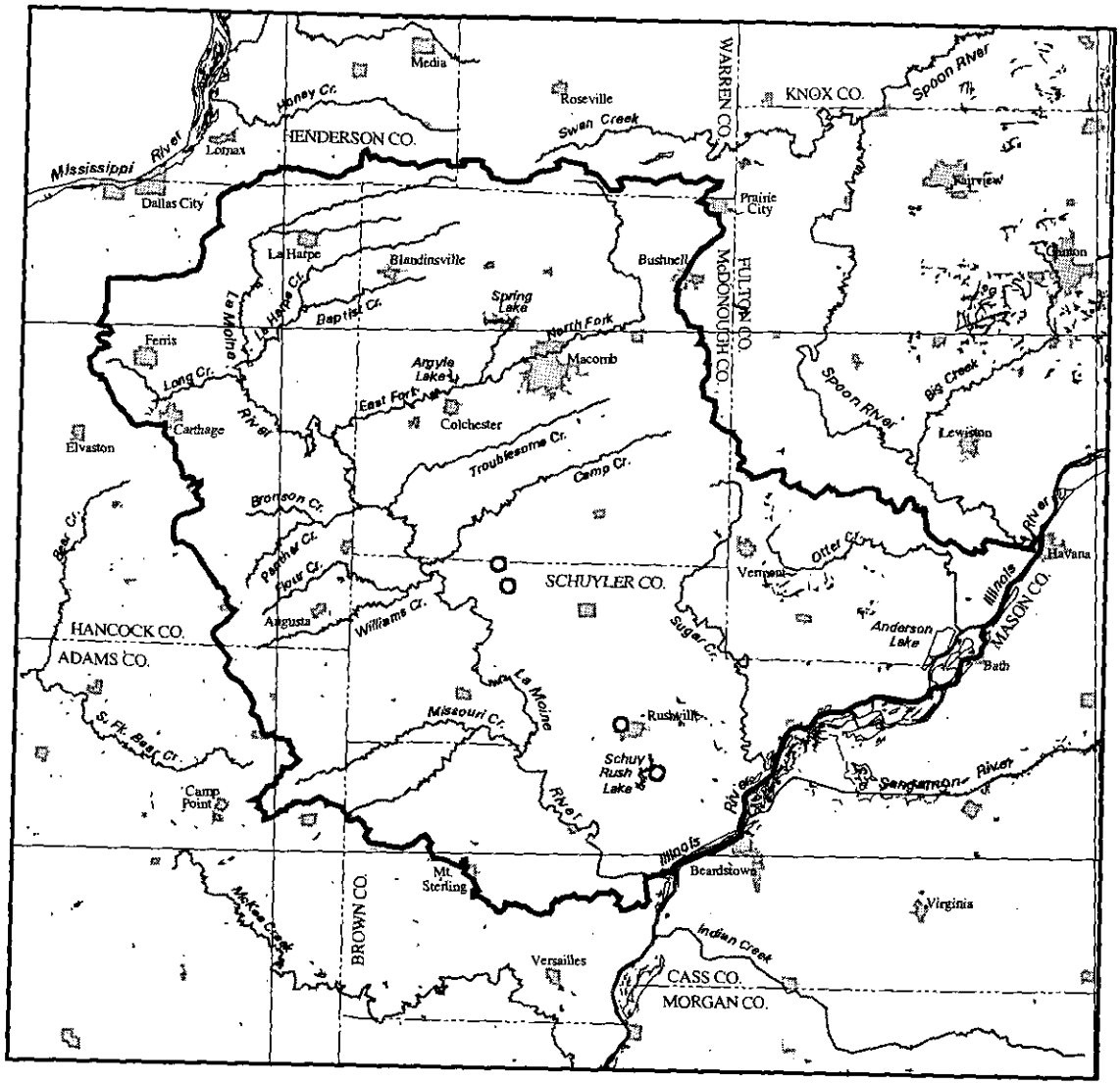
