

## C H A P T E R F O U R

## Rock River Watershed

Illinois' third largest ISIS watershed is located in the northwestern part of the state. It has the most grassland acreage in the state, as well as the highest percentage of land in grasses. The Rock is the third most urbanized watershed (in both acreage and percentage of land), with only the Fox/Des Plaines and Kaskaskia watersheds being more urbanized. (See page 103 for a color map of the watershed's land cover.)

Five sites within the watershed have been designated as Resource Rich Areas (RRA) — the Driftless Area, Kishwaukee River, Rock River, Sugar River, and Mississippi-Lower Rock River.

- The 300-square-mile Driftless Area RRA is a unique part of the state because it escaped Pleistocene glaciation. The area is characterized by rolling hills and wooded ridges and includes canyons, ravines, bluffs and palisades. Some of the flora and fauna are distinctive and unique in the state, including several plant species which are northern species or preglacial and interglacial relicts.
- The Sugar River RRA is characterized by a wide, wooded riparian corridor of floodplain forest

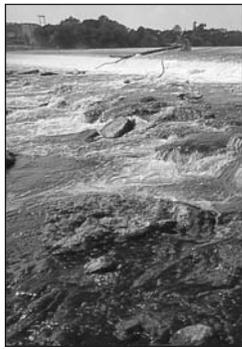


and upland woods. The smallest RRA at 23.7 square miles, the area is along an important bird migration route and provides habitat for several unusual amphibians and reptiles.

- The natural resources of the 101-square-mile Kishwaukee River RRA are concentrated along the wooded corridor of the river. Originally the area was savanna with many sloughs and marshes, but is now primarily agricultural.

- The Mississippi-Lower Rock River RRA encompasses 715 square miles — 81% in the Rock River watershed and 19% in the Spoon River watershed. It includes major rivers, bottomlands, upland forests, prairies and river bluffs. The area has a relatively high total acreage of natural areas because of the Mississippi River sites.

- The ecological core of the 322-square-mile Rock River RRA is the river corridor from Rockford to Dixon. Significant features include upland and floodplain forests, seeps, springs, prairies, aquatic systems, cliffs and bedrock outcroppings. Some of the habitats support relict boreal plants which are more normally found farther north in Wisconsin and Minnesota and in the Appalachian Mountains.



*Significant features include upland and floodplain forests, seeps, springs, prairies, aquatic systems, cliffs and bedrock outcroppings.*

**Table 15. Watershed Land Cover**

Land Cover	Acres	Percent of Watershed	Statewide Percentage*
Upland forest	297,383	7.3% (8)	7.2% (5)
Grassland	1,073,788	26.2% (1)	16.7% (1)
Non-forested wetlands	37,092	0.9% (5)	10.5% (5)
Bottomland forest	49,663	1.2% (8)	5.7% (8)
Water	63,506	1.6% (4)	12.7% (4)
Urban/built-up	175,492	4.3% (3)	9.4% (3)
Cropland	2,398,071	58.6% (8)	11.1% (5)
Total acreage	4,094,998	100.0%	11.3% (3)

\* The watershed's percentage of the land cover type statewide, e.g. 7.2% of the state's upland forests are located in this watershed. Note: the watershed's rank (1st-10th) is shown in parentheses.

## ECOSYSTEM MONITORING

CTAP biologists assessed eight streams in this watershed. The region had the worst average HBI score of all watersheds, indicating that its streams were the most organically enriched. Since the watershed is heavily grazed by livestock, the HBI average is not surprising. The Rock also had lower than average EPT richness, fish richness, and habitat quality. While historically it was one of the richest watersheds in EPT and native fish species, the loss of vegetated riparian zones, stream channelization, siltation, and livestock grazing have taken their toll.

The best stream sampled was Elkhorn Creek near Milledgeville. It had a habitat score well above the state and basin average, but it also had a relatively low native fish richness. The worst site was Coal Creek near Mineral in Bureau County. It had recently been dredged, so the bottom was mostly clay overlain by loose sand and silt. It yielded just two EPT taxa and habitat quality was very poor due to channelization, lack of variation in depth, and lack of canopy. However, native fish richness was relatively high for such a monotonous habitat.

