37 22' 30" 37 22' 30"

89 07' 30" 88 00'

Natural Resources Survey of the Cypress Illinois Quadrangle

A Partial Inventory of the Soil, Water, Plant, & Human Resources of the Area

USDA NRCS
Natural Resources Conservation Service

89 07' 30" 88 00'

37 15' 37 15'

Foreword

The Natural Resources Survey of the Cypress, Illinois, Quadrangle provides a partial inventory of the soil, water, plant, and human resources for a small part of the Cache River Watershed. This resource-rich area located in the southern tip of Illinois served as the project area to test the concept of building a natural resources Geographic Information System (GIS).

Natural resource data layers were acquired and developed for the Cypress Quad through the cooperative efforts of United State Department of Agriculture's Natural Resources Conservation Service, USDA's Forest Service, United States Department of the Interior's Fish and Wildlife Service, Illinois Department of Natural Resources–Division of Natural Heritage, Illinois State Geological Survey, Southern Illinois University, The Nature Conservancy, Johnson County, Pulaski County, Union County, and the Cache River Resource Planning Committee. The project demonstrates how the soil survey initiative can be taken to the next level and provide a valuable tool to communities. By enlisting our partners and clients in the effort, we were able to develop GIS data layers that will help us to conserve, improve, and sustain the natural resources and environment of the Cache River area.

The maps and narrative in this publication are presented to whet your appetite for the endless possibilities that are offered by GIS technology. The data and information collected for this project will be provided on CD-ROM as digital data layers ready to be analyzed with GIS.

WILLIAM J. GRADLE
Illinois State Conservationist

Introduction

The concept of creating a natural resources survey is right in line with a concept that has been promoted through the Illinois Cooperative Soil Survey for the last decade—"building a GIS." "Building a GIS" for the Cypress Quad was the concept that provided the direction for this project. United States Geological Survey (USGS) digital orthophoto quarter quads (DOQ's) served as the base for all of the spatial data layers created for this 36,000 acre project area.

As GIS technology is integrated into the way we do business, it only makes sense that other natural resources data layers be created simultaneously with the digital soil survey. As we acquire these digital data layers and apply GIS technology, our goals are to eliminate spatially inaccurate and expensive paper-based maps and information, eliminate duplicate sets of information, and provide easy access to quality geospatial data.

The Cypress Quad proof-of-concept project provides a score of geospatial data themes that will allow GIS technology to be used in the natural resource management decision-making processes.

The "Story of the Land" section, written by Max Hutchinson, offers a brief outline of the major cultural and natural influences that have caused the land of the Cache River Watershed and Cypress Quad to be as it is today. Hutchinson's story sets the tone for some of the natural resource concerns and challenges facing the area. The dozen or so base map geospatial data layers presented in the publication provide a framework to build on. The natural resource data layers of soils, geology, plant communities and wildlife habitat, watershed boundaries, and wetlands complement each other and allow for unique ways to observe the Cypress Quad. NRCS hopes data layers like those in this publication will help complete the story of the land in the Cypress Quad and offer a happy ending.

The casual observer should find the maps and narrative interesting. The GIS analyst will find the data and metadata on the CD-ROM invaluable.

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USDA NRCS
Natural Resources Conservation Service

ILLINOIS
DEPARTMENT OF
NATURAL
RESOURCES

Illinois State
Geological Survey

SIU
Southern Illinois University
Carbondale

The Nature Conservancy®

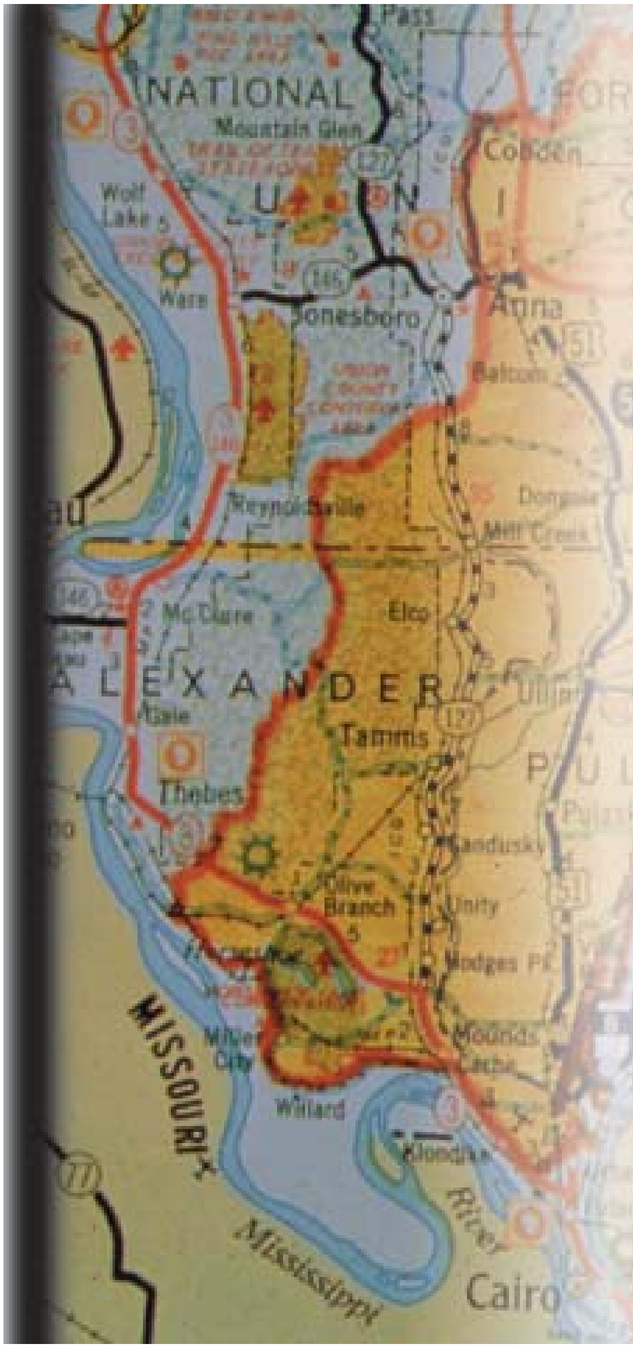
Forest Service
U.S. Department of Agriculture

U.S. Fish & Wildlife Service
Department of the Interior

Illinois Department of Agriculture

Supervisor of Assessments
Johnson, Pulaski, & Union Counties
Cache River
Resource Planning Committee

Geospatial Data Themes
Framework/Base Map



1993 Orthophotography

Aerial photographs have inherent distortion caused by unleveled terrain. This phenomenon is known as relief displacement distortion. Because of this distortion, the geographic location of a feature on an aerial photograph may not be the actual geographic location on the ground. An orthophoto is an aerial photograph that has been processed in a way that removes this distortion. Removing this distortion makes the orthophoto scale-accurate and allows for the direct measurement of distances, position, area, and angles. Thus, an orthophoto combines the image characteristics of a photograph with the geometric qualities of a map. These features, plus the 1:12,000 (1″=1,000′) scale, makes the orthophoto an ideal base layer for GIS data layers. The aerial photographs used to create the orthophotos for the Cypress Quadrangle were acquired from the National Aerial Photography Program (NAPP) and were taken on March 28, 1993.

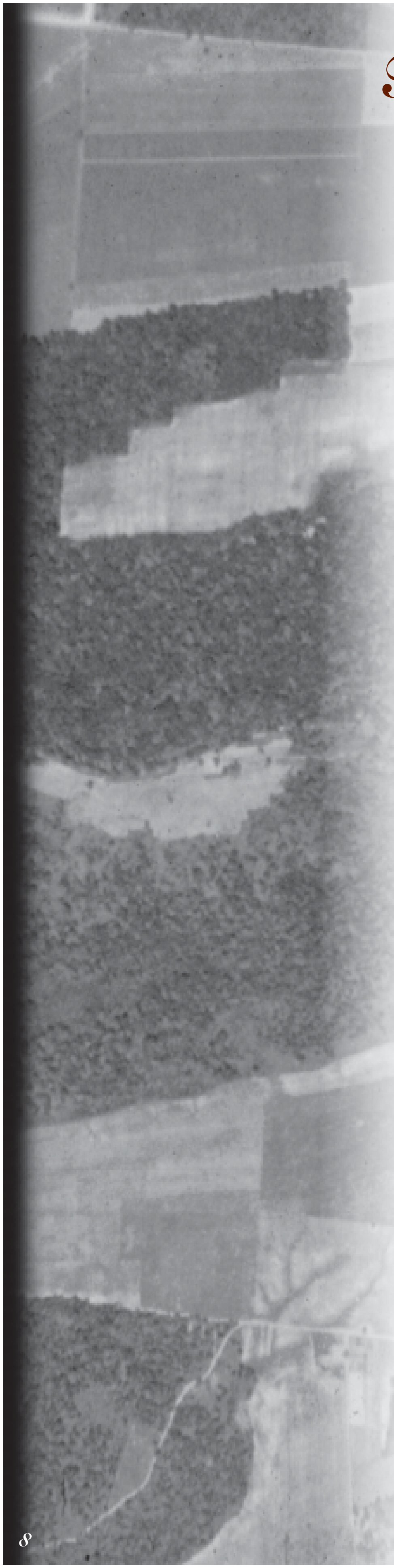
1993 Orthophotography

Source: 1993 USGS DOQ.
Projection: UTM, Zone 16, NAD 83
Map Date: 01/08/99

N

0.5 0 0.5 1 Mile

Framework/Base Map

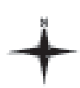


1938 Aerial Photography

The aerial photography used to create this mosaic was originally acquired by the Agricultural Adjustment Administration on August 7th (Johnson County), 23rd (Pulaski County), and 24th (Union County) of 1938. Twenty photographs were used to create this mosaic. The original scales range from 1:21,000 (1″=1,750′) to 1:22,000 (1″=1,833′). The photos were rectified and patched together to create a semicontrolled photomosaic. Careful attention was paid to performing tonal matching between photos and complex blend lines in order to hide the juncture of adjoining photos. The result is a nearly seamless mosaic retaining as much as possible of the tonal richness of the original aerial photography.

1938 Aerial Photography

Produced by: IDNR-ISGS
Source: 1938 historical aerial photography.
Projection: UTM, Zone 16, NAD 83
Map Date: 01/08/99



Framework/ Base Map

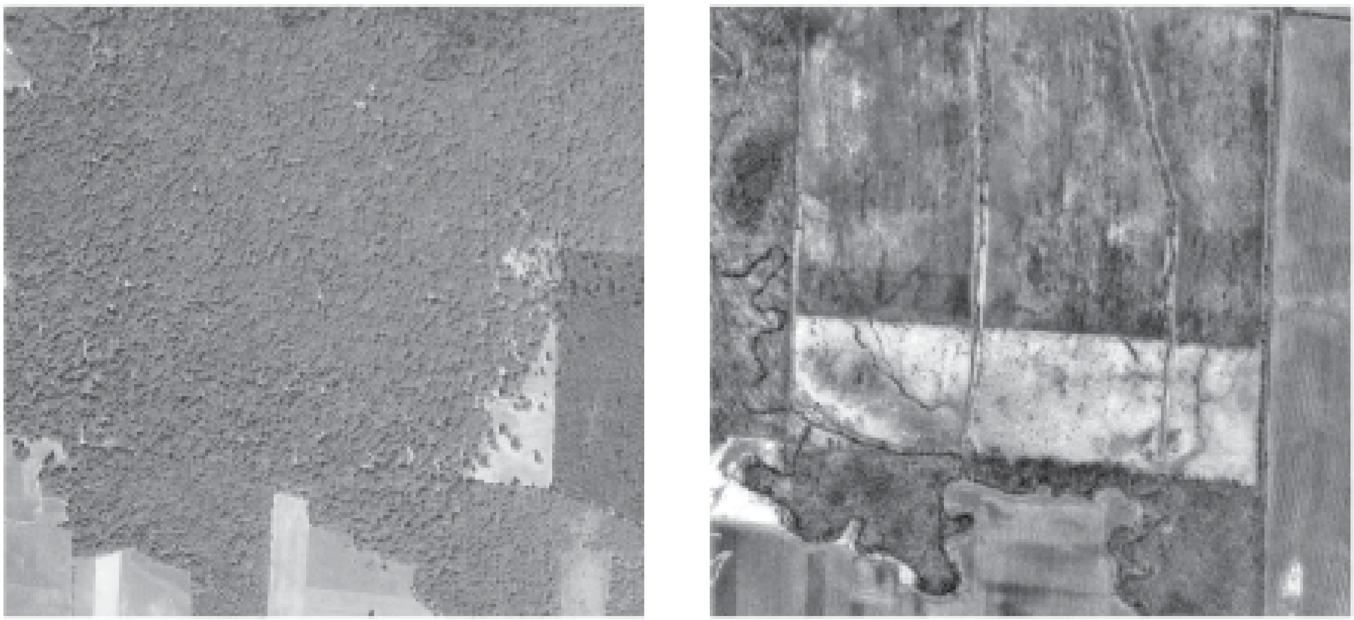
General Observations of Land Use Change: 1938-1993.

Comparison of orthophotos and the historic aerial photo mosaic reveals several changes in land management during the past half-century.

A few general observations are:

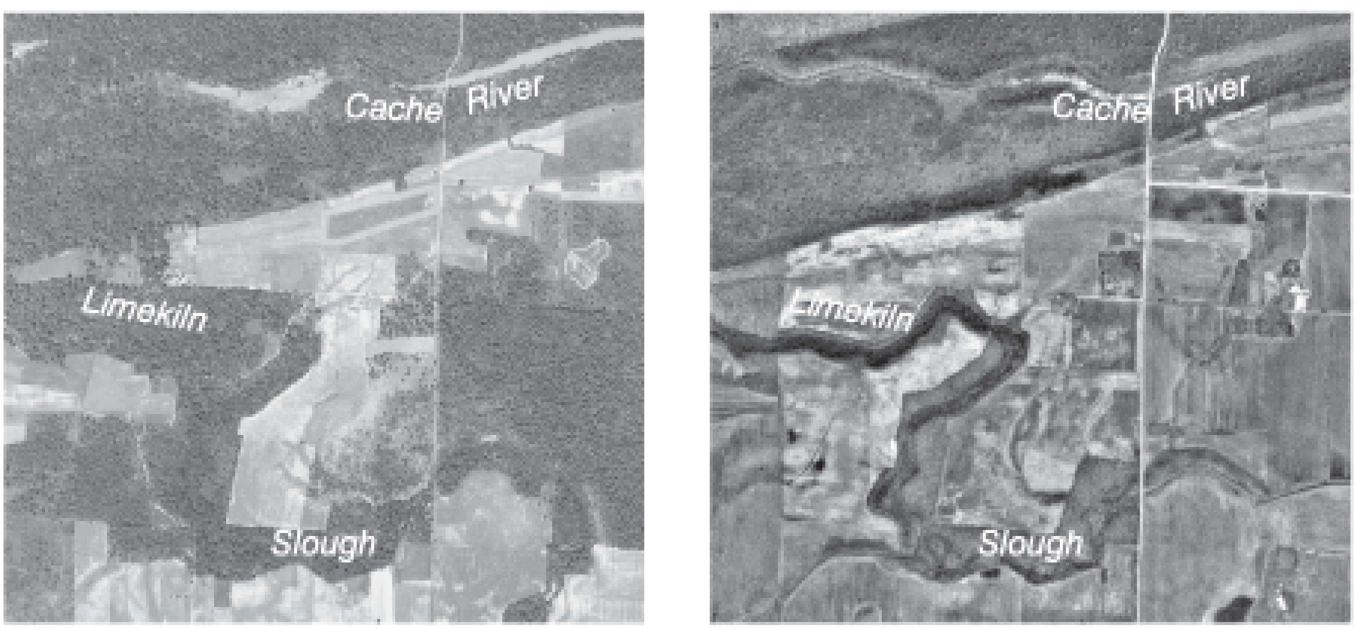
1. There have been significant changes in both the quantity and quality of the forest and woodland cover within the Cypress Quadrangle. Large areas of forestland as well as small woodlots have been cleared presumably for the value of the forest products and for expansion of agricultural production *(figure 1).*

2. Forested areas adjacent to the Cache River, including Limekiln Slough, have been cleared and replaced by intensive row crop agriculture *(figure 2).*



(a) 1938 (b) 1993

Figure 1. 1:12,000 scale images of the Hogans Bottoms area on the Cypress Quadrangle. The large, contiguous forest in the 1938 photo has been cleared and replaced with intensive row crop agriculture.



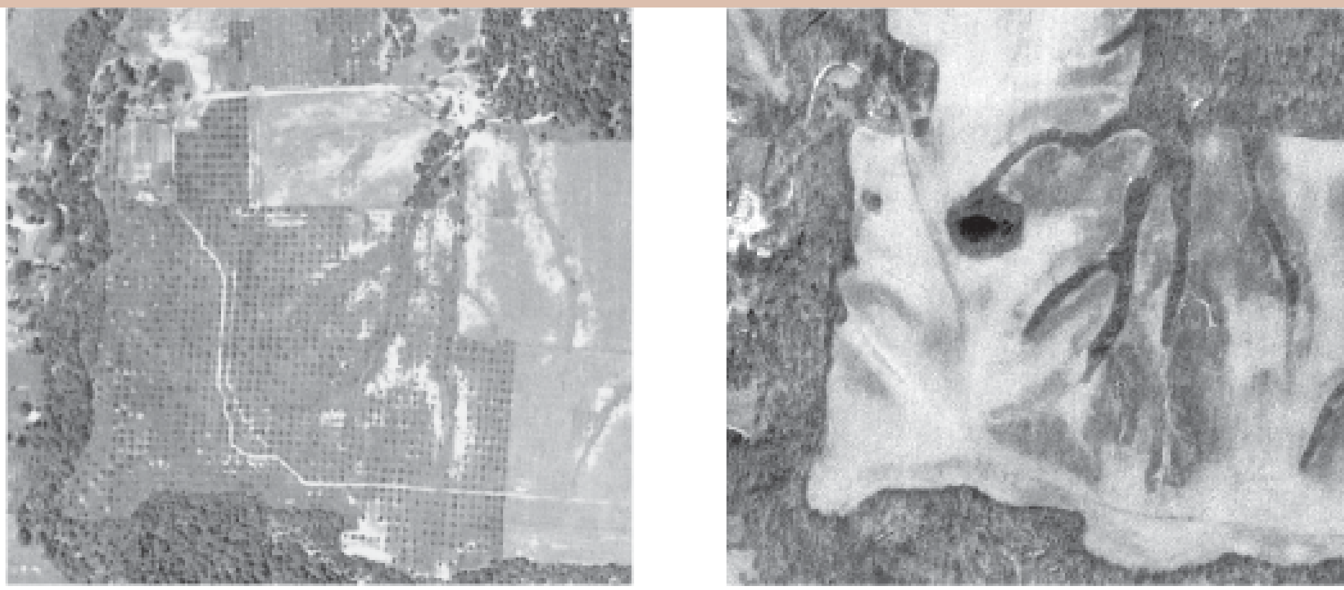
(a) 1938 (b) 1993

Figure 2. 1:24,000 scale images of Limekiln Slough on the Cypress Quadrangle. The riparian forest in the 1938 photo has been cleared and replaced with intensive row crop agriculture.

3. There has been a noticeable change in field size from 1938 to 1993, a result of the switch from horsepower to tractor power. The distinctive marks of "bunch" raking hay in figure 3 are evidence of horsepower farming.

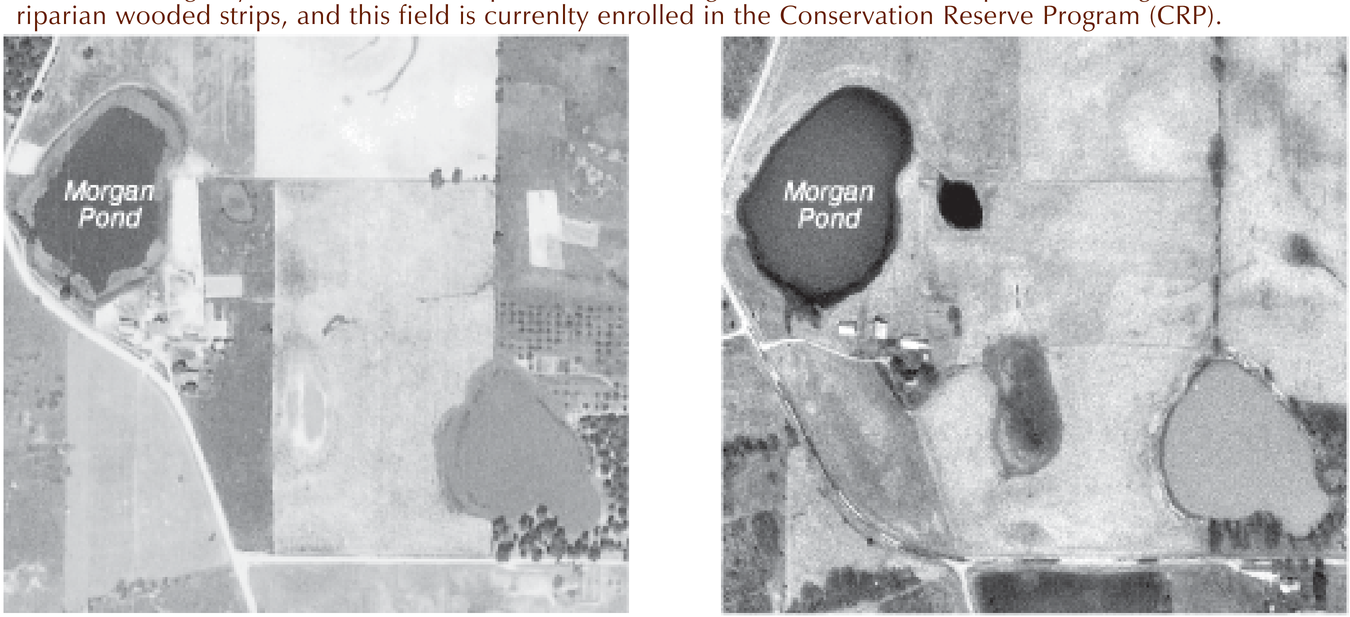
4. There are more areas of permanent pasture and other grassland in the 1938 mosaic as opposed to the 1993 orthophotos, and land use has changed to intensive row crop agriculture in many of these areas. In many of the areas, there is clear evidence of surface erosion and incipient gullying in the 1938 mosaic *(figure 3)*. Many of these areas have steep slopes and were most likely overgrazed.

5. Evidence of the decrease in wetland quality can be seen at Morgan Pond in the northwest corner of the quadrangle area *(figure 4)*. In 1938, Morgan Pond appears to be a palustrine open water wetland containing an aquatic bed perimeter; in 1993, the aquatic bed perimeter is absent. The pond southeast of Morgan Pond appears to have a high level of turbidity (indicated by the gray tone) in 1938 and in 1993.



(a) 1938 **(b) 1993**

Figure 3. 1:8,000 scale images of agricultural land just east of the town of Cypress. **(a)** Surface erosion appears as white tones, and darker linear features indicate the start of gullying. Also note the distinctive marks of "bunch" raking hay. **(b)** Conservation practices are being utilized in the 1993 photo. The gullies are now riparian wooded strips, and this field is currenlty enrolled in the Conservation Reserve Program (CRP).



(a) 1938 **(b) 1993**

Figure 4. 1:8,000 scale images of Morgan Pond in the northwest corner of the Cypress Quadrangle. Notice the aquatic bed around the perimeter of Morgan Pond in 1938. This aquatic bed is absent in 1993. Also note that the pond to the southeast of Morgan Pond was turbid in 1938 and 1993.

Framework/Base Map

Transportation

There are a total of 130 miles of roads and 15 miles of railroads in the quadrangle. The majority of the road (82 miles) are paved county roads. There are also 33 miles of unpaved access roads and 11 miles of state highways. There are 4 miles of streets in the towns of Cypress, New Grand Chain, and Perks.

There are two rail lines in the Quadrangle. The Central and Eastern Illinois line has 12 miles of rails, and the New York Central line has 3 miles. Most of the lines are abandoned.

Governmental Units and Place Names

Governmental units and place names are important framework/basemap information because they provide the map reader a point of reference and a sense of location. Some examples of governmental unit information are maps of political boundaries, such as county boundaries, state natural areas, state nature preserves, national natural landmarks, and incorporated areas. The USGS Geographic Names Information System (GNIS) is an excellent source of place names information. The GNIS consists of all recognized names shown on USGS's 7.5-minute topographic quadrangle series.

Natural Areas, Preserves, and Landmarks

The Cypress Quadrangle is at the junction of three counties: Union, Johnson, and Pulaski. One national natural landmark, one Illinois nature preserve, and six state natural areas are located on the Cypress Quad.

The Lower Cache River Swamp has high-quality natural communities, rare species, and huge ancient trees. The natural communities in this large natural area are cypress/water tupelo swamps and flood-plain forests. Some of the most striking features are the ancient cypress trees, some of which are more than 1,500 years old. The Buttonland Swamp National Natural Landmark and Section 8 Woods, an Illinois Nature Preserve, are located within the Lower Cache River Swamp.

Another natural area in the quadrangle that has high-quality cypress/water tupelo swamps and flood-plain forest natural communities is the Little Black Slough-Heron Pond Area. This is also the largest natural area in the region, having a total acreage of 6,613 acres; however, only a 236-acre portion of this large natural area is within the boundaries of the Cypress quadrangle. Besides having high-quality natural communities, this natural area also has rare species, streams, and unique geologic features.

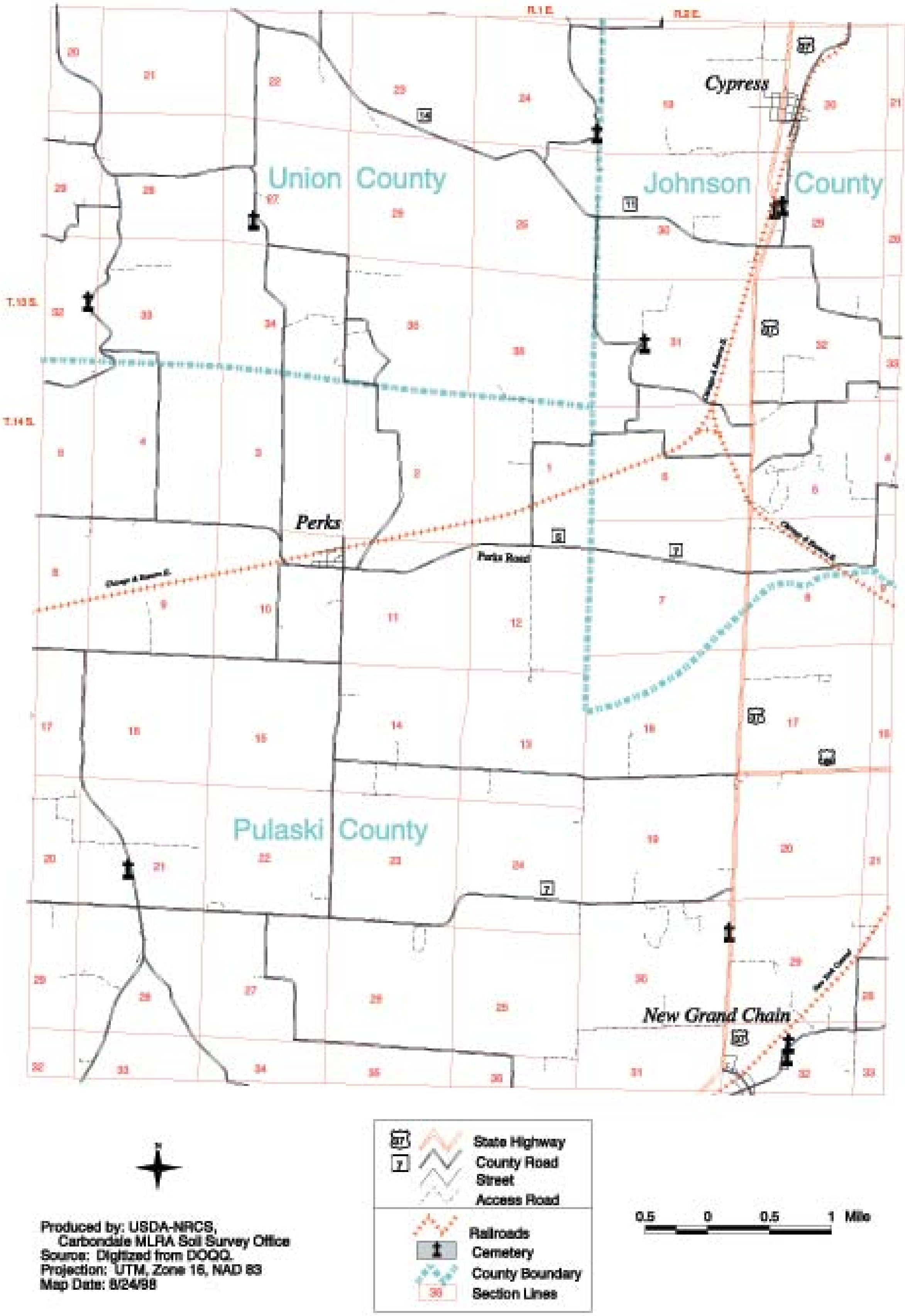
Two of the natural areas on the quadrangle are terrestrial cave communities. Mason Cave (10 acres) and Whitehill Cave (3 acres) both have terrestrial cave communities and special geologic features. Both caves are in the northeast part of the quadrangle. They formed in similar bedrock materials (Ste. Genevieve Limestone and Aux Vases Sandstone) and are only 1¼ miles apart.

A 165-acre natural area that surrounds Round Bluff is known as Glass Hill Natural Area. This natural area has high-quality natural communities, rare species, geologic features, and an archeological site. The 10-acre study plot called the Shawnee Community College Natural Area is known for its high-quality natural community.

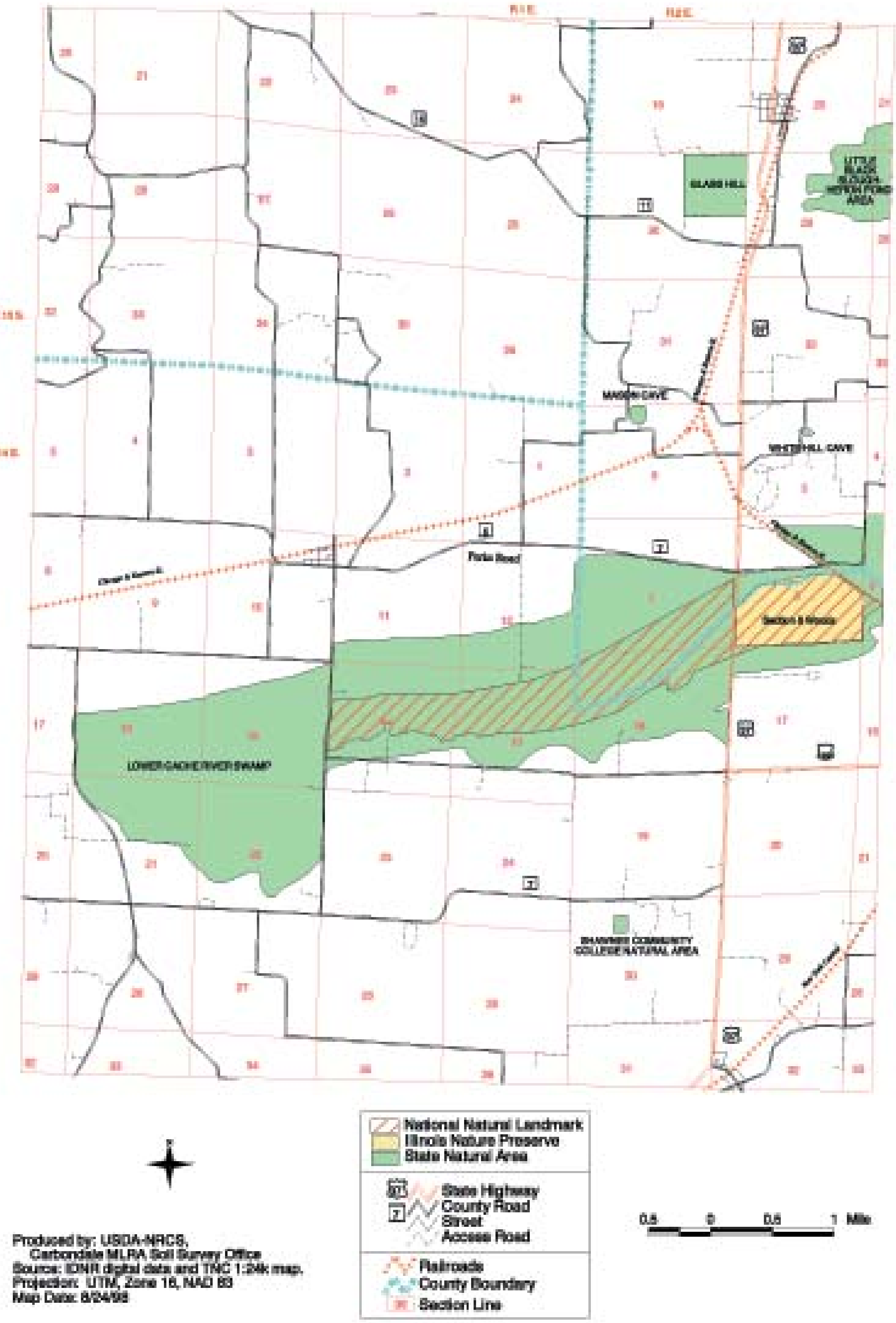
Topography

Topography is one of the most important framework data layers because it is an essential component in many natural systems and cycles. Topography dictates gravitational forces which drive the erosion/deposition and hydrological processes.