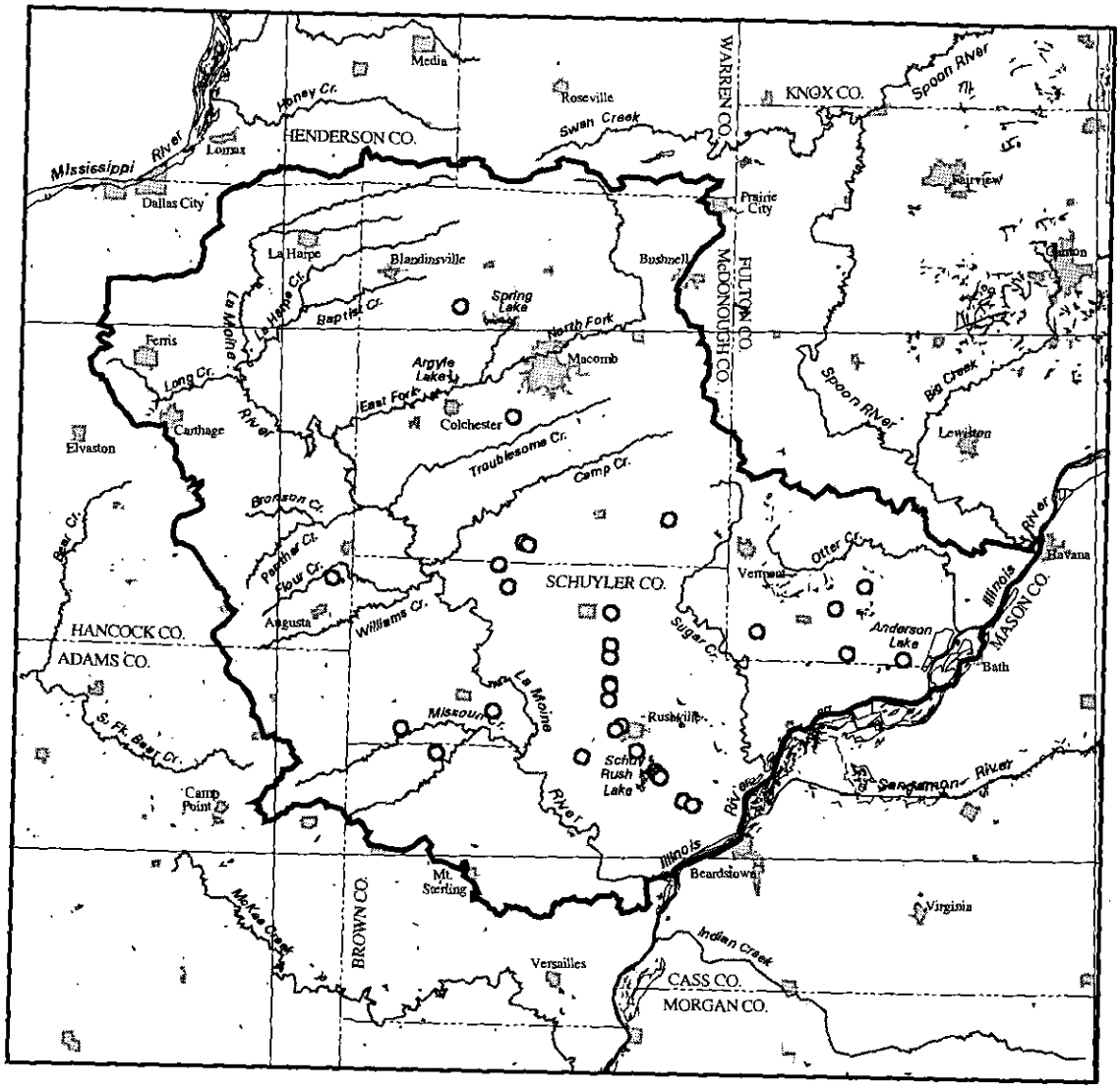


