

# THE ILLINOIS HEADWATERS

AN INVENTORY OF THE REGION'S RESOURCES

A Project of the Critical Trends Assessment Program





## ABOUT THIS REPORT

*The Illinois Headwaters: An Inventory of the Region's Resources* is a product of the Critical Trends Assessment Program (CTAP) and the Ecosystems Program of the Illinois Department of Natural Resources (IDNR). Both are funded largely through Conservation 2000, a six-year State of Illinois initiative to enhance nature protection and outdoor recreation by reversing the decline of the state's ecosystems.

Conservation 2000 is the culmination of recommendations from CTAP, the Illinois Conservation Congress, and Governor Edgar's Water Resources and Land Use Priorities Task Force. The CTAP recommendations came out of its 1994 report on the state of the Illinois environment. CTAP investigators inventoried and analyzed existing environmental, ecological, and economic data to establish baseline conditions from which future changes in ecological conditions might be measured. The report concluded that:

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

The Illinois Conservation Congress and Governor Edgar's Water Resources and Land Use Priorities Task Force came to broadly similar conclusions. For example, the Conservation Congress concluded that better stewardship of the state's land and water resources could be achieved by managing them on an ecosystem basis. Traditional management and assessment practices focus primarily on the protection of relatively small tracts of land (usually under public ownership) and the cultivation of single species (usually game animals or rare and endangered plants and animals). However, ecosystems extend beyond the boundaries of the largest parks, nature preserves, and fish and wildlife areas. Unless landscapes are managed on this larger scale, it will prove impossible to preserve, protect, and perpetuate Illinois' richly diverse natural resource base.

Because more than 90% of the state's land area is privately owned, it is plainly impossible for Illinois governments to acquire resources on the ecosystem scale. Therefore, the Task Force and the Congress called for public agencies and private landowners to cooperate in a new approach to natural resource protection and enhancement. If landowners can protect, enhance, or restore precious natural resources through enlightened private management, the need for public acquisition can be reduced.

The Congress and the Task Force agreed that this new approach ought to be:

- organized on a regional scale;
- voluntary and based on incentives;
- guided by comprehensive and comprehensible ecosystem-based scientific information;
- initiated at the grassroots rather than in Springfield.

Finally, the Congress and the Task Force agreed that natural resource protection need not hamper local economic development but can enhance it through tourism and outdoor recreation.

CTAP described the reality of ecosystem decline in Illinois, while the Congress and the Task Force laid out principles for new approaches to reversing that decline. And Conservation 2000, designed to achieve that reversal, has implemented a number of their recommendations, drawing on \$100 million to fund nine programs in three state agencies.

One of these programs is IDNR's Ecosystems Program. The program redirects existing department activities to support new resource protection initiatives such as Ecosystems Partnerships. These partnerships are coalitions of local and regional interests seeking to maintain and enhance ecological and economic conditions in local landscapes. A typical Ecosystem Partnership project merges natural resource stewardship (usually within a given watershed) with compatible economic and recreational development.

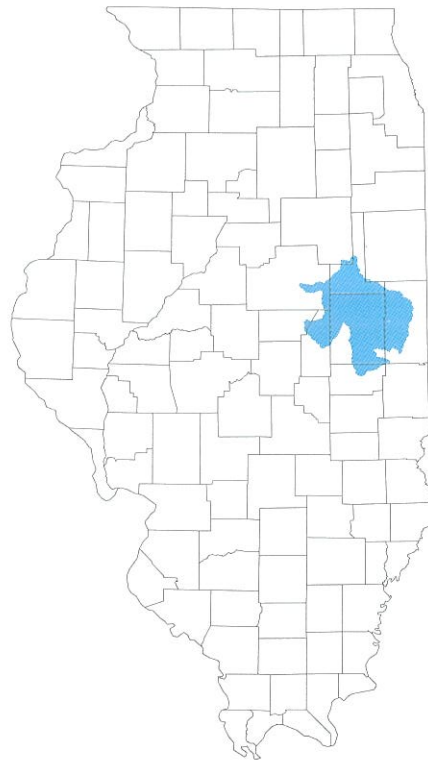
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A Project of the Critical Trends Assessment Program

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## AN INVENTORY OF THE REGION'S RESOURCES



**Jim Edgar, Governor**  
State of Illinois



**Brent Manning, Director**  
Illinois Department of Natural Resources



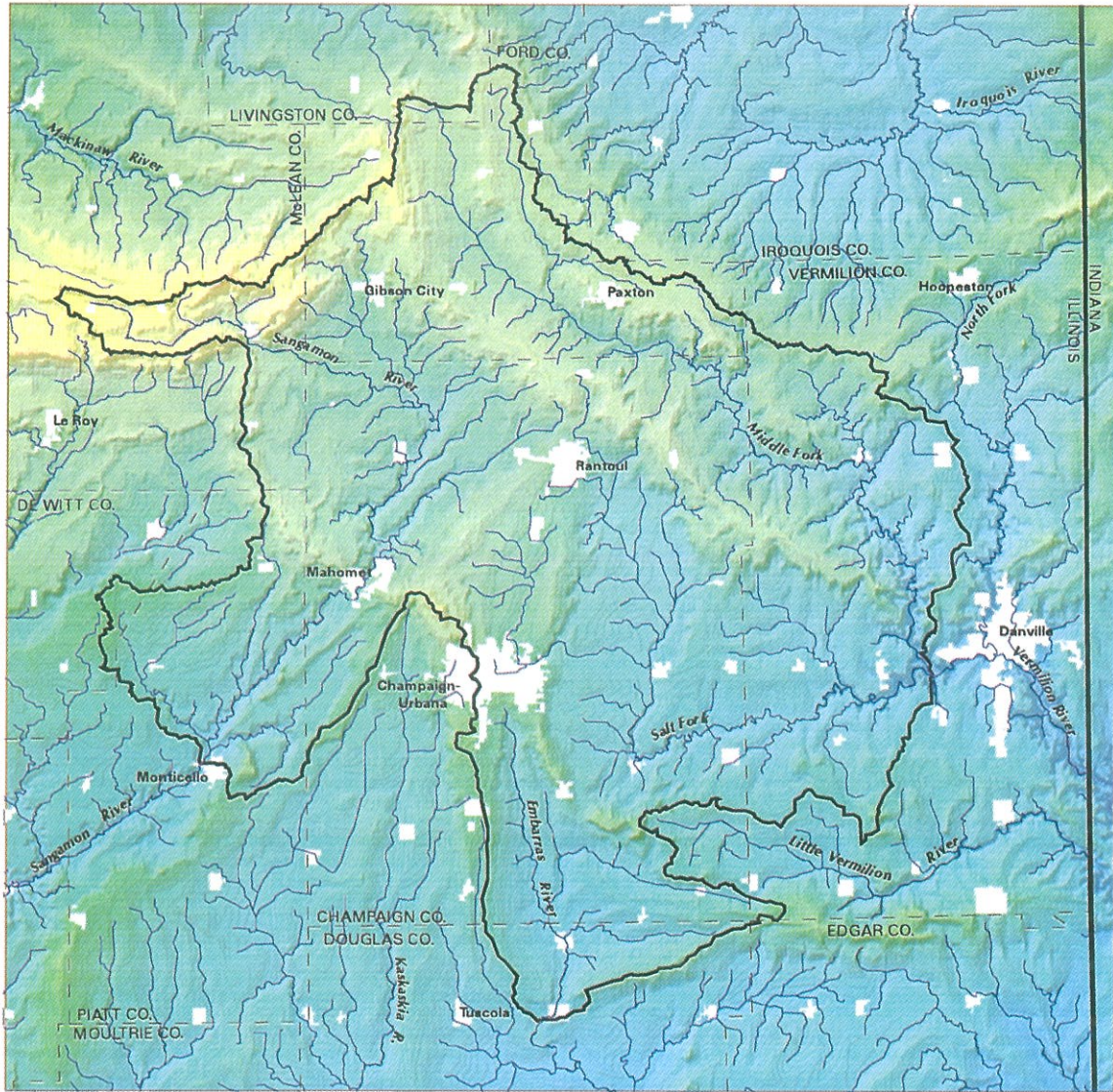
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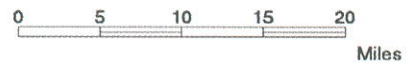
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# HEADWATERS