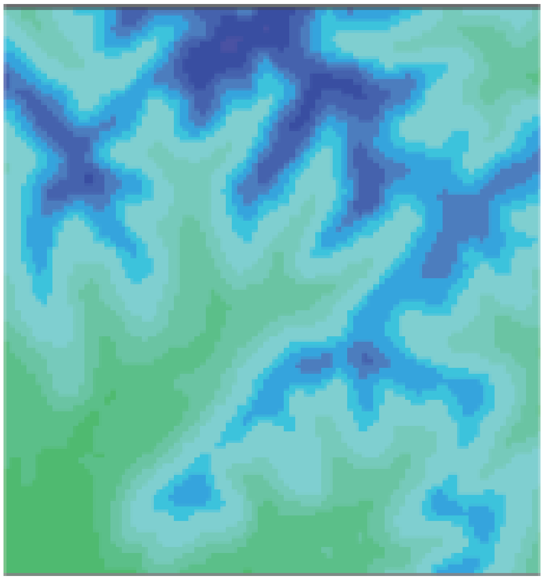
Transportation and Place Names



Natural Areas, Preserves, & Landmarks



DEM



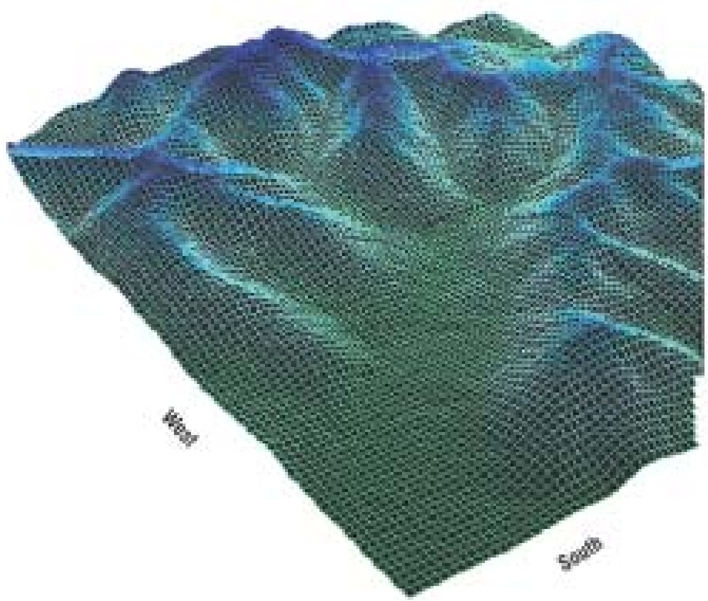
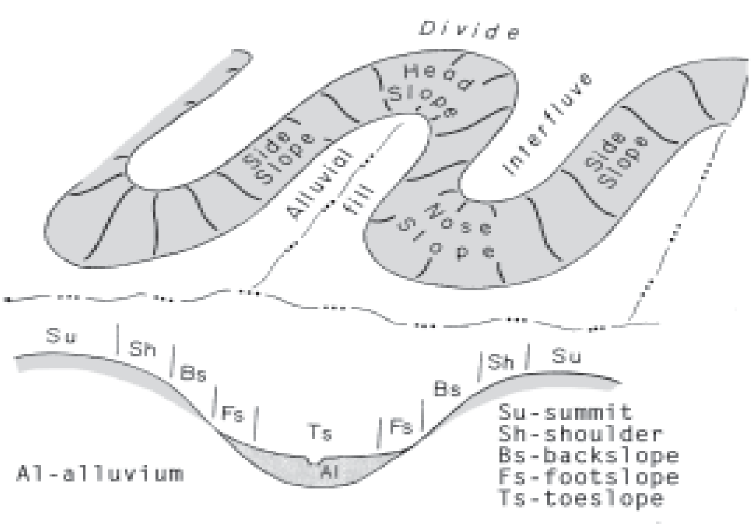


Figure 5.* Two-dimensional and three-dimensional visualization of DEM. *(Green represents lower elevations, and blue represents higher elevations.)

Figure 6. **Geomorphic Components of a Hillslope**



Topography (Continued)

Slope aspect influences solar insolation, which influences energy fluxes, biological processes, micro-climates, and ultimately soil development.

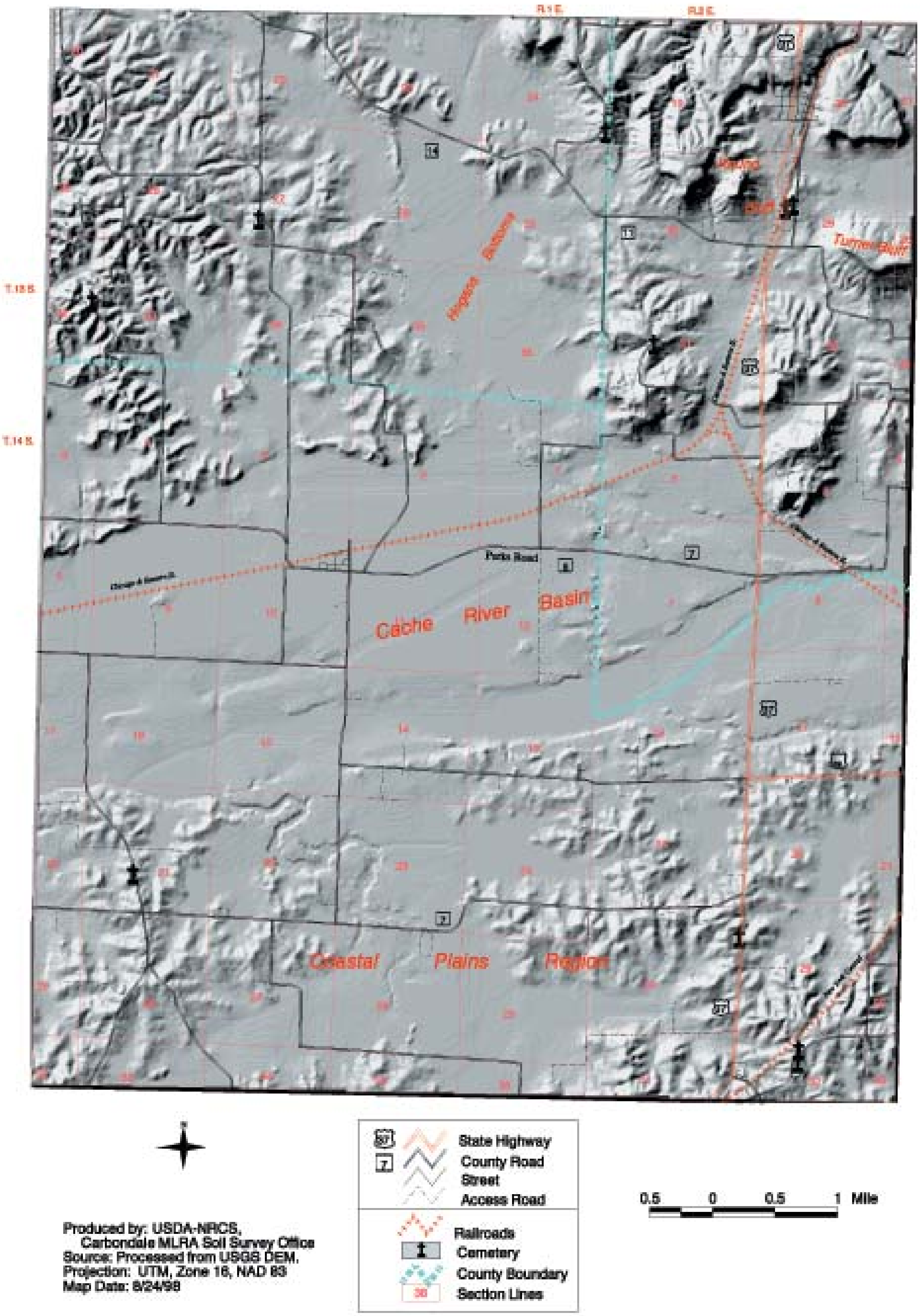
There is over 300 feet of local relief in the Cypress Quadrangle. Elevation ranges from 288 feet at the bottom of the Cache River Basin to 599 feet at the top of the bluffs and uplands in the northeast part of the quadrangle. There are four major landforms in this quadrangle. The Cache River Basin, which is 1½ miles wide, runs east to west and divides the quadrangle in half. The basin has relatively flat bottomlands and terraces. To the south of the Cache River Basin are the gently rolling hills of the Coastal Plains Region. To the north of the basin are the Shawnee Hills, in which two distinct landforms are present. In the northeast lie steep cliffs and bluffs, which are underlain sandstone and shale bedrock. In the northwest rugged ridges and steep hills of older limestone bedrock are evident.

The digital spatial data layer which provides topographic information is the Digital Elevation Model (DEM). What makes the DEM a valuable layer is that other topographic information, such as shaded relief, percent slope, slope aspect, and landscape classification, can be derived from this data set. The U.S. Geological Survey (USGS) produces DEM's by 7.5-minute quadrangle. A DEM is an array of cells (pixels) whose x and y values are referenced to the Universal Transverse Mercator (UTM) coordinate system and whose z values are elevations. Thus, if the x, y, and z data were plotted in a 3-dimensional graph, the result would be a three-dimensional representation (wire-frame) of the landscape *(figure 5)*. Using a GIS's 3-D visualization capabilities, other data layers could be draped over the wire-frame to create a virtual landscape.

Position on the landscape has been correlated to plant community types and also to many physical and chemical properties of soils. To better under-stand the landscape's relationship with natural resources, it is important to classify the landscape.

The landscape can be classified by it's geomorphic components of hillslope: summit, shoulder, backslope, footslope, and toeslope *(figure 6)*.

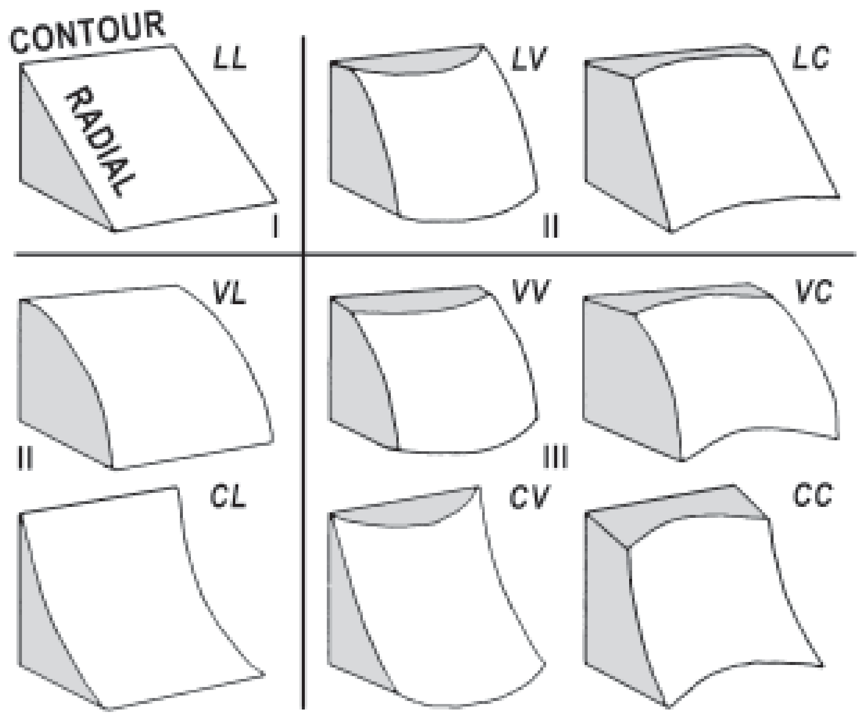
Hillshade



Produced by: USDA-NRCS,
Carbondale MLRA Soil Survey Office
Source: Processed from USGS DEM.
Projection: UTM, Zone 16, NAD 83
Map Date: 8/24/98

Figure 7

Geometric Forms of Hillslopes



Ruhe (1975)

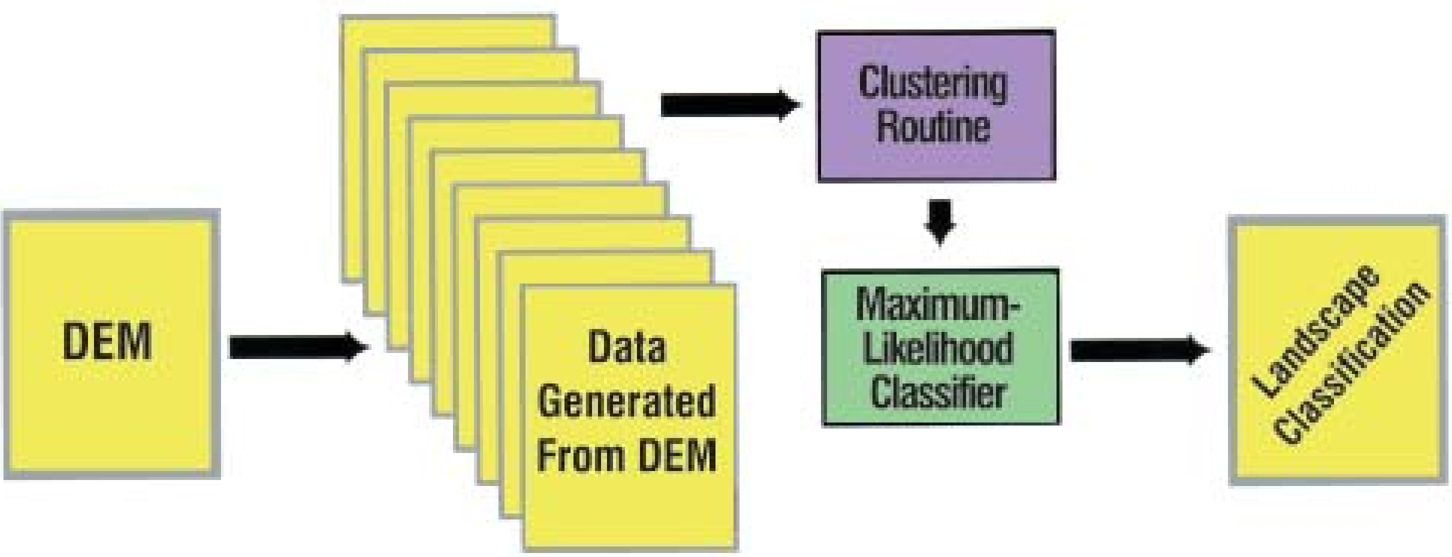
Topography (Continued)

These components can be described by geometric forms of a hillslope *(figure 7)*, which are defined by their slope curvatures: profile curvature and tangential curvature. Curvature of slope can be convex (V), Linear (L), or concave (C). It determines the speed and flow of water over the surface and thus is a major factor in geomorphic and pedologic processes.

The landscape can be classified through use of GIS modeling capabilities and digital elevation data, specifically DEM's. Spatial analysis and data exploration techniques were applied to the DEM of the Cypress Quad to create nine data layers. The nine data layers were percent slope, slope length, profile curvature, tangential curvature, mean curvature, flow line density, flow accumulation, distance to ridgetops, and distance to troughs. A cluster analysis was then performed to create 50 classes (signatures) based on the similarities of the nine landscape characteristics. A maximum-likelihood discriminant analysis classifier was then used to determine which of the 50 classes is most appropriate for each cel. The result of the maximum-likelihood classifier is the landscape classification *(figures 8 and 9).*

Progression From DEM's to Landscape Classification

Figure 8



Landscape Classification

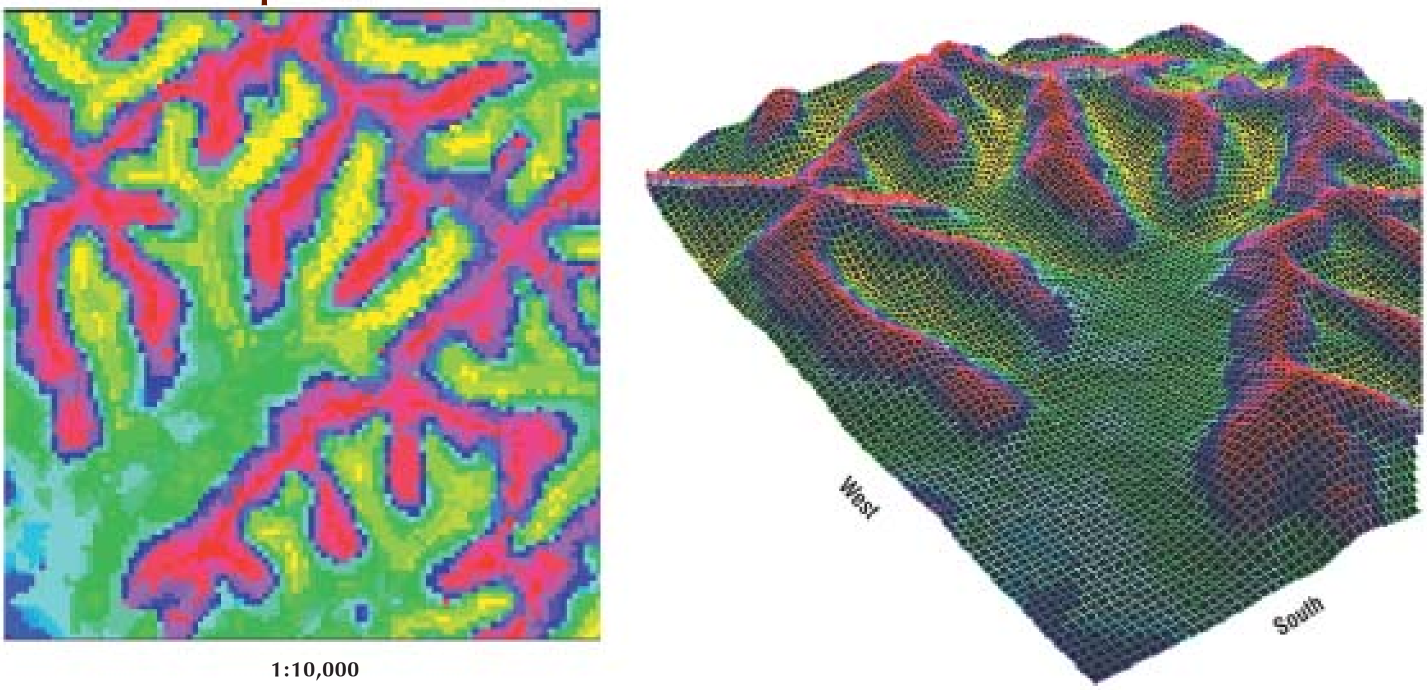


Figure 9. **Two-dimensional and three-dimensional visualization of Landscape Classification.**
(The summits are green; the shoulders are blue; the backslopes and footslopes are green; and the toeslopes are yellow.)

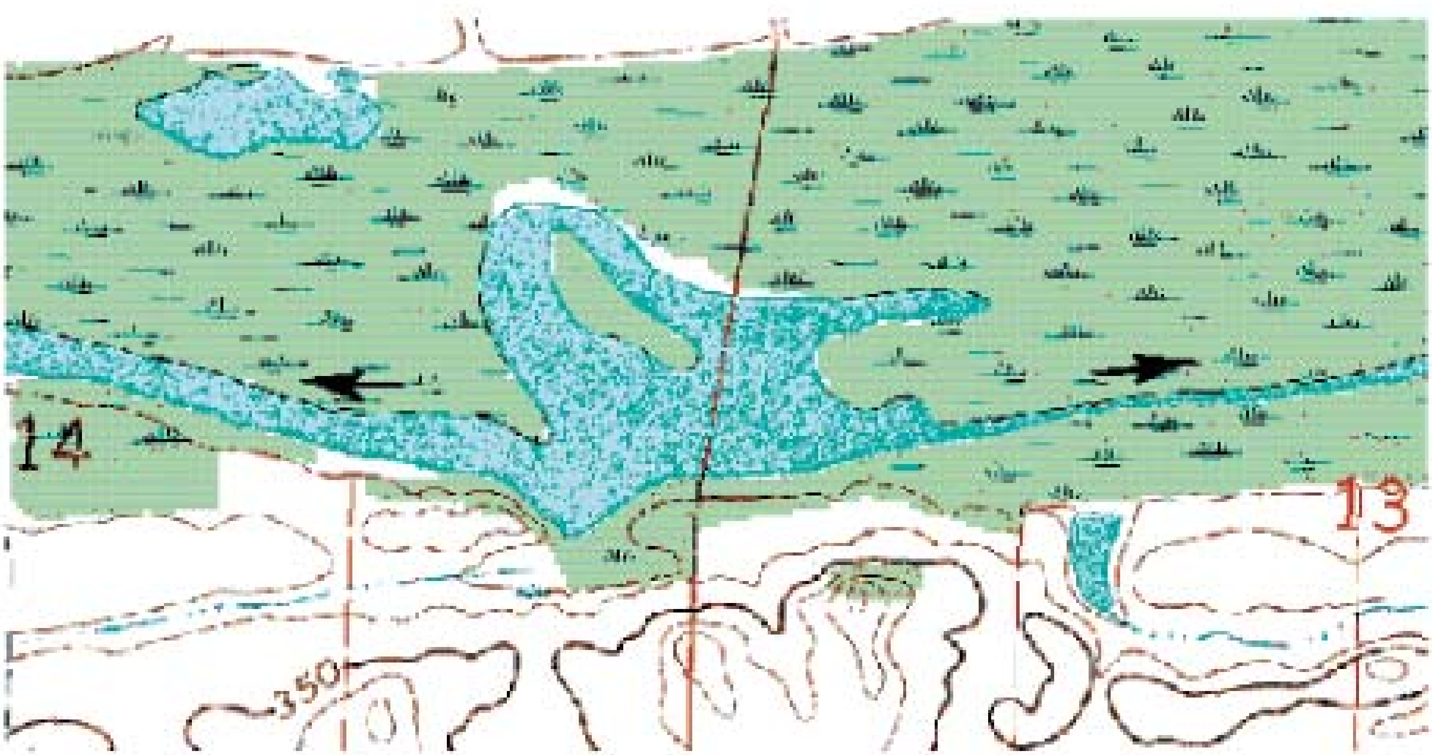


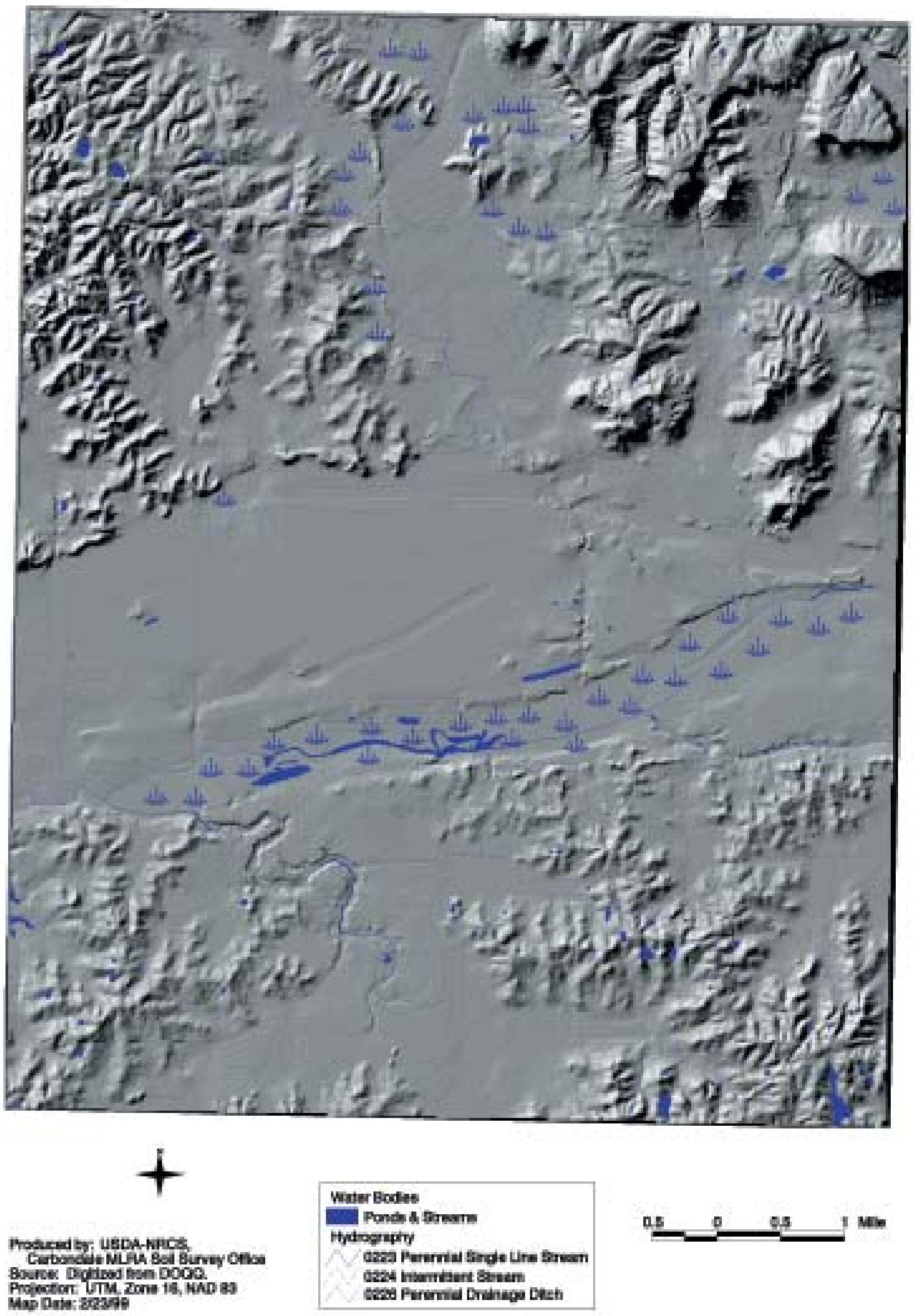
Figure 10. **Area on Cypress Quad showing flow of the Cache River in two directions.**

Hydrography

Hydrography data provide informa- tion on surface water features, such as lakes, ponds, canals, streams, and rivers. Detailed hydrography information has become increasingly important as issues of water quality and nonpoint source pollution become more of a concern. Detailed hydrography data are mapped as part of the soil survey initiative.

Two major tributaries flow into the Cache River. Cypress Creek flows south from the Shawnee Hills. The tributary which drains the swampy lands of the Coastal Plains region is known as Limekiln Slough. On the USGS 7.5-minute topographic map, the Cache River is shown to flow both east and west *(figure 10)*.

Hydrography



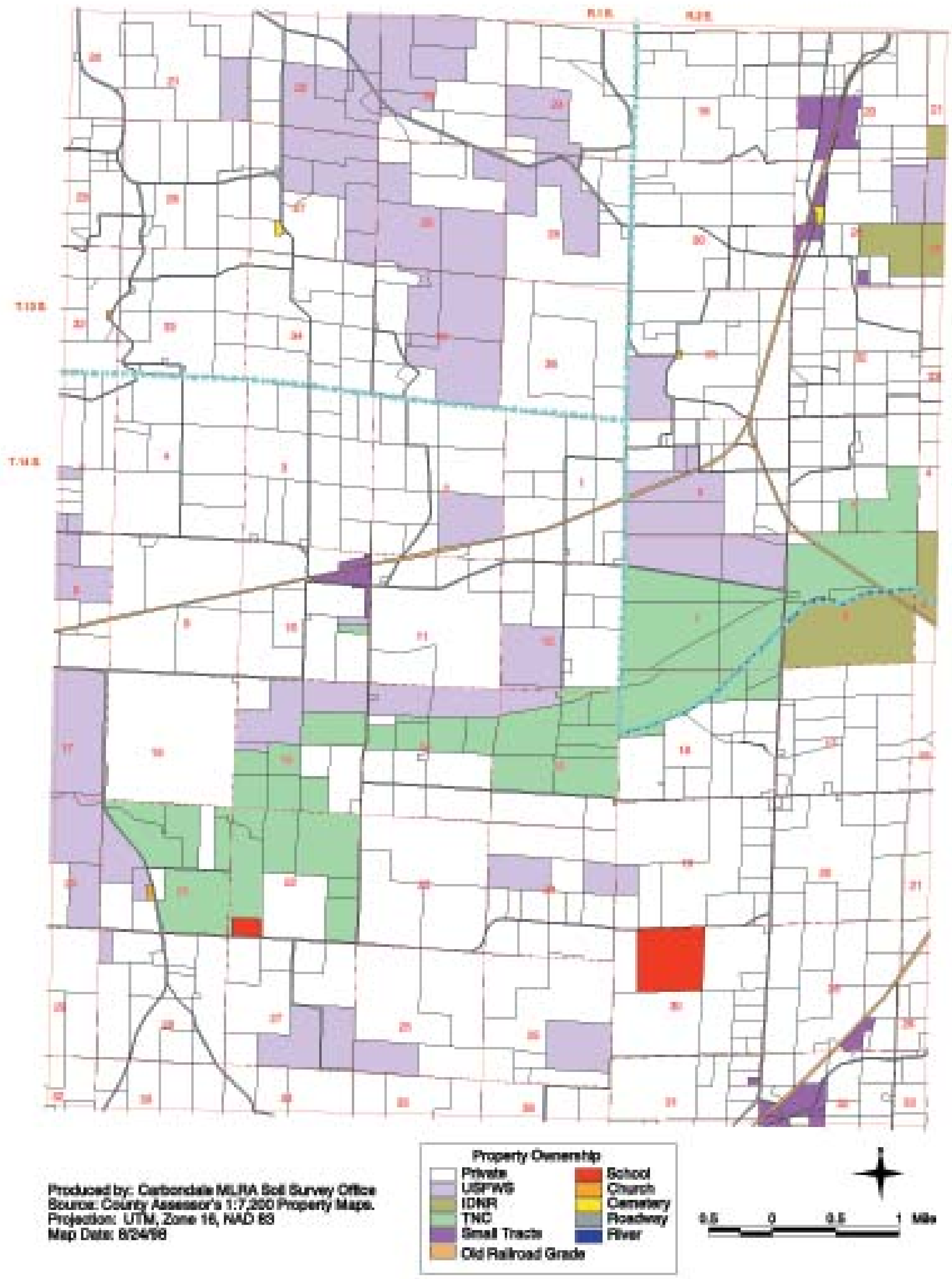
Property Ownership

Cadastral Data

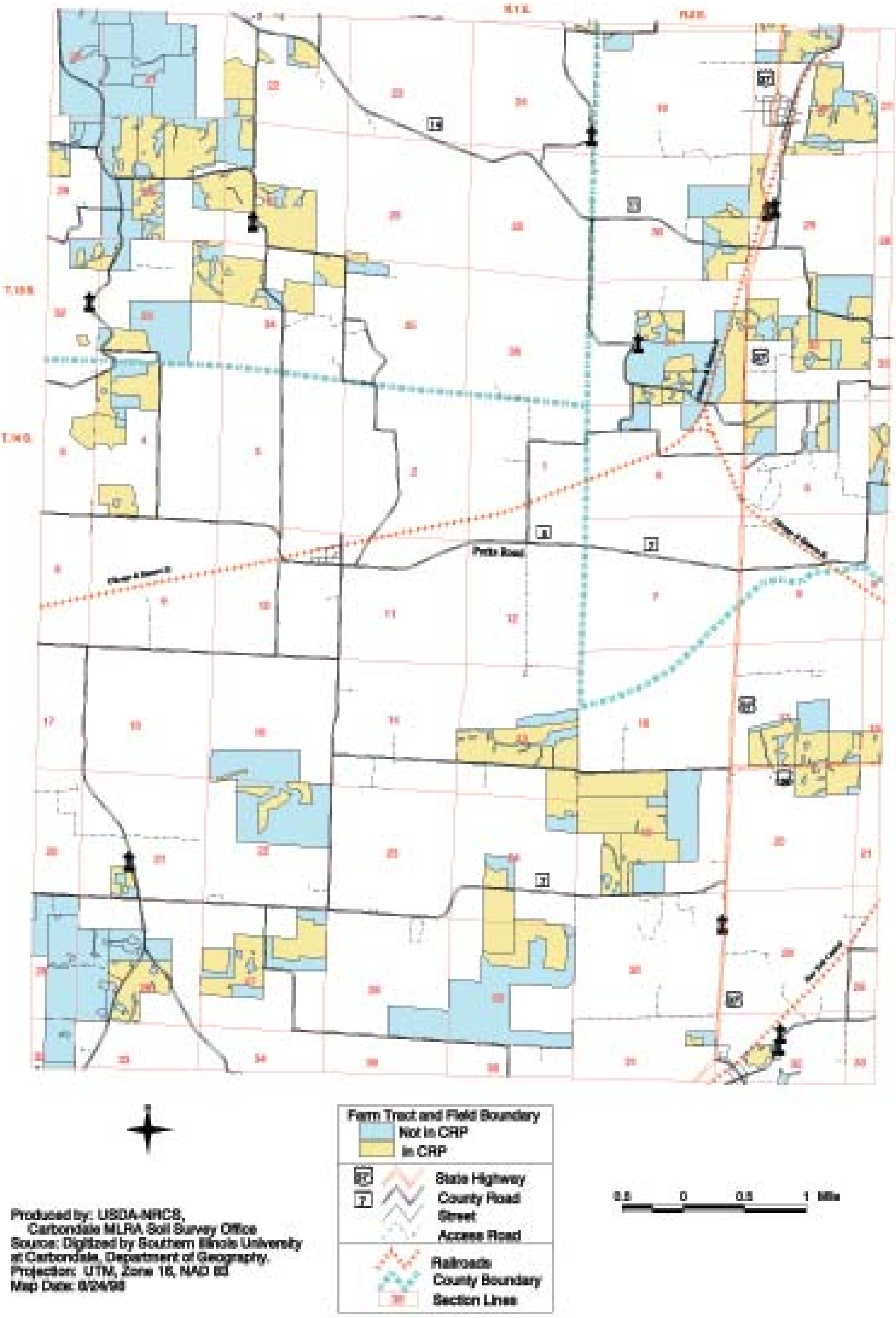
Cadastral information is the legally recognized registration of the acreage, property value, and ownership of parcels of land. In Illinois, this information is archived and updated by the Supervisor of Assessments in each county. These legal descriptions are based upon the Public Land Survey System (PLSS), also known as the township and range system.