RiverWatch collected 179 samples at 75 sites on 50 streams between 1995 and 1999. Its biological indicator data also suggest that the Rock River watershed is of slightly below-average

**Table 16. Watershed Indicator Scorecard**

Indicator	Watershed Value	Statewide Value	Watershed Ranking
<i>Macroinvertebrates</i>			
HBI	5.8	5.2	10
MBI	5.5	5.7	4
EPT richness	6.4	7.1	7
EPT taxa (RW)	2.7	2.6	6
Taxa richness	8.8	8.9	7
Taxa dominance	80.2%	80.4%	6
<i>Fish</i>			
Native fish	13.0	13.6	6
Darter richness	1.7	1.9	8
Exotic species	0.5	0.2	10
<i>Habitat</i>			
Habitat score	80.5	88.6	8

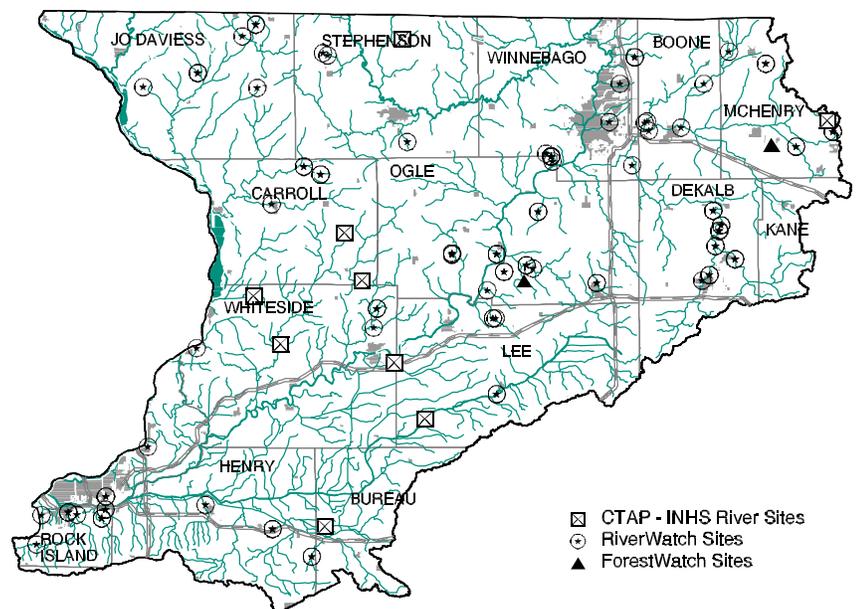
ecological quality (Table 16). The watershed ranked near the median in MBI and EPT taxa, both indicators of organic pollution. Taxa richness and taxa dominance are also slightly below average, showing lower diversity in macroinvertebrates than other watersheds. Midge larvae, scuds, and hydropsychid caddisfly larvae were the three most dominant taxa overall. Each is among the state's most common macroinvertebrates.

**Table 17. MBI Values**

Statistic	1995	1996	1997	1998	1999	Overall
Average	6.07	5.52	5.60	5.41	5.24	5.46
Standard deviation	1.19	0.65	0.97	0.82	0.89	0.89
Minimum	4.10	4.34	4.20	4.30	3.09	3.09
Maximum	7.63	6.81	8.87	7.67	7.68	8.87
Number of sites*	9	28	41	49	46	173

\* Only samples with at least 25 organisms were included in the analysis.

Statistical analysis did not detect any major trends in MBI (Table 17). Values decreased over the five years, suggesting improved stream quality, but the change is not statistically significant and was probably exaggerated by blood worm identification errors in 1995.



**Figure 29. Monitoring sites**

## REGIONAL ASSESSMENTS

Five regional assessments have been completed for the Rock River Watershed — for the Upper Rock River Basin, Lower Rock River Basin, Kishwaukee River Basin, Sugar-Pecatonica Rivers Basin, and the Driftless Area.