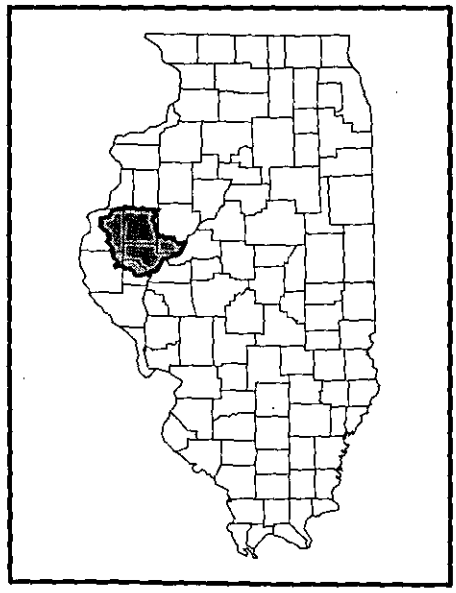
Figure 3-19. Historic Pioneer archaeological components.



5 0 5 10 15 Miles

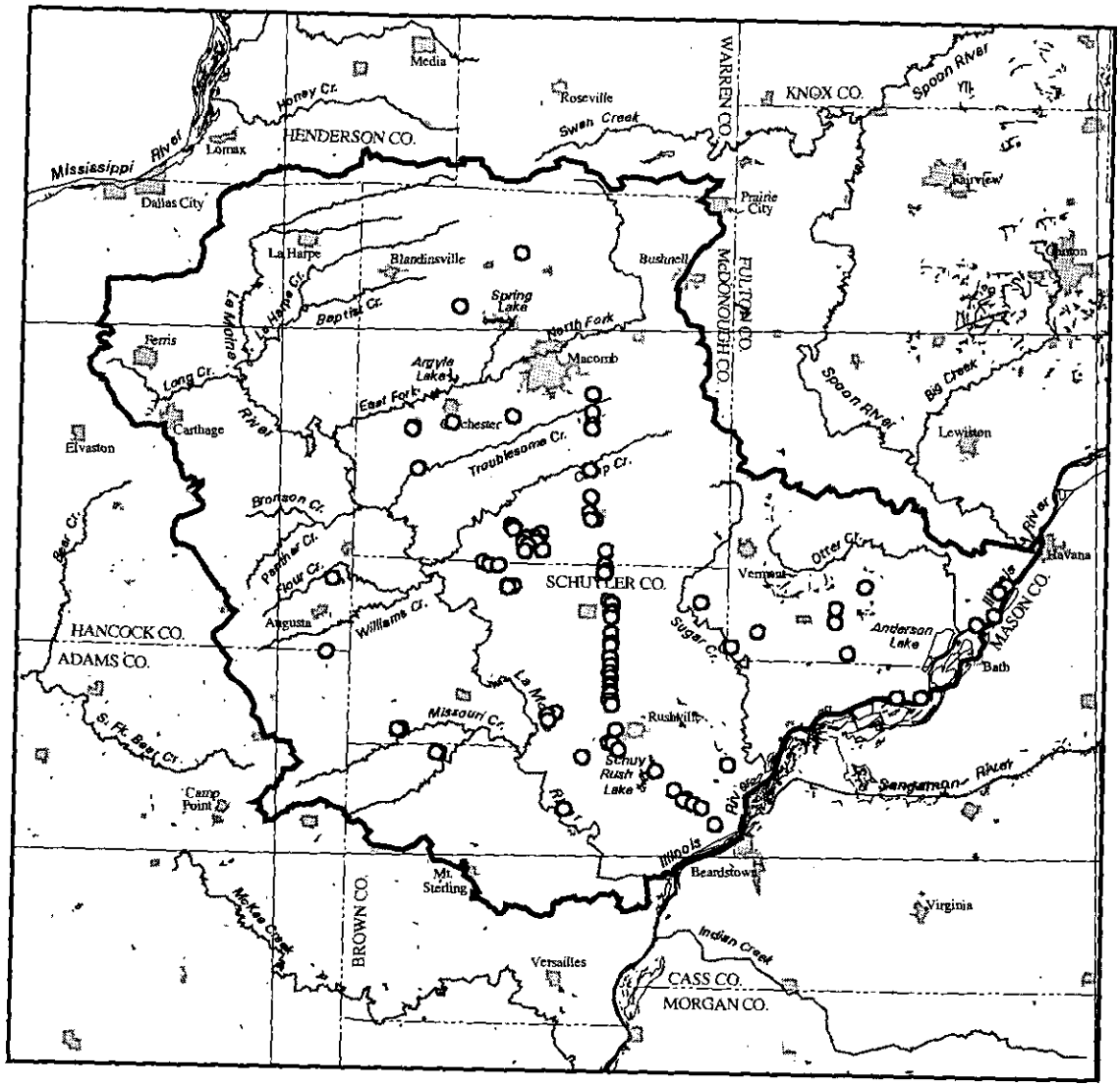
5 0 5 10 15 20 Kilometers

N



o Archaeological sites

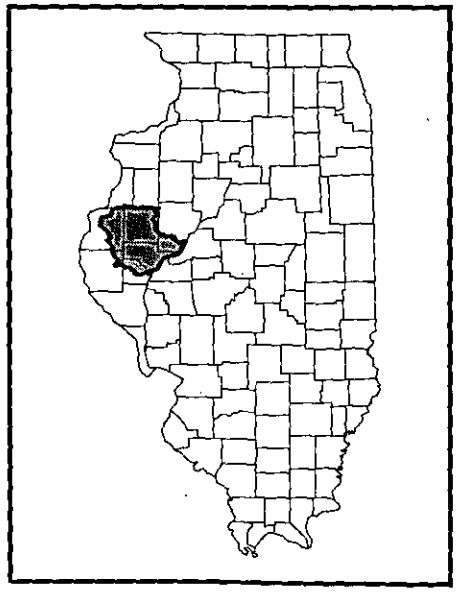
Figure 3-20. Historic Frontier archaeological components.