J. Hester and L. Smith, ISGS



Elevations in feet above mean sea level

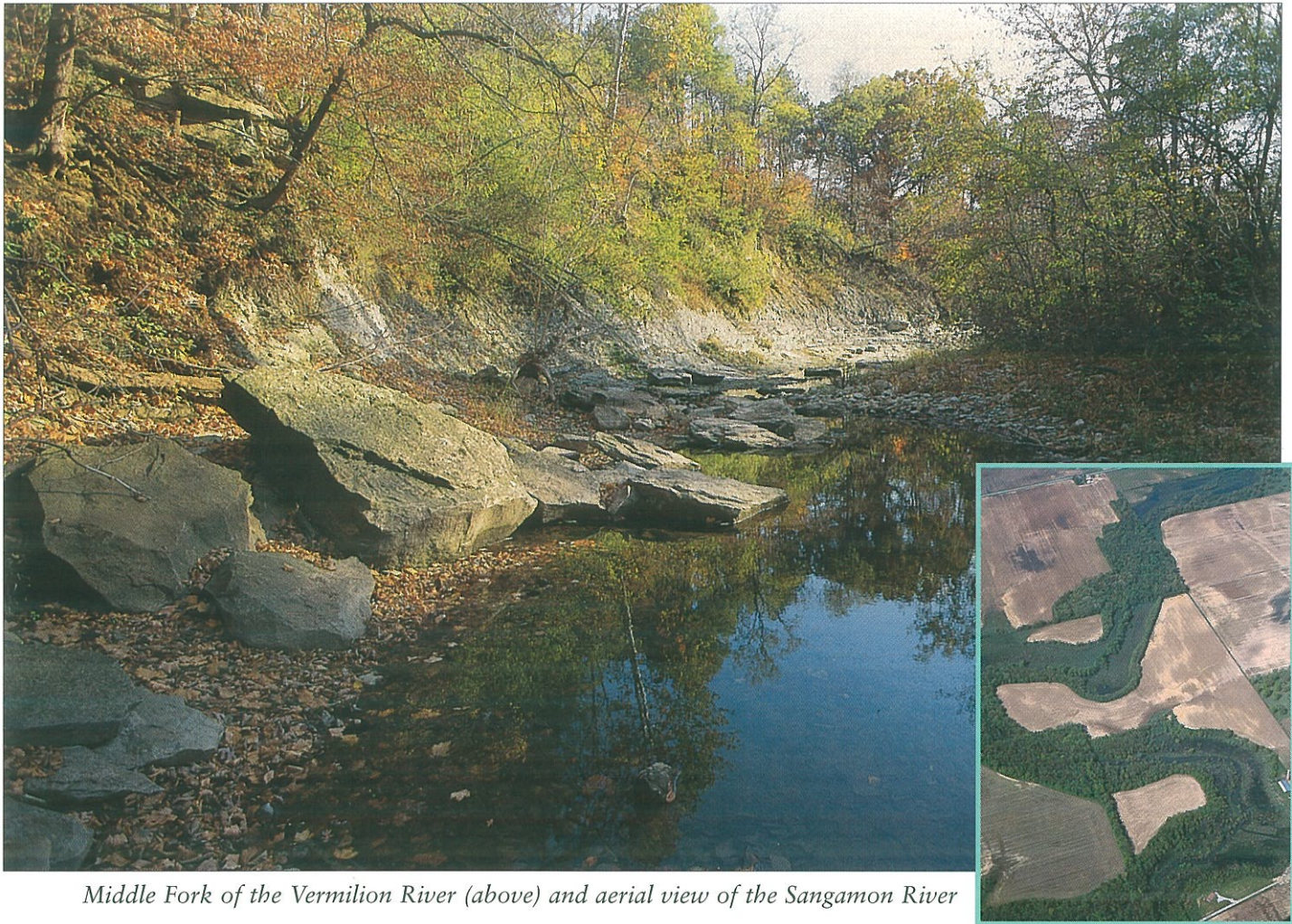


## SHADED RELIEF MAP OF THE ILLINOIS HEADWATERS



# THE ILLINOIS HEADWATERS

## AN INVENTORY OF THE REGION'S RESOURCES



*Middle Fork of the Vermilion River (above) and aerial view of the Sangamon River*

MICHAEL R. JEFFORDS

Just as the Grand Prairie—Illinois' namesake landscape—was the heart of the continent's "Prairie Peninsula," so the Headwaters area of east central Illinois is the heart of the Grand Prairie. It is one of the flattest parts of the state and is characterized by glacial topography, with the flat areas separated by glacial moraines that serve as drainage divides. This causes water to flow downhill in most directions, giving rise to six major streams—the Vermilion, Embarras, Sangamon, Mackinaw, Kaskaskia, and Little Vermilion rivers—that

together drain almost a third of the state. As used here, the "Headwaters" refers to an area centered in Champaign, Ford, and Vermilion counties, and sprawling across parts of seven other counties.

As noted nature writer John Madson once observed, this part of eastern Illinois was the place (with western Indiana) where the plow replaced the ax as the symbol of Euro-American conquest of the continent. Most of Illinois is suited to agriculture, but few parts of Illinois are as well suited as is the Headwaters to a particular kind of agriculture—in this case, intensive

production of row-crops like corn or soybeans. In recent decades, corn and bean yields in Champaign and Ford counties have led the state that leads the world. Champaign and Ford counties are among the five Illinois counties with the highest percentage of their land in agriculture. In some river sub-basins within the Headwaters—Kerr Creek, Bean Creek, Flatville branch, among others—88% of the surface area is planted in row crops.

If the Headwaters is a place where presettlement Illinois has been most changed, it is also one





*Trelease Woods in springtime, a remnant of the Big Grove which once covered 600 square miles. Below is a view of the woods seen from the air today.*



MICHAEL R. JEFFORDS

of the places where presettlement Illinois survives most gloriously in the form of the Middle Fork of the Vermilion, the first Illinois river to be included in the National Wild and Scenic River System. In that contrast between the nearly perfectly realized humanized landscape and the nearly perfectly preserved natural one, the Headwaters embodies much of Illinois' complex relationship to its own natural history.

### **Resilient Nature**

Nature has been transformed in the agricultural Headwaters, but it has not been banished. Of the 46 species of mammals known to dwell in the Headwaters, one, the Indiana bat, is officially recognized by state scientists as endangered or threatened in Illinois. (A maternity colony is found along the Middle Fork River in southern Ford county.) The region is home to 21 amphibian and 27 reptile

species, the latter including three state-listed species.

About 260 bird species may be regularly found in the Headwaters, and about 160 species breed here. Significant populations of all the songbirds common to this part of the world survive in the Headwaters, from yellow-billed cuckoos to great crested flycatchers. Endangered or threatened birds such as sharp-shinned hawks, long-eared owls, and veeries are known in local forests which also host locally rare species such as the wood thrush, American redstart, barred owl, and summer tanager.

The variety of animal life reflects the surprising diversity of natural communities that can still be found here. These include seven types of forest, five kinds of prairie, four types of savanna, plus seeps and cliffs, many of which are protected in the region's 15 nature preserves. As

has happened elsewhere in Illinois, most presettlement natural systems have been much reduced in extent. They persist in corners of the Headwaters landscape too rugged to plow or pave.

Stream corridors in particular offer tantalizing glimpses of the region's presettlement incarnation. The best Headwaters streams have beds of gravel, sand, and cobbles that create oxygen-rich boulder riffles, travel raceways, and clear pools. Diversity of habitat usually means diversity of life. The Headwaters' streams support at least 92 species of fish, 44 species of mussels, and 16 species of large crustaceans. Segments of six Headwaters streams—the Middle Fork and Salt Fork of the Vermilion River, Jordan Creek, Stony Creek, the upper Sangamon River, and Lone Tree Creek which feeds the



Embarras—have been recognized by state scientists as Biologically Significant Streams because of the unusually varied life they support.

Much of that diversity is concentrated in the basin of the Vermilion River where 79 fish, 37 mussel, and 15 crustacean species have been identified. This roster includes seven fish species whose survival in Illinois is considered endangered or threatened. (The bluebreast darter occurs in Illinois only in the tributaries of the Vermilion.) Twelve state-listed mussel species—among them the endangered wavy-rayed lampmussel and round hickorynut mussel—also occur here. The Sangamon River is nearly as rich: 62 fish species, 30 mussels, and nine crustaceans including the endangered slippershell.

Terrestrial ecosystems in the region have undergone more pronounced changes. A survey in the 1970s by the Illinois Natural Areas Inventory found that top-quality rem-

nants of presettlement ecosystems cover 251 acres—0.023% of the total area of the Headwaters, which is significantly smaller than in the state as a whole. Whole subcategories of habitat no longer exist in the Headwaters as functioning ecological entities capable of perpetuating themselves. Specifically:

**Forest** Forests of all types cover slightly more than 2% of total land area of the Headwaters. The Headwaters thus is even more lightly forested than Illinois as a whole, where trees grow on more than 11% of the land. Most surviving Headwaters forests are small woodlots and narrow riparian, or stream-side, woods perched on ravines and stream-side terraces. As is true across much of Illinois, even the surviving Headwaters woods have been ecologically disturbed. The Headwaters boasts none of what ecologists regard as Grade A forest, according to the

### *The Area at a Glance*

△ Six major streams originate in the area—the Embarras, Sangamon, Mackinaw, Kaskaskia, Vermilion, and Little Vermilion rivers—which together drain a third of the state.

△ Segments of six Headwaters streams have been recognized by state scientists as Biologically Significant Streams because of the unusually varied life they support.

△ The Middle Fork of the Vermilion River is the first Illinois river to be included in the National Wild and Scenic River System.



MICHAEL R. JEFFORDS

*Wood lilies bloom in Ten-mile Grove near Paxton, Ford County.*



## The Grand Prairie

In 1853 a traveler said of Illinois' Grand Prairie, "I do not fancy there exists in the whole world such a sight as we beheld." What caught his eye upon emerging from the dense forests of the eastern U.S. was the astonishing absence of trees. Apparently only 6.3% of Champaign County's land was wooded even in 1820. Ford County's presettlement forests covered only 3.6% of its land, making it the barest county in Illinois.

If the plow did not chase trees into the stream valleys of the Headwaters, as it did in so many other parts of Illinois, what did? Climate is thought to have played a part. This part of Illinois in about 9,000 B.C. is thought to have been dominated by deciduous forest. A substantially drier period beginning about 8,500 years ago saw drought-tolerant grasses begin to take over. This climatic shift was abetted by fire which, in its ecological effects, can be described as a very brief, very intense form of drought. The flat landscape of the Headwaters offered little obstruction to wind-pushed fires. Tree seedlings that stood in the path of these occasional conflagrations were scorched while prairie plants, whose growth nodes lay just below the surface, emerged safely.

Prairie plants did not only benefit from the rich Headwaters soils—they helped create them. The plants that grew upon glacial deposits aerated these deposits with their roots, added organic matter to it when their top growth died each year, and protected the soils against erosion. As a result, soils that developed under grasses are darker and more fertile than those that developed under trees.