### Upper Rock River Basin



The Upper Rock River covers nearly 640,000 acres (999 square miles) in north central Illinois. It consists of eighteen sub-basins between Rockford and Sterling that drain into the Rock River. It is typical of agricultural Illinois — rolling, rural, prosperous — except for the rocks. Bedrock has been pushed to the surface here. Exposed rock forms canyons, bluffs, and ravines. Where it has been crumbled by weather it creates unusual soils, which foster the development of equally unusual natural communities.

Agriculture is the dominant land use in the area, as it is across most of the state. Sixty-one percent of the area's acreage is devoted to croplands, slightly above the state average. Grasslands (mostly pasture, but also prairie, rights-of-way, and such) account for 23%, compared to 18% for Illinois. Forests and woodlands are the next-largest category with 8%, which is below the state average of 11%. Forests are concentrated on the uplands along the Rock River and its major tributaries. Urban and built-up coverage matches the state share of 6%.

Wetlands and open water combine for less than 3% of the area, compared to about 5.5% for the state. The distinctive landscape provides an array of natural habitats:

- several of the 33 Illinois Natural Area Inventory sites contain ecosystems of statewide significance — cliffs, bluffs, soils, and plant life associated with St. Peter's sandstone bedrock that are unique to this part of the state,
- 17 miles of streams (segments of the Kishwaukee and Rock rivers) have been

designated as Biologically Significant,

- 206,215 acres have been designated a state Resource Rich Area,
- the Castle Rock State Park/Lowden-Miller State Forest complex is home to more breeding pairs of forest bird species (85) than any other part of Illinois.



The basin supports nearly 800 native plant species, or 38% of the species native to Illinois.

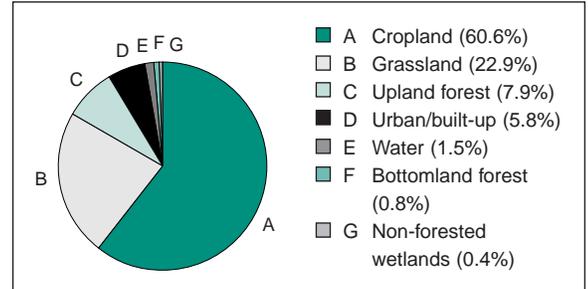


Figure 30. Upper Rock River basin land cover

### Plant and animal life

The basin supports nearly 800 native plant species, or 38% of the species native to Illinois. Thirty-eight plants are listed by the state as threatened or endangered. The prairie bush clover is also on the federal list of threatened species. Over half of the area's threatened or endangered species are associated with the St. Peter's sandstone bedrock and its derivative soils.

Basin acreage - 639,479 acres  
 State land\* - 5,303 acres  
 Total natural areas - 6,020 acres  
 High-quality natural areas - 200 acres  
 Nature preserves - 1,050 acres

*\* Does not include natural areas or nature preserves that may be state owned.*

The area has high terrestrial species diversity due to the range and extent of habitats. Birds account for the vast majority of state threatened and endangered species (T&E); the river otter is the sole T&E mammal. Among reptiles and amphibians, the four-toed salamander, western hognose snake, and Blanding's turtle are listed as T&E species. Nearly all reptiles and amphibians that existed in the area before European settlement are still present. Three T&E fish species and five mussels have been recorded in the area, but their continuing presence is unlikely.

## Local economy and outdoor recreation

The three main counties in the Upper Rock River basin — Winnebago, Lee and Ogle — account for 3% of Illinois' population and 2.5% of its personal income. Winnebago County accounts for 80% of the area's economic activity. Following national and state trends, the area economy has shifted towards the service sector — between 1969 and 1993, employment in the services sector grew from 14% to 29% of total employment, while employment fell from 39% to 24% in the manufacturing sector. Thanks to higher wages, however, manufacturing remains the largest sector in terms of earnings.

Outdoor recreation opportunities in the area are driven largely by the Rock River itself. The Rock is among Illinois' finest fishing streams — especially for walleye and catfish — and boat access is offered at 39 points. Nearly 9,200 acres are publicly owned, accounting for about 1.5% of the total area. Lowden-Miller State Forest is the largest state site, closely followed by the adjoining Castle Rock State Park. The area's five major state sites attracted nearly 1 million visitors in 1994 and created 250-300 jobs.