Thomas Jefferson developed the PLSS under congressional mandate. This system was authorized in 1785 in order to create parcels to pay off debts owed to the Revolutionary War soldiers. It is a rectangular system of survey based on principal meridians (north and south lines calculated by astronomical means) and base lines (east and west lines along a true parallel of latitude). Townships are typically 6 square miles in size. They are divided into 36 sections, each section being 1 square mile in size (640 acres). Legal descriptions of property are based on the township, range, section, quarter section, and the individual parcel within that quarter section.

Caution must be used when property maps are interpreted. Precise parcel boundaries and acreages must be surveyed by a registered surveyor. The property data created for this project was not surveyed and thus should be used only for the general location of property boundaries and for GIS demonstrations.



Farm, Tract, & Field Boundaries



Farm/Tract/Field

The common land unit information of farm, tract, and field boundaries is critical for USDA to conduct its business activities and to provide service to its clients. This information combined with orthophotography and soils data will improve USDA's operations and program delivery for farm and community programs, eligibility/compliance, conservation practices/plans, and resource inventory/assessment. Some of the programs that use the common land unit information are:

- Agricultural Market Transition Act Payments
- Business and Industry Direct Loan Program
- Business and Industry Guaranteed Loans
- Commodity Loans and Loan Deficiency Payments
- Conservation Reserve Program (CRP)
- Crop Insurance
- Dairy Indemnity Payment Program
- Dairy Refund Payment Program
- Emergency Conservation Program (ECP)
- Emergency Watershed Protection Program (EWP)
- Environmental Quality Incentives Program (EQIP)
- Farm Loan Programs
- Farmland Protection Program
- Flood Risk Reduction Program
- Forestry Incentive Program (FIP)
- Grazing Lands Conservation Initiative (GLCI)
- Noninsured Crop Disaster Assistance Program
- Outreach & Assistance for Socially Disadvantaged Farmers & Ranchers
- Stewardship Incentive Program (SIP)
- Water Bank Program
- Wetlands Reserve Program (WRP)
- Wildlife Habitat Incentives Program (WHIP).

Digital Raster Graphic (DRG)

Digital Raster Graphics (DRG) are scanned USGS topographic maps. The DRG for the Cypress quadrangle is the scanned 1966 USGS 7.5-minute topographic map. The scale of the 7.5-minute series maps is 1:24,000 *(see figure 11)*. The DRG's are very useful framework/base map data because they display contours which provide topographic information. They also display cultural information, such as roads, PLSS, cemeteries, buildings, towns, ponds, streams, and forests along with their associated names. This information is vital for map readers because it provides a point of reference and a sense of location.

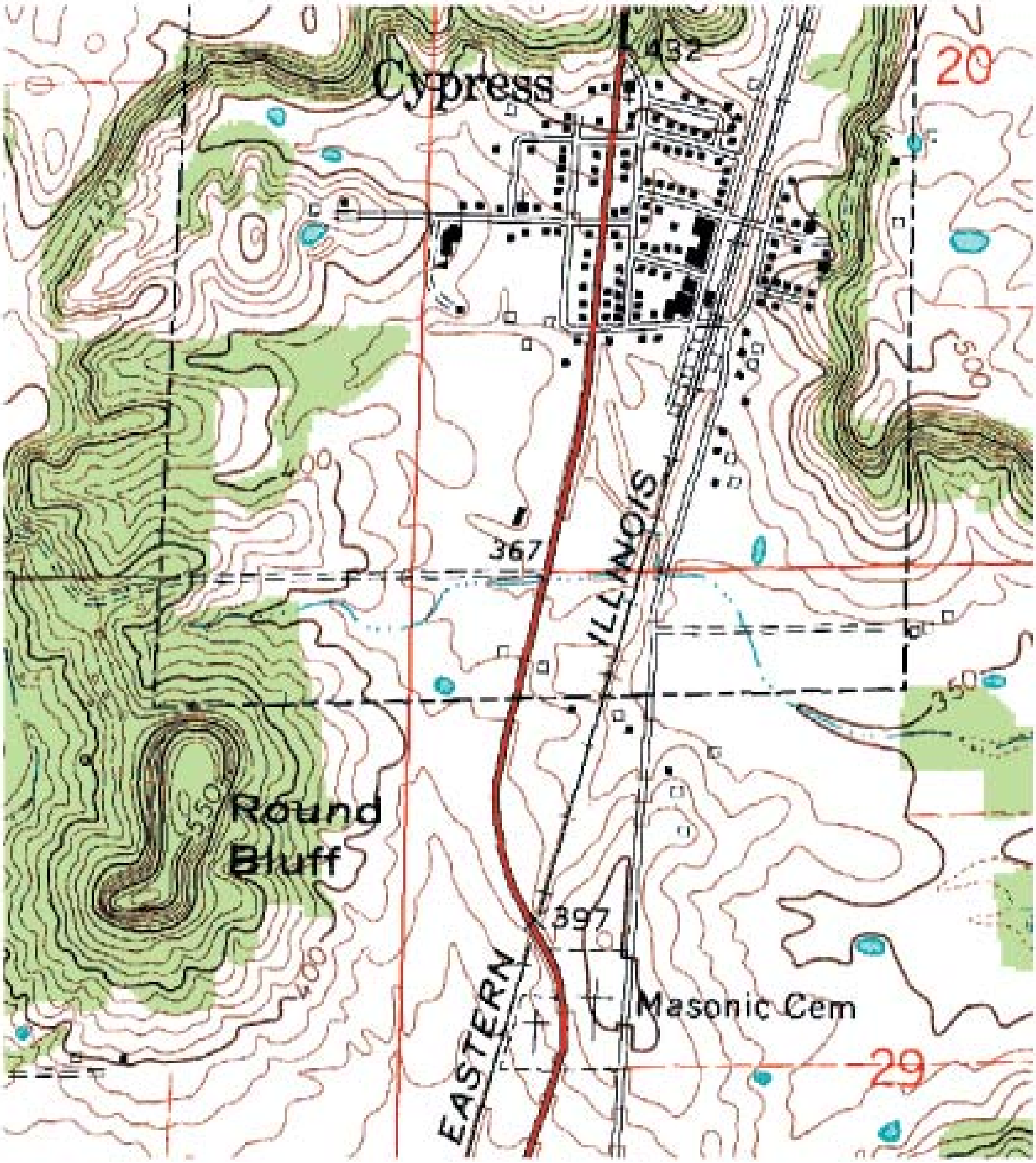


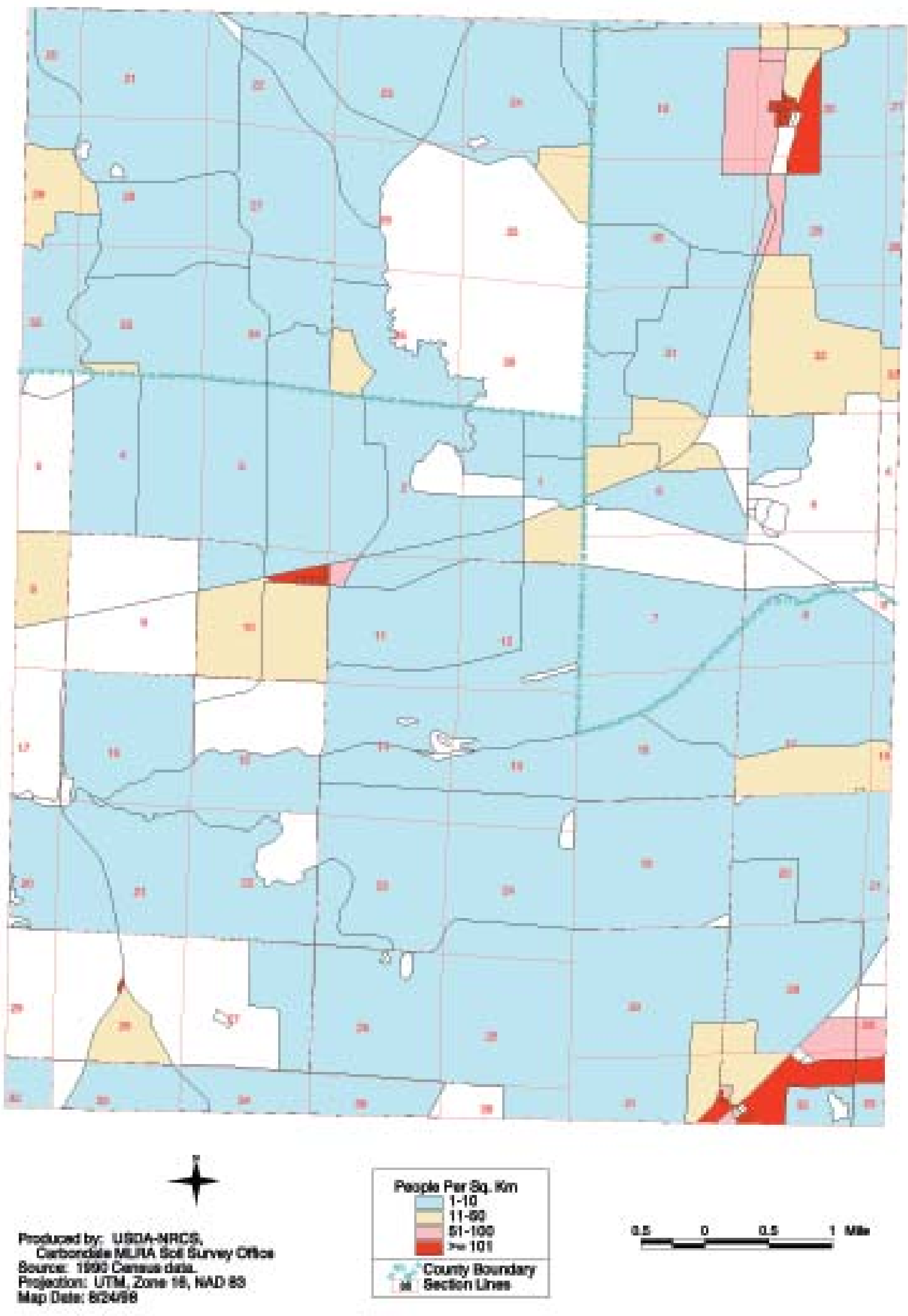
Figure 11. **A portion of the Digital Raster Graphic (DRG) displayed at 1:12,000**

Demographics

Demographic information is critical in order for USDA and NRCS to document client assistance and to support the USDA's outreach program. It is important in identifying customers and their attributes as well as any underserved areas. The U.S. Department of Commerce, Bureau of the Census, provides 1990 Census Block data on population density, age, gender, race, and cultural and economic features.

The total population of the Cypress Quadrangle in 1990 was 1,474. The majority of the population live in or near the three small towns of Cypress, New Grand Chain, and Perks. In 1990, the number of people over the age of 18 was 1,095 and the number under 18 was 379. The population of the quadrangle was made up primarily of Caucasions (1,340) but also included African Americans (125), Hispanics (5), and Native Americans (4).

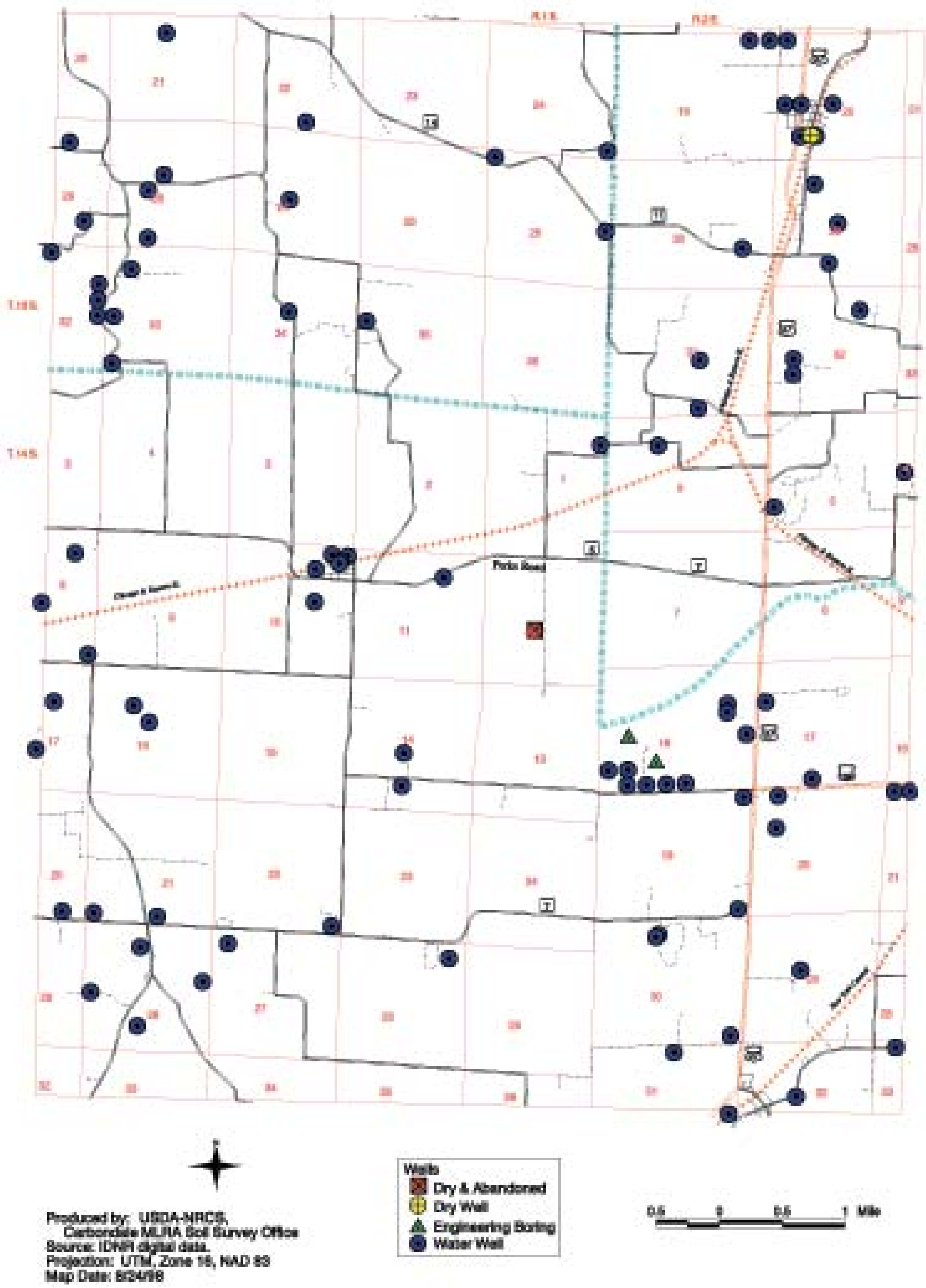
1990 Population Density (People Per Square Km)



Well Data

Well and boring data are useful for numerous geologic, hydrologic, soil survey, and environmental applications. ISGS maintains detailed digital and paper records for more than 420,000 wells in Illinois. Well data comes from driller's logs and engineering boring logs. The driller's logs for mineral borings, structure borings, coal borings, oil and gas wells, enhanced oil recovery wells, service wells, water wells, waste-disposal wells, and gas-storage wells are obtained through the Illinois Department of Natural Resources, Mines and Minerals. The Illinois Department of Public Health and county health departments obtain driller's logs for water supply wells. Engineering borings are voluntarily submitted to the Illinois State Geological Survey by the Illinois Department of Transportation. Most locations are accurate to +/- 100 feet; however, for some locations only township, range, and section are known. In the Cypress Quadrangle, there are 95 water wells, 2 engineering borings, 1 dry well, and 1 dry and abandoned well.

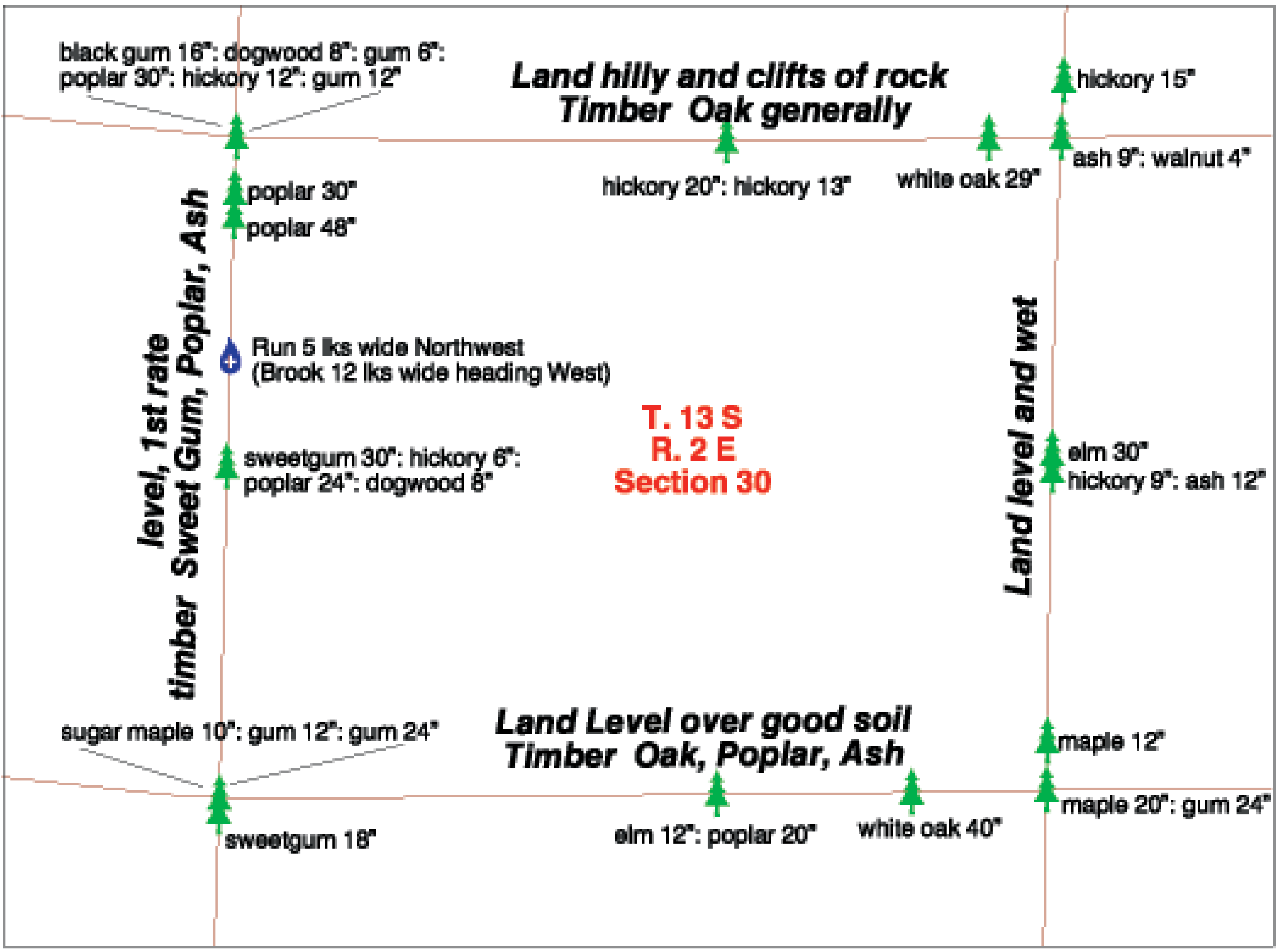
Wells and Borings



1807 Public Land Survey Notes

The Public Land Survey System (PLSS) was mandated by Congress and authorized in 1785 as a way to divide and inventory the expansive territory of the United States. The area covered by the Cypress Quadrangle was surveyed between January and April, 1807. The 1807 Public Land Survey field notes contain a wealth of information on the presettlement land cover and natural character of the area *(see figure 12)*. For each mile (section line), the surveyors described the topography, quality of the soil, drainage, dominant trees, understory species, and other special features they encountered. Two trees were usually blazed and recorded as witness trees in section and quarter-section corners. Also, trees cut by the section lines between corners were identified and located.

1807 Public Land Survey Notes



These are the 1807 Public Land Survey Notes for one section (T. 13 S., R. 2 E., Section 30) in the Cypress Quadrangle mapped at 1:24,000. The large, bold, print indicates general notes along the section lines. Tree species and basal diameter were noted along with any hydrologic features that occurred along the section line.

Figure 12

Geospatial Data Themes

Natural Resource Data

Soils

The soil survey of the Cypress Quadrangle provides an inventory of the soil resources of the area. It has maps and narratives which describe the distribution and extent of soils in the Cypress Quad. *(See Soil Survey Identification Legend.)*

Soil-Forming Factors of the Cypress Quadrangle

The soil types within the Cypress Quadrangle fit together like pieces of a jigsaw puzzle. *(See General Soil Map.)* The boundaries between the different soil types, or puzzle pieces, may be abrupt or gradual, and the characteristics of each of these soil types at any given point on the landscape are determined by the interaction of the five soil-forming factors—parent material, climate, organisms, topography, and time.

Climate and plant and animal life are active factors of soil formation. They act on the parent material and slowly change it into a natural body that has genetically related horizons. The effects of climate and plant and animal life are conditioned by relief or topography. Time is needed for the differentiation of soil horizons. Usually, a long time is needed for the development of distinct horizons. Following is a brief explanation of the soil-forming factors and how they influence the types of soils and distribution of these soils in the Cypress Quadrangle.

Parent Material

The material in which a soil formed is called parent material. The parent materials in the Cypress Quad are loess, loess over bedrock, loess over coastal plain sediments, colluvial sediments, sediments on terraces and benches, lacustrine sediments, and alluvial sediments. *(See Conceptual Array of the Cypress Quadrangle.)*

In the Cypress Quadrangle the sources of windblown, silt-size deposits (loess) are primarily the Mississippi and Ohio River Valleys and the Cache River Valley. The thick loess deposits occur as bluffs adjacent to the Cache River Valley. Alford, Menfro, and Winfield are examples of soils that formed in thick loess deposits. The loess thins towards the uplands. As the loess thins, the influence of the underlying bedrock on the type of soil that is formed increases. Zanesville and Neotoma are examples of soils that formed in a thin layer of loess over bedrock. Coastal plains sediments occur in the southern part of the Cache River Valley. They consist of stratified and generally noncemented gravel and sand, with some silt and clay beds. These areas are commonly covered with thick increments of loess. Hosmer and Stoy are examples of soils that formed in thick loess deposits overlying coastal plain sediments.

At the base of the loess bluffs are areas of colluvial sediments. These sediments originated from material eroded from the steeper upper portions of the loess bluff and then were deposited on the less sloping, lower part of the loess bluff. Drury soils formed in colluvial sediments.

Alluvial sediments (alluvium) are geologically recent silty to clayey deposits on flood plains. Birds and Jacob are examples of alluvial soils. Rising above the flood plains are terraces and benches. The soils in these areas are typically loamy and sandy in the upper part and have material consisting of varying amounts of silt, sand, and gravel in the lower part. Lamont and Weinbach are examples of these soils. Some of the terraces are slightly lower in elevation and have soils that are silty in the upper part and clayey in the lower part. Lacustrine, or lakebed, sediments have a high content of clay. Markland, Hurst, and Okaw soils formed in these sediments.

Organisms (Plant and Animal Life)

Living organisms, such as vegetation, animals, bacteria, and fungi, have important effects on soil formation. Human activities, such as logging and farming, also affect soil formation. Vegetation largely determines the organic matter content, color, and fertility of the surface layer. Most of the soils of the Cypress Quad formed under forest vegetation and have a light colored surface layer. Examples are Wellston, Menfro, and Lamont soils. Some soils formed under grass vegetation and have a moderately dark surface layer. These soils tend to have more organic matter in the surface and near surface layers than the soils that formed under dominantly forest vegetation. Darwin and Beaucoup are examples.

Topography

Many differences among the soils in the quadrangle result from variations in topography. Slope affects drainage, runoff, erosion, and deposition. Slopes differ in gradient, length, shape and exposure. These slope characteristics are responsible for differences among soils that formed in the same kind of parent material, such as Sciotoville, Weinbach, and Ginat soils. Soils that formed in different kinds of parent material but are in areas of similar topography have similar characteristics. Examples are Stoy and Hurst soils. As the slope gradient increases, the runoff rate and the erosion hazard also increase. Erosion can change the characteristics of soils, as is indicated by comparing severely eroded Menfro soils with uneroded or slightly eroded Menfro soils.

Climate

Climate affects plant and animal life, weathering, and erosion. The Cypress Quad is located in an area of transition from a humid, continental climate to a humid, subtropical climate and from a mesic to a thermic soil temperature regime. The climate of the Cypress Quad has favored the rapid breakdown and weathering of soil material, the formation of clay, and the downward movement of these materials in the soils. Most of the upland soils in the Cypress Quad have more clay in the subsoil than in the surface layer.

Time

Soils generally become more strongly developed as time passes. Soils that show little or no evidence of profile development are considered weakly developed. Soils having well expressed horizons are considered moderately or strongly developed. Soils that formed in the alluvial sediments on bottomlands, such as Wakeland and Birds soils, have weakly developed horizons. Soils that formed in thick deposits of loess, such as Menfro and Winfield soils are moderately developed. Soils that formed in a thin layer of loess over bedrock, such as Baxter and Zanesville soils, are characterized by moderately strong or strong development.

General Soil Map

The general soil map provides an overview of the soils in the Cypress Quad. The map has four broad soil map units and is compiled from the detailed soils information. The Upland (Deep Loess) soils include the Alford, Menfro, and Winfield soils, and the Upland (Moderately Deep Loess) soils include Baxter and Netoma soils. Lamont, Weinbach, Markland, Hurst, and Okaw soils are included in the Terrace map unit. Floodplain soils include Wankeland and Birds.

Detailed Soil Map

Detailed soil maps for two small areas of the Cypress Quad are presented as examples of the detailed soil survey.

Each map unit delineation on the detailed soil maps represents an area on the landscape and consists of one or more soils for which the unit is named. *(See Soil Survey Identification Legend).* A map unit symbol identifies the soil type within each map unit delineation. A map unit symbol consists of a number that represents the dominant soil type(s) in the delineation (e.g., 79 represents Menfro), a letter that represents the dominant slope range for the map unit (A = 0-2%, B = 2-5%, C = 5-10%, D = 10-18%, E = 18-25%, F = 25-35%, and G = >35%), and finally a number that represents erosion class (no number = no erosion or slight erosion, 2 = moderate erosion, and 3 = severe erosion. An example of a map unit symbol and map unit name is 79C3, Menfro silty clay loam, 5 to 10 percent slopes, severely eroded. Some map unit symbols in the Cypress Quad have prefixes. These prefixes are: 1 - wet phase, 3 - frequently flooded, 4 - ponded, 5 - karst, 7 - rarely flooded, and 8 - occasionally flooded.

Area 1

This area is in the northwest quarter of the Cypress Quad. The topography of this northwest area consists of rugged ridges and steep hills which have an underlying limestone bedrock. The soils in the uplands are Menfro, Baxter, and Winfield. Slopes range from 2 to 3%. These soils formed predominantly in loess or loess over bedrock. They are used mainly for hay, pasture, or cropland. Some small areas are forested. Haymond, Wakeland, and Dupo are bottomland soils. Slopes of these soils range from 0 to 2%. These soils formed predominately in alluvium. Most of these areas are used for cropland, pasture, or hay.

Area 2

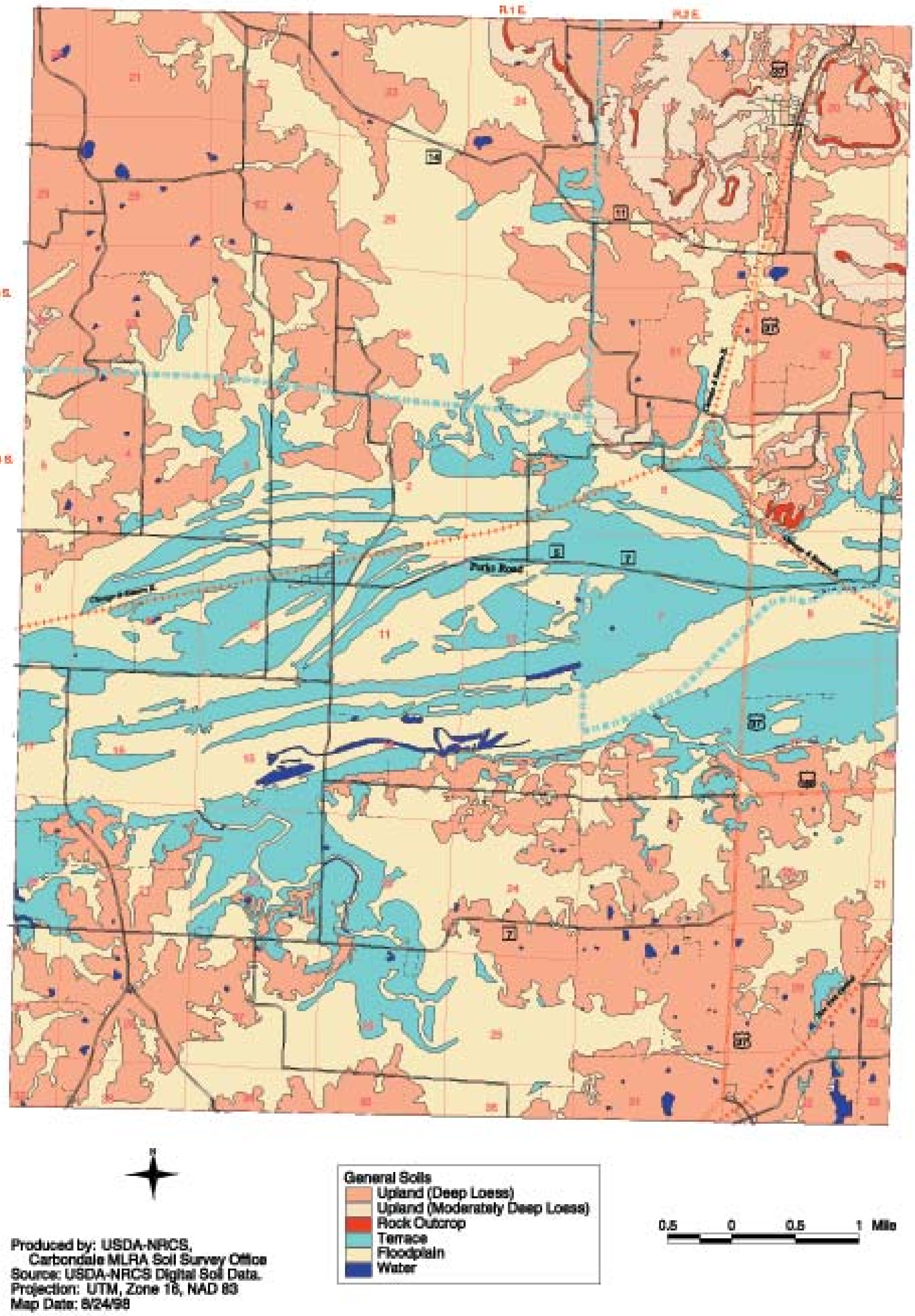
This area is in the northeast quarter of the Cypress Quad. It is labeled “Round Bluff“ on the topographic map. The soils and areas in the uplands are Zanesville-Westmore complex, Wellston, Neotoma, Hosmer, Menfro, Stoy and Sandstone Rock Land. Slopes range from 2 to more than 35%. These soils formed predominately in loess or loess over sandstone bedrock. The less sloping areas are used as cropland. The steeper areas are used for hay, pasture, or patchy forest. Haymond and Wakeland are bottomland soils. They formed predominantly in alluvium. Slopes of these soils range from 0 to 2%. Most areas of these soils are used for cropland, pasture, or hay.

Prime Farmland Soils And Hydric Soils

The detailed soil survey information can be used to identify prime farmland and hydric soils. Prime farmland is the land that is best suited to agricultural crops. It has an adequate and dependable supply of moisture, a favorable climate for crop growth, gentle slopes, favorable soil conditions, favorable drainage, favorable acidity or alkalinity, and few or no rocks and is not frequently flooded during the growing season. Hydric soils are defined as soils that formed under conditions of saturation, flooding, or ponding which lasts long enough during the growing season for the development of anaerobic conditions in the upper part of the soils.

In the Cypress Quadrangle there are approximately 20,000 acres of prime farmland and 17,000 acres of hydric soils. About one-half of the acreage of prime farmland consists of hydric soils.