By the mid-1800s Euro-Americans knew the soils of the Grand Prairie to be rich, in spite of their failure to grow trees. But Euro-American farmers shunned what one modern writer calls the "much dreaded prairies" until well into the 1800s.

Why? Permanently flowing streams were relatively few and far between, so that wells had to be dug for

drinking water in most parts of the open prairie. Turning over the tangled root mass of open prairie took expensive special equipment and teams of draft animals; the sod was relatively weak and much easier to break on the fringes of woods, where prairie plants were robbed of water and nutrients and light by woody plants.

Then there were the insects. Mosquitoes that bred in uncountable millions in wettish places spread malaria. The green flies that dwelt in open prairies were so vexing in season—usually about six weeks each summer—that travelers avoided the open country or traveled at night. Swarms of these blood-sucking insects were known to bite to death horses that could not escape them.

So early farmers stayed near the trees. Stream corridors in the Grand Prairie offered shelter and forage for hogs and cows and wood for fires and building. So did the prairie groves—those islands of trees in an ocean of grass, usually located downwind of some natural obstruction that blocked tree-killing prairie fires.

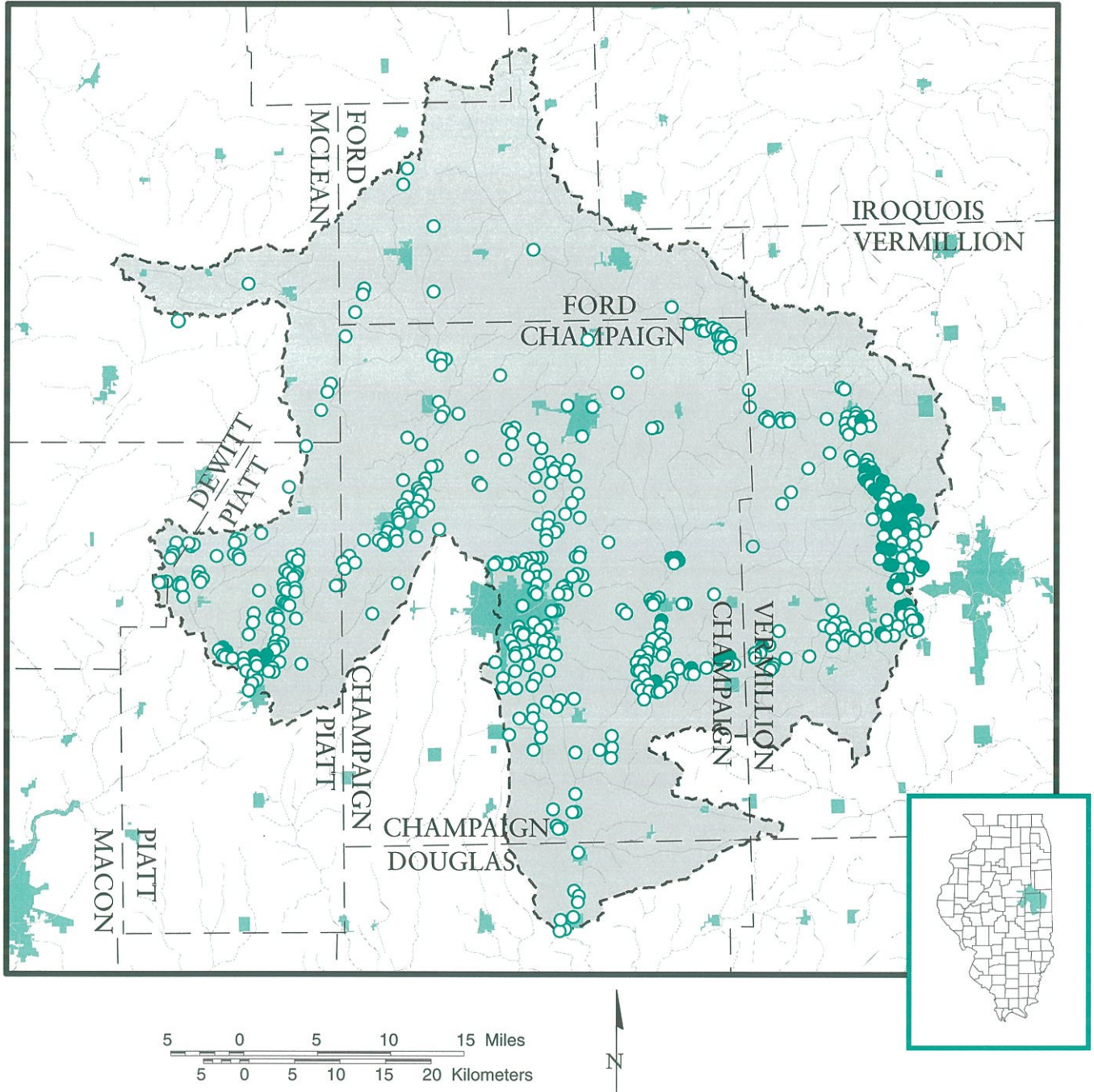
Ultimately the biggest drawbacks to the conversion of the Grand Prairie into farm were economic, not ecological. With no major rivers nearby, and with few decent freight roads, pioneer Grand Prairie farmers found it hard to ship what they grew to market. Once railroads linked the old Grand Prairie to the markets of Chicago, however, the land rush was on. In 1853–54, when the Illinois Central Railroad reached Danville, sales of once-scorned government land in the area skyrocketed to nearly a half million acres.

The mosquitoes and prairie fires are mostly gone, and the once-fearful isolation of the countryside is now sought after by people sick of town life. But people still shun the open prairie. One of the first steps people take to improve their homes—whether in farmsteads or in isolated subdivisions—is to plant trees. They thus recreate (using almost exclusively introduced species) the vanished landscape of the safe and shady prairie grove.





## Archeological Sites in the Headwaters



*Any contiguous block of 30 Headwaters acres is likely to hold evidence of Native American habitation; there are 832 known archeological sites. Unfortunately, uncounted upland sites have been plowed and streamside sites are often buried by silt from eroding fields. IAS Database: May 28, 1997*



## The Middle Fork

**T**he Middle Fork is the Headwaters' crown jewel. Named Illinois' first State Scenic River in 1986, the 83-mile-long stream offers a rare glimpse of presettlement Illinois. It ambles freely through still-wooded banks atop the sand and gravel bottom that in most other Illinois streams has long since been buried by sediments. Exposed groundwater seeps from its banks in the form of springs, and in its bluffs nest cliff swallows.

The Middle Fork hosts plant and animal communities that are distinct in Illinois. At least 250 species of birds have been recorded in the valley, with at least 125 species known to have bred there. The Middle Fork area is home to 45 mammal species, 13 reptile species, and 40 breeding bird species.

Because they tend to be inaccessible to the plow, hill prairies are among the last "living windows" into the pre-settlement Illinois ecology. One of these survives as the Windfall Prairie Nature Preserve, 61 acres (including buffer areas) on a bluff in Kennekuk Cove County Park beside the Middle Fork. Prairie dock, Indian paintbrush,

stiff gentian, and downy phlox are among the dry-loving plants found on this exposed spot.

A controversial 1960s plan to build a large reservoir by damming the Middle Fork near Oakwood was scuttled in 1978. In 1989 the Middle Fork was granted permanent protection by being named a National Scenic River by the U.S. Secretary of Interior—the first Illinois river to be included in the National Wild and Scenic River System.

Native Americans from the Woodland Period through historic times camped along such streambeds to harvest their many resources. Some 200 archeological sites have been identified along the Middle Fork. The Collins Archeological Complex, ceremonial mounds from the Late Woodland and Mississippian periods, has been designated a historical site and is under federal protection.

Today's area residents harvest different resources from the Middle Fork than did the Native Americans—hours of canoeing, fishing, hiking, and nature study, using more than 8,400 acres of public parks and preserves along its banks.



JAMES P. ROWAN

*The Middle Fork of the Vermilion: The best Headwaters streams have beds of gravel, sand, and cobbles that create oxygen-rich boulder riffles, travel raceways, and clear pools.*



1978 Natural Areas Inventory. Grazing and logging are common causes of disturbance, as is the introduction of such exotic species as amur honeysuckle. Species composition remains relatively rich, however, and includes such rarities as the false hellebore, a state-listed plant.

**Savanna** Savanna is a not-quite-forest, not-quite-prairie ecosystem in which scattered large trees (usually oaks) dominate an open landscape of prairie grasses and forbs such as the starry campion. Surviving savanna-type habitat in the Headwaters attracts native birds such as the whip-poor-will and eastern bluebird; oak savannas in particular are heavily used by migrating birds such as vireos and warblers. The combined extent of surviving high-quality true savanna in the Headwaters is 1.5 acres. Remnants of the region's presettlement savannas persist in the

Tomlinson Pioneer Cemetery Prairie Nature Preserve in Champaign County and the Fairchild Cemetery Savanna in Vermilion County, just outside Kennekuk Cove County Park.

**Prairie** About 85% of the Headwaters in presettlement years was thought to be prairie of one type or another—four types of tallgrass prairie (which vary according to the moisture of their soils) and glacial drift hill prairies. Champaign County alone had some 592,000 acres of prairie; today it has one acre of high quality prairie. (Other high-quality remnants may persist along local railroad rights-of-way, and another 30–40 acres of ecologically degraded prairie are undergoing restoration.) So few dry-mesic prairie sites survive that scientists have no originals from which to learn which species were present locally.