## Threats

While the Upper Rock River area's ecology is impressively diverse, it nonetheless faces threats common to Illinois including habitat fragmentation and degradation, stream alteration, and erosion.

**Habitat degradation and fragmentation** - Before settlement, more than one-third of the land was prairie and the remainder was forest. Today, 48 acres (0.02%) of presettlement prairie remains, and 9% of the area remains forested, with 114 acres considered high quality. Remaining habitats are often carved up into habitat "islands", which may not be able to sustain healthy ecosystems over the long run. Large mammals and other far-ranging species lack adequate habitat, and the small populations of plant and animal species that do live here are vulnerable to disease, drought, and a lack of genetic diversity.

Most of the original habitat was displaced by agriculture, but urbanization is now a noticeable trend. In some former agricultural regions in Illinois, such as the Fox and DuPage river valleys,

subdivisions, malls, and office parks have largely replaced farms as the dominant features in the landscape. The same economic and social forces are now pressing on the Upper Rock River area, accelerating fragmentation.



*In some former agricultural regions in Illinois, subdivisions, malls, and office parks have largely replaced farms as the dominant features in the landscape.*

**Stream alteration** - Dams and levees have been built along the Rock River for flood control and electricity generation. Unfortunately, they also raised water temperature, slowed the current, isolated fish and mussel populations, and generally disrupted wildlife that had adapted to the natural cycles of the river.

**Erosion** - The hilly, heavily farmed Rock River basin has been subject to erosion, which costs farmers valuable soil and leads to increased siltation in streams and rivers. This in turn can choke off vegetation and fish nests, impede fish that depend on their sight for survival, and carry pesticides and fertilizer into streams. During the 1930s and 1970s, erosion in the form of gulying was particularly severe. Today, however, only 25% of the land is considered "moderately" eroded, and siltation has decreased since the early 1980s. The change may be due in part to more farmers using conservation tillage and setting aside erodible land in response to federal incentives.

## Opportunities

Many of the changes that humans have made are reversible. For example, controlled burns can kill off tree seedlings sprouting in prairie sod the way that lightning fires used to, and dismantling drainage structures can put the "wet" back into wetlands. If the dams cannot be removed along the Rock River, they should at least be modified to include chutes that both fish and canoeists can use to move up and down the river.

The basin has several large, contiguous habitats that serve to mitigate the problems of



*The amount of potentially restorable natural land in the area is sizable.*

fragmentation. The most significant is the Castle Rock State Park/Lowden-Miller State Forest complex. Most of the 4,225 acres are forested, providing one of the finest bird habitats in Illinois. Large tracts like this offer certain birds protection from competitors and predators that frequent the forest edge, such as the cowbirds that parasitize native songbird nests.

The amount of potentially restorable natural land in the area is sizable. For example, several dozen acres of restorable prairie persist within a golf course maintained by the Byron Forest Preserve District.

The Nachusa Grasslands offer similar potential as a large prairie. The Nature Conservancy site now includes more than 1,000 acres. The Conservancy intends to protect the existing patches of prairie and restore as fully as possible the fields separating them. Ultimately, the plan is to connect Nachusa to Franklin Creek State Park, maximizing the amount of contiguous wildlife habitat.

### Lower Rock River Basin



The Lower Rock River Basin encompasses 2,543 square miles (1.6 million acres) in northwestern Illinois, including substantial parts of Bureau, Carroll, Henry, Lee, Ogle, Rock Island, and Whiteside counties and slivers of DeKalb and Mercer counties. The bulk of the area consists of that

portion of the Rock River's drainage area that lies between the DeKalb/Lee county line and the river's confluence with the Mississippi River near Moline.

Agriculture is the dominant land use with 87.5% of the land cover — high even by Illinois standards. More than 75% of the agricultural land (68% of the total) is dedicated to crop land (mostly row crops, but also small grains and orchards). The remainder consists of rural grasslands, which include pastures, alfalfa and other hay, roadsides, remnant prairies, and other grassland cover in rural areas.