General Soil Map



Soil Survey Identification Legend

for the Cypress Quad

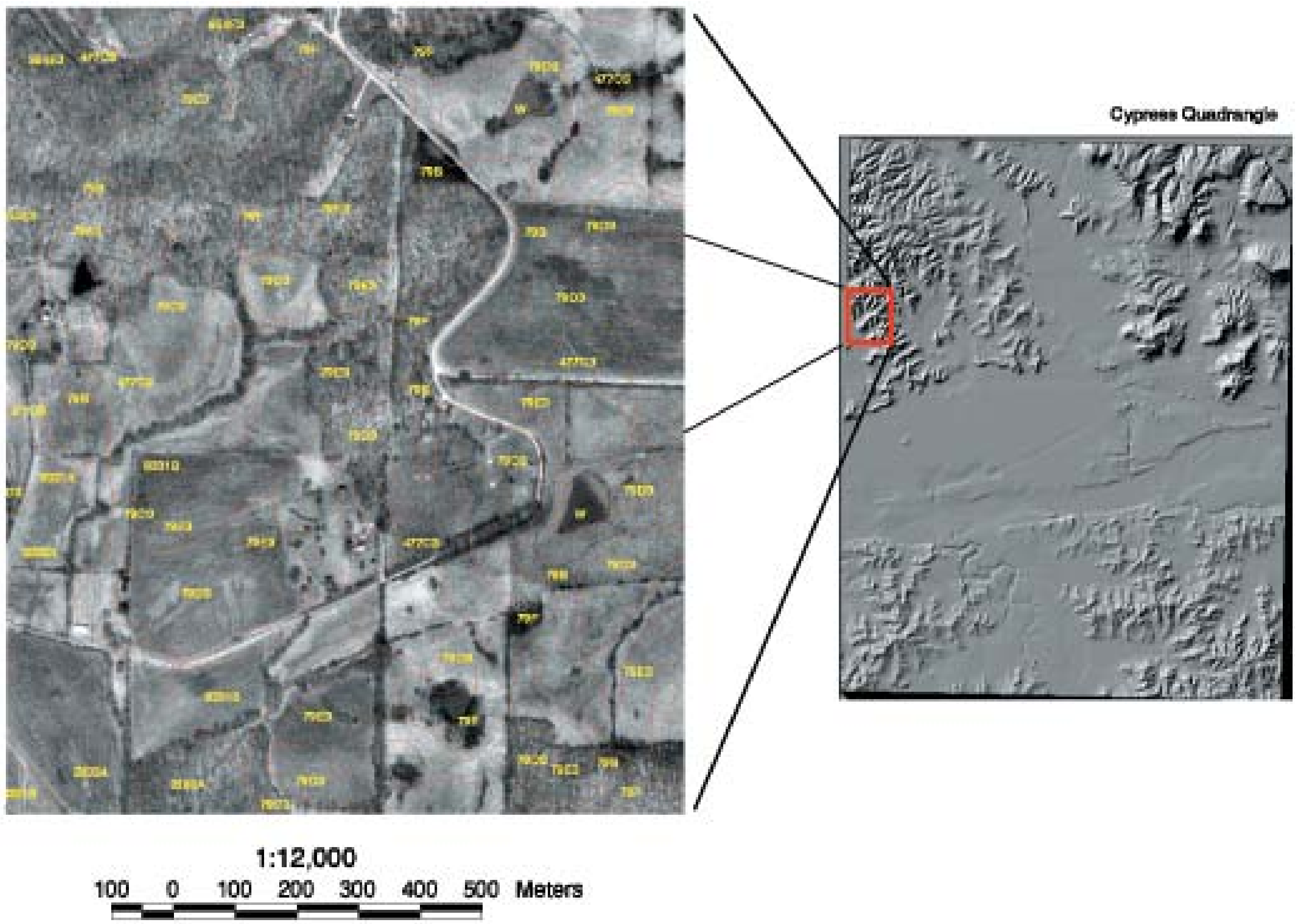
Map Symbol	Soil Name
9G	Sandstone rock land, 35 to 90 percent slopes
53B	Bloomfield loamy fine sand, 2 to 5 percent slopes
75B	Drury silt loam, 2 to 5 percent slopes
79B	Menfro silt loam, 2 to 5 percent slopes
79C3	Menfro silty clay loam, 5 to 10 percent slopes, severely eroded
79D3	Menfro silty clay loam, 10 to 18 percent slopes, severely eroded
79E3	Menfro silty clay loam, 18 to 25 percent slopes, severely eroded
79F	Menfro silt loam, 18 to 35 percent slopes
164A	Stoy silt loam, 0 to 2 percent slopes
164B	Stoy silt loam, 2 to 5 percent slopes
175A	Lamont fine sandy loam, 0 to 2 percent slopes
184A	Roby fine sandy loam, 0 to 2 percent slopes
214B	Hosmer silt loam, 2 to 5 percent slopes
214C3	Hosmer silty clay loam, 5 to 10 percent slopes, severely eroded
214D3	Hosmer silty clay loam, 10 to 18 percent slopes, severely eroded
340C3	Zanesville silty clay loam, 5 to 10 percent slopes, severely eroded
340D3	Zanesville silty clay loam, 10 to 18 percent slopes, severely eroded
460A	Ginat silt loam, 0 to 2 percent slopes
461A	Weinbach silt loam, 0 to 2 percent slopes
461B	Weinbach silt loam, 2 to 5 percent slopes
461C3	Weinbach silt loam, 5 to 10 percent slopes, severely eroded
462B	Sciotoville silt loam, 2 to 5 percent slopes
462C3	Sciotoville silt loam, 5 to 10 percent slopes, severely eroded
462D3	Sciotoville silt loam, 10 to 18 percent slopes, severely eroded
467B	Markland silt loam, 2 to 5 percent slopes
467C3	Markland silt loam, 5 to 10 percent slopes, severely eroded
467D3	Markland silt loam, 10 to 18 percent slopes, severely eroded
477B	Winfield silt loam, 2 to 5 percent slopes
477C3	Winfield silt loam, 5 to 10 percent slopes, severely eroded
477D3	Winfield silty clay loam, 10 to 18 percent slopes, severely eroded
694E3	Menfro-Baxter complex, 18 to 25 percent slopes, severely eroded
802B	Orthents, loamy, 2 to 20 percent slopes
940C3	Zanesville-Westmore silt loams, 5 to 10 percent slopes, severely eroded
940D3	Zanesville-Westmore silt loams, 10 to 18 percent slopes, severely eroded
940E3	Zanesville-Westmore silt loams, 18 to 25 percent slopes, severely eroded
977E3	Wellston-Neotoma complex, 18 to 25 percent slopes, severely eroded
977F	Wellston-Neotoma complex, 25 to 35 percent slopes
986C3	Wellston-Berks complex, 5 to 10 percent slopes, severely eroded
986D3	Wellston-Berks complex, 10 to 18 percent slopes, severely eroded
986E3	Wellston-Berks complex, 18 to 25 percent slopes, severely eroded
986F	Wellston-Berks complex, 25 to 35 percent slopes
1071A	Darwin silty clay, undrained, 0 to 2 percent slopes, frequently flooded
1288A	Petrolia silty clay loam, undrained, 0 to 2 percent slopes, frequently flooded
1333A	Wakeland silt loam, undrained, 0 to 2 percent slopes, frequently flooded
1334A	Birds silt loam, undrained, 0 to 2 percent slopes, frequently flooded
1426A	Karnak silty clay, undrained, 0 to 2 percent slopes, frequently flooded
3070A	Beaucoup silty clay loam, 0 to 2 percent slopes, frequently flooded
3071A	Darwin silty clay, 0 to 2 percent slopes, frequently flooded
3131A	Alvin fine sandy loam, 0 to 2 percent slopes, frequently flooded
3180A	Dupo silt loam, 0 to 2 percent slopes, frequently flooded
3288A	Petrolia silty clay loam, 0 to 2 percent slopes, frequently flooded
3331A	Haymond silt loam, 0 to 2 percent slopes, frequently flooded
3331B	Haymond silt loam, 2 to 5 percent slopes, frequently flooded
3333A	Wakeland silt loam, 0 to 2 percent slopes, frequently flooded
3334A	Birds silt loam, 0 to 2 percent slopes, frequently flooded
3426A	Karnak silty clay, 0 to 2 percent slopes, frequently flooded
5079B	Menfro silt loam, karst, 2 to 5 percent slopes
5079C3	Menfro silt loam, karst, 5 to 10 percent slopes, severely eroded
5079D3	Menfro silt loam, karst, 10 to 18 percent slopes, severely eroded
7084A	Okaw silt loam, 0 to 2 percent slopes, rarely flooded
7131A	Alvin fine sandy loam, 0 to 2 percent slopes, rarely flooded
7131B	Alvin fine sandy loam, 2 to 5 percent slopes, rarely flooded
7131C3	Alvin fine sandy loam, 5 to 10 percent slopes, severely eroded, rarely flooded
7338A	Hurst silt loam, 0 to 2 percent slopes, rarely flooded
7338B	Hurst silt loam, 2 to 5 percent slopes, rarely flooded
7338C3	Hurst silt loam, 5 to 10 percent slopes, severely eroded, rarely flooded
8070A	Beaucoup silty clay loam, 0 to 2 percent slopes, occasionally flooded
8071A	Darwin clay, 0 to 2 percent slopes, occasionally flooded
8109A	Racoon silt loam, 0 to 2 percent slopes, occasionally flooded
8162A	Gorham silty clay loam, 0 to 2 percent slopes, occasionally flooded
8180A	Dupo silt loam, 0 to 2 percent slopes, occasionally flooded
8288A	Petrolia silty clay loam, 0 to 2 percent slopes, occasionally flooded
8331A	Haymond silt loam, 0 to 2 percent slopes, occasionally flooded
8331B	Haymond silt loam, 2 to 5 percent slopes, occasionally flooded
8333A	Wakeland silt loam, 0 to 2 percent slopes, occasionally flooded
8334A	Birds silt loam, 0 to 2 percent slopes, occasionally flooded
8426A	Karnak clay, 0 to 2 percent slopes, occasionally flooded
8787A	Banlic silt loam, 0 to 2 percent slopes, occasionally flooded
W	Water

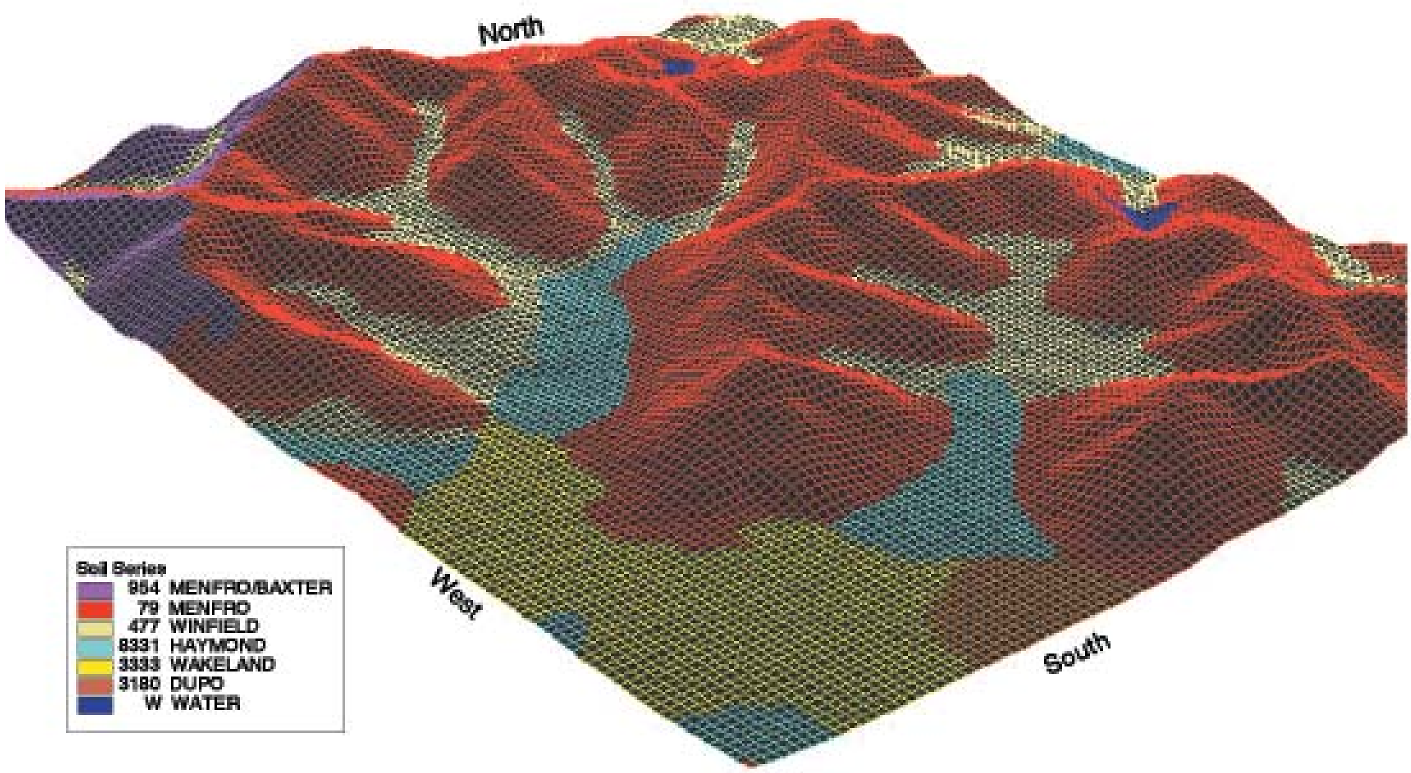
Conceptual Array of Soils for the Cypress Quad

General Soils	General Landform	Parent Material	Surface Color	Degree of Development	Natural Internal Drainage Class: Well	Moderately Well	Somewhat Poor	Poor
Upland (Deep Loess)	Bluffs Loess over Limestone	Loess > 60 in. thick, calcareous at > 42 in. (5- > 20 ft. thick)	Light	Moderate	Menfro	Winfield		
	Coastal Plain	Loess > 50-70 in. thick on gray paleosols in Illinoian drift	Light	Strong		Hosmer	Stoy	
Upland (Moderately Deep Loess)	Uplands	Loess 24-48 in. thick on acid residuum and on sandstone, shale and siltstone at 40-80 in.	Light	Moderately Strong	Zanesville			
	Moderately Thick Loess Uplands	Loess 20-40 in. thick on > 10 in. residuum on shale, siltstone, and sandstone, limestone at > 48 in.	Light	Moderate	Westmore			
	Pennsylvanian or Mississippian Bedrock	Channery shale, siltstone, and sandstone residuum; acid shale, sandstone, and siltstone at 20-40 in.	Light	Weak	Berks			
		Loess < 20 in. thick on channery, flaggy residuum on acid sandstone and siltstone at 40-80 in.	Light	Weak-Moderate	Neotoma			
		Loess 20-40 in. thick on acid residuum (< 35% clay) and on sandstone, shale, and siltstone at 40-72 in.	Light	Moderate	Wellston			
	Mississippian Bedrock	Loess < 10 in. thick on thick, cherty, clayey, acid residuum, limestone at 60+ in.	Light	Strong	Baxter			
	Footslopes	Silty colluvial sediments > 60 in. thick formed at the base of bluffs	Light	Weak	Drury			
Terrace	Thin Loess or Silty Alluvium	Loess 30-55 in. thick on gray paleosols in Illinoian till or local wash	Light	Strong B, Thick A				Racoon
	Ohio River & Stream Terraces	Fine sand, sand, or loamy fine sand > 60 in. thick, 50-90% fine sand	Light	Weak B, 40-60 in.	Bloomfield			
	Interfluve Summits & High Stream Benches	Sandy loam of fine sandy loam 20-40 in. thick on leached sand, loamy sand, fine sand, and loamy fine sand	Light	Weak B, 15-30 in.	Lamont			
	Low Stream Terraces Second Bottom	Sandy loam of fine sandy loam 20-40 in. thick on leached sand, loamy sand, fine sand and loamy fine sand	Light	Moderate B, 15-30 in.	Alvin		Roby	
	Ohio River Terraces	Silty and loamy material on 30-50 in. thick on stratified, micaceous silt, sand, and gravel	Light	Moderately Strong		Sciotoville	Weinbach	Ginat
	Ohio River Terraces Clay Lacustrine	Medium-textured material < 20 in. thick on silty clay or clay, calcareous at < 42 in.	Light	Moderate	Markland			
		Medium-textured material < 20 in. thick on grayish silty clay or clay, calcareous at > 42 in.	Light	Moderately Strong			Hurst	Okaw
	Low Stream Terraces Second Bottom	Very strong-strong acid silt loam > 40 in. thick on silt loam with sandy lenses	Light	Weak			Banlic	
Floodplain	Mississippi & Ohio River Tributaries	Medium acid-moderate alkaline silt loam > 40 in. thick on silt loam with sandy lenses	Light	None		Haymond	Wakeland	Birds
		Medium acid-mildly alkaline silty clay loam > 40 in. thick	Light	None				Petrolia
	Ohio River Contrasting Textures	Medium acid-mildly alkaline silt loam 20-40 in. thick on dark silty clay, clay, or silty clay loam	Light	None			Dupo	
	Mississippi & Ohio River Soils	Medium acid-mildly alkaline silty clay loam > 40 in. thick on stratified, medium-textured material	Dark to 10-24 in.	None-weak				Beaucoup
		Strong to medium acid silty clay or clay (45-60% clay) > 40 in. thick	Light	None-weak				Karnak
		Medium acid-mildly alkaline silty clay or clay (45-55% clay) > 40 in. thick	Dark to 10-24 in.	None-weak				Darwin
		Medium acid-mildly alkaline silty clay loam 20-40 in. thick on stratified sandy material	Dark	None-weak				Gorham

Natural Resource Data

Area 1





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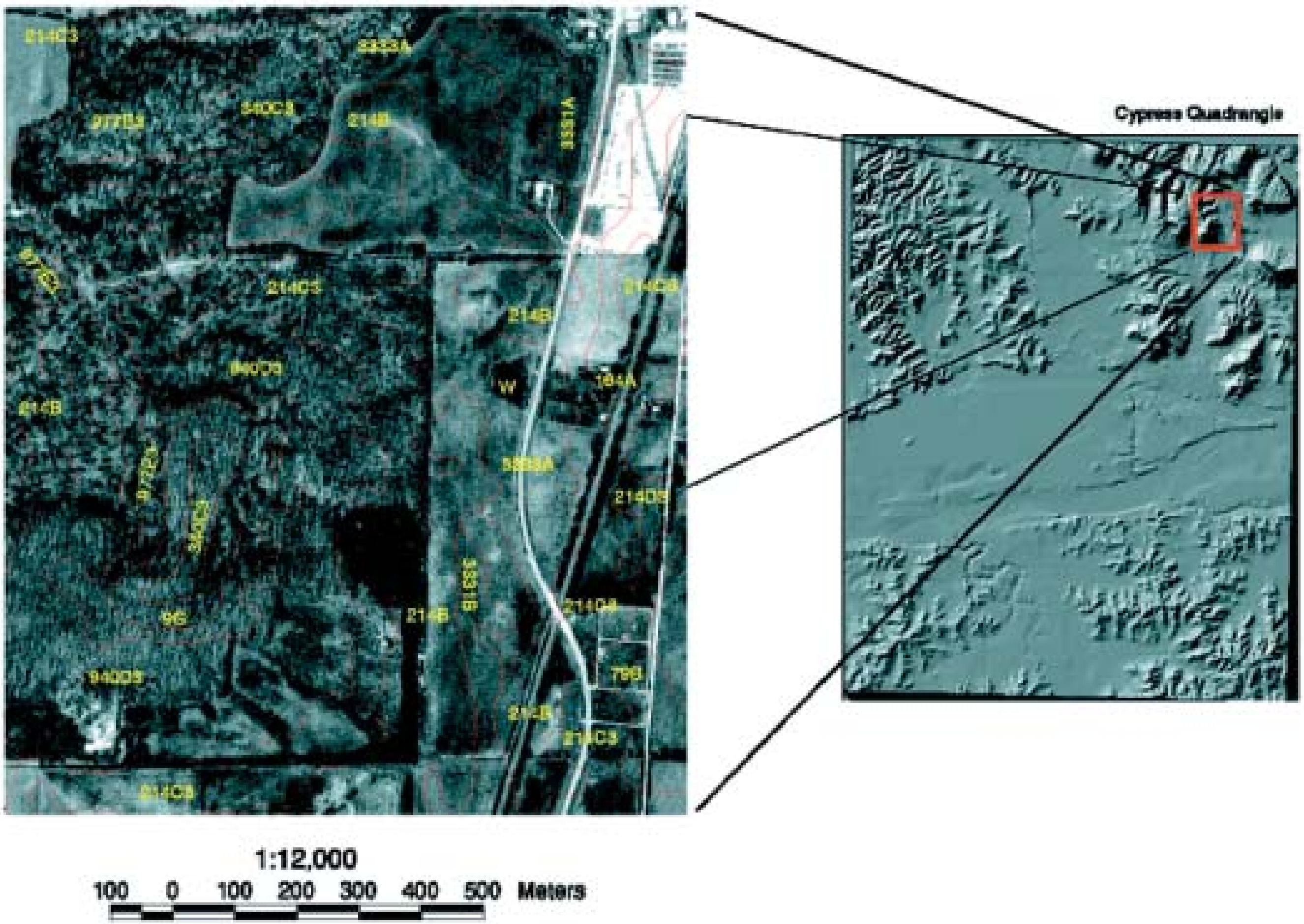
Cypress Quadrangle
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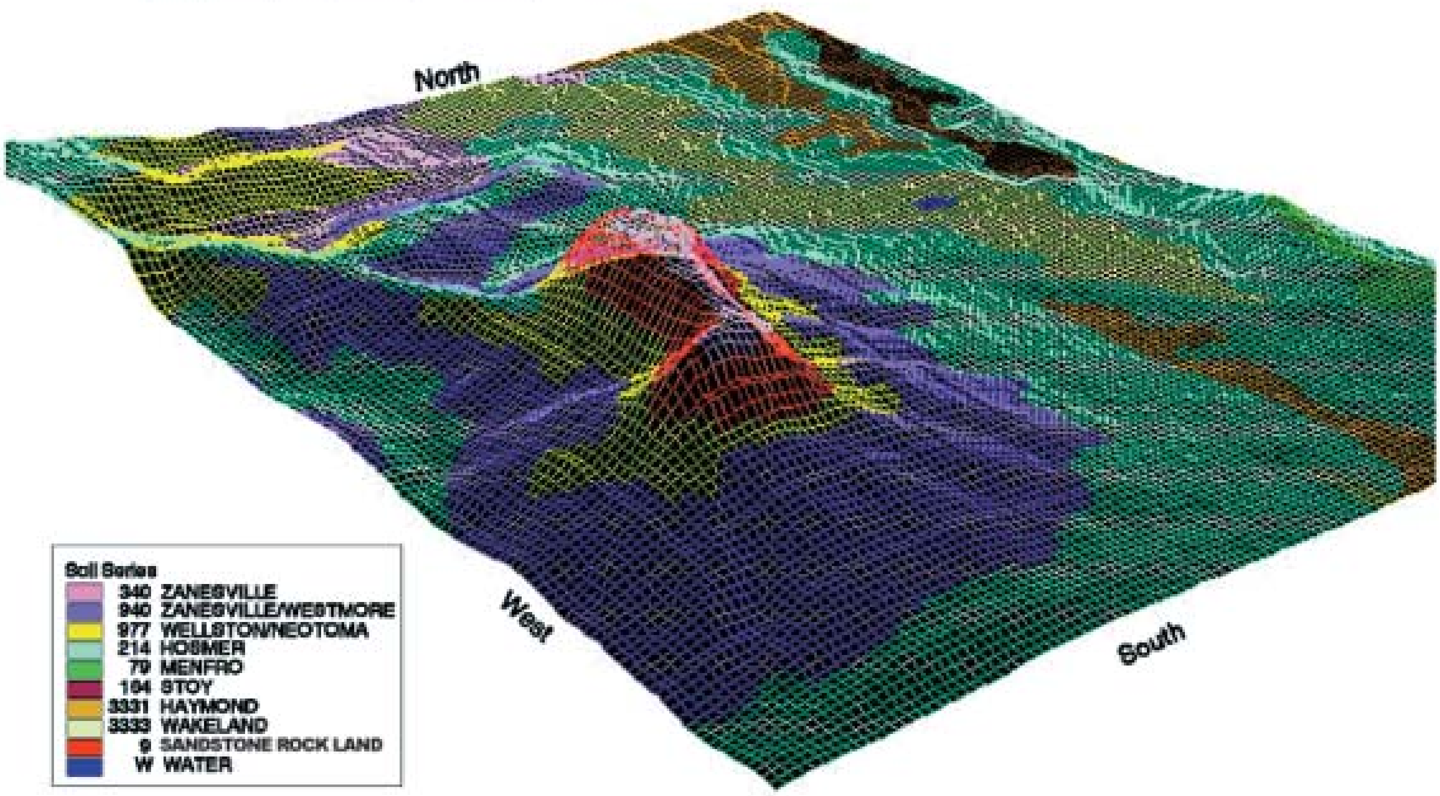
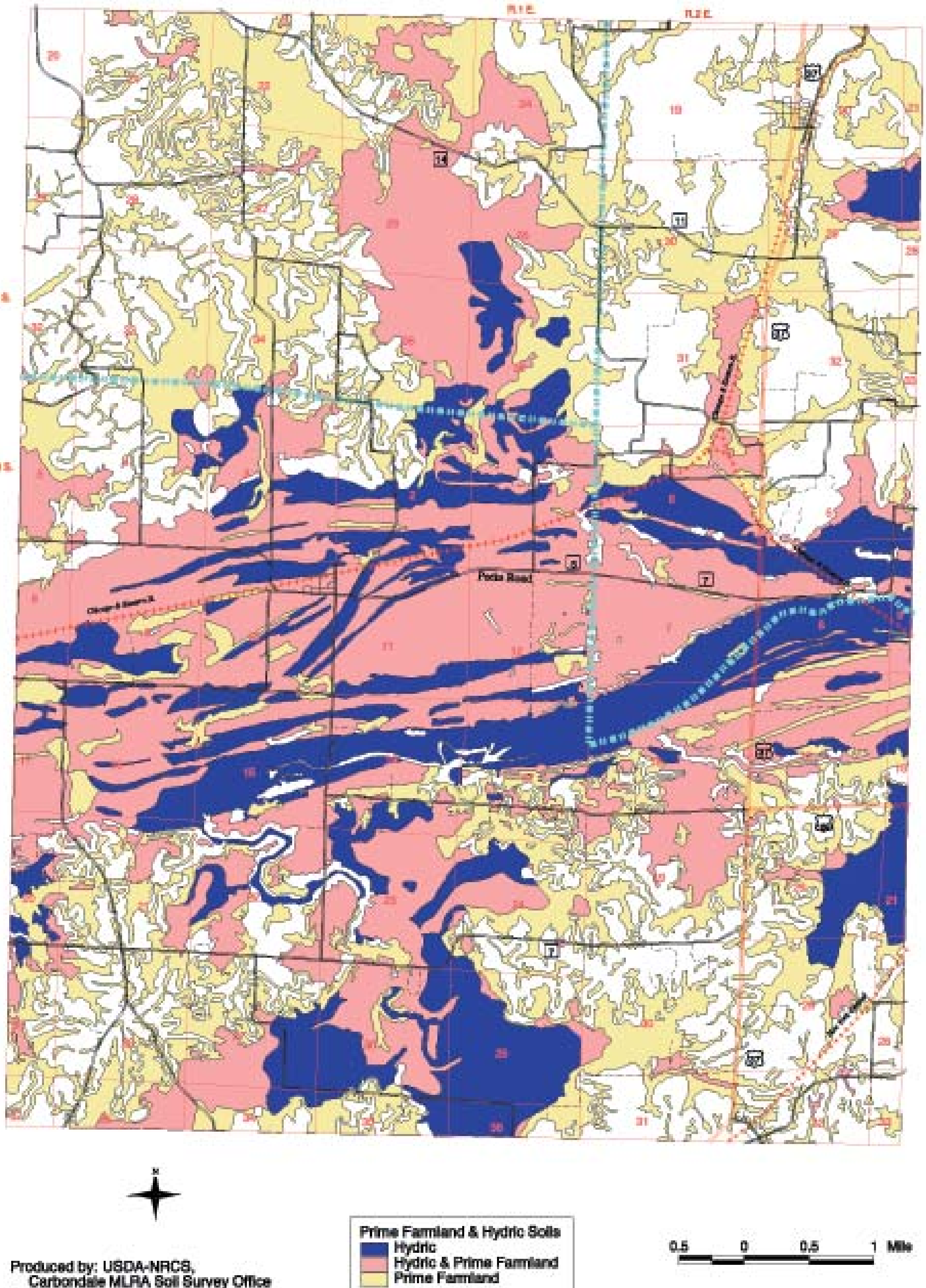

North
West
South
Soil Series
340 ZANESVILLE
940 ZANESVILLE/WESTMORE
977 WELLSTON/NEOTOMA
214 HOSMER
79 MENFRO
164 STOY
3331 HAYMOND
3333 WAKELAND
9 SANDSTONE ROCK LAND
W WATER

Prime Farmland and Hydric Soils



Produced by: USDA-NRCS,
Carbondale MLRA Soil Survey Office
Source: USDA-NRCS Digital Soil Data.
Projection: UTM, Zone 16, NAD 83
Map Date: 3/01/99

Natural Resource Data

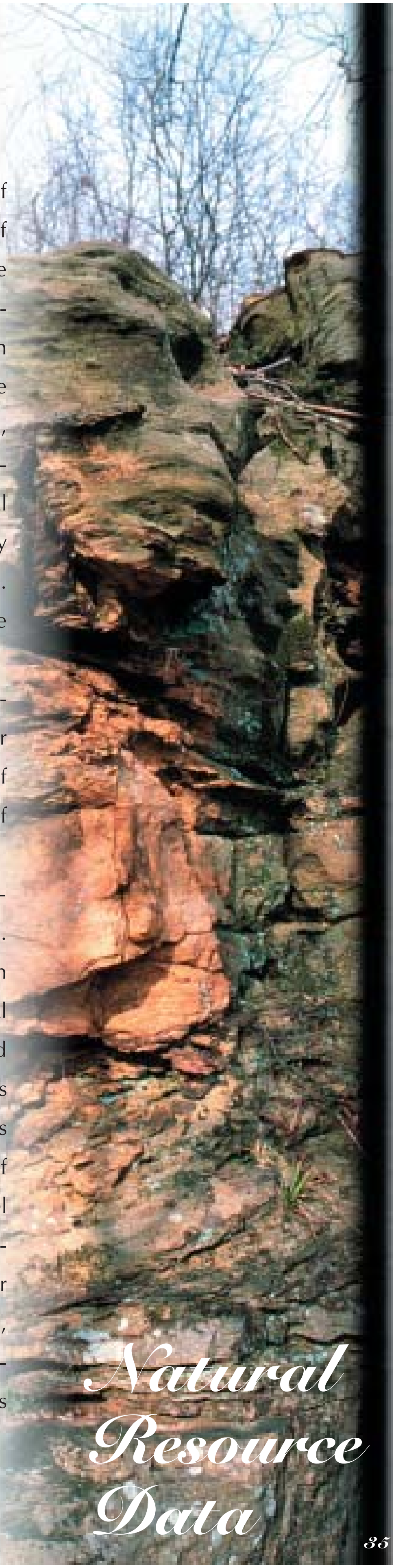
Geology

Bedrock Geology

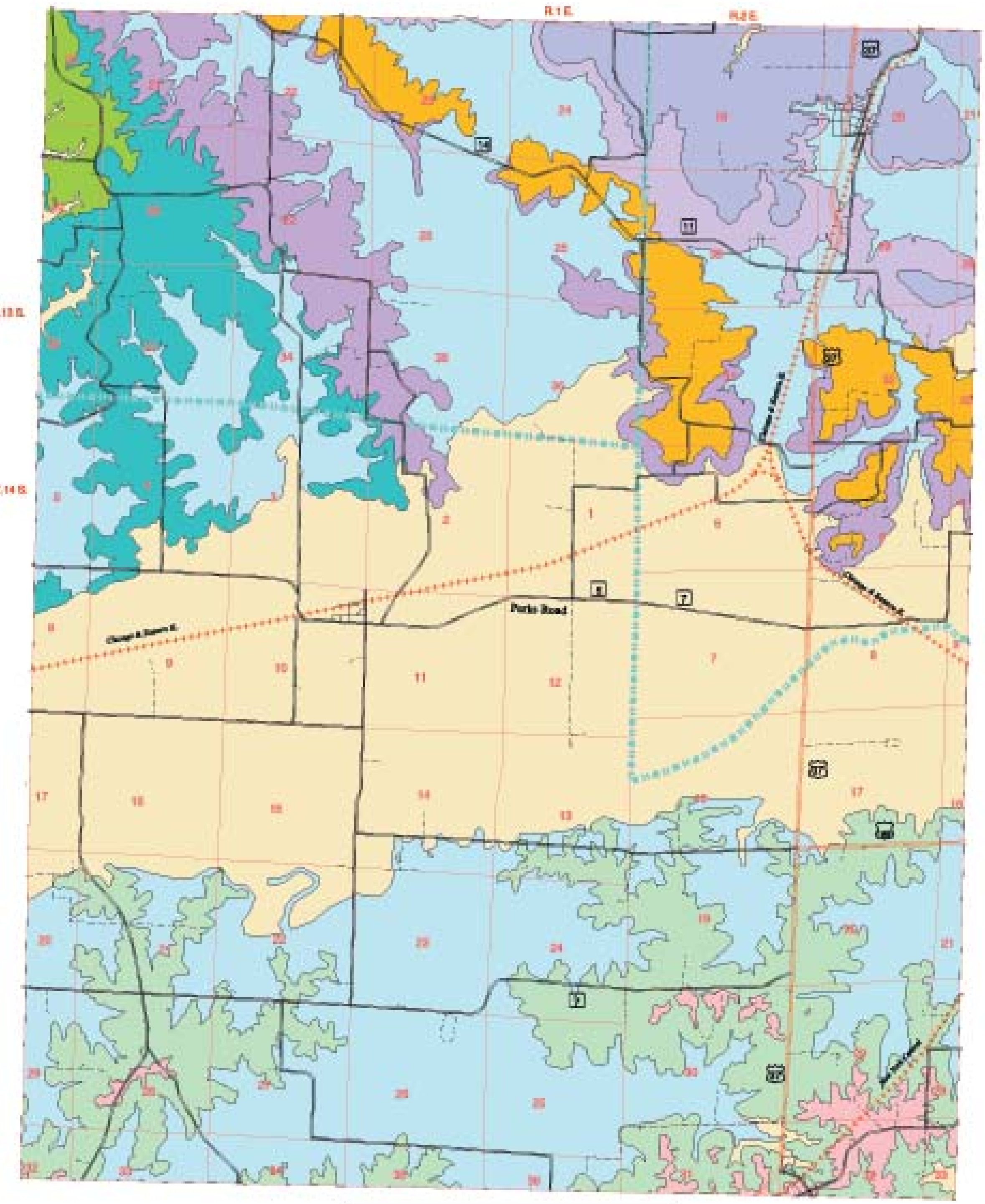
The Cypress Quadrangle is an area of geologic extremes. To the north of the Cache River, limestone and sandstone hills represent remnants of ancient environments that existed here 330 million years ago. These limestone rocks were deposited in warm shallow seas. The sandstones were deposited under subtidal, tidal, and deltaic conditions. The sediments to the south of the Cache River are 65 million years old. These sediments cover rocks that were formed 330 million years ago. The sediments are composed of white, fine grained, loose quartz sand, clays, and silt that comprise the rolling Cretaceous hills of dinosaurian age. The sands accumulated at the head of a large gulf embayment, a coastal plain, the ancient Gulf of Mexico. The unconsolidated sand is called the McNairy Formation. The Cache River Bottoms contains the youngest deposits in the area. It separates Paleozoic rocks on the north from Mesozoic rocks on the south. See the cross section that bisects the Cypress Quadrangle from north to south.