Only one-third of the Prospect

**The Area at a Glance**

△ The Headwaters' streams support at least 92 species of fish, 44 species of mussels, and 16 species of large crustaceans.

△ A surprising diversity of natural communities can still be found in the Headwaters, including seven types of forest, five kinds of prairie, four types of savanna, plus seeps and cliffs.

△ The region is home to 21 amphibian and 27 reptile species, the latter including three state-listed species.



MICHAEL R. JEFFORDS

*Streambank erosion: Clearing forest to the water's edge harms a stream's ecological function even if the stream itself is untouched. Urban uses along Champaign County streams—including some Headwaters watersheds—increased more than 37% from 1958 to 1988 and forest cover shrank 40–80%.*



*Roadside prairie remnant with puccoon and wild hyacinth (right) and old headstone in Tomlinson Cemetery (below)*



MICHAEL R. JEFFORDS

Cemetery Prairie Nature Preserve outside Paxton retains its presettlement vigor. Even so, it harbors 21 native herbaceous forbs and grasses that occur nowhere else in the county. Most such plants were locally rare to begin with. Other grassland plants, like the prairie white-fringed orchid, once were quite widespread in the Headwaters but their populations shriveled along with their habitats. Because nearly all species found in prairie also occur in other states or in habitats other than prairies, few species are endemic to the prairie ecosystem; one of these, the state-listed Sangamon phlox, is a native of the Headwaters.

**Wetlands** Before it was drained artificially, even the upland parts of the Headwaters had high water tables and flooded frequently. Water did not move quickly off the flattish land, the heavy growth of grass held excess water in place, the clayey local subsoil did not absorb water well, and depressions in the uplands retained some water at or just below the surface for all or part of each year.

No surprise, then, that scientists estimate that 40–45% of the land that became Champaign and Ford counties were wetlands in presettlement times. Most of these were wet prairies, plus prairie potholes on the uplands and floodplain forest along the rivers. These were rich, even lush environments for plants and animals adapted to them. The wet carbonate soils of the

Headwaters (a product of limestone bedrock ground up by glaciers) was a perfect home for snails, for example, which lived in such profusion in prairie wetlands that the shells of the dead animals gave the soil a whitish cast.

Whereas much of yesterday's wetlands were on open prairie, most of today's wetlands (63%) survive in unfarmed stream corridors. Less than 1% of the region's land area remains wetland of any type—about 11,500 acres of floodplain forests, shrub swamp, seeps, ponds, and lakes. About 64 acres of these (mostly floodplain forest) are considered high quality. While reduced in extent, the Headwaters' wetlands still host endangered or threatened species, including such birds as the pied-billed grebe and the least bittern.



### The Ecological Effects of Change

The region has been occupied by humans more or less continuously for 12,000 years. More than 800 sites of Native American camps, villages, and burial grounds have been identified within it (with less than 2% of the region systematically surveyed by archeologists). Most consist of fragments of pottery, a few small mounds, and stains of rotted wood in the soil.

The landscape changes wrought by Native Americans were less obvious to the early Euro-Americans than changes made by large animals such as the bison, which cut deep trails and wallows into the surface. But Native Americans shaped the local landscape more profoundly by deliberately burning the prairie. Some experts believe that Native Americans perpetuated, even expanded, the range of grass-based ecosys-

tems at the expense of forest. In general, however, the Native American tenancy had little permanent impact on the Headwaters.

While Euro-American settlement of the Headwaters region came late, its ecological impact was more dramatic. Rapid landscape change on a wide scale led inevitably to wholesale changes in local populations of living things. The bison and beaver apparently had been pushed out of the Headwaters' lands before Euro-Americans arrived in numbers. The wolf (which competed with humans for the meat of deer) lingered for a while but it was doomed by the gradual loss of habitat and by hunting pressure; in the winter of 1833, hunters killed 68 wolves at Cheney's Grove, a space of not quite five square miles—a statistic that attests both to the plenitude of the wolf and the ferocity of its human enemies.

### The Area at a Glance

△ About 260 bird species may be regularly found in the Headwaters, and about 160 species breed there.

△ Few parts of Illinois are as well suited as is the Headwaters to row crop agriculture. In recent decades, corn and bean yields in Champaign and Ford counties have led the state that leads the world.

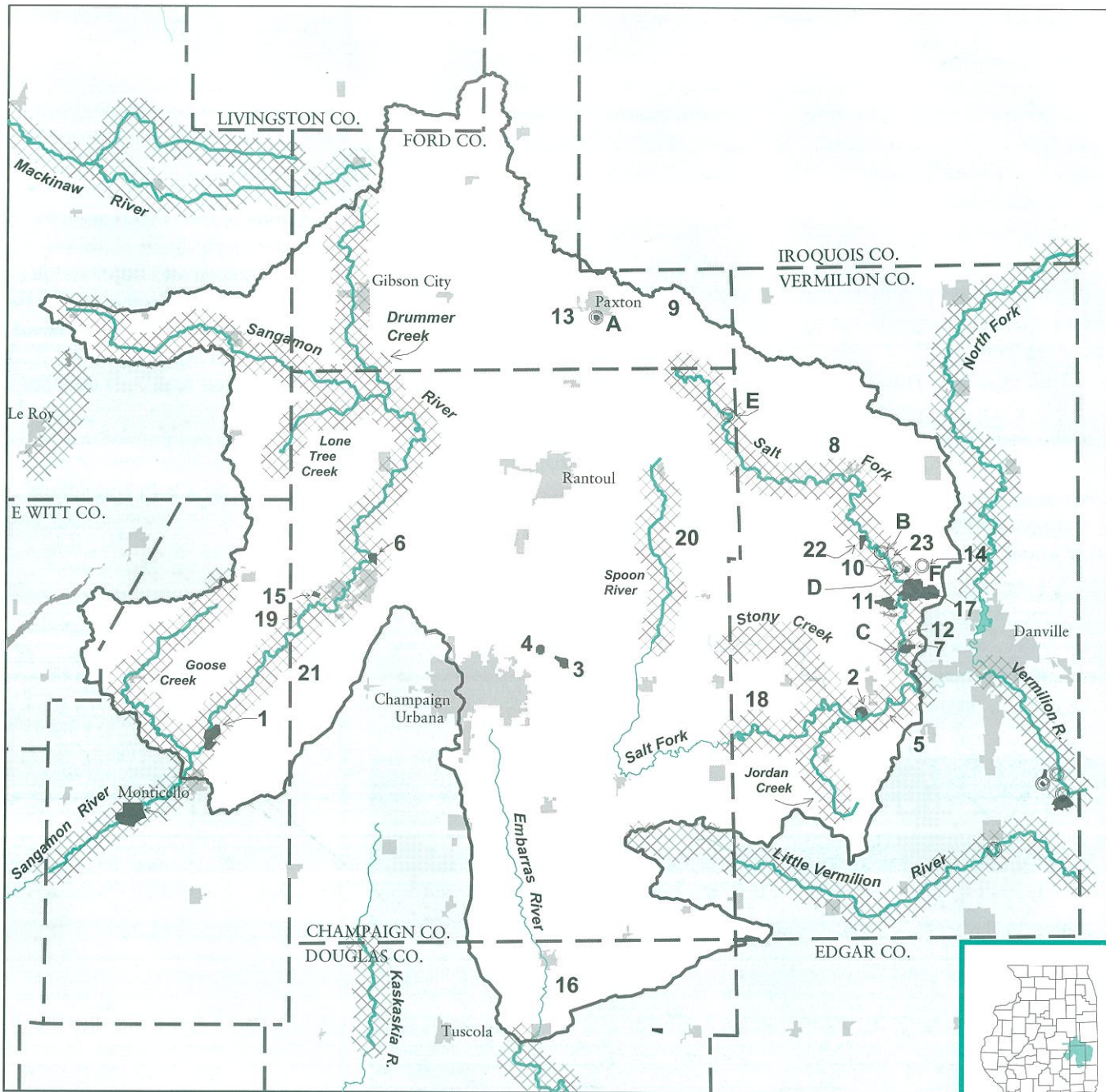
△ Champaign and Ford counties are among the five Illinois counties with the highest percentage of their land in agriculture; 92% of their combined area is in agriculture.



JAMES P. ROWAN

*Some species such as flying squirrels, which are adapted in specialized ways to habitats, may be unable to disperse among the isolated fragments of the Headwaters. This increases their risk of becoming locally extinct.*





**Illinois Natural Area Inventory Sites (INAI),  
Illinois Nature Preserves (INP),  
and Biologically Significant Streams  
in the Headwaters Area**

See key at right

 = Biologically Significant Streams



Less obvious in some ways, but affecting many more species, is wholesale changes made to habitat. At settlement, 15% of Headwaters land was thought to be forest and almost all the rest supported grassland ecosystems such as prairie and savanna. Today only about 2% of the land area of the Headwaters remains in forest, buildings and roads take up nearly 4% of the region's land, and slightly more than 2% is open water and wetlands. Almost all the rest—92%—is agricultural lands of various sorts.

The replacement of one grassland ecology—the prairie—with another—the modern farm—is the central historical, social, economic, and ecological fact in modern Headwaters history. Like development today, the process raised controversies, and imposed costs that were not always apparent at the time. For example:

- Naturally-occurring fires in Headwaters woods and fields (usually ignited by lightning) have been suppressed to protect fields and buildings for more than a century. Without occasional fires, more shrub and tree seedlings survive in savanna, which

speeds that ecosystem's conversion to forest. Hill prairies of the Headwaters grow atop glacial deposits; they too are quickly taken over by woody plants when fires are stopped.