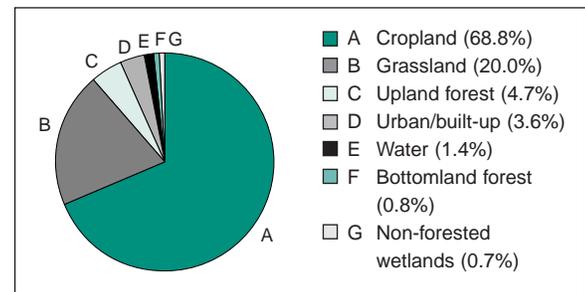
Little of the area's presettlement natural habitats remain. Less than 0.001% of the area's ecosystems are considered high quality, compared to 0.07% statewide. Most of the native prairie was plowed; only 0.002% of presettlement prairie survives. Channel dams have converted the Rock River into a series of lakes, and the rich complex of wetlands, once the area's most distinctive ecological asset, has long since been drained and converted to crop land.

Basin land - 1,627,442 acres
State land* - 10,012 acres
Federal land - 675 acres
Total natural areas - 9,255 acres
High-quality natural areas - 154 acres
Nature preserves - 445 acres

*\* Does not include natural areas or nature preserves that may be state owned.*

Even so, the area's varied topography supports a wide range of ecological communities, which in turn support an impressive variety of species, and largely compensates for the relative scarcity of high-quality habitat. Key features include:

- 44 miles of streams that have been designated Biologically Significant because of their fish or mussel diversity;
- 43 Illinois Natural Areas Inventory sites that include marshes, seeps, two types of forest, and eight types of prairie; and
- Nachusa Grasslands, a 1,000-acre prairie restoration owned by The Nature Conservancy.



**Figure 31. Lower Rock River basin land cover**

### Plant and animal life

An estimated 1,180 plant species can be found in the Lower Rock River area, roughly 80% of which are native to Illinois. Overall, 39% of Illinois' plants

can be found here, a high percentage for an area that encompasses only 4.5% of the state. A more thorough survey would probably uncover more species. While high-quality habitat acreage is low, the variety of habitat has nonetheless promoted a good diversity of plant species. Twenty-nine state threatened or endangered plant species are known from the area. Most are restricted to high-quality natural communities, and more than half can be found in sand prairies.

More than three-fourths of Illinois' mammal species live in the area, including the state threatened river otter. Fifteen amphibian and 27 reptile species are thought to exist here, including the endangered mud turtle, the threatened western hognose snake, and perhaps the threatened timber rattlesnake. Although the area supports a large diversity of aquatic species, some species have disappeared from the drainage in recent decades. With improvements in water quality, extirpated species could conceivably return.

### Local economy and outdoor recreation

Between 1870 and 1990 the population of the five main counties in the basin grew 117% to 330,000, or 2.9% of the state total. By 1994, the area supported nearly 176,000 jobs and generated \$4.6 billion in personal income. Rock Island County accounted for more than 50% of the employment and 60% of the income. Since 1970, employment has grown slowly, at 0.4% annually compared to 1.1% statewide. Meanwhile, the economy has shifted towards the service sector, which accounted for 23% of all jobs in 1994 (up from 14% in 1970) while manufacturing slipped from 26% to 17%.

Recreational opportunities abound in the Lower Rock River area as evidenced by six major state parks and fish and wildlife areas. The 1.5 million visitors at the state sites generate \$16.5 million in economic output and 260 jobs each year. More than 800,000 people visit the Hennepin Canal Parkway State Park each year to fish, boat, canoe, hunt, hike, bike, ride horses, snowmobile, and picnic along the old canal. Part of the Upper Mississippi National Wildlife and Fish Refuge is also located in the area.

### Threats

While the area contains diverse habitat, its ecology nonetheless faces threats common to Illinois: notably habitat fragmentation and degradation, stream alteration, and degraded water quality.

Habitat fragmentation and degradation - Fragmentation, the carving of once-extensive forests, wetlands, and prairies into small habitat "islands" by roads, subdivisions, and farm fields shrinks and modifies habitat. Smaller tracts may not support wide-ranging species, or may support only small populations that are more vulnerable to stress, in-breeding, and local extinction. Significant fragmentation has occurred across Illinois, but is particularly problematic in the Lower Rock area. For example, the area's 1,113 parcels of forested wetlands average only 8.2 acres. Few forest tracts are as large as the 500 acres required by many song-birds. Except for the Nachusa Grasslands, most prairie remnants are also too small to support anything approaching the complexity of the original tallgrass prairie.