5 0 5 10 15 Miles

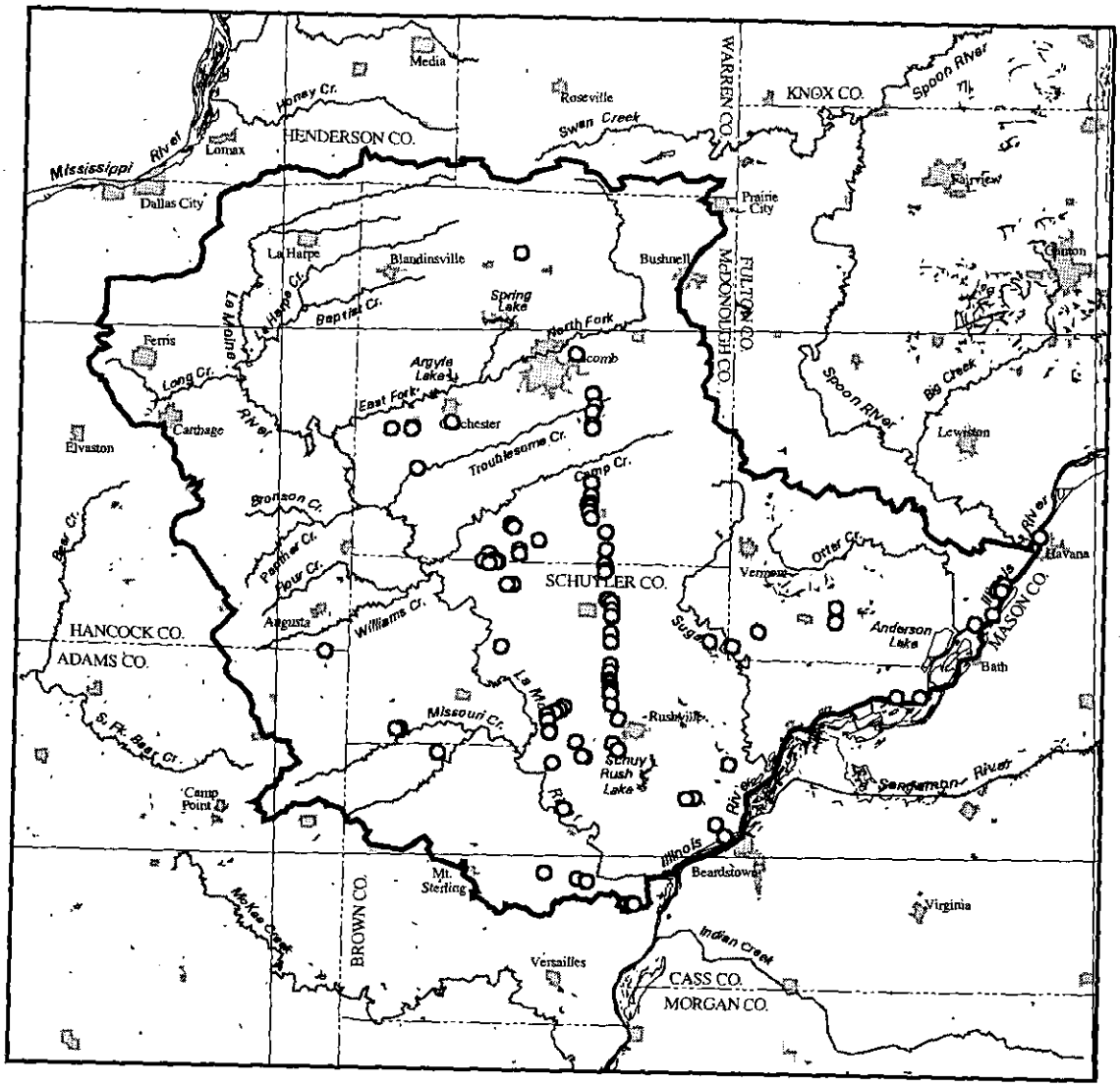
5 0 5 10 15 20 Kilometers

N



o Archaeological sites

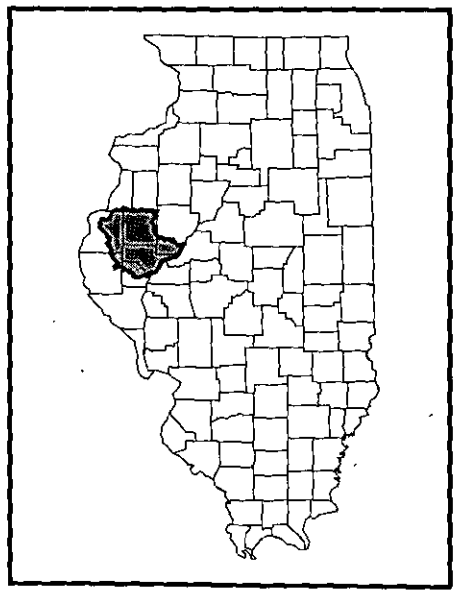
Figure 3-21. Historic Early Industrial archaeological components.