- Roads, fields, and houses divide forest, wetland, or prairie into habitat "islands." Isolated habitat fragments often cannot supply the resources needed by species with extensive home ranges, such as badgers. Some species adapted in specialized ways to habitats, such as flying squirrels and woodland voles, may be unable to disperse among these isolated fragments, which increases their risk of becoming locally extinct. Nor can fragmented habitats accommodate genetically varied breeding populations. Prairie and savanna remnants in the Headwaters are often less than one acre in size. The entire local populations of some plant and animal species in these tracts may include only a few individuals; the smaller such local populations, the more vulnerable they usually are to disease and in-breeding stress.

Fragmentation not only shrinks the size of specific habitats, it also severs the natural landscape links that

### The Area at a Glance

△ A survey conducted in the 1970s by the Illinois Natural Areas Inventory found that top-quality remnants of presettlement ecosystems cover 251 acres—0.023% of the total area of the Headwaters, which is significantly smaller than the state average.

△ At settlement, 15% of the Headwaters was thought to be forest and almost all the rest was prairie (including savanna).

△ Prairie and savanna remnants in the Headwaters are often less than one acre in size, making the plants and animals in them vulnerable to disease and in-breeding stress.

#### KEY TO NUMBERED INAI AND INP SITES

##### INAI sites

- 1 Lodge Park
- 2 Horseshoe Bend
- 3 Trelease Woods
- 4 Brownfield Woods
- 5 Camp Drake
- 6 Nettie Hart Woodland Memorial
- 7 Harmattan Stripmine
- 8 Middle Fork/Vermilion River
- 9 Clarence West RR Prairie
- 10 Windfall Prairie
- 11 Orchid Hill
- 12 Middle Fork Woods
- 13 Prospect Cemetery Prairie
- 14 Fairchild Cemetery Prairie & Savanna
- 15 Mahomet Site

- 16 Embarras River - Camargo
- 17 Kennekuk Cove County Park
- 18 Salt Fork Vermilion River
- 19 Sangamon Phlox Site
- 20 Spoon River
- 21 Sangamon River
- 22 Kinney's Fork Seeps
- 23 Middle Fork Seeps

##### INP sites

- A Prospect Cemetery
- B Horseshoe Bottom
- C Middle Fork Woods
- D Windfall Prairie
- E Tomlinson Pioneer Cemetery Prairie
- F Fairchild Cemetery



*Fishing is a popular recreational activity in the Headwaters.*



JOEL DEXTER

connect disparate habitats. Each spring, Headwaters amphibians such as the American toad migrate from upland forests to lowland areas to breed, while each fall reptiles move to upland retreats to hibernate. Fragmentation blocks these natural movements.

Several of the publicly-owned forested streambanks in the region are large enough in area to be viable habitat for songbirds. But while extensive, these woods are for the most part quite narrow, with a high proportion of “edge” habitat to overall area. Edges expose the forest interior to predators and non-native animal competitors for nest sites and food.

- Changes made to the physical shape of streams affect the ways they function too. Channelizing, or straightening, the naturally sinuous courses of streams speeds the movement of water away from fields and towns. Speeding up the flow of water in a channel also enhances its ability to wear away soil from its banks,

which clouds the water and smothers stream bottoms. The effects can be seen in the upper reaches of the Embarras River which supports only 32 species of fish, 16 of mussels, and 6 of crustaceans, far fewer than its more natural-flowing neighbors, the Middle Fork and the Sangamon.

- Because the Headwaters is predominantly rural, and because it has no major concentrations of industry, it is not much troubled by conventional pollutants. (Eight “Superfund” sites have been identified in the region, although none is considered to pose pressing risks.) Urbanized Champaign County in 1995 was the source of virtually all the conventional pollutants found in the Headwaters by EPA monitors—carbon monoxide, oxides of sulfur and nitrogen, dust and soot, and volatile organic carbons.

Western Champaign County and most of Ford County are underlain with massive underground deposits of sand and gravel that collect and store water. Most of the

water for human needs in the Headwaters is supplied from wells that tap these aquifers. Total withdrawals amounted to about ten million gallons per day in 1995. Most was withdrawn by public water systems, with lesser amounts taken to supply private wells, industry, and livestock watering.

The quality of this rich groundwater resource is generally good, although the water is considered fairly hard. Concentrations of dissolved solids, chlorides, and nitrates are moderate, and while the iron in it is concentrated enough to stain porcelain plumbing fixtures it poses no threat to human health. Monitoring data contain no hint of a decline in quality, mainly because upper soil layers in most parts of the region act as filters.

The longer-term pollution trends in the Headwaters, as in most of the rest of Illinois, have been positive. In the mid-1970s, for example, airborne particles from fields, coal-burning power plants, and other





*The red shiner is tolerant of silt in water and can survive and thus populate waters that more fastidious cousins like the spotfin shiner cannot survive. Red shiner numbers in the Headwaters have increased relative to the spotfin shiner as farming has intensified.*

sources gave this part of Illinois some of the poorest visibility in the contiguous U.S. In recent years monitors in even heavily urbanized Champaign-Urbana report no violations of standards for particulate matter, ozone, or sulfur dioxide.

At the turn of the present century, the Salt Fork of the Vermilion River was the ultimate dump for Champaign-Urbana's sewage. By the 1920s the stream was reported (perhaps with only slight exaggeration) as being fishless as far downstream as the town of Homer. Water quality in the Headwaters improved in the 1970s and '80s, thanks mainly to better treatment of such sewage. In 1972 the Vermilion's Salt Fork and the Embarras River suffered "moderate" pollution; ten years later, both streams were judged to have only minor pollution.

- The principal form of farm-related pollution is eroded farm soils in the form of stream-clogging sediments. Surveys of Champaign County streams dating back to 1892

showed that the numbers of fish species present dropped by one fourth from 1928 to 1959, in substantial part because of the introduction of intensive agriculture techniques.

The removal of soil from exposed fields and stream embankments is a natural process, and up to a point a welcome one. Unfortunately, the soil-moving power of a hard rain on loess-based soils is substantial. Maximum daily sediment load—the total amount of soil particles suspended in water—measured at the Vermilion River at Danville during 1980–81 was nearly 55,000 tons.

As early as the turn of the century, when parts of the Headwaters had been under constant cultivation for 60 years, evidence of soil wasting was plain, although topsoil losses never reached the catastrophic levels seen in the hilly parts of far southern or western Illinois. Headwaters soil loss per acre in recent decades appears to be low compared to much of the rest of Illinois—5–10 tons per

### *The Area at a Glance*

△ Today forests of all types cover slightly more than 2% of total land area of the Headwaters compared to more than 11% statewide. Even so, species composition remains relatively rich and includes rarities such as the false hellebore, a state-listed plant.

△ The trees that do survive in the area tend to grow in blocks that are larger than 500 acres, generally considered the minimum size to provide viable breeding for forest birds.

△ Scientists estimate that, in presettlement times, 40–45% of the land in Champaign and Ford counties was wetland, mostly wet prairie, prairie potholes and floodplain forest. Less than 1% remains wetland of any type.



## Drainage

**A**part from the plowing of the prairie, the most ecologically significant change made by humans to the Headwaters ecology is the least visible—its massive artificial drainage system. Euro-American settlers found the region a less than congenial environment. Much of its prairie land was too wet to farm, and the mosquitoes that bred in the wet low ground, wrote one local historian, “yielded to the early settler their quota of fever and ague.” Congress considered such land nearly worthless, and gave away 1.5 million wet acres to the State of Illinois in 1850 with the instruction to sell them (for no less than a dime per acre) and use the proceeds to build levees and drainage systems.

Only the biggest farm operators could afford to “ditch and drain” the wet prairies. (In the early 1880s draining one 7,500-acre parcel in Champaign County took four years and \$300,000.) The General Assembly in 1879 had authorized the formation of drainage districts empowered to tax local landowners to pay for such improvements. Tiling of fields began on a massive scale in the 1880s. The area around Champaign-Urbana,

thanks to the University of Illinois, became a sprawling outdoor laboratory for testing new ideas in drainage engineering. In Champaign County alone, some 120 drainage districts were formed, covering 85% of the county. Today some 65–70% of the land in Champaign and Ford counties is underlain with tiles, which empty into an extensive network of surface drainage ditches.

Not since the glaciers retreated has any single hydrologic change so affected the Headwaters region. While human disease rates dropped with the demise of mosquitoes’ breeding habitat (one of the happier consequences of ecological change from a human point of view), populations of wetland species types declined. Numbers of Blanding’s turtle and the massasauga rattlesnake have dropped enough to get both species put on the Illinois Department of Natural Resources’ “watch” list. The eastern newt, once thought to occur across Illinois, no longer is found in the state’s central counties due to the draining of prairie marshes. And wet prairies, once so common, today scarcely exist in central Illinois, and none at all are found within the Headwaters region.

acre per year even in the 1980s, when row-crop plantings reached historic highs.

There has been some recovery in fish species diversity in the region’s streams since 1959, presumably because of more efficient fertilizer use, conservation tillage, and other environment-friendly practices adopted by the region’s farmers. Agriculture remains a source of significant pollutants nonetheless, if only because so much Headwaters land is farmed. Farm chemicals for example can move off the farm in dust, dissolved in rainwater, attached to eroded soil particles, or as volatilized gases. These migratory chemicals are a principal source of nonpoint pollution across rural Illinois.

Headwaters ecosystems have changed not only in extent, but also in their usage by humans. Consider the Headwaters’ forested land. Unlike a century and a half ago, trees provide not fuel and forage but fun. All the popular recreational spots in the Headwaters are located in or near woods, as are the majority of the region’s nature preserves. The State of Illinois, county forest preserve districts, and local parks departments maintain a sizable system of public parks and preserves along the Middle and Salt forks of the Vermilion River.