Stream alteration - Apart from the clearing of the prairies, no change to the Lower Rock area has had a more profound ecological impact than attempts to alter the flow of water through it. The draining of area wetlands and the tiling of farm fields increases the amount of arable land, but it also speeds the flow of water into area streams, which then rise to flood stage faster, crest higher, and run faster (and thus do more damage to stream-banks). In an attempt to reduce flooding, all but 27 miles of the Green River has been dredged and straightened to increase its water-carrying capacity.

Erosion and sedimentation - The area's loess soils are vulnerable to the forces of wind and water. Erosion accelerated beginning in the 1920s when area farmers, like their colleagues across Illinois, converted from small grains to row crops, which expose more soil. Much of this valuable soil was washed from fields and became sediment in streams, dramatically affecting stream ecology. Fortunately, erosion has been much reduced since the 1980s. Row crop acreage has declined, with most of the region's hilliest, most erodible land taken out of production through the U.S. Department of Agriculture's Conservation Reserve Program. Also, more farmers are using soil-saving



*More than 800,000 people visit the Hennepin Canal Parkway State Park each year.*

tillage methods. Today, three-fourths of basin farmland loses soil no faster than natural processes can replenish it.

**Water pollution** - Two-thirds of the Rock River is now clean enough for the uses to which it is put, according to EPA standards, as is half the Green River. Most remaining pollution can be attributed to excess nutrients from partially treated sewage and runoff from



farm fields, both of which promote the growth of bacteria that deplete water of oxygen. About 58% of the area is deemed at least “moderately” vulnerable to aquifer contamination, due to geological factors. However, such pollution is usually local.

### Opportunities

While pristine examples of original habitats either do not exist or are quite small in the Lower Rock River basin, many acres of degraded natural communities persist. These remnants need to be identified, in particular those restorable bits of floodplain forest, mesic (moist) prairie, and savanna of which few or no high-quality examples remain. If they were restored, they could prove crucial to maintaining the biodiversity of the region.

Many other steps can be taken to increase local biodiversity; the following are just a few of several recommendations.

- Restore grassy and sedge-dominated wetlands to attract threatened and endangered species such as the least and American bitterns, green heron, king rail, and marsh wrens. The Green River Conservation Area in particular would be a likely area for trumpeter swans to begin nesting again in Illinois. While there is a paucity of public sites large enough to attract breeding birds, the smaller areas could be managed as stopover sites to attract migrating species such as warblers and vireos.
- Leave unmowed strips around ponds to provide refuge for reptiles and amphibians and

nesting sites for birds, and delay mowing hayfields in which bobolinks nest to spare young birds, since mowing kills as many as 94% of nestlings.

- Reestablish streamside grasses, shrubs, and trees to restore the ecological richness of streams. For example, in spite of being surrounded by farmland, Fairfield Ditch #1 has clear water because its banks are protected by a sediment-catching buffer of small trees and grasses some ten feet wide.

### Kishwaukee River Basin



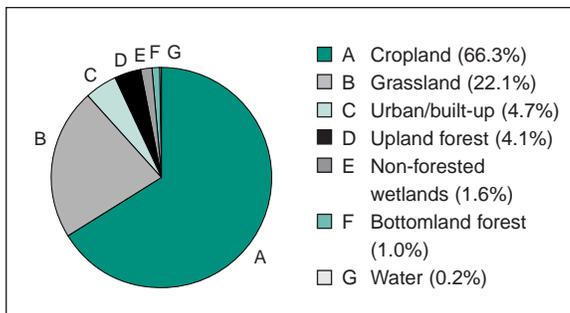
The Kishwaukee River originates just south of Woodstock in McHenry County and flows into the Rock River just south of Rockford. The basin covers approximately 1,218 square miles in parts of seven counties. Much of the land is used for agricultural purposes; only 7% is forest or wetland.