5 0 5 10 15 Miles

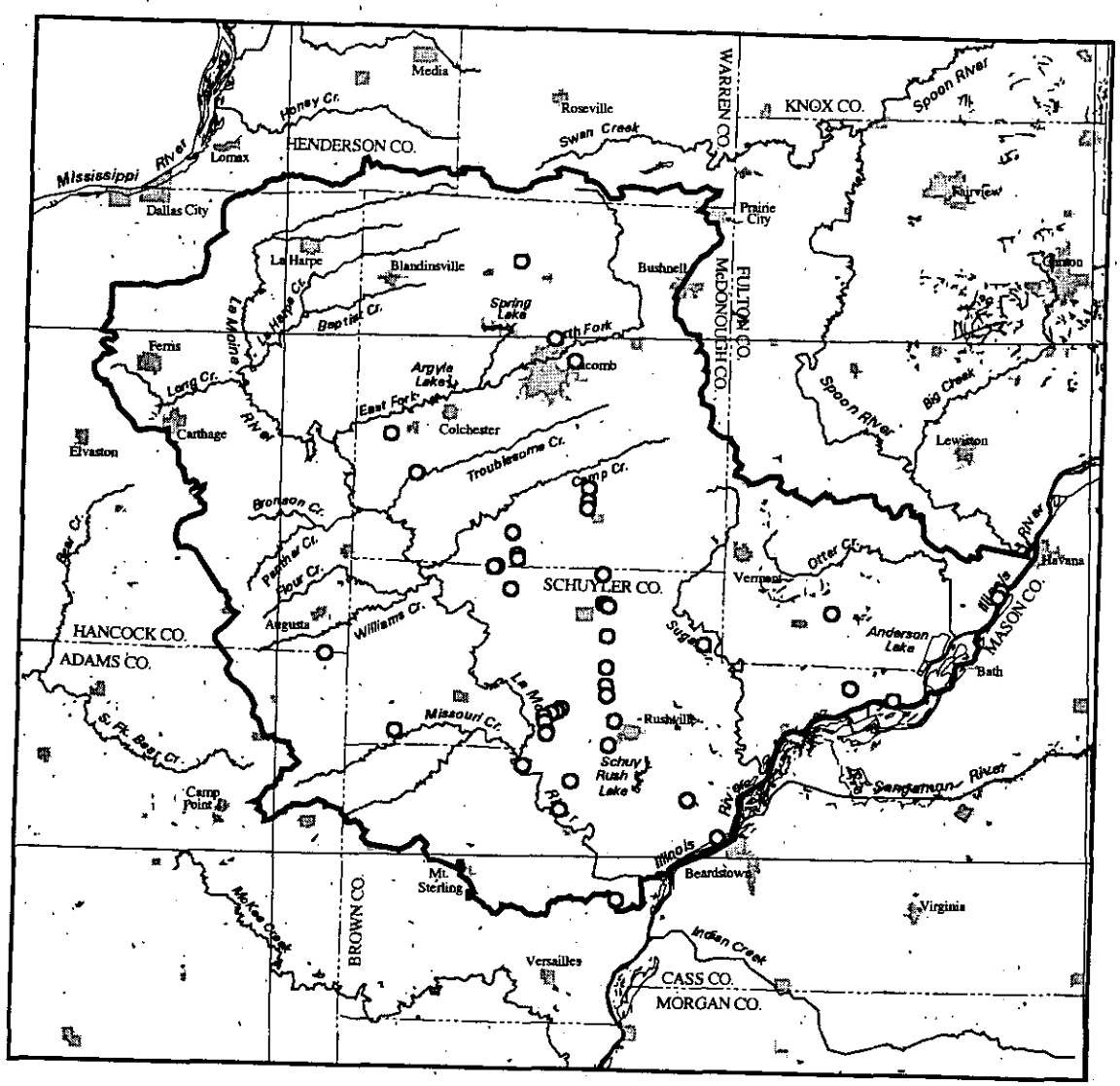
5 0 5 10 15 20 Kilometers

N



o Archaeological sites

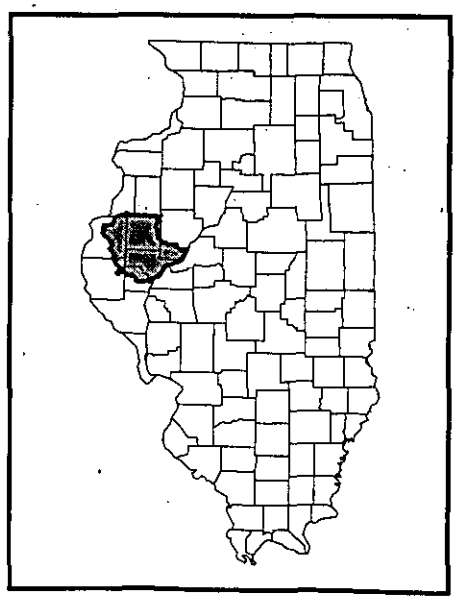
Figure 3-22. Historic Urban Industrial archaeological components.



5 0 5 10 15 Miles

5 0 5 10 15 20 Kilometers

N



○ Archaeological sites

Figure 3-23. Historic Postwar archaeological components.