Besides the stark difference in geology south of the Cache River, modern species of plants and some forms of animal life have more in common with the lower Mississippi Valley than with the upper Mississippi Valley. The southernmost part of Illinois, mainly Alexander, Pulaski, and Massac Counties and a small portion of Union County, is included in the Coastal Plain Province.

The Cache River Valley is the most recent geologic feature on the Cypress Quadrangle; however, the current river is too small to have carved such a wide channel. A preglacial river probably flowed from the east into the area from the Appalachian Highlands through the upper Tennessee River Valley. Evidence of this preglacial river is in the form of tan, rounded, chert gravel and sands that were deposited about 1.5 million years ago. The area of chert gravel and sands is called the Mounds Gravel. It was partly eroded later by a younger river system. About 100,000 years before the present, the low lying areas of the Cache were flooded by meltwaters of the Illinoian Glaciation. Evidence of this outwash is in the form of sands and gravel obtained from drill holes within the lowest part of the Cache Valley. The last glaciation, the Wisconsinan, flooded these lowlands again and created slack-water lakes south of the rocky uplands. Sometime after deposition of the lake sediments, the ancestral Ohio River flowed through the Cache as well. It is clear that numerous river systems left their mark on the land, creating the large valley that includes the modern Cache River.



Bedrock Geology



N

Symbol	Formation
Qal	Alluvium and Loess
Qe	Equality
QTm	Mounds Gravel
TKu	Undifferentiated Gravel
Km	McNairy Sands
Mcy	Cypress Sandstone
Mrp	Ridenhower Shale /Paloli Limestone
Mav	Aux Vases Sandstone
Msg	Ste. Genevieve Limestone
Msl	St. Louis Limestone

0.5 0 0.5 1 Mile

Produced by: USDA-NRCS, Carbondale MLRA Soil Survey Office
Source: Illinois State Geologic Survey digital data.
Projection: UTM, Zone 16, NAD 83
Map Date: 8/24/98

Surficial Geology

The bedrock geology examines the materials that are underneath the surface of the earth. By understanding the bedrock stratification, scientists can gain knowledge of the ancient depositional and erosional processes that formed the landscape. Surficial geology examines the unconsolidated material that overlies the bedrock. This material, which includes the soil, was deposited over the bedrock or weathered from the bedrock. Surficial geology helps to identify the depostional processes that helped to form the landscape. The surficial geology of the Cypress Quadrangle can be grouped into three broad classes: alluvial deposits, stream terraces, and uplands.

The flood plains have three kinds of **alluvial deposits**: Cahokia Alluvium, the Equality Formation, and the Henry Formation. Cahokia Alluvium is mapped primarily in the Cache River Basin. This alluvium consists of post-glacial deposits. It is dominated by silt and ranges from silty sand to clay. The deposits generally are 5 to 20 feet thick; however, in the abandoned ancestral Ohio River channel, they may be up to 60 feet thick and have lenses of gravel. Beneath the alluvium lies stratified sand, silt, and clay of Wisconsinan age (outwash and lacustrine deposits).

The Equality Formation consists primarily of slack-water lake deposits laid down when glacial meltwater flooded of the Cache River Valley during the Wisconsinan Glaciation. It consists of up to 100 feet of stratified silt and clay and has lenses of sand and gravel derived from local valley slopes. This unit intertongues with the Henry Formation.

The Henry Formation is primarily glacial outwash formed by meltwater floods durning the Wisconsinan Glaciation. It consists of up to 180 feet of sand and has lenses of gravel, silt, and clay from glacial and local sources. The sand is white to medium gray and yellowish brown and very fine to coarse grained. The composition is 80 to 90% quartz grains and 10 to 20% chert grains.

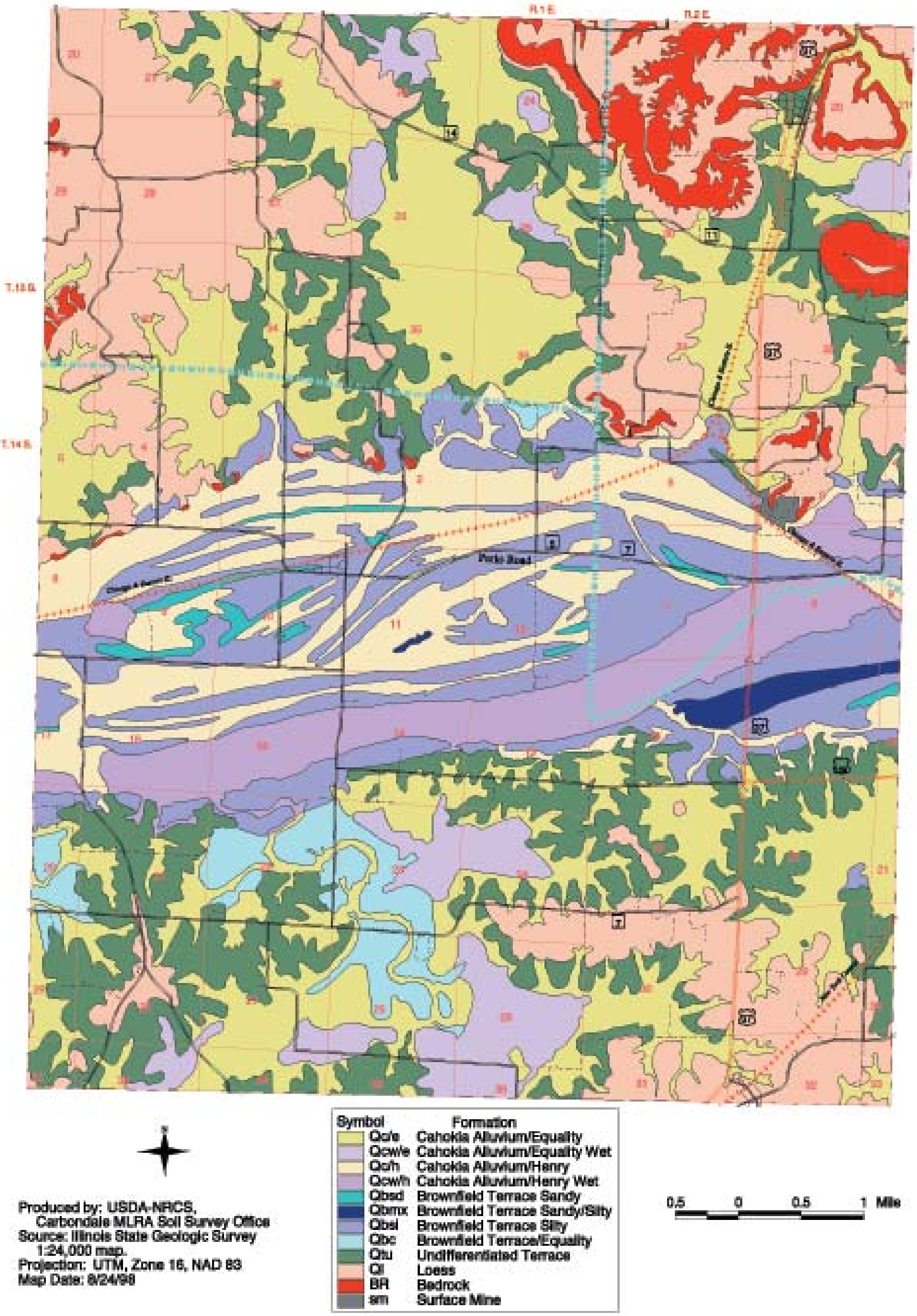
Stream terraces are remnants of the old abandoned floodplain which formed in a previous stage of deposition. An increase in flow energy associated with the Wisconsinan glacial period caused the stream to erode through the flood-plain, creating the terraces. The late Wisconsinan terraces are mapped as the Brownfield Terrace Formation in the Cypress Quadrangle. They are underlain by stratified deposits of either the Henry Formation (sand and gravel) or the Equality Formation (silt and clay). These terraces range from 335 to 355 feet in elevation and are partially buried by Cahokia Alluvium. This partical burial indicates that record historic floods once covered the Cache River Basin.

The surficial geology map has three units mapped in the **uplands**. Loess is mapped where windblown silt deposits are 5 to 15 feet thick. In the Cypress Quadrangle three geological events deposited the loess; all three events left distinct marks in the soil profile. The three loess types, from most recent to oldest, are Peoria Silt, Roxana Silt, and Loveland Silt. Oxidized Peoria silt is commonly yellowish brown, Roxana silt is commonly reddish brown, and Loveland silt may range from yellow to dark red. In wet sequences all loess units are gray and difficult to distinguish by color. Below the loess sequence, 1 to 5 feet of Oak Formation clay is common. This formation is an accumulation of clay-rich, weathered material commonly referred to as residuum.

If the loess was relatively thin, 0 to 5 feet thick, it was mapped as bedrock on the Surficial Geology map. The bedrock includes Mississippian sandstones, shales, and limestones,. The bedrock unit was mapped in areas of numerous outcrops and steep talus slopes.

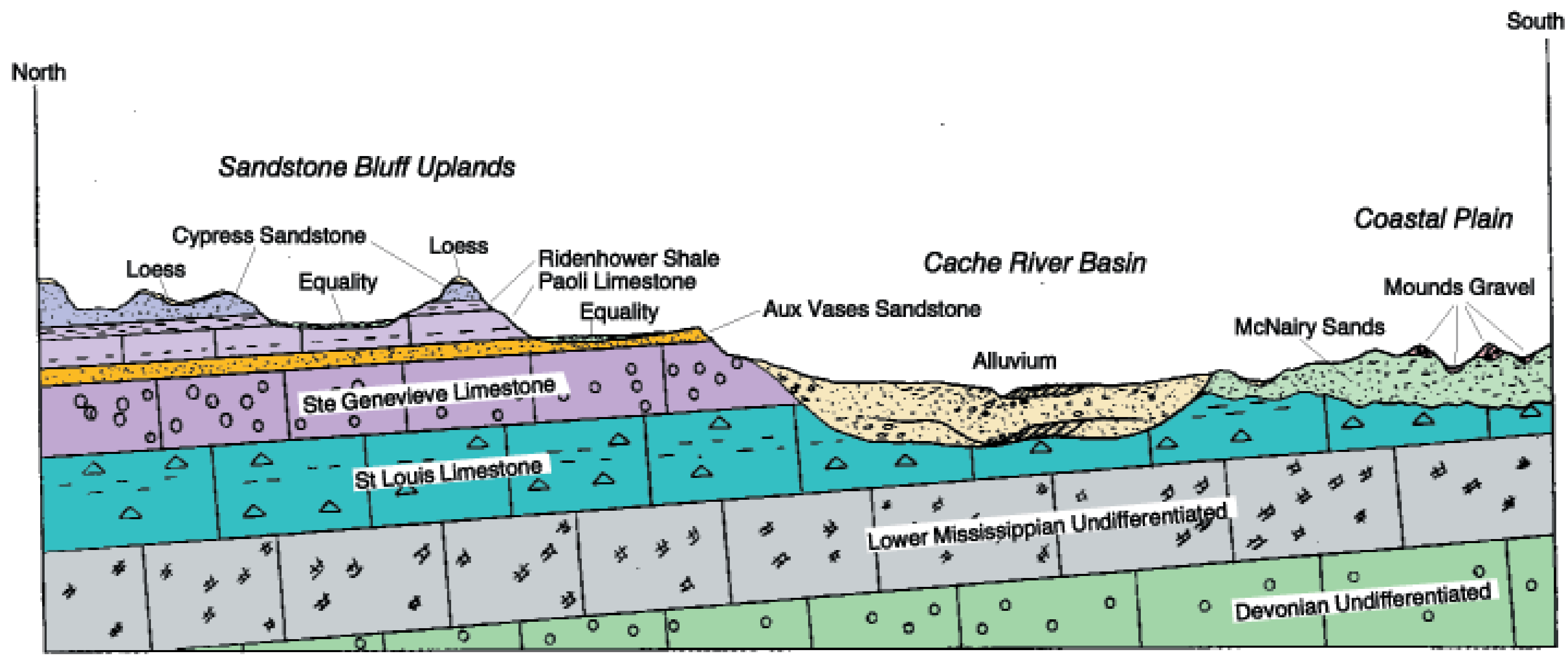
The Undifferentiated Terrace is a transitional unit to bottomlands. It is a complex of terracelike landforms that occur between elevations of 350 and 400 feet in the region. These landforms are likely to be loess-covered bedrock benches and older terraces. The terraces have 5 to 15 feet of loess overlying unweathered or weathered sandy sediments. The benches have similar form and loess cover but are underlain by the Oak Formation clay (bedrock residuum) or bedrock.

Surficial Geology



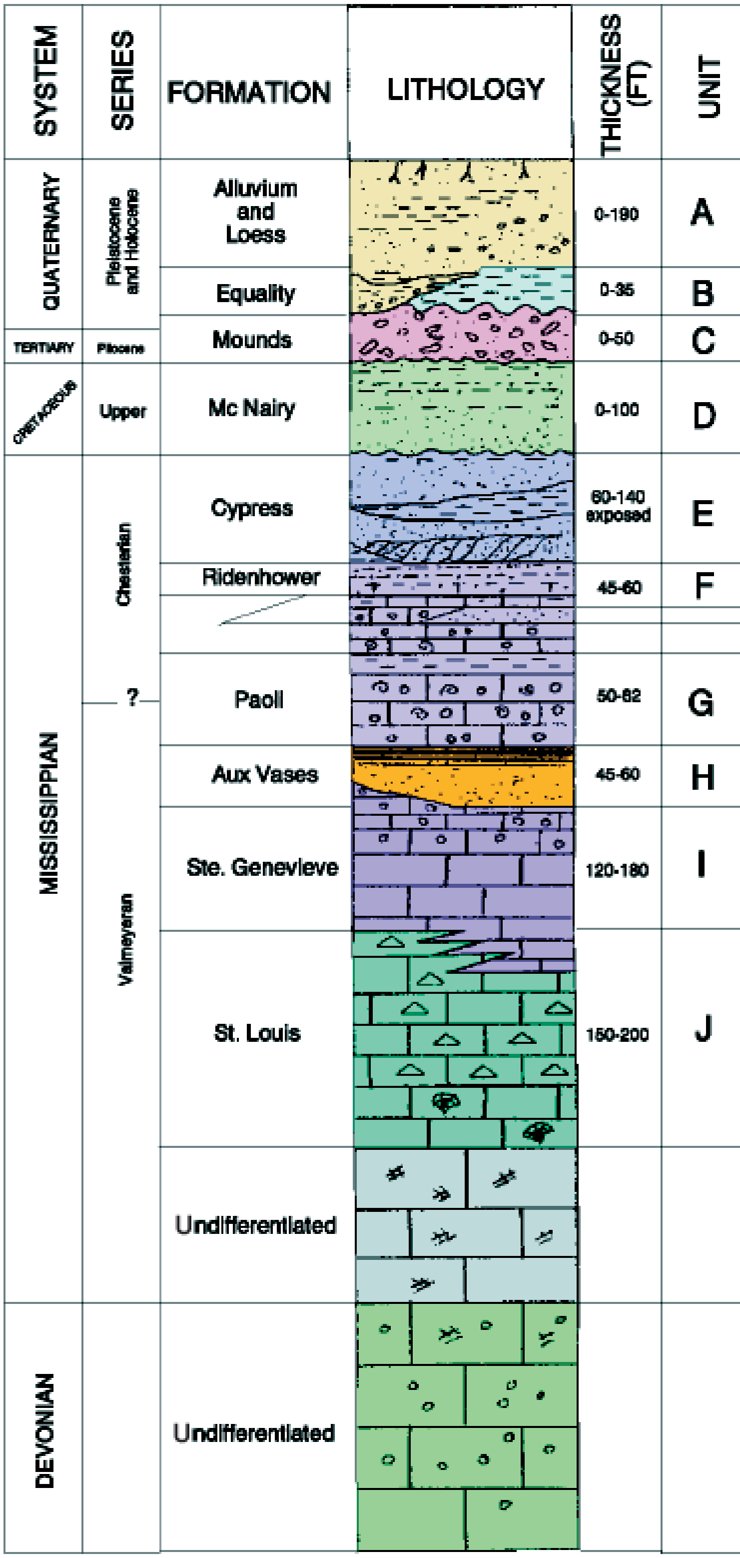
Geologic Cross Section

Figure 13. **Geologic Cross Section in the Cypress Quadrangle**



Geologic Column

Figure 14. **Geologic Column of the Cypress Quadrangle**



DESCRIPTION

A. The alluvial deposits are in the Cache River basin. This unit consists of clay, silt, sands, and gravel. The uplands are blanketed with loess, and though the loess is not mapped on the bedrock geology map, it can be seen on the cross section and the surficial geology map.

B. This unit consists of clays and silts, and it fills the valleys north and south of the main Cache River Valley. It is interpreted as lacustrine and fluvial-overbank sediments.

C. These tan, rounded, chert pebbles were probably deposited from a preglacial river that flowed from the Appalachian Highlands. Ascertaining the distribution of these pebbles is in the quadrangle because of the thick loess cover.

D. This unit is composed of very fine to medium grained micaceous quartz sand, silt, and clay. This unit is poorly exposed, and the description is based on the well samples and outcrops in adjacent areas.

E. The sandstone is white, fine to medium grained, subangular, nearly pure quartz, commonly is crossbedded, and has ripple marks. It forms cliffs up to 80 feet high near the village of Cypress.

F. This unit consists of dark gray to greenish gray clay shale with limestone lenses. The limestone beds contain many fossils such as; brachiopods, bryozoans, and crinoid stems.

G. This unit is dominatly light gray, fossiliferous limestone with thin interbeds of greenish gray shale.

H. This sandstone formation is nearly pure quartz, is very fine or fine grained, and can range from light gray and greenish gray to purplish red. It may contain fossils of brachiopods.

I. This crossbedded limestone is light gray to white and is composed of small, spherical concretions of calcium carbonate called oolites. Chert is present but not abundant. The basal contact interfingers with the unit below.

J. This limestone unit is dominated by medium gray limemudstones that contain abundant chert nodules. The limestone is dense, is thick bedded, and rarely contains oolitic beds.

Plant Communities and Wildlife Habitat

The Cache River watershed lies at the juncture of four physiographic regions: the Illinois Ozarks to the west, the Shawnee Hills to the north, the Upper Gulf Coastal Plains to the south, and the Mississippi Alluvial Basin to the southwest. These regions differ in their geologic history, terrain, and vegetation. The watershed also lies at the boundary of the Humid Continental climatic region of north-central and northeastern parts of the United States and the Humid Subtropical climatic region of the south-central and southeastern parts. These landform and climate variations create a great diversity of flora and fauna habitats. The Cache River Basin is home to as many as 20 natural communities, some of which are unique to this area. These natural communities can be grouped into six broad land cover classes: swamps, bottomland forests, transitional forests, upland forests, grasslands, and streams/rivers.

Land Cover

Swamps are usually inundated with standing water of varying depths throughout most of the year. The driest times are in summer, and the wettest are in spring. Few species of plants can tolerate continual standing water, whereas many species grow in the slightly higher and drier conditions provided by stumps and logs within the swamps. Many of the bottomland species grow on the ridges within the swamps, whereas the deeper, semipermanently inundated areas are limited to cypress, water tupelo, and buttonbush, to name a few flora species. The swamps provide excellent habitat for the endangered river otter and the more common beaver, muskrat, mink, and raccoon. The swamps also provide habitat for a wide variety of frogs, salamanders, snakes (including the venomous cottonmouth), ducks, and birds. It is not uncommon to see the great blue heron, green heron, little blue heron, or great egret in the swamps.

Bottomland forests are adjacent to swamps, rivers, and streams, but they are at a slightly higher elevation, making them relatively drier. They are subject to seasonal and periodic flooding, though the water usually does not persist into the growing season. Because of variations in the depth of floodwater and the frequency of flooding, bottomland hardwood forests support numerous distinct and highly variable plant communities, giving them the highest species diversity of all the land cover classes. Forests are composed of a wide variety of oaks (overcup, chestnut, pin, shumard, cherrybark, and willow) and hickories (water, shellbark, and bitternut), while also supporting cypress, tupelo, sycamore, sweetgum, ash, and maples. Throughout bottomland forests, shrubs and vines are prevalent and often form impenetrable thickets. Dense stands of giant cane also occur within bottomland forest areas. They provide habitat for some of the rarest wildlife, such as Bachman's warbler. Seasonal flooding provides the shallow standing water essential for invertebrate, fish, and amphibian reproduction. As this water recedes, aquatic organisms take refuge in nearby lakes, rivers, streams, and wetlands. Predatory animals, such as snakes, herons, egrets, raccoons, opossum, and mink, prey on the organisms stranded in isolated depressions. The stress of seasonal inundation causes considerable damage to trees. Woodpeckers capitalize on infestations of wood-boring insects, and they also make their nest cavities in the damaged trees. A rich diversity of birds inhabits the bottomland forests. Amphibians also reach peak numbers in these forests.

Transitional forests occur at the boundary between the floodplains and uplands. Plant and animal species composition (density and diversity) reflects the influence of both bottomland and upland forests. Transitional forests support sweetgum, elm, and ash, which are common on wet bottomland sites, and also support sugar maple, poplar, American beech, oaks, and hickories associated with upland

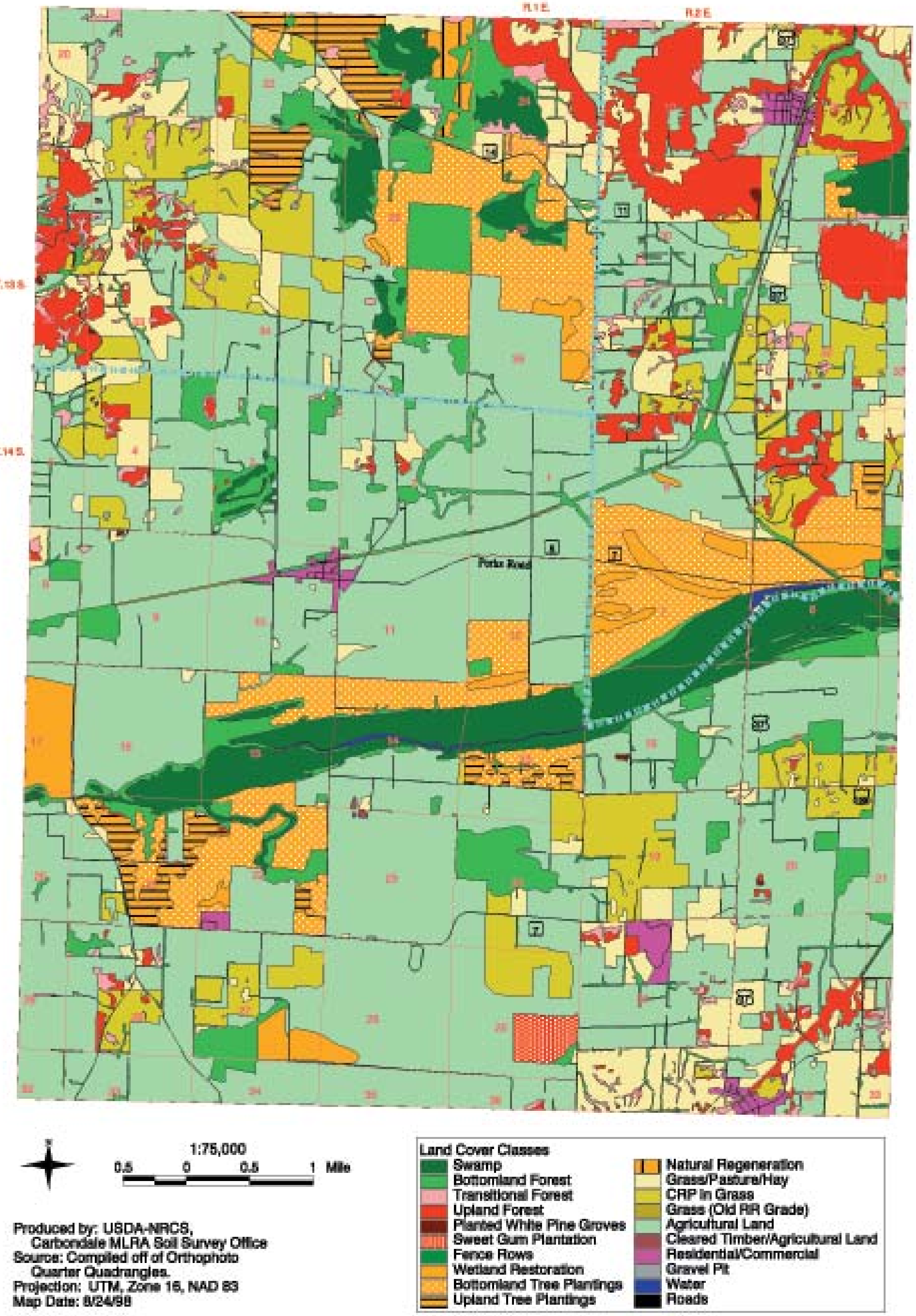
Natural Resource Data

forests. Transitional habitat is narrow and linear. This “edge” between habitat types contributes greatly to overall habitat diversity. Due to higher elevations, upland forests are better drained and drier than bottomland forests and therefore have less species richness. The main community type is the oak-hickory forest community. Moisture conditions in upland forests range from xeric, where bedrock is at or near the surface and soils are thin and droughty, to mesic, where deep, rich soils support rich and diverse herbaceous and shrub layers, which thrive under a closed canopy of trees that often reach heights of more than 140 feet. Many mammals and birds range broadly throughout upland forest communities. Reptiles reach peak numbers in this habitat, as do large predatory mammals, such as coyotes, foxes, and bobcats. Rodent populations also reach peak numbers in this forest type.

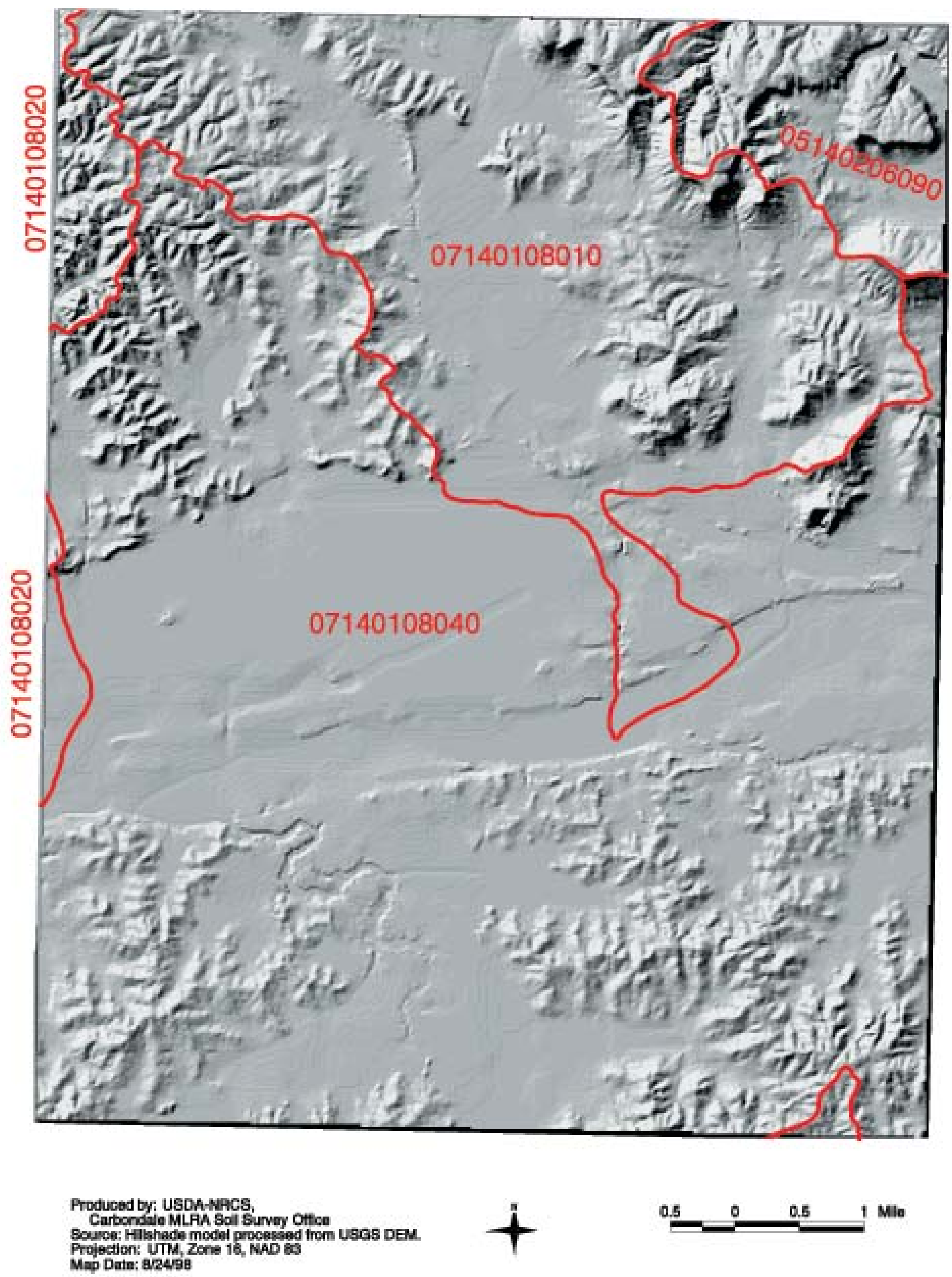
Natural grassland habitat is uncommon in southern Illinois and is confined to barrens and glades, which occur in upland areas on dry exposed ridges where soils are thin and droughty. Grassland habitat also occurs on old pastures, abandoned fields, abandoned railroad tracks, and reforestation plots. Grasslands support a diversity of rodents and snakes and many ground-nesting birds. Numerous forest birds are common visitors, often seen searching for insects and nest materials. Bison and elk once frequented this community type, grazing on the abundant native prairie grasses and forbs. The effects of grazing, browsing, and trampling (along with occasional prairie fires) were the primary means by which grassland ecosystems were maintained. Today, in the absence of large herbivores, professional resource managers use fire to prevent encroachment of woody vegetation on barrens and glades in southern Illinois. Without disturbance, the grasslands will eventually convert to forest.

Streams and rivers support a wide variety of aquatic life. Flow volume/velocity, depth, substrate heterogeneity, and vegetation determine what aquatic species can be found in any reach of a river or stream. Streams support species adapted to high-flow velocities and rocky substrates. Flow in streams is flashy during seasonal rainy periods but often minimal during summer months. Many streams are spring-fed, but the primary source of water for streams in southern Illinois is rainfall and surface runoff. Water clarity in streams is good, and dissolved oxygen is at or near saturation. The dominant invertebrate species include detritivores and predators, such as stoneflies, mayflies, caddisflies, and dragonflies. Rivers are the main avenue for drainage within a watershed. They receive water from streams as well as from precipitation and surface runoff. Water in rivers is more turbid because of inputs of sediment and organic matter from in-stream bank/bed erosion and upland sediment and organic matter delivered by tributary streams. Invertebrate species diversity is often reduced in rivers, but densities of pollution-tolerant filter feeding species can be quite high. The insects characteristic of rivers in southern Illinois include mayflies, dragonflies, blackflies, and midges. Mussels are common in perennial waterways. Streams and rivers provide water utilized by terrestrial fauna throughout the year.

Land Use/Cover



Watershed Boundaries (11 Digit) of the Cypress Quadrangle



Watershed Boundaries

A watershed is an area of land that drains water, sediment, and dissc materials to a common outlet at some point along a stream channel. A w shed area comprises all the land and water within the confines of a drai divide and follows hydrologic boundaries.

Parts of two river basins occur on the Cypress Quad. The Lower Cache I Basin is subdivided into four watersheds, of which three are on the Cy| Quad.

07140108010 Cypress Creek
07140108020 Big Creek
07140108040 Lower Cache River Main Stem to the Ohio River

One of five watershed of the basin of the Ohio River Tributaries is or Cypress Quad - 05140206090 Upper Cache River.