Glaciation, however, has left moraines, sub-glacial channels, terraces, out-wash fans, valley train deposits, and bedrock highs in the area. The Marengo Moraine is the oldest moraine in the area and is one of the most striking glacial landforms in Illinois.

Though much of the land has been altered for agriculture, unique natural communities remain:

- parts of three streams, totaling about 64 miles, are recognized as Biologically Significant because they support a high level of mussel and fish diversity,
- 64,386 acres have been designated a state Resource Rich Area,
- 30 acres of wetland and 22 acres of prairie are classified as high quality,
- the Illinois Water Quality Report rated 86.5% of the Kishwaukee sub-basin as “full support,”
- the Biological Stream Characterization rated the Kishwaukee River upstream from the South Branch as an “A” stream.

*Many steps can be taken to increase local biodiversity.*



**Figure 32.** Kishwaukee River basin land cover

### Plant and animal species

Thirty-five percent of the state's native and naturalized vascular plants are found in the basin. Of these, 14 are listed as state endangered and 14 as state threatened. Of these 28 T&E species, 17 occur in wetlands. Not all plants found here are wanted or appreciated — 21% of the plants have been introduced from other geographical areas.

At least 262 of the 299 bird species that regularly occur in the state can be found in the area. Of these 262, 135 breed or formerly bred here, including 14 of the 34 T&E bird species. The area's wetlands represent the most significant avian area where species such as the state threatened least bittern and sandhill crane breed.

Seventy-five percent of the state's mammal species are likely to occur in the Kishwaukee area, and the state threatened river otter has recently been sighted along the south branch of the Kishwaukee River. The basin also supports a diversity of aquatic species and state endangered fishes include the blacknose shiner and the Iowa darter.

### Local economy and outdoor recreation

The area is home to nearly 5% of the state's population and is highly urban, with nearly four-fifths of its residents living in urban areas. Since 1870 the population in the Kishwaukee River area has grown fivefold; growth has been particularly high in Winnebago and McHenry counties.

The local economy grew nearly twice as fast as in the rest of the state between 1970 and 1994. It generates 4.7% of the state's employment and personal income. In 1994 it employed more than 314,000 people and generated \$13 billion in income.

There are no major state-owned recreation areas in the basin, but conservation districts offer several forest preserves and trails. There are also limited activities including hiking and natural history discovery at the undeveloped nature preserves and natural areas.

### Threats

Today's Kishwaukee River basin is much changed from the presettlement era. Forests, wetlands and prairies have given way to agriculture, artificial water drainage, and urbanization. Today's landscape is 85% agricultural and urban.

Basin acreage - 779,744  
 Total natural areas - 3,379.1 acres  
 High-quality natural areas - 52 acres  
 Nature preserves - 247.4 acres

**Flooding** - One of the greatest concerns for area residents is flooding. Average annual flow in the basin has jumped more than 50% since 1970. Although average precipitation has increased, other explanations for the increased flow include the drainage and removal of wetland areas and the discharge of treated waste water into the river basin.

**Erosion** - Field drainage has played an important role in increasing the volume and rate of runoff from cultivated fields. With the majority of the soils in the watershed having loess as their uppermost parent material, the potential for soil erosion is moderate to high and the increased discharge is causing erosion problems along the Kishwaukee River and its drainage. Channel widening and bank failures are two major erosion problems.

**Habitat loss** - The loss of natural habitat in the basin has been severe. Prior to European settlement in 1820, the area was a montage of different forest types, savannas, blacksoil and gravel prairies, and a variety of wetlands from marshes to fens. For example, wetlands covered as much as 31% of McHenry County, 21% of Boone, and 14% of Winnebago. Today, McHenry County still has the highest percentage of wetlands — 6%. Overall, only 2.6% of the area's land is wetland. There has also been a similar decline in prairie, savanna and forest. Altogether only 52 acres (0.006% of total area) remain in a high quality, undegraded condition, all of it wetland and prairie. No pristine forest or savanna remains.



*At least 262 of the 299 bird species that regularly occur in the state can be found in the area.*

This is even more severe than statewide levels, where only 0.07% of the total area remains in a high quality undegraded condition.