While not tourist meccas, these places are a considerable local amenity—increasingly a factor in economic development. They offer trees and varied terrain in a part of the state

that otherwise has very little.

Opportunities for swimming and boating are plentiful, as are snowmobiling and cross-country skiing in season, plus hiking and horseback riding. The quality of local sport fishing exceeds the Headwaters’ reputation for angling, thanks to the quality of local streams; among the prizes are smallmouth bass, a game fish with fastidious taste in clear water.

Because of the lack of forest cover, Headwaters’ hunters manage harvests of deer less than a quarter of those taken in some of the more wooded counties along the Mississippi. Partly as a result, Ford and Champaign are two of only seven Illinois counties where hunters spend



more time chasing pheasants rather than deer. The bird is better adapted than most game birds to the Headwaters farmscape, and hunters took nearly 26,000 birds in 1987–93.

Within certain limits, many native Illinois animals can adapt to a world altered for and by humans. Spotted sandpipers are known to frequent strip mine ponds in the Headwaters. The striped chorus frog can breed today in flooded fields and roadsides ditches just as it did a century ago in prairie wetlands or potholes. In important respects, former prairies and savannas that grow wheat, oats, or hay and other forage crops continue to function as grasslands. (All are grass plants.) In fact, the initial conversion of prairie to “secondary grasslands” may have enhanced Illinois’ habitat for certain birds such as the dickcissel and the prairie chicken.

Even row-crop land is not devoid of wildlife. Indeed, a few native species (American kestrel and horned lark among several others) thrive in them. Migrant shorebirds light in flooded fields. The native ground squirrel, meadow jumping mouse, and woodchuck are common around farmsteads (as are the non-natives familiar from cities—house sparrows, pigeons, European starlings, house mice, Norway rats). Birds commonly found in prairie, including such listed species such as the northern harrier, Henslow’s sparrow, and upland sandpiper, have survived on fallow farm fields.

Nonetheless, the Headwaters is a “population sink” for many bird species. Too few birds are produced to replace those that die, mainly because predators feed on their eggs

and their young and other species parasitize their nests. The populations are stable overall only because of migration into the region by birds born elsewhere.

There are limits to nature’s adaptability. The more specifically a creature is adapted to an environmental niche, the more vulnerable it usually is to changes in the world that surrounds that niche. The silvery salamander lives in underground burrows built in forests by shrews and mice. The adults emerge to migrate to woodland ponds, where they mate and lay their eggs. Woodland ponds are distinct from streams or backwater lakes by having no egg-eating fish in them. And they differ from roadside ditches temporarily flooded by spring rains in their relative longevity, since the ponds must retain water until the young salamanders can crawl out of them in mid-June or so. The only place in Illinois that meets the silvery salamander’s exacting conditions is Kickapoo State Park, where dwell the entire documented population of 182 adults.

### Human Presence

The Headwaters remains sparsely populated by humans. Its 1990 population, most of which lives in Champaign County, was under 200,000 persons. The region’s population density overall is only three-fifths that of the state average; if the Headwaters was as densely populated as suburban Chicago, it would be home to nearly 4 million people.

Urbanized Champaign County has grown faster than the state as a whole, especially in recent years (429% between 1870 and 1990, com-

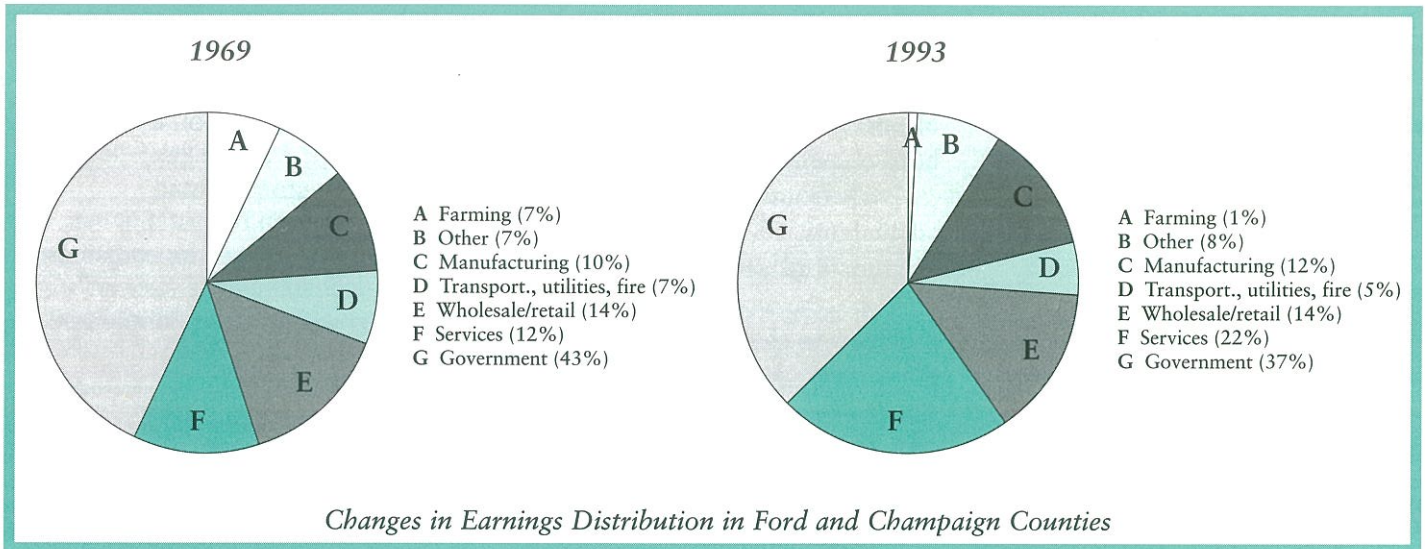
### *The Area at a Glance*

△ Significant populations of all the songbirds common to this part of the world, from yellow-billed cuckoos to great crested flycatchers, can be found in the Headwaters, as well as endangered or threatened species such as sharp-shinned hawks, long-eared owls, and veeries.

△ The Headwaters is a “population sink” for many bird species, meaning that more birds die in the region (mainly through nest predation and parasitism) than are born there. The populations are stable overall only because of migration into the Headwaters by birds born elsewhere.

△ The region has been occupied by humans more or less continuously for 12,000 years. More than 800 sites of Native American camps, villages, and burial grounds have been found here.





pared to 350% statewide). While fewer people live in neighboring Ford County than did a generation ago, more of them (an increase of 13% since 1970) live and work in towns.

In contrast, the Headwaters' rural areas are losing people. The population of Ford County has grown only 57% since 1870 and even slipped 13% since 1970. Fewer farms mean fewer farm families, and improvements in farm technology have made it pos-

sible for farm families to work more and more land. (In 1993, only 2% of the area workforce was engaged in farming.) The result is a continuing growth in the size of the average Headwaters farm. The number of farms in Champaign and Ford counties dropped 23% in the past 25 years. In spite of that, the region continues to be an efficient food factory. Except for drought years, Headwaters grain farms earned dis-

proportionately more per acre (measured in cash receipts) than did the average Illinois farm.

While the region's farm income remains high, total farm earnings are a fraction of those of manufacturing, government, and services, which has expanded locally, thanks to medical services and regional retailing in Champaign-Urbana. Farming accounted directly for 1% of earnings in 1993 in Champaign and Ford counties—a drop of 60% since 1969, or roughly as much as relative farm earnings have declined across the rest of Illinois. Rural local governments (including schools) have always depended on farmers for revenues, but farmland's relative contribution to the local government tax base also is shrinking. In heavily rural Ford County, farm property accounted for 48% of the property tax base in 1993 compared to 63% in 1981.

Agriculture is perhaps more significant economically than such statistics suggest. A larger workforce is employed in support of those farmers, in the finance, chemicals, and equipment businesses. Food

**I**llinois' long growing season is a crucial factor in its agricultural productivity. There is a trend detectable over recent decades toward a longer growing season, in spite of a cooling trend overall. Data after 1980 suggest



a possible return to a warming trend, but speculation that global warming may alter that seasonal cycle cannot yet be demonstrated. (Courtesy: Illinois US Dept. of Agriculture, National Resources Conservation Service)



processing also adds to the farm-related employment; Kraft Foods is the Headwaters' number two employer.

**Restoration**

What humans have done they often—within limits—can undo. According to travelers' accounts, wild turkeys were as common in the Headwaters of the 19th century as pigeons are in cities today. The bird was later extirpated in Illinois, but a population has been re-established along the Middle Fork. While poor physical habitat and increased urbanization make full recovery unlikely, since 1959 most Champaign County streams have seen revived populations of finicky native fish species such as black

bass and channel catfish.