Wetlands

Illinois' wetlands were inventoried in the 1980's as part of the U.S. Fish Wildlife's National Wetlands Inventory (NWI) program. The Illinois NRCS land Inventory is an enhanced version of the original NWI data.

For purposes of this classification, wetlands must have one or more o following three attributes: 1) at least periodically, the land supports pred nantly hydrophytic or "water-loving" plants; 2) the substrate is predomin undrained hydric soil; and 3) the substrate is saturated with water or covere shallow water at some time during the growing season of each year. Perma water bodies greater than 6.6 feet in depth at low water are termed "deep v habitat" in the NWI (Cowardin et al. 1979).

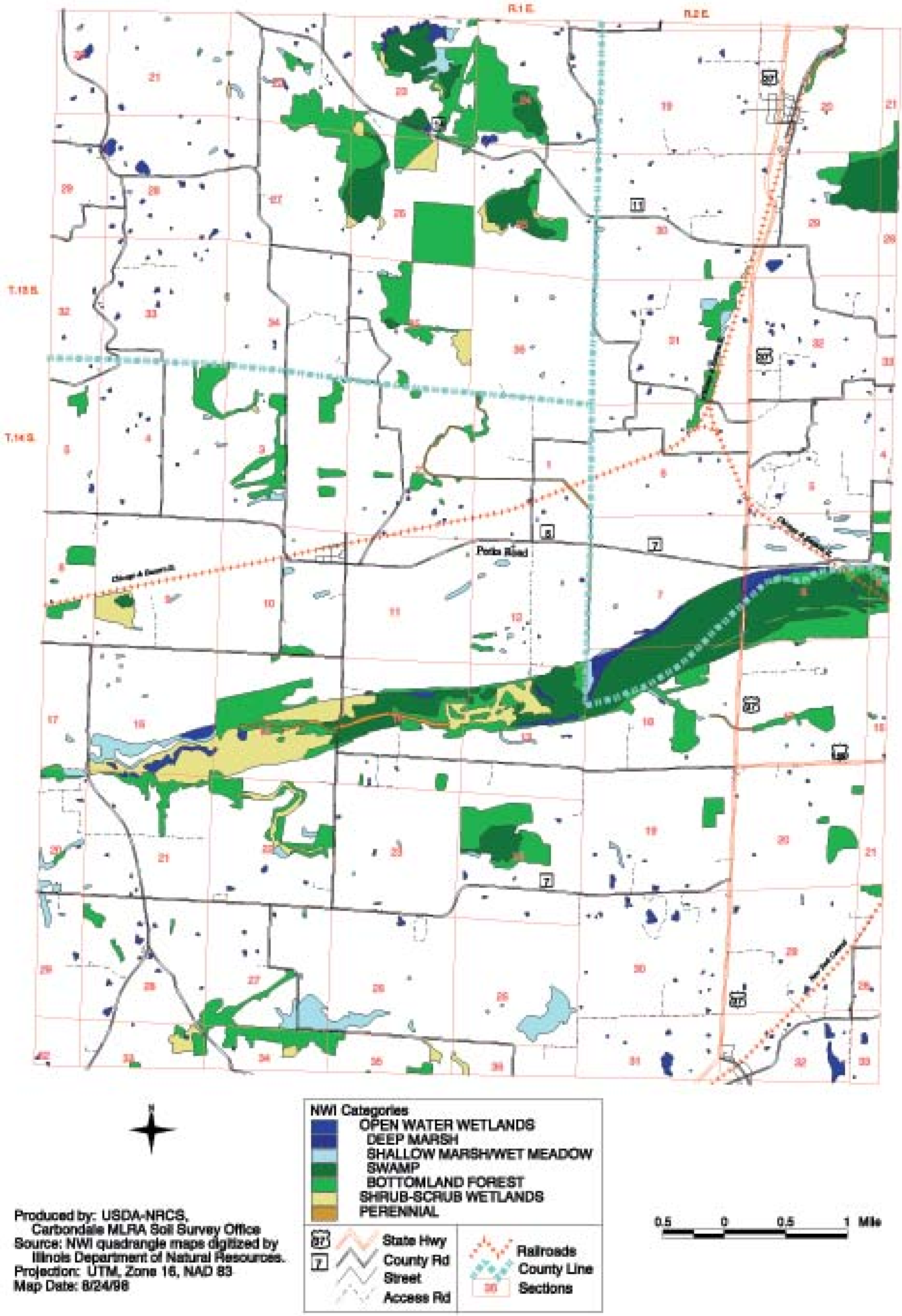
Wetland types

The classification system for Illinois includes:

- **Bottomland forests—**characterized by woody vegetation 20 feet (6 or more in height over 30 percent or more of the area. They are a temp rarily or seasonally flooded area that lacks continuously standing wat This definition is based on a water regime as opposed to its proximity streams or rivers. Bottomland forested wetlands range from areas that a frequent flooded and have poorly developed understory to drier wetlan which have a greater diversity of plant species.
- **Swamp—**forested wetlands that are typified by the presence of wat on a permanent or semipermanent basis.
- **Shallow marsh/wet meadow—**an emergent wetland dominated rooted, herbaceous hydrophytic vegetation, such as sedges, rushes, fork and grasses. Vegetation may remain visible throughout the year or c back in the nongrowing season. Standing water is present for brief moderate periods during the growing season.
- **Deep marsh—**an emergent wetland typified by the presence of stan ing water or soil saturation on a semipermanent to permanent basis duri the growing season.
- **Open water wetlands—**nonvegetated areas less than 20 acres in si and less than 6.6 feet (2m) in depth, such as farm ponds, borrow pits, str mine ponds, small reservoirs, and open water areas that occur within marsh or swamp.
- **Shrub-scrub wetlands—**characterized by woody vegetation less th 20 feet (6m) tall covering 30 percent or more of the area. Scrub-shru wetlands can be a successional stage in the transition of an emergent we land to forest, or it may represent a climax community, such as the shru bogs of northeastern Illinois.
- **Perennial—**perennial riverine wetlands characterized by flowing w ter throughout the year.

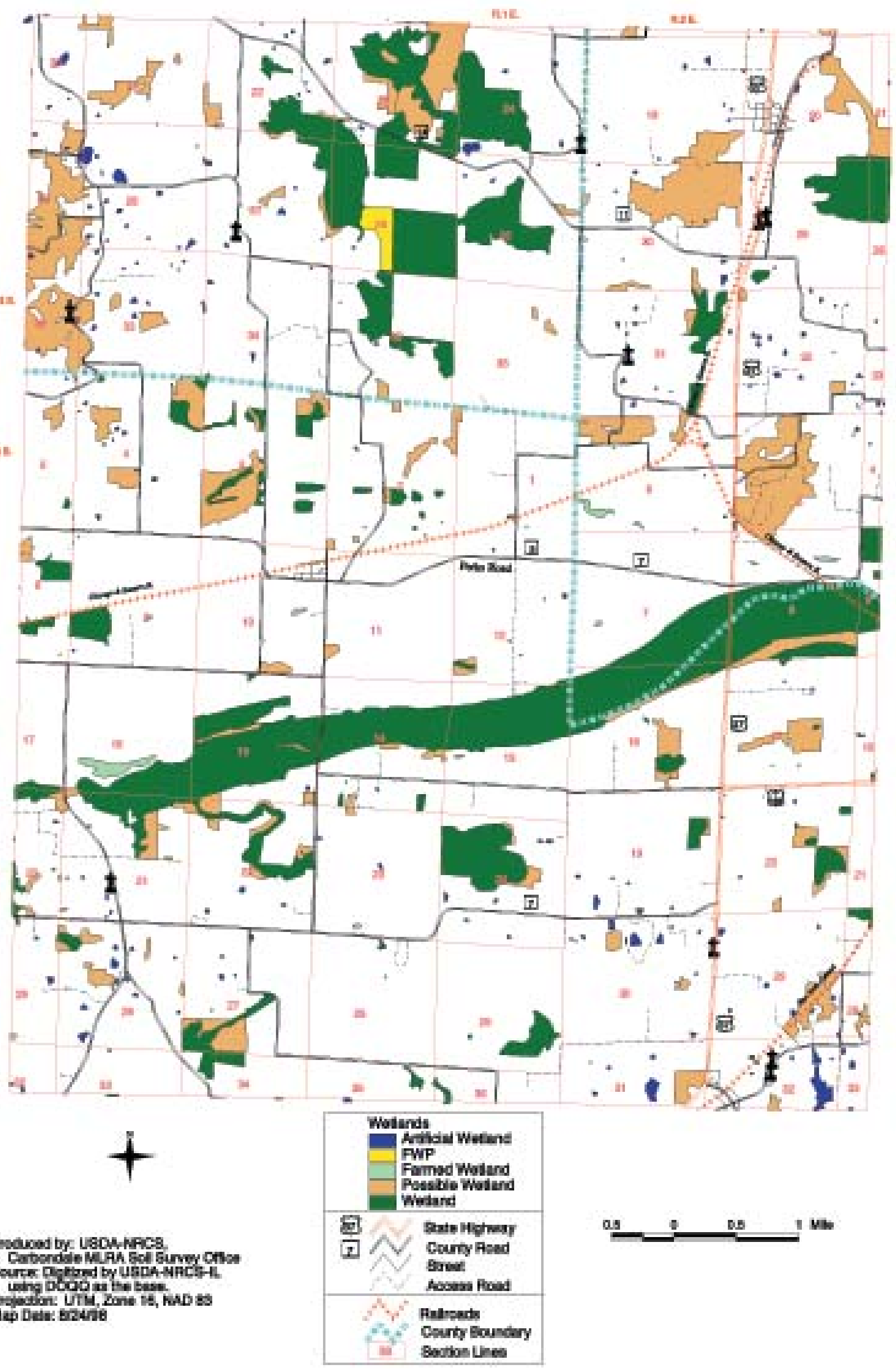
L. Suloway and M. Hubbell. *Wetland Resources of Illinois - An Analysis and* *Illinois Natural History Survey*, Special Publication 15, July 1994, 88p.

National Wetland Inventory



Produced by: USDA-NRCS,
Carbondale MLRA Soil Survey Office
Source: NWI quadrangle maps digitized by
Illinois Department of Natural Resources.
Projection: UTM, Zone 16, NAD 83
Map Date: 8/24/98

NRCS Wetland Inventory

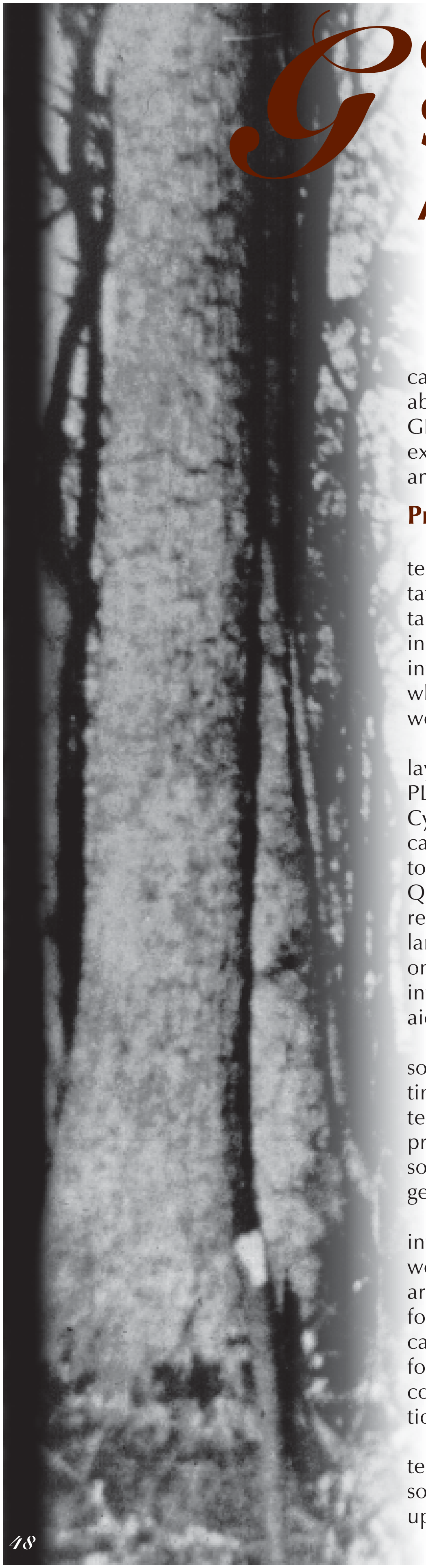


Wetlands

The NRCS Wetland Inventory was conducted in most of the counties in Illinois Counties between 1988 and 1990. Many counties were reinventoried during the 1990's with a revised set of mapping conventions. The inventory consisted of an in-office procedure which utilized the County Soil Survey, NWI, climatic data, flooding data, and at least 5 years of low altitude color aerial slides. The purpose of the wetland inventory was to produce a tool that would be useful to NRCS field staff when making wetland determinations for wetland conservation provisions of the 1985, 1990, and 1996 farm bills. While the inventory is often used as a tool for making determinations, a NRCS Certified Wetland Determination is always conducted on site to ascertain whether or not the wetland criteria have been met.

Wetland labels:

- **Artificial Wetland (AW)—** An area that is artificial or irrigation induced wetland.
- **Farmed Wetland Pasture (FWP)—**An area that is pasture or hayland; was manipulated before December 23, 1985, but still meets wetland criteria, and it has not been abandoned.
- **Farmed Wetland (FW)—**An area that is farmed; was manipulated and planted before December 23, 1985, but still meets wetland criteria.
- **Possible Wetland –** An area on the inventory, some of which is likely to be wetland, which requires a site investigation in order to delineate the wetland and nonwetland parts.
- **Wetland (W) —**An area that meets wetland criteria, other than the wetland types listed above.



Geographic Information Systems (GIS) Application

Geographic Information Systems (GIS) are designed for the creation, storage, manipulation, retrieval, and update of spatial information. The real utility of a GIS, however, is in its analytical and spatial modeling capabilities. At a time where we are data rich and information poor, GIS has the ability to analyze data and provide information to support decisions. The use of GIS allows for the detailed analysis of natural resource problems. Below is an example of how this technology can be applied to natural resource problems in an analysis that supports wise management and land use decisions.

Presettlement Vegetation/Tree Planting Recommendation

Many conservation and preservation agencies and organizations seek to protect Theartened and Endangered Species (TES) by preserving and restoring habitat. If biodiversity is to be protected, it is critical that natural habitats be maintained. With the aid of historical aerial photography and satellite imagery, change in land use and land cover can be observed. While these observations provide information about the fragmentation and shrinking of habitat, they do not show what the pre-European settlement land cover was like. To gain this knowledge, we must interpret the historical data.

The Presettlement Land Cover map was created from analysis of only two data layers—the 1807 Public Land Survey Notes (PLSN) and the soils data. The 1807 PLSN is the oldest and most detailed hand-written historical record of what the Cypress Quadrangle was like before the area was settled by the European-Americans. Congress mandated the Public Land Survey System (PLSS) in 1785 as a way to divide and inventory the expansive territory of the United States. The Cypress Quadrangle was surveyed between January and April of 1807. The field notes recorded by the surveyors contain a wealth of information on the presettlement land cover and natural character of the area. Since the surveyors recorded notes only along section lines, the data represent just a sample of the total area and interpolations between the section lines must be performed. The soils data can aid in these interpolations.

Topography, parent material, vegetation, climate, and time are the factors of soil formation . Soils take many years to form and, for the most part, take a long time to change. Thus, we can consider soils to be a historical record. A soil can tell us something about prehistoric climates, ancient geological events, and presettlement vegetative cover. With the aid of an understanding of the various soil-forming factor, and the 1807 PLSN, the soil survey data were interpreted and generalized, as a presettlement land cover map was created.

When the presettlement land cover map was created, soils were reclassified into land cover units. All upland soils (thick loess and moderately thick loess) were classified as "Upland Forest." The upland soils of the Cypress Quadrangle are all classified as Alfisols (Udalfs). Alfisols are generally soils that formed under forest vegetation. The natural vegetation of Udalfs was deciduous forest. Thus, it can be concluded that the presettlement land cover of the uplands was upland forest. The present-day upland forest consists primarily of the oak-hickory forest community. Aspect does not seem to be a factor in forest community composition in the Cypress Quad.

All stream terrace soils were classified as "Transitional Forest," since a stream terrace is a transitional area from bottomlands to uplands. The stream terrace soils are predominatly Alfisols. The drainage of terrace soils is poorer than that of upland soils but better than that of bottomland soils. As a result, it was determined that the tree composition of the presettlement forest was probably a transition from the bottomland forest community to the upland forest community.

The floodplain soils were classified into five units; Bottomland Forest, Bottomland Forest/Grassland/Sedges, Swamp/Bottomland Forest, Swamp, and Water. The Bottomland Forest/Grassland/Sedges unit is comprised of the soils that are classified as Mollisols. Mollisols typically form under prairie-grass-sedge vegetation. Since much of the Cypress Quadrangle was once covered with forest, it can be assumed that Mollisols were potentially a transitional area from bottomland forest to grasslands.

Karnak, Birds, and Petrolia are poorly drained bottomland soils. The cypress/water tupelo/buttonbush swamps in the Cypress Quadrangle today have only these three soil series. Thus, these three soils make up the Swamp unit on the presettlement land cover map. For these soils to be included into the Swamp category, they had to meet certain criteria. All of the Karnak soils were classified as Swamp unless the 1807 PLSN showed that areas were actually cypress ponds or lakes. The Karnak soils in these areas were classified as Water. In order for the Birds and Petrolia soils to be classified as Swamp, they had to have a “ponded” flood-frequency phase. If they had an occasionaly flooded phase, they were classified as Bottomland Forest and if they had a frequently flooded phase, they were classified as a transitional class of Swamp/ Bottomland Forest.

The Bottomland Forest unit is comprised of all remaining floodplain soils that were not classified in the other four bottomland units. The bottomland forest is presently composed of such species as shellbark hickory, water hickory, overcup oak, swamp white oak, pin oak, willow oak, cottonwood, sycamore, willows, and sweetgum to name a few.

The presettlement land cover map gives insight into what the natural character of the area was. To gain an understanding of the species within these general plant communities, the 1807 PLSN for witness trees was cross-referenced with the presettlement land cover map. Caution must be used when the 1807 PLSN is interpreted for witness trees because of significant differences in tree taxonomy between the early 1800s and today.

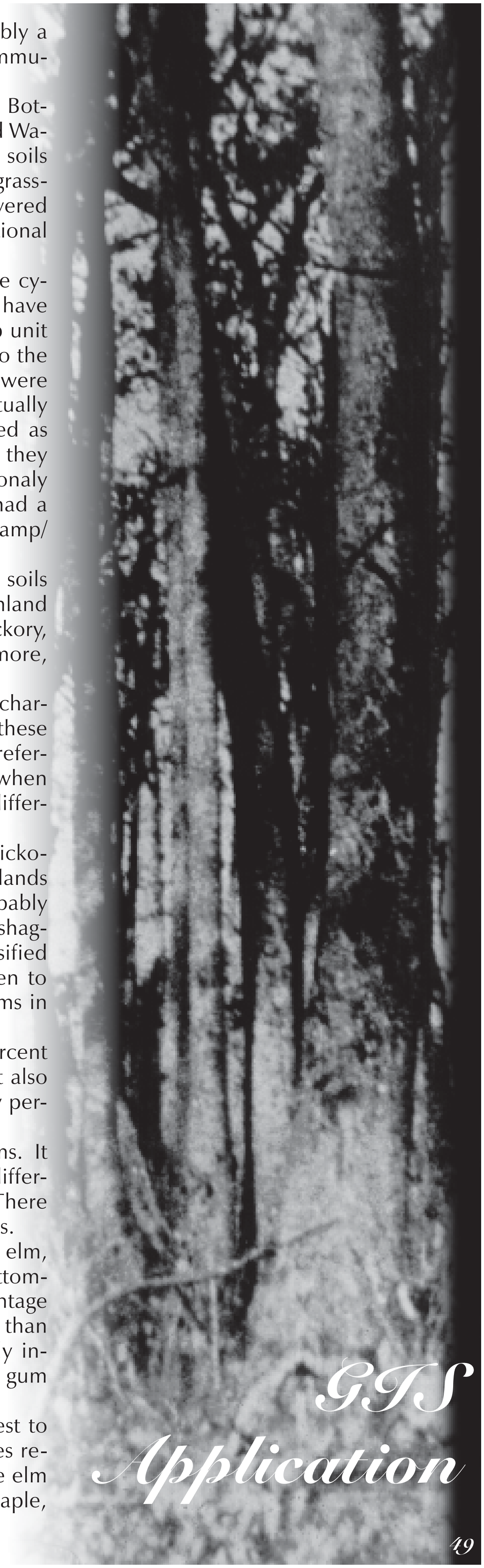
In 1807, surveyors did not distinguish between the various types of hickories and white oaks. It can be assumed that white oaks on the bottomlands are swamp white oak. Also, the hickories on the bottomlands were probably shellbark and bitternut hickory, whereas those on uplands were probably shagbark, pignut, bitternut, and mockernut hickory. The surveyors also classified many trees as “gum.” It is likely that “gum” was the classification given to tupelos in the swamps, sweetgums in the low, wet woods, and blackgums in the uplands.

The upland forest had the most witness trees recorded. Forty eight percent of the upland forest consisted of oaks and hickories. The upland forest also had the largest percentage of dogwoods and poplars and had a very low percentage of maples and elms.

The transitional forest was composed of oaks, elms, hickories, and gums. It had a slightly higher oak composition than the upland forest. The main difference is the large number of elms that appeared in the transitional forest. There was also a significant decrease in the amount of hickories and dogwoods.

The bottomland forest was composed mostly of white oak followed by elm, ash, gum, and hickory. Unlike the upland and transitional forests, the bottomland forest had very few black oaks reported as witness trees. The percentage of elm was significantly higher than that in the upland forest and lower than that in the transitional forest. The number of ash reported significantly increased over the upland and transitional forest, while the hickory and gum composition remained comparable to that of the transitional forest.

The forest composition of the transitional area from bottomland forest to grasses/sedges appears to be unique, though the number of witness trees recorded in these areas was relatively low (only 12 trees). There were five elm trees recorded, two gum trees, and only one each of dogwood, hickory, maple, and white oak.

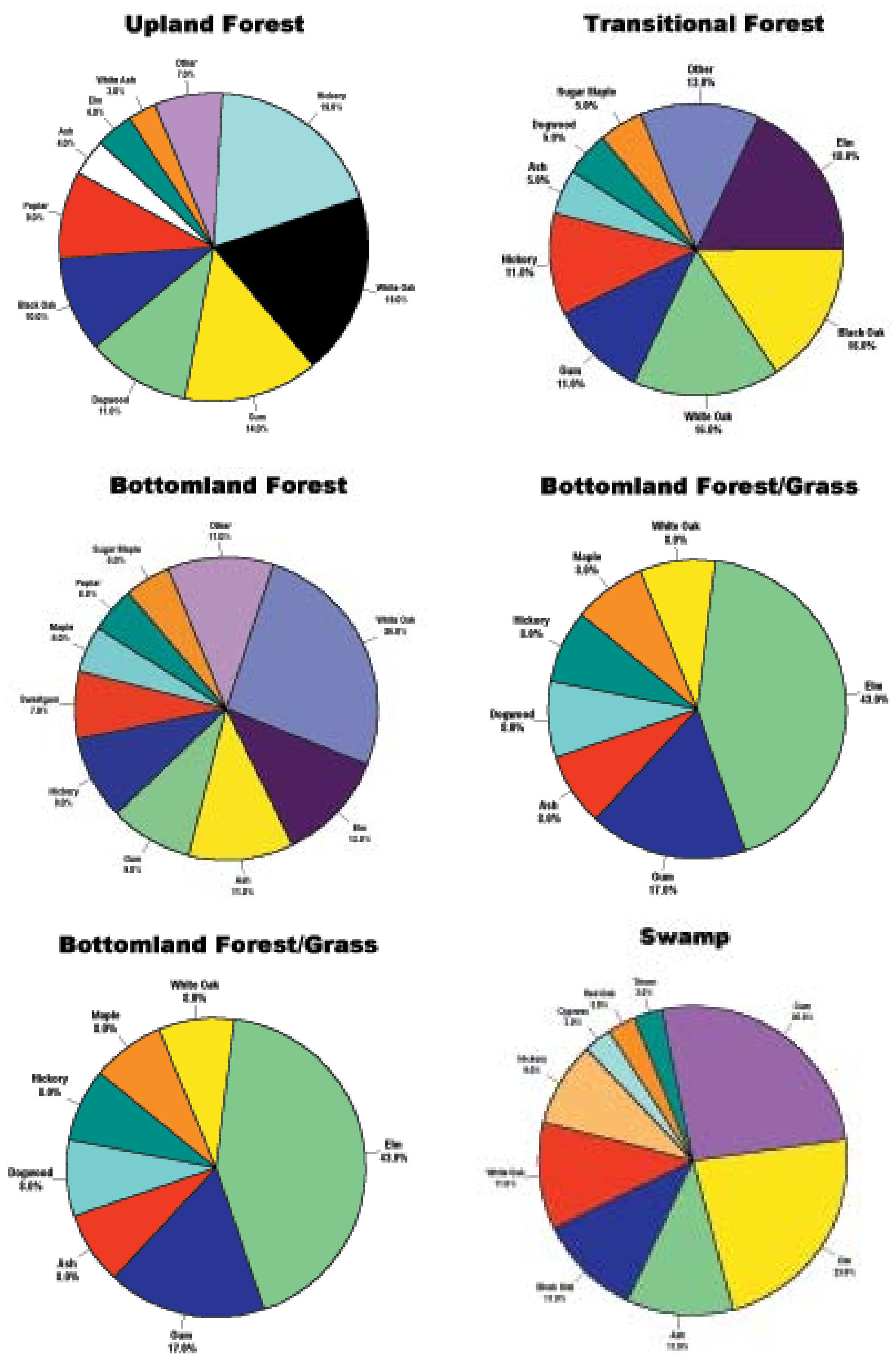


GIS Application

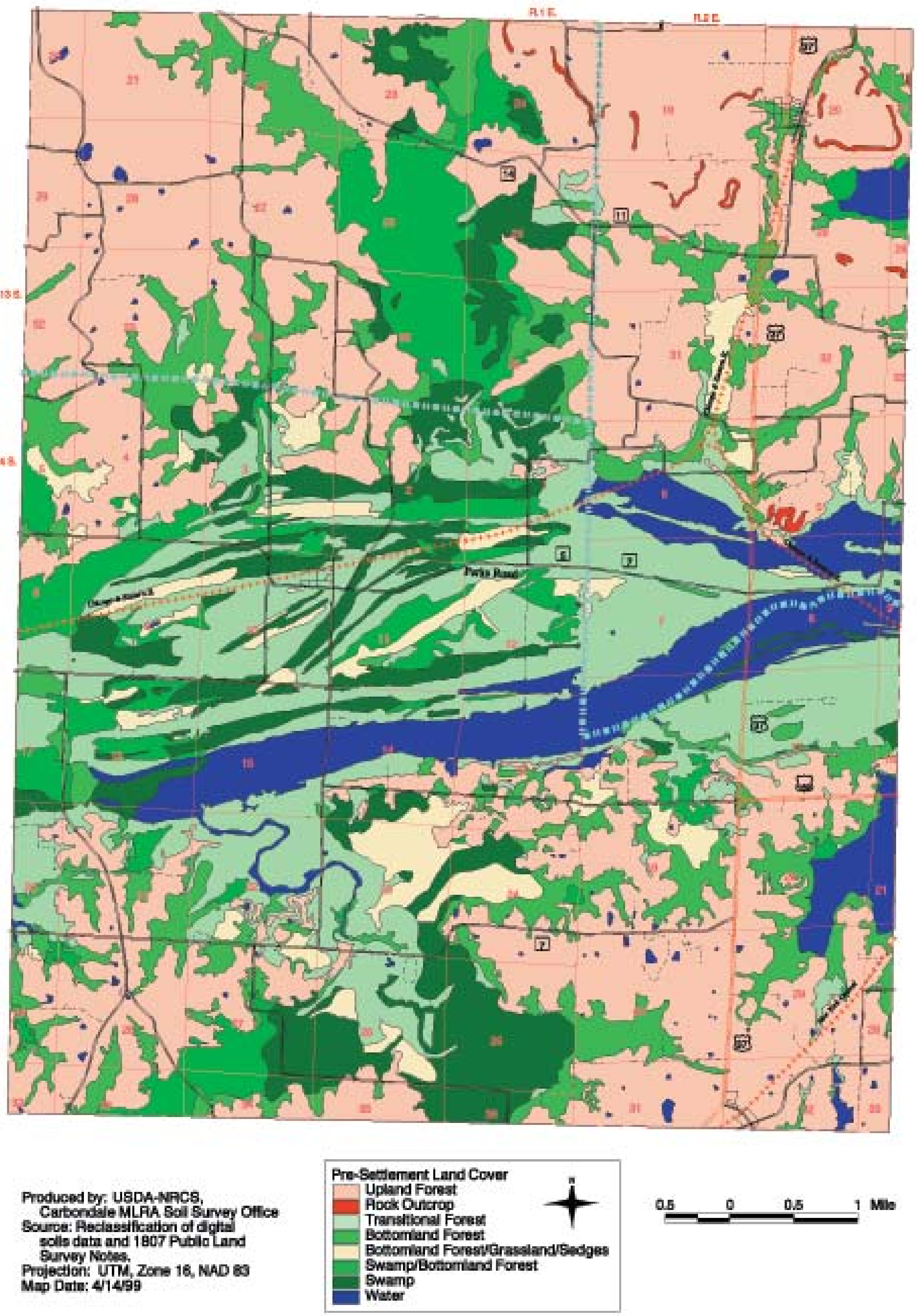
The presettlement map has a transitional area from bottomland forest to swamp. This unit had also the largest percentage of white oaks (36%) of all of the presettlement land cover classes. This unit was also composed of gum (17%), elm (13%), and hickory (13%). Very few cypress trees were recorded in the PLSN, probably because the areas where the cypress grow were impassable.

In the swamp unit, gum composed 26% of the trees recorded in the PLSN. These were most likely water tupelo. This unit also had a large percentage of elm, followed by ash, black oak, and white oak. A cypress tree was also noted.

Figure 15. Composition of the Cypress Quad Forests by Tree Species



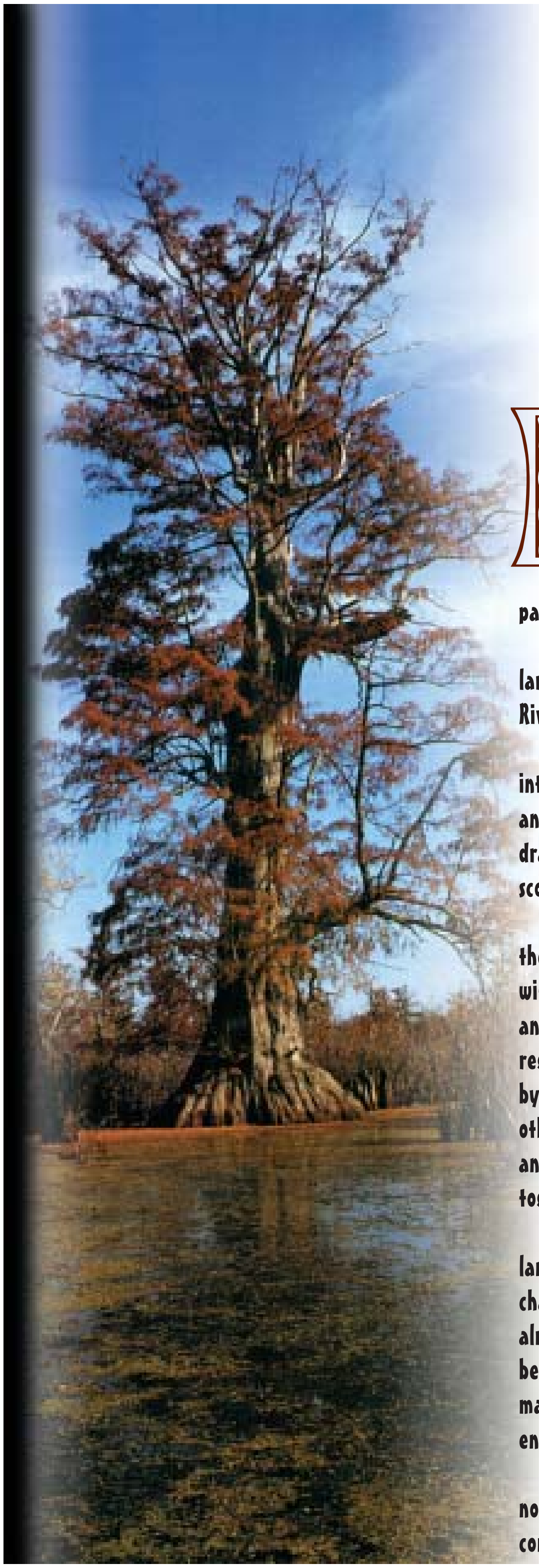
Presettlement Land Cover



Story of the Land

The Cache River Area of Southern Illinois

By Max D. Hutchinson



Illinois Champion 1,000-year-old bald cypress

Introduction

Illinois is known as the prairie state, and much of it was once a vast level grassland. The southern tip, however, is far from being a flat plain. Here, the Shawnee Hills form a high, rugged ridge that crosses from the Ohio River to the Mississippi River. This bedrock upland rises to more than a thousand feet above mean sea level (MSL), as much as 850 feet above the floor of the valleys. A part of the Ozark Uplift with its maze of ridges and ravines also extends eastward into southern Illinois.

Bordering this range of hills underlain by Paleozoic bedrock is an unusual valley to the south that is as large as the valleys of the Ohio and Mississippi nearby but has no great river. The relatively small Cache River is its major stream, and the valley is commonly known as the Cache River Basin.

This basin is 1 to 2 miles wide and has flat terraces and bottomlands extending as fingerlike projections into the bordering hilly areas along tributary streams. Prior to settlement, much of the valley was swampland, and most of the remaining forest tracts and many cleared farm fields are still annually flooded and poorly drained. The hills where the Cache River begins are deeply dissected by erosion, and the streams are mainly scoured to bedrock. Bluffs commonly have extensive exposures of massive sandstone cliffs and overhangs.

The half-million-acre Cache watershed area is unique in that it represents the geographical point on the continent where the last invasion of the sea into the Midwest reached its northernmost limit. It is also within a few miles of the southernmost extent of the continental glaciers. Its great diversity of landforms and biota is largely a result of the fact that southern Illinois is at the junction of four major physiographic regions. Its diversity of plants and animals is due to the large size and extent of its watershed. As described by Voigt and Mohlenbrock (1964), "the southern Illinois area, by its antiquity and location with respect to other floristic centers, and by the vicissitudes of crusted upheavals, rise and recession of seas, glaciation and climatic change, has become a 'floristic melting pot.' In other words, many plants have been brought together here by a long history of physical and climatic changes.

From the time of the earliest European settlement, human activities have changed the southern Illinois landscape, cutting the trees, clearing the land, draining the swamps, and plowing the soil. Most of these changes, instigated with good and honorable intentions, have been detrimental to the environment. They almost always have disrupted naturally functioning systems so that the ecological processes, the relationships between biological and physical components, have become less stable, now require more and more artificial management and manipulation, and in themselves have led to more serious problems dealing with new environmental concerns.

Today, the Cache area is primarily rural with no large population centers, and most of the land that is not forested is used for agriculture. Disturbances have accelerated soil erosion and drainage problems that concern farmers, hunters and fishermen, land speculators, and conservation agencies. There has been little coordinated land-use planning in the past. Human activities have certainly changed the southern Illinois landscape in the last 200 years, but the land has also had a tremendous impact on the human population, and to understand the cultural history of southern Illinois, we must look at the history of land use, the "story of the land."

Geologic history and character

Much of this section is copied from the "Lower Cache Preservation Plan," prepared by the Natural Land Institute for The Nature Conservancy in 1984; original sources include several Illinois State Geological Survey publications.

Although the Cache River as we know it did not exist until near the end of the Great Ice Age, the general pattern of drainage across the Midwestern States was set millions of years ago when the region became lowland between the Appalachian and Rocky Mountains. For eons, rivers from the north, east, and west have met in the Illinois region and flowed southward to the sea.

The bedrock formations exposed in the upper part of the Cache River watershed were deposited 400 to 300 million years ago during Devonian, Mississippian, and Pennsylvanian periods. These are sedimentary layers that originated mainly in the marine seas that intermittently invaded the continent.

The Devonian deposits are the oldest, and this part of the Paleozoic Era is referred to as the Age of Fishes. Originally soluble limestones, the deposits have been replaced by silica, forming thick beds of white chert. This chert was later altered along fractured zones to a powdery substance referred to as tripoli. Toward the end of the Devonian time, there was a great influx of mud, and much shale was formed. The rugged hills along the Mississippi River north of the present site of Olive Branch have narrow ridges and deep ravines and are a part of the Ozark region cut off from Missouri by the Mississippi River. They are formed of Devonian cherty limestones. The part of this upland ridge between Olive Branch and Jonesboro forms the western edge of the modern Cache River watershed.

During Mississippian time, clear, warm, shallow seas invaded the Mississippi Valley. Relatively pure limestones were deposited over enormous areas. South-flowing rivers built deltas into the sea, much like the present-day Mississippi River delta in Louisiana. The delta front shifted back and forth as the shoreline fluctuated, and the continually changing water depths produced striking lithological variations that can be seen in exposed cross sections of the formations today. Such features as pebbly zones, ripple marks, and crossbedding indicate that the sandstones and limestones formed in high-energy environments. Sandstones, shales, and limestones were laid down in regular alternation, each beginning with a deposition of basal sandstone, then shale, and finally limestone. Thin coal seams indicate times when the sea withdrew and plant debris accumulated in freshwater swamps. Mississippian-age bedrock is exposed over most of the gently rolling to hilly parts of the upper Cache River watershed. These formations commonly form south-facing cliffs and steep bluffs along the northern margin of the basin.

During the latter part of the Paleozoic Era, Pennsylvanian seas covered the area and deposited thick layers of sandstone. During this period coal-bearing strata were laid down, most of which have been eroded away in the Cache River watershed area. Pennsylvanian-age sandstones cap the high Greater Shawnee Hills ridge that crosses southern Illinois and forms the northern boundary of the Cache River watershed. These formations are cliff-formers, and because of the general northern dip of the bedrock, vertical south-facing bluffs create a stair-step profile in a north-south cross section. During the Mississippian and Pennsylvanian times, amphibians were prominent and early land plants became common.

Following Pennsylvanian time, there was considerable movement of the earth's crust. The Ozark area (to the west of the Cache River Basin) was uplifted, and the Illinois Basin (to the north) was depressed. The major faults crossing the area (mostly in parallel lines trending northeast-southwest across southern Illinois and into Kentucky) developed during this time. There was a long period of erosion when the wind, weather, and streams wore down the irregular surface, forming a low lying coastal plain. The low chert hills in present-day Alexander and Union Counties were particularly resistant to that erosion and remained higher than the plains to the east.

A bedrock trough, called the Mississippi Embayment Syncline, formed as movements of the earth's crust caused the region between the Ozark Dome (on the west), the Nashville Dome (on the east), and the southern margin of the Illinois Basin (on the north) to subside. It gradually deepened southward toward the Gulf of Mexico, allowing an arm of the sea to advance northward and inundate the southern tip of Illinois during Cretaceous time (70 to 65 million years ago) and during Tertiary time (64 to 55 million years ago). The Cretaceous and Tertiary strata deposited during these invasions represent both terrestrial, transitional, and marine sediments that filled the embayment trough and formed a wedge-shaped body of unconsolidated gravels, sands, clays, and silts that gradually thickened southward (now ranging from a thin erosional edge in southern Illinois to more than 3,000 feet in Tennessee). These deposits form the low, rounded gravel hills south of the Paleozoic bedrock outcrops and are most prominent south of the Cache River Basin in the present-day counties of Pulaski, Massac, and Pope. The Cretaceous System is a part of the Mesozoic Era known as the Age of Reptiles. During the Cretaceous period, the flowering plants appeared. The Tertiary System is the earlier part of the Cenozoic Era known as the Age of Mammals. During the Tertiary period, the deciduous trees developed, including

the taxodiums, ancestors of the modern baldcypress. This period ended between 2 and 3 million years ago. As the sea withdrew from this area, the region was uplifted, and erosion has continued to the present.

The later part of the Cenozoic Era is known as the Pleistocene Epoch, commonly referred to as the Great Ice Age. Beginning about a million years ago, extensive continental glaciers covered the northern part of North America and most of Illinois. There were four major glacial advances, and the third, the Illinoisan, reached the farthest south, barely entering present-day Johnson County and the northern edge of the Cache River watershed. Early in the Pleistocene, the Ohio River was formed by streams diverted and combined in a westerly course south of the ice front. This was the stream that flowed through the Cache Valley. Outwash, composed of silt, sand, and gravel, was deposited by sediment-laden meltwater streams pouring from the ice fronts during both advance and waning stages of the glaciers. The valleys of the Mississippi and Ohio Rivers were greatly enlarged during times of flooding, but during times of little meltwater flow, they became filled with outwash. Near Cairo, deposits as much as 250 feet thick accumulated. Near the end of the last glacial advance, the Wisconsinan, a great meltwater flood caused major changes in the channels of the streams. Most geologists believe that it was during this time, perhaps 13,000 to 10,000 years ago, that the Ohio was diverted from its course across southern Illinois into a river channel to the south. This diversion left the abandoned Cache Valley to fill with alluvial material to its present level. The Ohio established its present course in the lower valleys of the Cumberland and Tennessee Rivers, but it has continued to occasionally use the Cache Valley as an overflow route and did so as recently as 1937.

The unconsolidated clays, silts, sands, and gravels that form the low, rounded hills south of the Cache River Basin have been reworked by the changing courses of the major rivers and mixed with glacial outwash and recent alluvium.

The upland and terrace soils in the area indirectly resulted from glacial meltwaters originating farther north. Wind-blown silt, called loess, was deposited as a blanketlike cover over the bedrock and alluvial materials in most of the region. This silt came from the flood plains of the Mississippi and Ohio Rivers where great dust storms occurred during periods when they were dry. The loess is as thick as 50 feet in some areas along the Mississippi Valley, but it thins to the east and is commonly less than 5 feet thick in the uplands of the Cache River Basin. Much of the present-day alluvium is derived from eroded upland loess.

During the Pleistocene, as the sediment carried by the glaciers aggraded the Cache Valley, it blocked tributaries, forming slack water lakes. The ancestral Cache River was blocked near the present site of Forman, forming a lake upstream, and the Little Black Slough-Heron Pond swamps represent a Pleistocene lake remnant in its waning stages.

After the Cache Valley was abandoned by the Ohio River, drainage continued to flow westward. The present-day Bay Creek was once part of the headwaters of the Cache River system. Gradually, sediment deposited in the basin by the Cache River headwaters formed a whaleback across the valley near the present site of Reevesville. This low ridge divided the drainage, causing the water to the east to flow that direction into the Ohio near the present site of Bay City. The main stream in the eastern end of the Cache Valley is now called Bay Creek.

West of the Reevesville divide, the water continued to flow westward in the basin. The bottomland sloughs joined with the upper Cache River at a point near the present site of Belknap, forming the lower Cache River. The river continued to flow west in the basin and was joined by other streams flowing southward out of the hills. The water moved sluggishly across southern Illinois to near the present site of Tamms. It then turned south, flowing very near one of the Mississippi River bends, then turned east and entered the Ohio River above the present site of Cairo, about 5 1/2 miles above that river's junction with the Mississippi.

In its primitive state, the Cache Basin was frequently flooded. Thousands of acres were inundated from 6 to 8 months of the year. There were many inlets, especially streams from the upland hills along the north border, but few outlets. There was very little relief, and many of the swamps had no drainage outlets. The water simply stood there, partially evaporating during dry periods. High water in the Ohio River often held back the basin floodwaters and prevented the lower section of the Cache River from draining.

During the last 10,000 years, changes in climate have affected the Cache River watershed. Extremely wet periods resulted in accelerated erosion of the uplands. At times, the basin resembled a huge shallow lake, but it was continually filled with sediment washed from the adjacent hills. Thick layers of organic debris accumulated on the bottom of the swamps. During droughty periods, the lakes and ponds were reduced in size and much of the swampland was dried, allowing the organic materials at their bottoms to be oxidized. Occasionally overflowing into its old channel, the Ohio River scoured out much of the accumulated silt and debris, and in places the swift currents washed away stands of trees, leaving deep openings that later became linear open ponds. Aggradation exceeded degradation, however, and overflows by the Ohio became less frequent. The huge lakes were reduced to relatively small remnants. As the general elevation of the basin was raised, the water spread out, creating large areas of flat, shallow swampland and wet flood-plain forest.

The Cache area just prior to settlement

Much of this section is taken from the Public Land Survey field notes of 1807-1810.

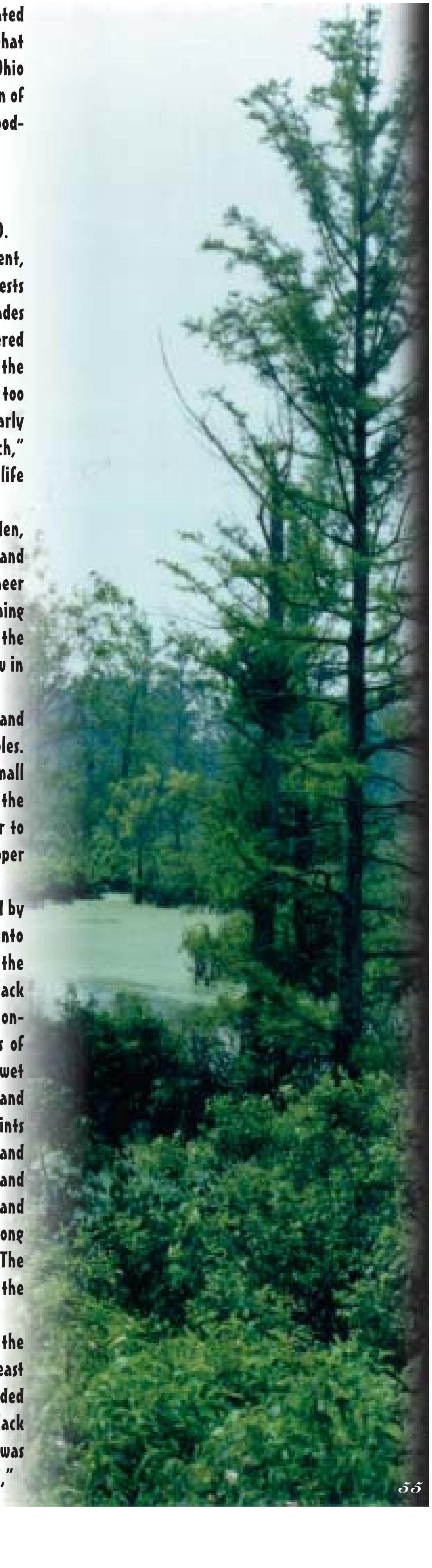
Although most of the Cache River watershed was densely forested prior to settlement, there were places where trees never grew. Narrow linear openings on dry ridge crests and along south-facing slopes were common in the high rugged hills north of the basin. Small prairie glades were scattered on open hillsides where limestone bedrock outcropped. Grassy, nearly treeless, barrens covered large areas, several square miles in size, on the rounded gravel hills to the south. On the bottomlands, the swamps, low ridges, and higher terraces were covered with dense stands of timber. Where the water was too deep for trees, there were ponds, sloughs, and oxbow lakes. Many of these were given names by the early settlers that reflected their natural character, names such as "The Scatters," "Grassy Slough," "Long Reach," "Round Pond," "Cypress Pond," "Fish Lake," "Long Lake," and "Horseshoe Lake." The plant and animal life in the watershed was as diverse as the varied types of terrain.

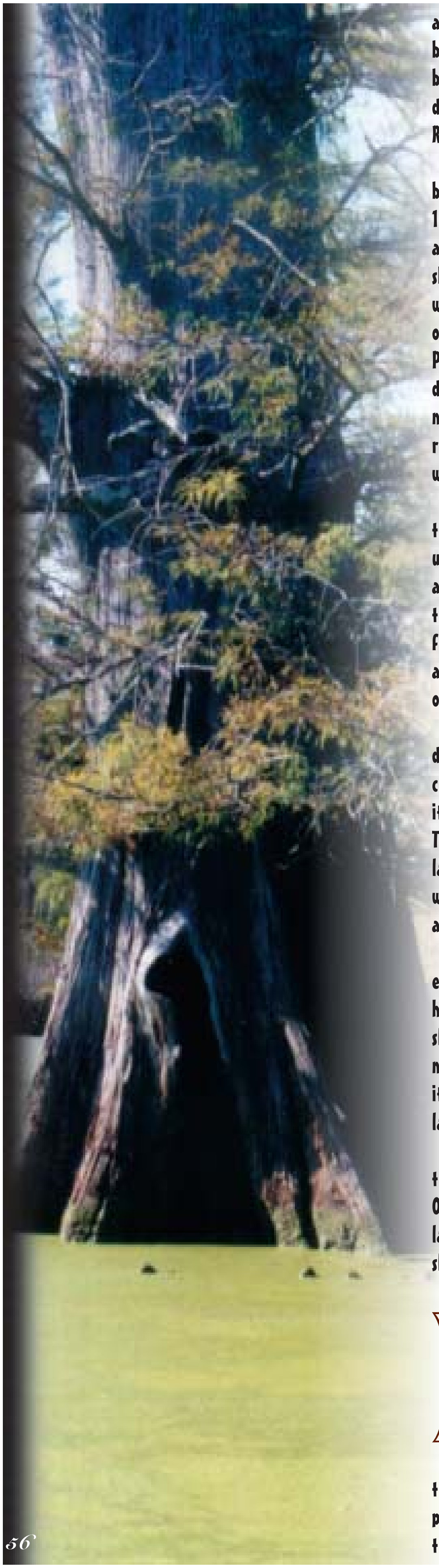
The Cache River proper began where small tributaries joined near the present sites of Anna and Cobden, in what is now Union County. These small streams were very crooked and had beds filled with boulders and gravel bars. In places the clear waters flowed over solid pavements of bedrock and meandered against sheer sandstone cliffs. During storms, much leaf litter and woody debris was carried downstream, sometimes forming small temporary dams where it lodged against piles of sandstone boulders. Springs were common in the adjacent ravines and along the base of the nearby bluffs, and they helped to maintain a permanent flow in many of the small watercourses.

The upper Cache flowed eastward from its source through hills with rock outcroppings, small cliffs, and sandstone overhangs. This part of the watershed had a forest cover of oaks, hickories, ashes, and maples. Beech, tuliptree, and walnut were locally common in the hollows. Larger tributaries had developed small flood plains that supported tall sweetgums. Runoff was fairly rapid because of the steep slopes, but the watercourses were so crooked and choked with rocks and fallen logs that it took 3 to 4 days for water to move from the upper part of the watershed to the lower Cache in the basin. The main channel of the upper Cache in this region was commonly about 65 feet wide.

South of the present site of Vienna, in what is now Johnson County, the upper Cache River was joined by its largest tributary, Dutchman Creek. It flowed generally south from that point to where it emptied into the basin near the present site of Belknap. The river meandered through a large swamp before entering the main valley, and the largest pond in this bottom area along the river became known as the Little Black Slough. Other sizable swamps and ponds occurred along the Cache upstream as far as the present Union-Johnson County line. Cypress was the dominant tree on these wetlands. Local sites had dense stands of tupelo, but this species was not so abundant here as in the basin proper. Other common trees in the low, wet woods were swamp chestnut oak, Shumard oak, kingnut hickory, American elm, swamp red maple, and sweetgum. The main channel of the Cache still did not average more than 65 feet wide, and at several points it was less than 50 feet wide. The river had many hairpin curves, and it was often filled with logs and driftwood that almost dammed its flow. It often changed its course, cutting across narrow necks of land between bends, forming new channels and leaving dead sloughs and oxbows. Here, the channel widened and became shallower, with a flat bottom and rounded, sloping banks. In some places erosion was active along the outside banks of steep curves, but in most places the banks were stable and the water had little silt. The swamps and ponds were perched on the banks slightly higher than the bottom of the river channel, but the river commonly overflowed its banks several times a year and covered much of its flood plain.

The river slowed drastically once it left the hills and entered the low, nearly level bottomland of the basin. At a point southeast of the present site of Belknap, it was joined by a sluggish stream from the east (referred to by the early settlers as the Big Black Slough Ditch). This stream had a watershed that extended 15 miles (straight-line distance) east to near the present site of Temple Hill in Pope County. This Big Black Slough region covered 11,000 acres and was the largest cypress-tupelo swamp north of the Ohio River. It was variously described at different points by the public land surveyors in 1807 as being a "Lake," a "Pond,"





and "Inaccessible" and as having "water too deep to wade." Some section lines were surveyed on the ice, but several lines were never run. Most of this large swamp was densely forested with cypress and tupelo, but there were open areas of deeper water. The water never completely drained and the swamp never dried up, even during the driest years. During periods of heavy rainfall, the water from the upper Cache River backed up into this low part of the basin.

After receiving water from the Big Black Slough Ditch, the Cache River turned and flowed west in the basin. Below the present site of Belknap, the channel was divided, forming a braidwork of small channels 10 to 12 feet wide and 2 to 3 feet deep. This area was called the "Scatters." Much of the channelway for a distance of nearly 12 miles (between the present sites of Kamak and Ullin) was made up of wide, shallow swamps and slightly deeper open ponds. There was very little current, as the fall in that distance was less than 6 inches. The swamps south of the present site of Perks had one of the two largest areas of open water in the basin. Local names, such as "Long Reach," "Short Reach," "Eagle Pond," and "Goose Pond," were given to different parts of this wetland region by the early settlers. Here, cypress was the dominant tree in the swamps, and huge individual trees, many 5 to 6 feet in diameter, grew along the natural levees of the channels. Trees of all species were larger in the swamps and on the low ridges in this region than on the bottomlands of the upper Cache River. Huge elms, overcup oaks, and swamp maples with widespread crowns made up much of the canopy cover in the wet flood-plain forests.

Three major tributaries entered the basin and flowed into the lower Cache River in this region. The two from the north, Big Creek and Cypress Creek, both arose in the hills near the beginning point of the upper Cache River. They had extensive swamps along their winding channels. The broad wet flatwoods along these streams had some of the finest stands of sweetgum timber in the Midwest. Limekiln Slough, the third major tributary, entered the river from the south. It had a sluggish flow and collected water from the large swamps along the south edge of the basin. One of these became known as "Brushy Pond," a large flood-plain forest near the present site of Grand Chain in Pulaski County. This flood plain was one of the few places in the basin where pecan was common.

From a point near the present sites of Ullin and Tamms, the Cache River turned and flowed south, developing an extremely crooked course. Swamps and wet woods bordered it in many places and were commonly enclosed by its bends. Spring water flowed into the river from sandy seeps and contributed to its flow. Two major tributaries, now called Mill Creek and Sandy Creek, entered the Cache in this region. These streams had their headwaters in the rugged Ozark Hills. Upland timber was diverse. Mesic stands of large tuliptrees and beech trees were in the ravines. Slopes were steep, but tributary streams flowed over wide beds of cherty gravel. Their waters were always clear. There were swamps, 200 to 300 acres in size, along the downstream portions of these tributaries in the basin.

Near the present site of Unity, the Cache River was bordered by the gravelly Tertiary hills along its east bank. Here, beech and red oak were common trees in the ravines and along small valleys. Scattered huge cypresses and tupelos grew on the banks of the main stream and along the natural levees of the sloughs and oxbows. To the west, a large bottomland swamp and pond, now called Horseshoe Lake, covered nearly 3,200 acres. Although the wetland in this area extended westward almost to the Mississippi River, it drained eastward (by means of a stream now called Lake Creek) into the Cache. Horseshoe Lake had a large area of open water, and large cypresses and tupelos lined the shallow waters along its edge.

After meandering to within 1-1/2 miles of the Mississippi River, the Cache turned east again, crossed the narrow peninsula above the present site of Cairo, and entered the Ohio River about 5 miles above the Ohio's junction with the Mississippi River. This section was low and swampy scattered groves and stands of large cypress trees. Huge canebrakes were common along the edge of the swamp, and there were many sloughs and oxbows.

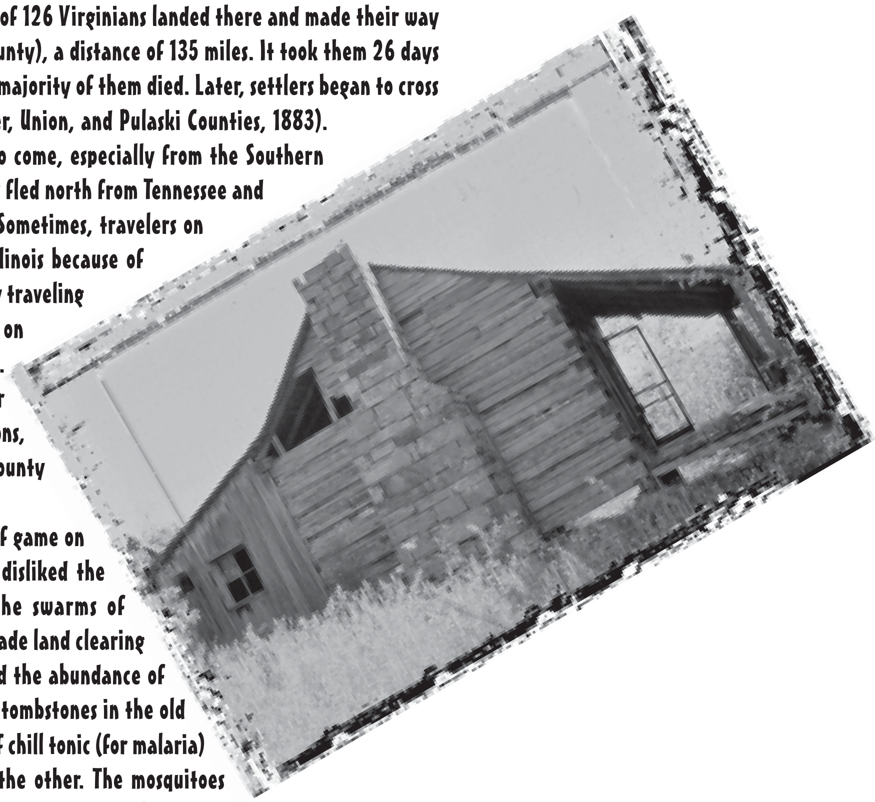
Early settlement and unnatural disturbances

Itinerant hunters and trappers, probably Frenchmen, were the first white men to travel across southern Illinois and view the Cache River. A few knew its paths and waterways quite well, even prior to the Revolutionary War, for it was a hunter that guided George Rogers Clark and his little band of soldiers across the swamps and hills of the Cache River watershed on their way to Kaskaskia in 1778. These rugged, half-wild pioneers built no permanent homes, cleared no ground, and left few permanent marks upon the area. It is probable that these early hunters depleted certain game species, such as buffalo, elk, and beaver. Indians continued to use the area as a hunting ground until about 1800. The roving bands found plenty of fuel, good water, and an abundance of food.

After the Revolutionary War, traffic on the Ohio River increased. Canoes, dugouts, and frail rafts carried hardy explorers and their families downstream into wilderness territory. The explorers were continually searching for more game and new fertile lands. Temporary camps of settlers were established along the banks of the Ohio and a short distance up the Cache River as early as 1795.

In 1803, Abram Hunsaker and George Hacker came down the Ohio and up the Cache, hunting and fishing. They camped near the present site of Jonesboro in Union County. "The next morning, they killed a bear and a turkey gobbler, and were so delighted with the land of plenty, both of game and excellent water, that they built cabins to house their families and became the first white settlers in the territory" (History of Alexander, Union, and Pulaski Counties, 1883). Government crews began to survey southern Illinois immediately after its acquisition from the Kaskaskia Indians in 1803. The surveyors' maps and descriptions of the Cache River country provide an eye-witness account of what the region was like prior to disturbance by European settlement. The surveyors noted that there were two "dwelling houses" along the Ohio at the mouth of Bay Creek in 1806. In 1795, William Bird first landed at the junction of the Ohio and Mississippi Rivers (the present site of Cairo), but he did not return until 1818. A few families were living along the lower Cache River in 1812. In that year, all the residents were massacred by the Indians, save one man, who it is said escaped "sorely wounded by swimming a wide bayou of the Cache" (History of Alexander, Union, and Pulaski Counties, 1883).

For a time, Fort Massac was the landing point for pioneers traveling overland from the Carolinas, Virginia, and Kentucky on their way to Kaskaskia or Cahokia. In 1797, a group of 126 Virginians landed there and made their way across the swamps and dense forests to New Design (in Monroe County), a distance of 135 miles. It took them 26 days to make the trip, and so great was the toil and exposure that the majority of them died. Later, settlers began to cross on ferries at Shawneetown and at Golconda (History of Alexander, Union, and Pulaski Counties, 1883).



Life was not easy in the wilderness, but settlers continued to come, especially from the Southern States. After the great New Madrid earthquakes of 1811-12, many fled north from Tennessee and Kentucky to southern Illinois, seeking higher and safer ground. Sometimes, travelers on their way to places farther west or north stayed in southern Illinois because of accidents or because they were stranded along the way. One family traveling down the Ohio River stopped when they saw smoke from a cabin on the riverbank, because the mother was due to give birth to a baby. They were invited to spend the night and eventually traded their flatboat for the cabin and decided to stay. This family, the Bartlesons, later became one of the most important landowners in Pulaski County and operated a sawmill along the Cache River during the 1870's.

Although the first visitors were attracted by the abundance of game on the Cache River wetlands, the settlers who came there to live disliked the swamps. They feared and avoided the swamps because of the swarms of mosquitoes, the prevalence of diseases, the mud and water that made land clearing and agriculture difficult, the lack of healthy drinking water, and the abundance of snakes. Many who stayed were unhealthy and died young (as the tombstones in the old cemeteries indicate). It was common for loggers to carry a bottle of chill tonic (for malaria) in one back pocket and a bottle of whiskey (for snakebite) in the other. The mosquitoes were so bad, loggers working in the hot summertime often wore coats that were buttoned up to their necks.

Large tracts of bottomland were first bought up by land companies with northern and eastern stockholders who had never seen the Illinois territory. From the first, speculators who studied maps of the new country were convinced that a great city would arise somewhere on the peninsula between the Mississippi and Ohio Rivers. It was imagined that the capitol of the Nation would someday be in that vicinity. As the point between the rivers was low and subject to frequent flooding, some assumed that the city would be located a short distance to the north, on higher ground. As towns, such as America and Trinity, were platted and lots were sold, boom towns were envisioned. For various reasons, however, the towns never prospered. The town of America, located a short distance above the mouth of the Cache River, was almost wiped out by cholera soon after it was settled. A riverboat landed there to bury a passenger who had died of the disease, which quickly spread to the residents. The first improvements at the present site of Cairo were made in 1818 by William Bird. The very existence of the settlement since that time has depended upon the levees which have been built and rebuilt in an attempt to keep the floodwaters out. The first levee work was done in 1834, and by 1843, there was a levee extending from the Ohio River to the Mississippi River.

Early land developers always seemed interested in improving water travel by deepening, snagging, and straightening streams. As early as 1819, there was an act of the Illinois Legislature to dam the Cache River and make it a part of the great national highway for navigation. It is not known how much was actually done, but such damming activities met with much local resistance from residents who hated the "miasmatic swamps" and waters "which covered much good land." In 1824, two brothers traveled up the Cache from the Ohio River and camped at a spring along it in what is now Johnson County. They assumed that the Cache River would someday be an important stream for riverboat traffic and decided to settle there. They entered two sections of land, and the property was owned by descendants of the Marshall family until the 1980's.

When the swamplands were put up for sale (after the Swamp Land Acts of the 1850's), many of the tracts in the Cache watershed were acquired by lumbering interests. James Bell bought some of the largest tracts of cypress and established a mill near Ullin in Pulaski County. He cut cypress in the swamps and floated the logs down the Cache for many years. In the 1890's, after the Bell Lumber Company went out of business, the Main Brothers acquired some of the land and established a large mill at the present site of Karnak.

Although the better drained, choice sites were soon settled, it was after 1900 before much of the Cache River bottomland was inhabited, Prior to 1835, most settlers were squatters. They built rough cabins, cleared a few acres for a truck patch, stayed a year or two, and then moved on. Surviving was not easy, and farming was basically subsistence farming. As one resident put it, "It was a good country for men and dogs, but powerful tryin on women and oxen." Many of the early residents were migratory, living and farming on the bottoms after the spring floods subsided and retreating to the hills to spend the winter. As emigrants from the mountainous sections of the Southeastern States, most were not accustomed to having things too nice and they were fairly content to stay that way. Struggling for survival took away most of the ambition they may have had when they got to the Cache area. Clearing the land was extremely difficult where the forests were dense and the trees were huge. Many of the settlers became discouraged and moved north to the rich fertile prairie lands where there were few trees to clear and where floodwaters seldom destroyed crops. Much of the land in the hills had thin soils that eroded quickly. Many farms in the Belknap area were worn out and already abandoned prior to the Civil War.

Agricultural activities have been a major disturbance in the watershed area since the time of earliest settlement. Partly because the upland sites, such as the barrens on the hills in Pulaski and Massac Counties, were naturally more open, the areas with the thinnest and most erodible soils were frequently settled and plowed first. With little concern for saving the soil, the land was cropped until it washed away or became too even for weeds. It was a common practice when one farm wore out to then move to another, or as most farms had some timberland, a new patch of ground would be cleared for farming. Farms were small, generally 40 acres or less, and by the 1920's, almost every upland forty in the watershed had a house and barn. A few wealthy landowners cultivated large fields on the bottoms, but the overall percentage of land that was cropped each year was relatively small. One resident at Forman remembered how hard his father worked, year after year, to tend one 15-acre field with a team of balky mules. In some years the man barely raised enough corn to feed the mules until the next crop year.