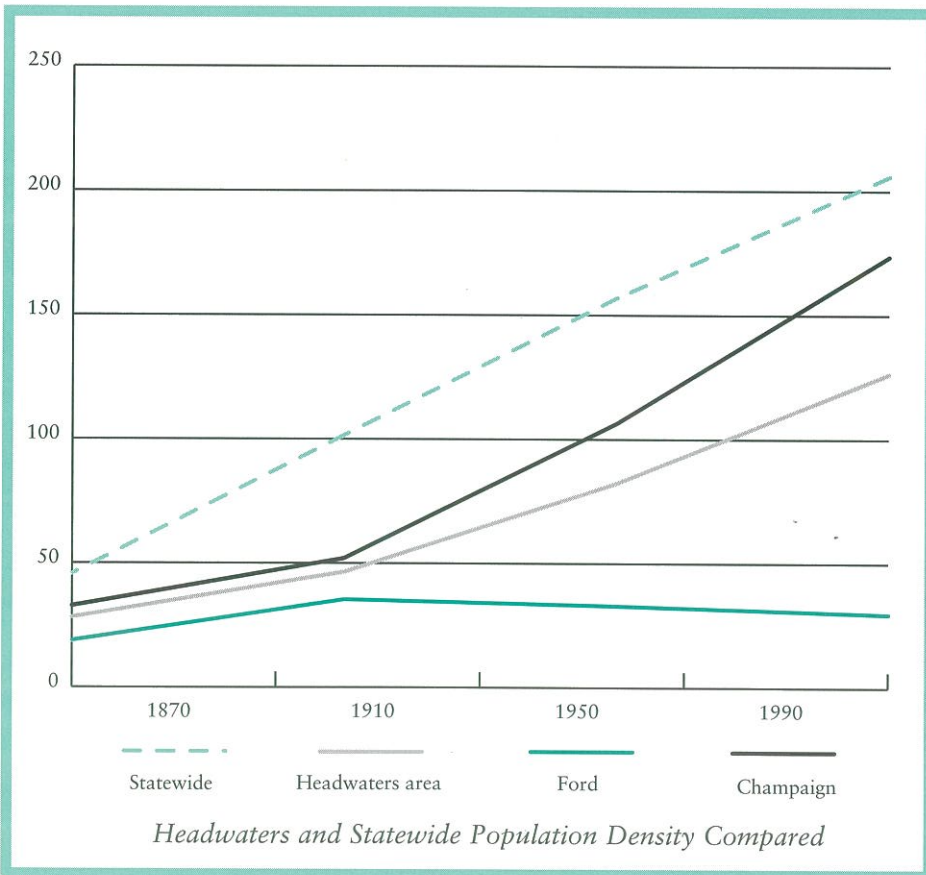
Well-designed conservation and recreation projects seek to make the most efficient use of land, just as scientific farming sought to do in the previous century. Reforesting stream banks, for example, enhances game-fish habitat while filtering runoff from fields. A once-drained low field re-engineered back into a marsh creates bird habitat while it catches the eroded soil that otherwise would end up in a ditch. Most of the wetlands under public stewardship in the Headwaters are managed to attract game waterfowl such as ducks and geese. Maintaining marshy borders in such waterfowl management areas would attract rare species as well, and add birding to the list of activities available at the site.

**The Area at a Glance**

Δ The region's population density overall is only 3/5 that of the state average, but Champaign County has grown faster than the state as a whole, while Ford County has lost population.

Δ In 1993, government and services supplied more than half the employment and earnings in Champaign and Ford counties; farming accounted for only 2% of the workforce and 1% of the earnings.

Δ Western Champaign County and most of Ford County are underlain by sand and gravel aquifers that supply most of the water in the area.





## Geology

Everything about the Headwaters region, from its soil chemistry to its terrain, owes to the massive reordering of the land by ice and water. The Wisconsin ice sheet that dominated the Headwaters until about 12,000 years ago crushed an earlier landscape under a mile-thick sheet of ice. It left behind glacial debris known as drift—crushed bedrock consisting of dolomite, limestone, and sandstone of varying antiquity. This debris ranges in size from dust to boulders and filled in the ancient valleys, leaving a surface of impressive, if tedious, flatness.

Much of that surface was itself subsequently buried by loess. Known to geologists as Peoria Silt, this loess is particles of quartz, feldspar, mica and other minerals mixed with clays that were ground into dust, from bedrock, by glacial ice. On this foundation was built the economy of modern central Illinois. Rich in chemicals, moderate in pH, this talcum-powder-like material originally was deposited in great sheets along the floodplains of the Illinois River valley to the west; from there it was carried many miles downwind. Most of Champaign County is blanketed with 24–60 inches of loess; a few miles to the northeast, in Ford County, it is less than 20 inches thick on average. The difference partly explains why grain yields on Ford County farms tend to be lower than Champaign County's.

The richness of the Headwaters' best soils also owes partly to their youth. Surface soils there have been acted upon by weather for only about 12,000 years—not long enough for leaching and exposure to seriously drain their mineral fertility. In far southern Illinois, surface soils have lain exposed for 60,000 years, during which time they have lost much of their original wealth of chemical nutrients.

*Glacial erratic, hundreds of miles from its origin*

“Glacial erratics” here and there protrude from the surface of the glacial rubble that buries them. Some are chunks of igneous bedrock-like granite that were ripped up by ice and shoved hundreds of miles from their origins north of the Great Lakes. Some blocks of dolomite (mainly in Champaign, Ford and Vermilion counties) are large enough to be mistaken as eruptions of bedrock. Because they were ice-borne only tens of miles rather than tens of hundreds of miles, these behemoths were not broken up or worn down by their passage. Settlers crushed and burned rock from these portable quarries in local kilns to make cement, or cut it into building blocks.

A half-dozen state-recognized natural areas in the Headwaters offer glimpses of its glacial past, usually where streams have sliced open the covering mantle of drift. Most of what is visible are the deposits laid by Illinoian- and Wisconsin-era ice, but one can also see shales and (in the Ocoya Geological Area in Livingston County) fossil-bearing limestone laid down in a warm ancient sea that predated the ice.



ARDITH HANSEL

Opportunities to restore nature persist in the form of stream corridors, river-edge parks, even roadsides and the hedgerows that still separate some fields. A significant percentage of the area's grassland habitat consists of grassy strips along roads. Planted in appropriate species and managed in ways that delay mowing until fledglings are out of nests, these linear

preserves enormously boost populations of grassland birds such as the grasshopper sparrow and Eastern meadowlark. Roadside plantings benefit humans too, by adding color and variety to the countryside.

Connecting disparate habitats can make even fragmented countryside more than the sum of their parts, ecologically speaking. For

example, the trees that do survive in the area tend to grow in blocks larger than 500 acres, which is generally considered the minimum size to provide viable breeding for forest birds. Much of these mini-forests are in public ownership or are otherwise protected. These include the State of Illinois' Mackinaw River Natural Area at 1,700 acres, Sangamon River



## Salines

Long before European newcomers named it, the Salt Fork of the Middle Fork River was known as a source of that essential mineral. Several bison trails converged on saline springs bubbling from a bluff on the stream's north bank where it enters the Middle Fork in Vermilion County. Indeed, early travelers reported that so many animals of all types visited there that the soil had been trampled free of grass all around.

Bison were not the only large mammals in the Headwaters to go out of their way to get salt. Extracting salt from briny groundwater was one of the first industries set up by humans. Many American histories state that the Salt Fork springs were "discovered" in 1819, but French explorers had noted their presence a century previously, and long before that the Kickapoo people had collected salt there.

Boiling briny water in large iron kettles concentrated the salt, which was then dried for shipping. The Salt Fork operation had as many as 80 kettles boiling, and in 1848 yielded 120 bushels each week. This was a modest output even by standards of the day, and one that was inefficiently obtained. A geologist in 1870 wrote that the Salt Fork springs were but "feebly impregnated with salt." Every 170 gallons of brine yielded but one bushel, while mines in far southern Illinois returned a bushel of salt for every 2.5 to 5.5 gallons of brine.

The availability of cheaper salt from other sources meant that the Salt Fork works made money for only a few years. Unlike other early extractive industries, such as coal mining, salt-making left no scars on the land—only historic bric-a-brac like the kettle on display at the Salt Kettle Rest stop on I-74 West near Oakwood.



*The Salt Fork of the Vermilion River*

MICHAEL R. JEFFORDS

### *The Area at a Glance*

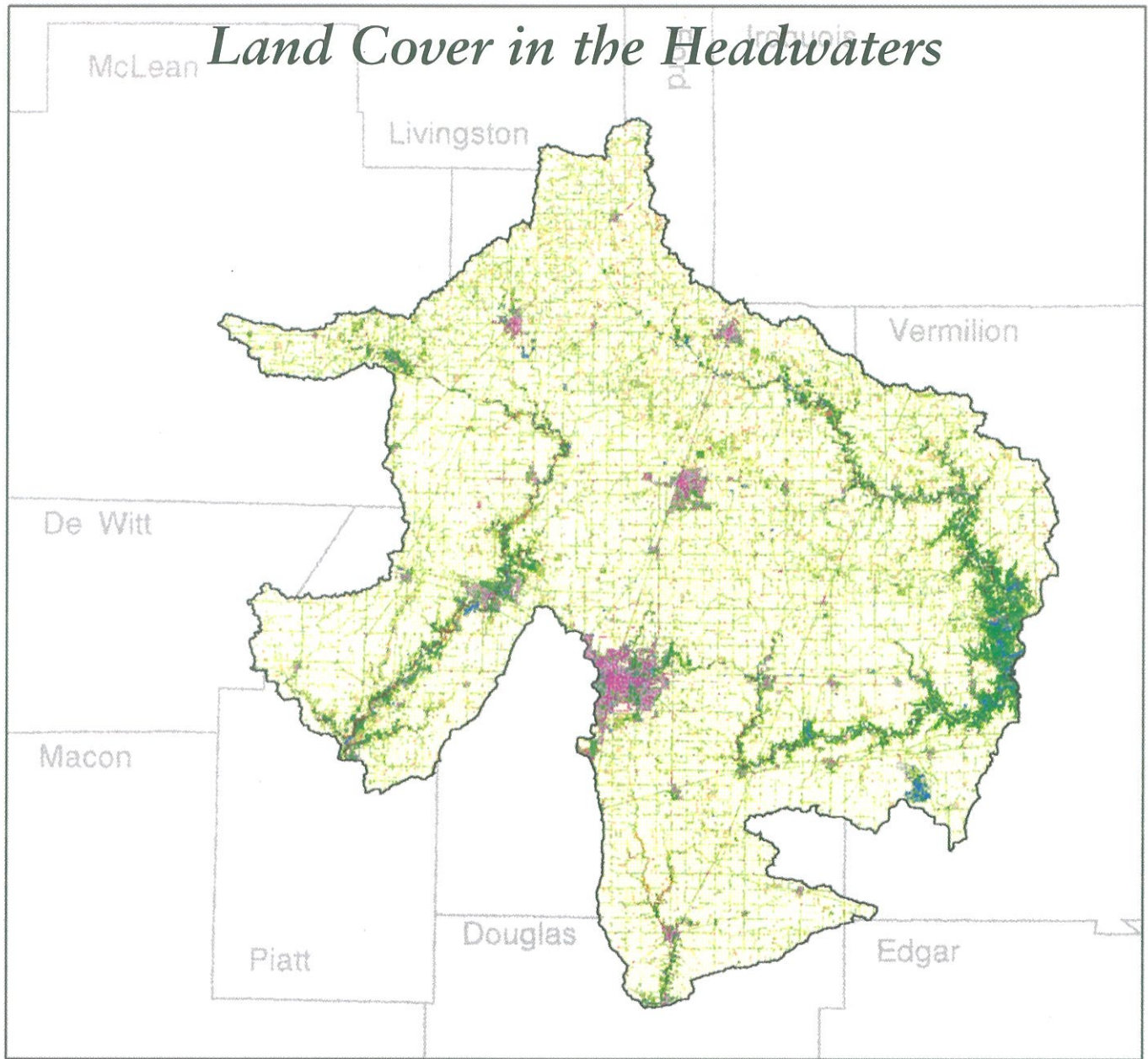
△ Local water quality is considered generally good and atmospheric visibility, stream water quality, and fish species diversity are much improved in recent decades.





