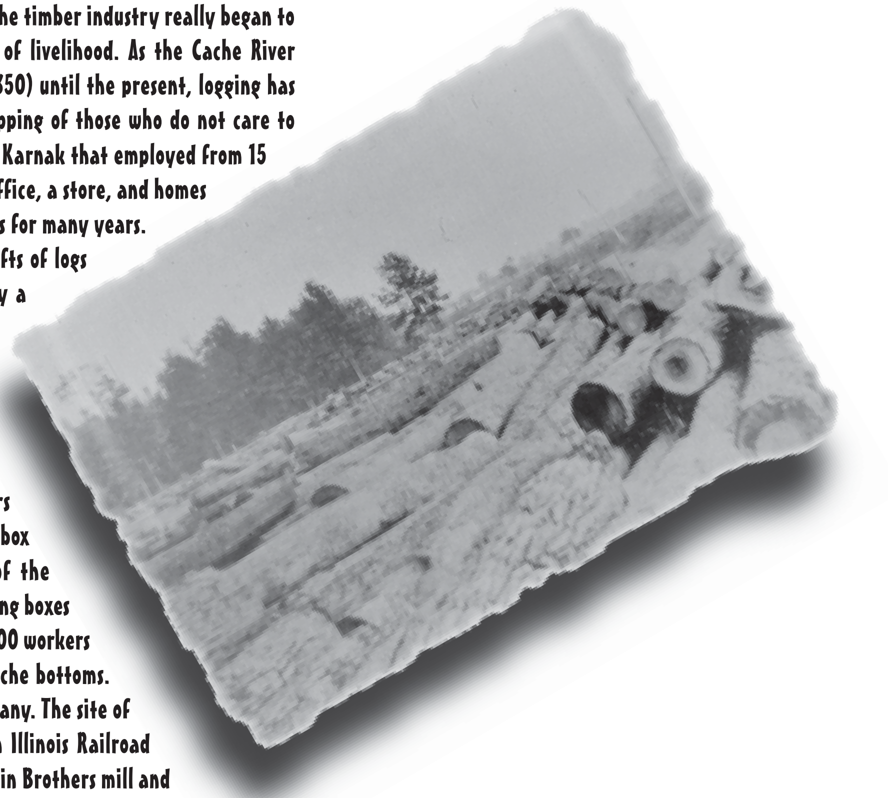
By the time of the depression years in the 1930's, the watershed was in poor condition. Many residents abandoned their farms, and those who stayed either were not willing or were not able to properly take care of their soil and timber. Livestock, especially hogs, were often allowed to roam the woods. Streams were sometimes full of wallowing pigs on hot summer days. Gullies became so bad that farmers could no longer cross them with mowing machines, and they grew up in bushes and briars. Timber was indiscriminately cut and sold for nearly nothing, sometimes not bringing enough to pay the taxes on the property.

With the conservation programs of the New Deal and the creation of such Federal agencies as the Soil Conservation Service and the Civilian Conservation Corps, land care improved. The Shawnee National Forest was created in 1933, and the Federal Government immediately began to buy worn-out farmland and cutover timberland in southern Illinois. New ownership and management tremendously improved the condition of the Ozark Hills in parts of the Cache Watershed in Union and Alexander Counties.

Still, the most serious agricultural impacts upon the area came after World War II. With the advent of tractors and bulldozers, farming methods changed. Farms became larger, and a greater percentage of the horses could be plowed by tractors. Tractors could plow across gullies and small drainageways. In recent years, compaction and the application of pesticides and fertilizers has changed the character of the soils. Herbicides and insecticides are now found in most of the streams. Silt has choked the springs and ditches and filled the swamps. One landowner along the south edge of the Little Black Slough can point to where his fence, built across a shallow neck of the swamp in 1928, is now completely covered with silt. He had to use a tractor and front-end loader to find a steel post marking his property corner. The post used to stand over 4 feet tall.

Farming has also been responsible for introducing many of the exotic plant species now so common throughout the watershed. Problem weeds, such as Johnsongrass and Japanese honeysuckle, have spread into much of the open bottomland in the basin.

There were sawmills along the Cache as early as the 1850's, but the timber industry really began to boom after 1870, and logging became the most important means of livelihood. As the Cache River Drainage Commissioners comment in their report of 1905, "From (1850) until the present, logging has been one of the occupations of those who wished to work, and trapping of those who do not care to work." In 1871, AC. Bartleson had a sawmill near the present site of Karnak that employed from 15 to 40 men. The settlement, which was called Cachetown had a post office, a store, and homes for the employees. James Bell had the largest mill in southern Illinois for many years. It was in an area along the Cache River near Ullin where "great rafts of logs were brought to their doors, thus saving the poor patient ox many a hard pull." A log boom and dam maintained across the Cache at the mill site handled these rafts of logs. The Bell Lumber Company cut the best of the virgin cypress timber throughout the Cache River swamps and shipped millions of board feet per year.



Soon after the Bell Company ceased operation, the Main Brothers came from Ohio to Pulaski County and built a large sawmill and box factory on the banks of the Cache River. They came because of the abundance of tupelo, which they found particularly suitable for making boxes for shipping glass jars. The Main Brothers employed between 200 to 300 workers and eventually owned nearly 25,000 acres of timberland on the Cache bottoms. Some of that land was swampland previously owned by the Bell Company. The site of the first Main Brothers mill was where the Cincinnati and Eastern Illinois Railroad crosses the Cache, and the town site was called Rago. In 1905, the Main Brothers mill and box factory was moved 2 miles to the southeast, to a site at the junction of the Cincinnati and Eastern Illinois Railroad and the Cleveland, Cincinnati, Chicago, and St. Louis (Big Four) Railroad. This was the old site of the Bartleson mill in the 1870's. The few residents in the little settlement who were still there referred to the place as Oaktown, but the Main Brothers bought the property, platted a new town, and called it Karnak. It was a company town for many years.

Logs were floated from the Big Black Slough swamps in Massac County from as far upstream as the Enterprise School, about 3 miles south of New Columbia. An extensive network of ditches was constructed in this area to provide better routes for moving the logs out of the swamps and into the Cache. The Main Brothers formed a separate entity, the Cache River Drainage Corporation, that dug most of the ditches in the Big Black Slough prior to 1920. The Main Brothers Company cut many millions of feet of timber along the Cache until it ceased operation in the 1970's. The company cut 2 million feet per year for 20 years in the Big Black Slough area alone. It cut mostly softwood species, such as tupelo, sweetgum, tuliptree, cottonwood, and elm. Much of the forest land along the Cache that is left is still composed of groups of young trees filling in between the old oaks and hickories that were left. Little cypress timber was cut by the Main Brothers, except for local use, because there was little market for it. Many of the big oak trees that remain along the Cache River banks were left, because most oak logs are too heavy to float. Some cypress was cut for use as floaters; a cypress log would be "pegged" to a heavier log so that it could be rafted to the mill. The cypress logs were then often piled and burned. A large crew of Main Brothers employees annually cleared the banks and snagged the main channel and tributaries of the Cache to keep them open. Logs were cut and piled along the riverbanks and were rolled in when the water was high and the current just right. As they came down the river, often carried swiftly by the current, a boom (a string of large logs pegged together) across the upper

Creek Cutoff diverted the logs through a gate into the sawmill pond at the mill site. Logs cut ere pulled out with boats along "float roads." These were in long strings of two logs abreast, d together. In later years, strings of logs a half mile long were pulled out of the Little Black ts using gasoline engines. Trees in the swamps were frequently cut during the winter out of onally on the ice. The stumps commonly were 6 to 8 feet tall. From the higher ground and e logs had to be skidded and piled along the ditchbanks, where they were kept sometimes for ter levels were sufficiently high to float them downstream. It was a busy time for all the en conditions were just right. As men were dumping and releasing logs from many points rew near the mill had to be ready to stop the great raft of logs at the boom as they rushed reek Cutoff. Men rode the floating logs down the river, using long spike poles to keep the acles. Sometimes huge jams would form that had to be blown loose with dynamite. Occasionally, break, allowing thousands of logs to be lost and carried on down to the Ohio River.

ars, oxen were used in the Big Black Slough and Little Black Slough swamps, but about 1920, they were replaced with mules and horses. Loggers set up camps and lived in the woods where they worked. As many as 40 teams of mules were kept at one time and stabled in the woods near Belknap while crews were working the timber in the Bird Springs area. It was after World War II before logs were moved to the Main Brothers mill by truck. Prior to that time, what logs were not floated had to be moved by team and wagon, and that was a slow process. Usually, only one log could be hauled at a time (if it were of average size), and a man had to be able to get from the woods to the mill before noon in order to have time to get back and pick up another load before night.

Many other sawmills and several wood-products industries in the Cache River watershed area during the early 1900's helped to deplete the vast timber stands. There were permanent mills at Cairo, Dongola, Cobden, and Jonesboro, and a few approximated the annual cut of the Main Brothers. Pulaski County was second in the State for value of lumber sawed in 1870. Perhaps as much as 20 million board feet of timber was processed annually from the Cache watershed area during the 1920's. This total included sawed lumber, veneer for baskets and boxes, crossties for railroads, and mine timbers. In 1919, about 2,228,000 board feet of cypress was cut in Illinois, and most of that probably came from the Cache River swamps. In addition, there was a considerable amount of local timber cut for making charcoal. Kilns at Ullin, Perks, and Belknap used a lot of hardwood between 1900 and the 1960's. Most of the charcoal wood was hauled by team and wagon (later by truck) to the kiln yards.

Although some of the larger lumber companies were selective in their logging operations, many were not. It was a general policy on Main Brothers land not to cut trees less than 24 inches in diameter at breast height, and loggers were instructed to leave one good large tree per acre as a "seed tree." Thus, much of their timber land maintained good stands that continued to produce high volumes even when logged repeatedly. Much of logged timberland, though, was devastated. The practice of only cutting the best trees (high-grading) gradually left poorly stocked stands that were almost worthless. Land clearing followed logging on most privately owned tracts, and even land worthless for farming was cleared of its timber if the owner could get to it. A lot of land in the area was cleared by girdling the trees to deaden the timber and then burning it. Except for a few hickory removed for wagon stock, a tract of several hundred acres along the Cache River near Belknap was girdled and deadened about 1900. Most of that stand was made up of tall sweetgums 3 to 4 feet in diameter.

Artificial drainage rather than logging was responsible for the degradation of the Cache River forests. From the time of earliest settlement, there were men who had high hopes for developing the prosperity of the area, men who envisioned a great agricultural and residential region. They saw that the area needed only one thing—drainage. Many spent their lives promoting projects to drain the swamps and bottomlands. In the 1870's, a group of Chicago capitalists studied the feasibility of draining the bottoms in the Belknap area by cutting a ditch straight south to the Ohio River. Even prior to that time, there were local efforts to cut ditches to drain farmland. Sometimes the engineering was less than accurate. Following the construction of a ditch to drain one swamp in Pulaski County, the water ran back from the creek into the swamp instead of the direction desired.

Drainage efforts were particularly encouraged by the Swamp Land Acts of 1849, 1850, and 1860. Under these Federal acts, millions of acres of swamp and overflow land in 15 states were conveyed to the respective States to facilitate reclamation of the land for agricultural use. These lands were eventually transferred to the counties to be sold. The proceeds were to be used for drainage. Thousands of acres were so transferred to the counties of Pope, Massac, Pulaski, and Alexander. Four drainage districts within the Cache River watershed were in existence prior to 1904, three in Pulaski County and one in Johnson County, near Belknap. Some efforts were made at drainage within these districts, but little real benefits were realized.

In 1903, an act of the Illinois Legislature authorized and funded a survey of the Cache River to determine a feasible way to drain and reclaim large areas of overflow lands within its watershed. The results of this survey were published in a report recommending that a cutoff ditch be constructed from a bend of the Cache River near Karnak straight south to the Ohio River. This ditch was to short-circuit the natural flow and carry the upper Cache water directly into the Ohio by a much shorter and faster route than could be possible by improving the existing channel. The Cache River Drainage District was organized in 1911 to sponsor the project. This work was accomplished between the years 1913 and 1916, essentially as recommended. The ditch partly followed Post Creek, a tributary of the Cache, and it became known as the Post Creek Cutoff. The results of this effort have been dramatic. Gradually, the ditch was so deepened and widened by erosion that some of the lower Cache water began to flow backwards into it.

Following completion of the Post Creek Cutoff, drainage work throughout the watershed accelerated. Swamps and ponds rapidly dried up. The Big Black Slough no longer received a tremendous volume of backwater from the upper Cache, and with a good outlet, it drained almost completely. Large-scale land clearing, tiling of farm fields, and cleaning of stream channels were all supplemental activities that concentrated the waterflow, increased the runoff, deepened the channels, and contributed to the instigation of severe erosion along the streambanks. On the upper Cache, crooked sections of the channel were bypassed with straight ditches. In 1937-38, Dutchman Creek was drastically changed by channel work, dredging, and levees. With the water gone, at least during the dry seasons, land owners quickly saw the potential for clearing the timber and farming the fertile soil on the broad, flat bottoms. The trees disappeared at a rate that is almost unbelievable, and much of the land was cleared without the aid of huge motorized machines. One landowner who was farming 2,000 acres of bottomland in the old Big Black Slough area in 1970, said that when he started farming as a young man, all except 57 acres of that bottomland was still in timber. Fire was the most common tool for clearing land, and often the "newground" burned for weeks at a time. Even after Illinois Route 45 was completed across the bottomlands in the Mermet area, traffic was often slowed by the smoke from fires in the swamps that were being cleared. One resident remembers watching the fires in the Little Black Slough from a hilltop and seeing the huge hollow cypresses burn like torches, throwing flames 150 feet in the air.

The lower Cache River, downstream from the Post Creek Cutoff, was directly affected only a short distance by that ditch, but other drainage projects were soon instigated to "improve" that downstream region. Straight ditches were dug to eliminate loops, bends, and curves of the main stream. Big Creek, one of the largest tributaries, was drastically changed by dredging and channel straightening. A straight ditch was cut from a bend in Cypress Creek directly to the Cache River, causing the creek to abandon its original longer course. In 1912, channel straightening was initiated along the Cache below Ullin for a distance of nearly 2 miles. In 1930, the Illinois Division of Waterways began "improvements" which consisted of channel deepening and straightening from just upstream of the mouth of Mill Creek to a point upstream of the mouth of Boar Creek. The division also made most of the channel modifications along Dutchman Creek on the upper Cache. Cypress Creek was straightened and diverted by local interests. Federal projects funded the construction of levees to protect the Mounds-Mound City area, and the lower section of the Cache River was cut off by a diversion ditch into the Mississippi River near Beech Ridge. This channel was constructed in 1950 by the Army Corps of Engineers under authority of the Flood Control Act of 1938. The Corps of Engineers also built a levee from Karnak to Belknap along the Forman Floodway. Work was begun in 1949. This levee across the old river channel near Karnak helped to further divide the upper and lower Cache watersheds. About the time that the Post Creek Cutoff and the Forman Floodway were being constructed (1912-1916), a small earthen levee was

constructed near Reevesville along the divide between the Cache River and Bay Creek watersheds. In the 1940's and 1950's, the Corps of Engineers built higher levees in this area to divide those basins. Some early dredging work was done between Karnak and Perks. The spoil was deposited on the south bank, where it formed a low, uneven levee. In section 8, near the old site of Rago, lateral ditches were cut into the Cache to drain the swamps along both sides of the river. In the 1960's and again in the 1970's, draglines were used to dredge sections of the river from south of Perks, east to Route 37. The timber along the banks was cut in several places to facilitate movement of the machines. The spoil deposited along the north edge partially blocked old oxbows, such as Short Reach.

Following the drainage modifications and large-scale land clearing activities, thousands of acres of bottomland were brought under cultivation. As the timber industry declined, however, many residents left the region to find other employment, and the population declined. The farms became bigger and more mechanized. The Mains in Pulaski County once had 13 families living on 1,000 acres of cropland, but now that land is farmed by one person with seasonal help.

The railroads have had a great influence upon the area. The Illinois Central was completed to Cairo in 1856. The Conrail (or Big Four) was originally known as the Cairo and Vincennes Railroad. It was constructed across southern Illinois and south to Cairo in 1870-72. The St. Louis, Alton, and Terre Haute line was built through the eastern part of the area in 1888-89. It passed through Big Bay and Reevesville on its way to Metropolis and was later acquired by the Illinois Central. The Chicago and Eastern Illinois line was built in 1900. It passed through West Vienna, Karnak, and Boaz on its way to Metropolis. The Chicago, Burlington, and Quincy Railroad was built through this area between the years 1905 and 1910. It passes through the Little Black Slough and Heron Pond swamps near Forman. These railroads were a major factor in opening up the country. They provided a means for transporting the fruit and farm produce of the area to market and for bringing badly needed construction supplies into the area. They made it possible to transport goods at all times of the year instead of depending on the fluctuations of the river water levels for flatboats and barges. The railroads were a particularly important means of shipping lumber and wood products and made the timber industry in the area one of the largest in the State.

The railroads created a tremendous market for crossties. For many years, local farmers supplemented their income by splitting and hewing ties with a broad ax and hauling them to buying yards along the railroads. Until the days of preservatives, white oak was the preferred species because it was hard and relatively durable. This preference was a major factor in eliminating much of the large old-growth white oak timber in the region. Large clear logs were selected by the tie hacks because they split easily. It was difficult to hew across knots. Later, small sawmills sprang up in nearly every settlement, and many depended primarily on the tie market for their operation.

The piling market is a rather specialized industry that had an effect on the forests of the region. A pile is a large timber driven into the ground like a stake to support large buildings, bridges, roads, etc. Where the ground is soft and the bedrock deep, it is important that piling trees be tall and straight. According to an elderly resident whose grandfather once owned a large part of the Little Black Slough, much of the cypress in that swamp was cut in the 1870's for piling. It was shipped to Chicago and used along the lakeshore during reconstruction after the great fire. Cypress was selected because of its long, clean, straight bole and its resistance to decay. The resident claimed that after that cutting, the original cypress stands were replaced by tupelo in the swamp.

The upland timber in the Cache River watershed has been particularly affected by cutting for barrel staves. In recent years, small mills have removed much of the best white oak timber throughout the area for whiskey barrels. In the late 1800's prior to the days of cardboard and paper, stave material for fruit and dry goods barrels was in great demand. Several species other than white oak could be used to make barrels that did not have to be waterproof. Four sawmills in one section of land (640 acres) were noted on an old atlas of Union County. The stave industry probably did more to deplete the original stands in the Ozarks Hills of Alexander and Union Counties than the lumber market. As stave blocks had to be clear and were preferably large, big, solid old trees were usually selected.

The veneer market has always had a great impact on the older timber stands. Veneer logs are preferably large and clear, and thus, the old-growth stands have suffered the most. In recent years, development of the hardwood veneer industry has resulted in timber prices so high that few private landowners are able to resist selling their old-growth stands, particularly if they have any white oak or walnut.

In a few places ferries carried travelers across the Cache River during the 1800's. In the Long Reach area, south of Perks, one elderly resident described how people in the area used to get to church. They traveled in a wagon to the Cache, unhitched the team and uncoupled the wagon, loaded the wagon bed, running gears, and people on a raft, swam the horses across, and then reassembled everything and continued on their way.

There may have been some minor impacts on the Cache River by early water-powered mills. There are records of several in the watershed, but most did not last long. A mill was located along the lower Cache as early as 1816. In 1828 there was a mill along the upper Cache west of West Vienna. The mills powered the grinding of wheat for flour and corn for meal. Sometimes they were used to power sawmills. Small dams to divert water into a mill race were usually constructed of loosely piled stones. They probably washed away soon after they were abandoned.

A few written reports document what kind of wildlife must have inhabited areas along the Cache. Joliet and Marquette found geese and ducks at the mouth of the Ohio River. The birds made no effort to fly or swim away from the intruders. Wild turkeys paid no attention to the men. Jacques Gravier, a Jesuit missionary, saw 50 bears in a single day near the mouth of the Ohio in 1688. The brightly colored Carolina parakeets were common in the cypress swamps. A visitor to the region in 1810 described a willow grove "40 acres in extent so filled with pigeons, the branches were broken off and large saplings were bent to the ground." In that same year, Audubon visited an Indian camp at the mouth of the Cache River. He said that the Indians were picking up pecans and hunting swans. Although hunting, trapping, and fishing were serious activities in the Cache River area for many years, it is astonishing to note the rate at which the wildlife population declined. Deer, elk, bears, beavers, wolves, and cougars were hunted practically to extinction before 1900. Buffalo were slaughtered for their hides and almost gone before 1820. Carolina parakeets and ivory-billed woodpeckers disappeared as the virgin groves of cypresses were cut down. Wild pigeons were gone before 1880; wild turkeys, before 1920. In recent years, all species of waterfowl have declined drastically in number. As the habitats have disappeared, so have the animals. With low population numbers and little habitat left, many residents now no longer hunt or fish in the area.

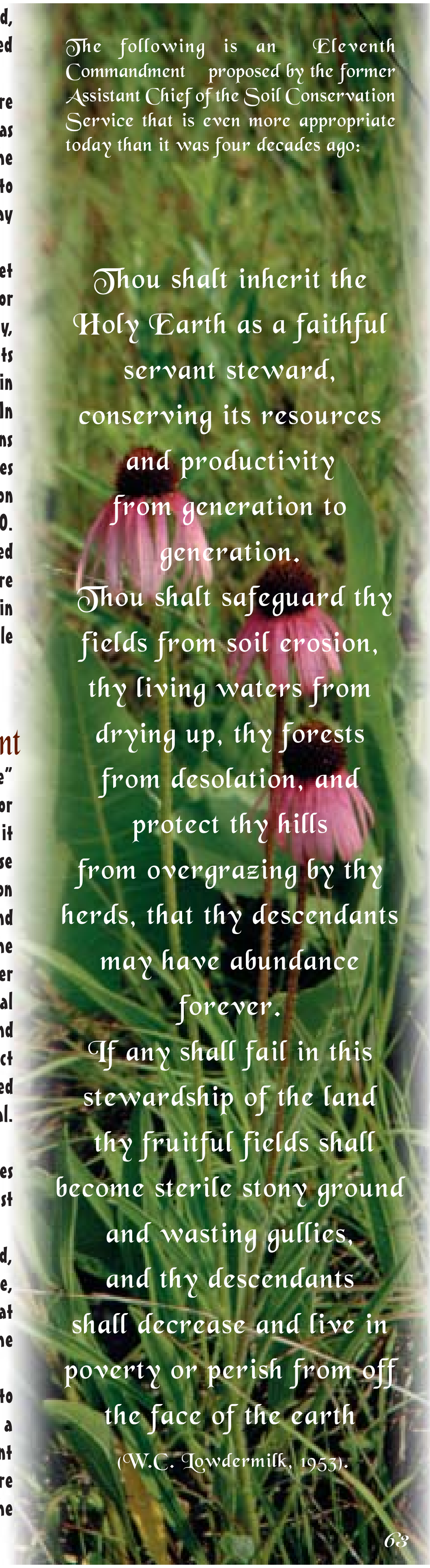
Results of disturbance and concerns for improvement

Since the arrival of the earliest settlers, there have been continued efforts to "improve" southern Illinois and the Cache area, to change it and supposedly make it better for human habitation. Much has been achieved but at a high cost. Many now realize that it is expensive to force changes that the natural landscape cannot sustain. Many of these cultural activities meant to improve the land have been detrimental to the area. Land clearing and cultivation of marginal land have led to the loss of tons of topsoil per acre per year. The waters of the Cache River and its tributaries and adjacent swamps are now nearly always muddy, and sediment has filled many of the channels, so that flooding is now even more frequent than it originally was. Much of the remaining timber on the wetlands is affected by siltation, and dead and dying trees are common. Runoff from agricultural land carries fertilizers, herbicides, and insecticides into the streams. Ground water has been polluted, and its level has been lowered drastically in some areas. Many springs and wells have dried, and droughts affect the land more severely than ever before. On most of the marginal land along the Cache that was drained and cleared during the dry years of the 1950's and 1960's, farming has not been practical or economical. Several of the owners of large wet tracts have recently tried farming the lowland and have failed.

The Cache area is now quite a different place from what it was when the Indians paddled their canoes along its waterways. Essential resources, such as rich soil, clean water, and valuable timber, have been lost that will take a long time to replace.

The primary mission of resource conservation agencies is to improve the quality of the Cache watershed, to make it a better place for people to live and work and visit. To make the area healthier, more attractive, and more productive, we must protect its natural character—the physical and biological features that have made it unique since presettlement times. We are trying to develop long-term solutions to the environmental problems that have resulted from shortsighted and poor land-use practices in the past.

In determining the suitability of land use, priorities are seldom clear. We need the wisdom of Solomon to objectively determine the best use of a particular acre of land. Based on the results of the past, we have a record of making poor land-use decisions. We must do better in the future. The fate of the environment hinges on the willingness of this generation to develop a better system, a wiser approach, a more environmentally sensitive method for deciding what to do with the lands and waters that make up the Cache landscape.



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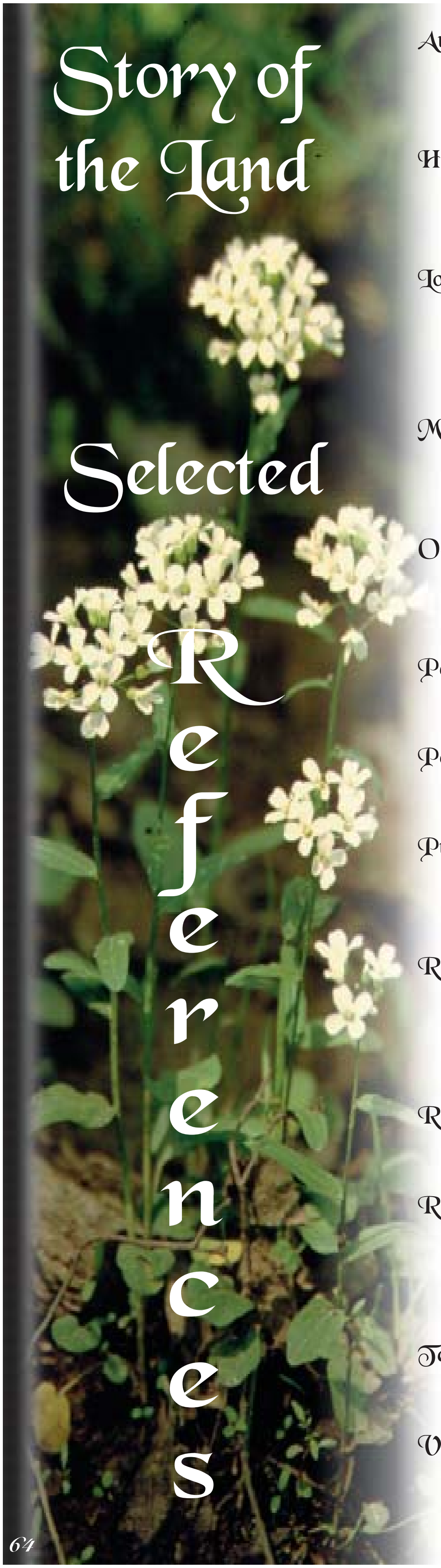

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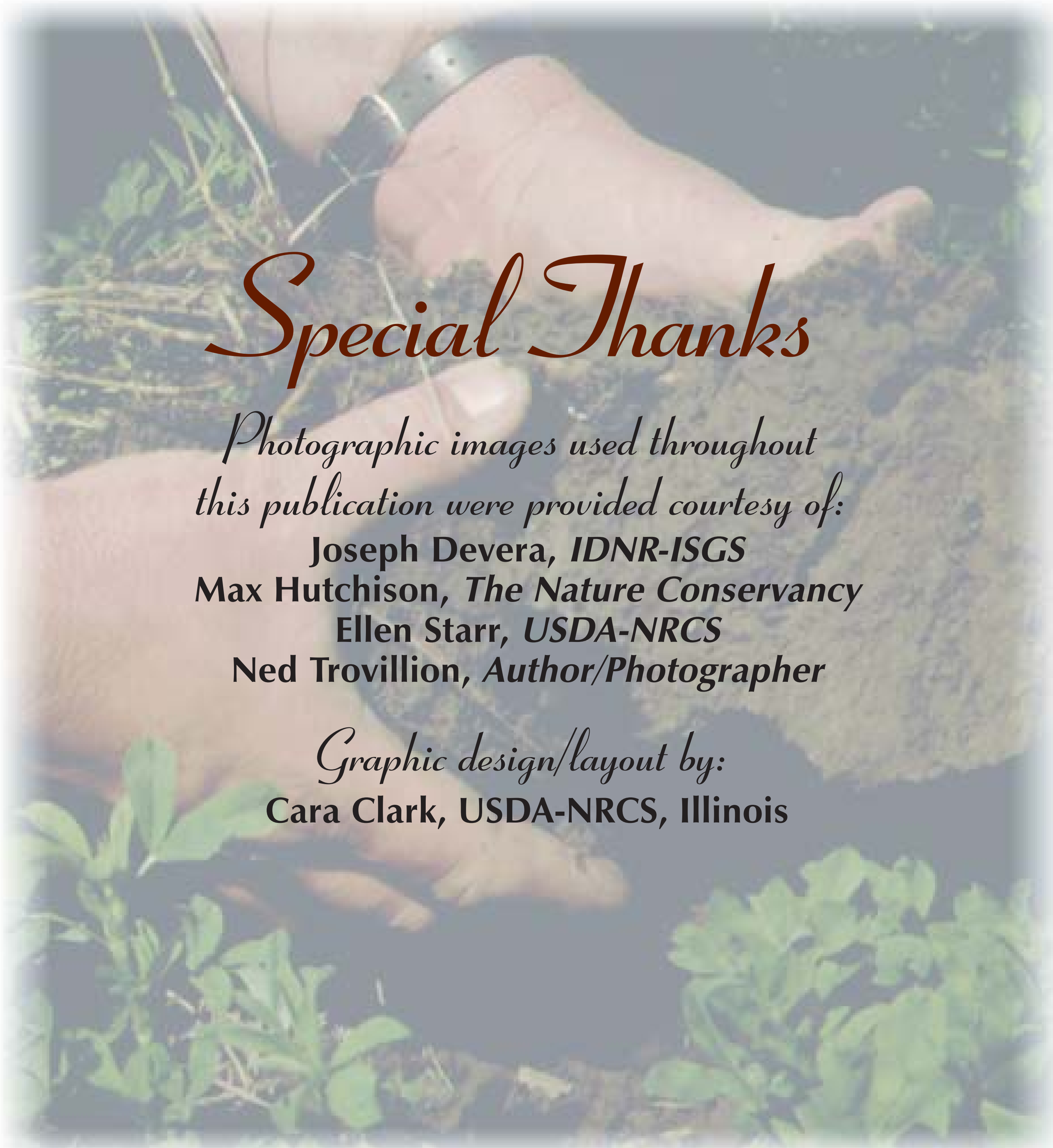

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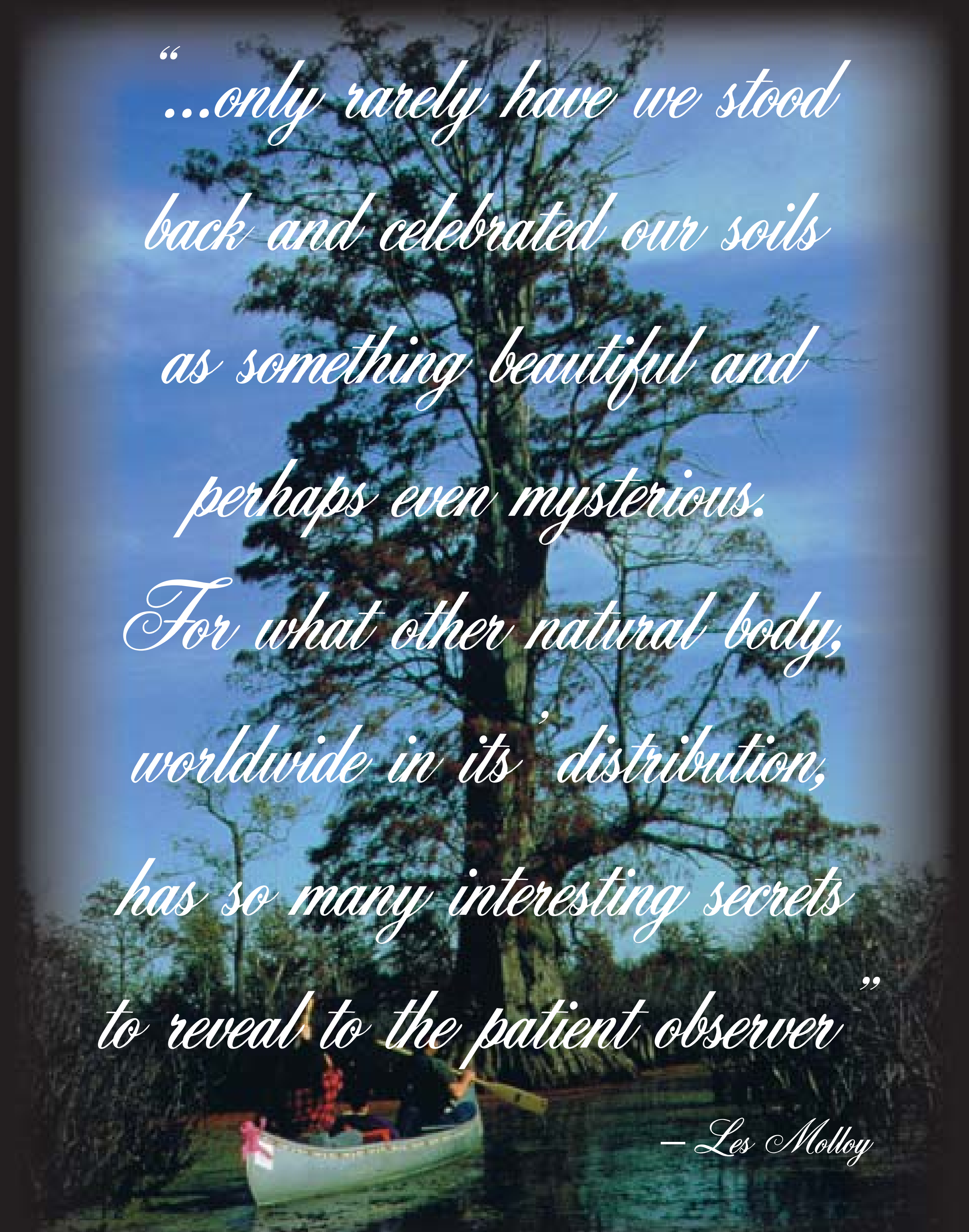
"...only rarely have we stood
back and celebrated our soils
as something beautiful and
perhaps even mysterious.
For what other natural body,
worldwide in its' distribution,
has so many interesting secrets
to reveal to the patient observer"
– Les Molloy