△ The Headwaters has relatively more days with freezing rain and fog compared to the rest of Illinois; otherwise local weather is relatively benign in terms of mean precipitation and susceptibility to weather extremes such as drought, heavy snows, and tornadoes.

△ In recent decades, soil loss per acre appears to have been low compared to much of the rest of Illinois (5–10 tons per acre per year) even in the 1980s when row-crop planting reached historic highs.

△ A sizable system of public parks and preserves has grown up along the Middle and Salt forks of the Vermilion River.



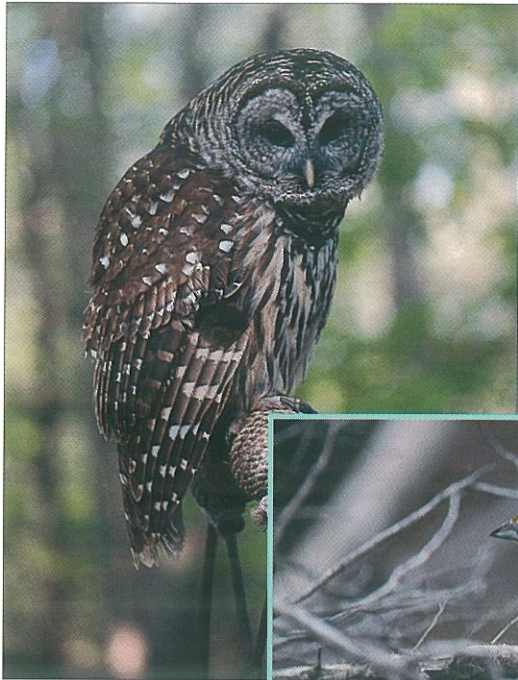


- |  |   |
|--|---|
|  Basin Boundary         |  County Boundaries |
|  Urban - High Density   |  Open Wooded       |
|  Urban - Medium Density |  Coniferous        |
|  Urban - Low Density    |  Open Water        |
|  Row Crops              |  Shallow Marsh     |
|  Small Grains           |  Deep Marsh        |
|  Orchards               |  Bottomland Forest |
|  Urban Grass            |  Swamp             |
|  Rural Grass            |  Shallow Water     |
|  Deciduous              |  Barren            |

0 Scale 24 Km







JAMES P. ROWAN



*Headwaters forests host such locally rare species as the barred owl (left) and “secondary grasslands” provide habitat for birds such as the dickcissel (below).*

Natural Area (1,050 acres), and Middle Fork of the Vermilion River Natural Area (590 acres); the Kickapoo State Park (2,850 acres); Champaign County’s forest preserves at Middle Fork River (1,500 acres), Lake of the Woods (900 acres), and Salt Fork River (800 acres); and Vermilion County’s 2,500-acre Kennekuk Cove County Park.

Improving forest corridors that link larger wooded areas in the Headwaters river valleys would make extensive habitat available to far-ranging animals like the bobcat or gray fox at a cost of only a relatively few restored acres.

Today’s Headwaters contains only 7.9 known acres of undegraded tallgrass prairie. Restorable remnants of lesser ecological quality have been identified by local conservation groups such as Grand Prairie Friends. Restored prairies have a significance out of proportion to their size.

Projects at Kennekuk Cove County Park and Middle Fork River Forest Preserve have attracted populations of bobolinks, Northern harriers, and Henslow’s sparrows. These patches also serve as seed sources for efforts to rebuild prairie from scratch or restore ones that languish in poor condition.

Many such projects are already underway around the Headwaters thanks to local volunteers, enlightened property managers (including industry), and new government initiatives. While the large tracts of land set aside for nature are in public ownership, not all the habitat is on protected public lands; the ovenbird, one of the region’s less common breeding birds, nests in large woods on Illinois Power property south of the Middle Fork Wildlife Area.

There is a local tradition of private involvement in nature protection and restoration. Several local nature

### *The Area at a Glance*

△ Restored prairies at Kennekuk Cove County Park and Middle Fork River Forest Preserve have attracted populations of bobolinks, northern harriers, and Henslow’s sparrows.

△ Just as modern agriculture has turned the best farmers into scientists, so the expanding field of ecological restoration is turning scientists into farmers.

△ Private involvement in nature protection and restoration is a local tradition—several nature preserves are managed by private groups such as the Audubon Society and cemetery associations.



*Prairie coneflowers at Prospect Cemetery Prairie (right) and compass plant leaf (below) from a prairie remnant, Ford County. The compass plant is so named because its leaves orient themselves in a north-south direction to take full advantage of the sun's rays.*



ROBERT J. REBER



preserves are managed by private citizens organized as the Audubon Society and cemetery associations. The region's birdwatchers have added enormously to the store of knowledge about species habits, and thus their habitat needs. Danville citizens donated much of the money that made possible the purchase of the defunct strip mine that became the popular Kickapoo State Park.

Success in future conservation and restoration projects can draw upon two other local traditions: agricultural innovation and science. The first is rooted in the century-old partnership between local farmers and the University of Illinois and kindred institutions. And thanks mainly to the presence of the University and

the state scientific surveys, the Headwaters has served for decades as an outdoor laboratory for ecological research. As a result, far more is known about fish and bird life in the

Headwaters than in any similar farming area in Illinois. The two traditions point toward a productive new hybrid. Just as modern agriculture has turned the best farmers into scientists, so the expanding field of ecological restoration are turning scientists into farmers.

In spite of the relative decline in the economic importance of farming in the Headwaters, the old Grand Prairie is unlikely to return to grand prairie any time soon. Headwaters soils are too fertile, the terrain too conveniently flat for large tracts of it to be used for anything but large-scale grain farming or building, and its distance from large urban areas saves it even from the latter. Farming will remain the way most Headwaters land is used for a long time, even as it ceases to be the way most Headwaters people are sustained. But it is not likely to be the only way land is used. ❁



MICHAEL R. JEFFORDS

*Canada geese swim in a pool created from a rehabilitated strip mine in Kickapoo State Park. Local citizens purchased the land.*



(continued from inside front cover)

In addition to coordinating IDNR programs with those of Ecosystem Partnerships, the Ecosystems Program:

- provides technical assistance to the partnerships, such as resource management plans for use by participating landowners;
- assesses resources in the area encompassed by each Ecosystem Partnership, collecting data that the local partners themselves may use to set project priorities and design projects, and supplying scientific support to ecosystem partners, including on-going monitoring of Ecosystem Partnership areas;
- funds site-specific ecosystem projects recommended by each partnership. Such projects may involve habitat protection and improvement, technical assistance, and research and education, including projects that seek to expand the relationships between natural resources, economic development, and recreation.

To provide focus for the program, IDNR developed and published the *Inventory of Ecologically Resource-Rich Areas in Illinois*; detailed regional assessments are being completed for resource-rich areas in which a public-private partnership is formed.

*The Illinois Headwaters: An Inventory of the Region's Resources* is based on one of these assessments, the *Headwaters Area Assessment*. The assessment was compiled by staff of IDNR's Division of Energy and Environmental Assessment, Office of Realty and Environmental Planning; the Illinois State Museum and the Illinois Natural History, State Geological, and State Water Surveys of IDNR's Office of Research and Scientific Analysis; and Ecological Services of Urbana, Illinois.

The *Headwaters Area Assessment* and all other CTAP and Ecosystems Program documents are available from the IDNR Clearinghouse at (217)782-7498 or TDD (217)782-9175. Many are also available on the EcoForum Bulletin Board at (800)528-5486 or (217)782-8447. Documents also are available on the World Wide Web at

<http://dnr.state.il.us/ctap/ctaphome.htm> and

<http://dnr.state.il.us/c2000/manage/partner.htm>.

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

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COVER: THE MIDDLE FORK OF THE MACKINAW RIVER, MICHAEL R. JEFFORDS

PUBLICATION DESIGN: GRAY INK