### Opportunities

To address area flooding and habitat loss, a critical element is to protect and restore wetlands. Wetlands mitigate the effects of storm flow in streams by retaining excess rainwater and delaying delivery of water to the main stream. Reduced stream flow will not only reduce flooding and erosion, but will also enhance the quality of the stream by limiting channeling and bank failure. Maintaining even small, temporary wetlands would benefit almost all of the reptiles and amphibians in the area; the American toad, western chorus frog, and bullfrog do well in small patches of cattail marsh, even when the marsh is completely surrounded by developed land. Additionally, wetlands are important stopover sites for migrating birds and are heavily used by nesting birds.

Remnants of other ecosystems can play a key role in preserving the ecology of the area; small

*Maintaining even small, temporary wetlands would benefit almost all of the reptiles and amphibians in the area.*



pieces of natural communities can still harbor diversity. For example, an unknown quantity of degraded prairie most likely remains, particularly along railroad rights-of-way. Some of this degraded prairie has high restoration potential.

### Sugar-Pecatonica Rivers Basin



The Sugar-Pecatonica Rivers basin encompasses approximately 796.2 square miles in north central Illinois. The Pecatonica is the dominant stream, accounting for two-thirds of the drainage area. It originates in Iowa County, Wisconsin, crosses the Illinois border near the town of Winslow, flows south to Freeport, then heads east-by-northeast towards its confluence with the Rock River near Rockton. In Illinois the length of the Pecatonica River is 92.4 miles.

Basin acreage - 509,679 acres

State land\* -701 acres

County land - 3,334 acres

Total natural areas - 3,647 acres

High-quality natural areas - 85.7 acres

Nature preserves - 672 acres

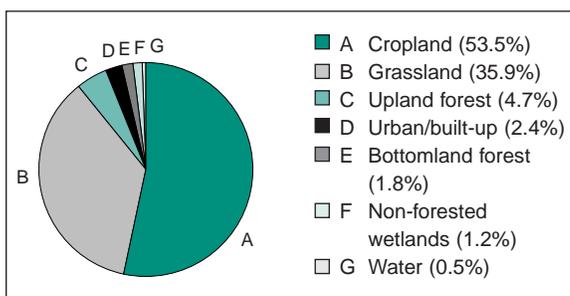
*\* Does not include natural areas or nature preserves that may be state owned.*

Much of the land in the basin is used for agriculture — 53% in cropland and 36% in grassland, most of which is non-native forage grasses such as hayfields and pastures. Only 8% of the area is forest or wetland.

The area has a number of natural community remnants that are otherwise rare or absent in the rest of Illinois, especially prairie, wetland, and sand communities. The Sugar and Pecatonica river corridors have some of the most extensive riparian wetland communities left in northern Illinois. The sand area between the Sugar and Raccoon Creek supports several rare sand communities, and the eastern portion supports some of the best examples of dolomite prairie left in the state. Other significant features:

- high quality natural areas include 60 acres of upland forest, almost eight acres of prairie, six acres of shrub swamp, eight acres of sedge meadow, and three acres of pond;

- the Winnebago County Forest Preserve District is acquiring many other native habitats, including several high quality wetland sites and a number of prairie and wetland restoration projects;
- the Biological Stream Characterization rated much of the Sugar River as a Class “A” stream (unique aquatic resource) and rated the Pecatonica and several of its tributaries as a Class “C” stream (moderate aquatic resource);
- two segments of area streams, for a total of 10.1 miles, are recognized as Biologically Significant because they support a high level of mussel and fish diversity;
- 15,144 acres have been designated a Resource Rich Area.



**Figure 33.** *Sugar-Pecatonica rivers basin land cover*

### Plant and animal life

Thirty-three percent (850) of the state’s native plant species occur in the area. Of these, 26 are state endangered (the eastern prairie fringed orchid is also federally threatened) and six are state threatened. Most of these rare species occur in the prairie and wetland communities, particularly the sand communities in the Sugar River drainage and the wetland habitats associated with the bog area in the Raccoon Creek drainage.

At least 261 of the 299 bird species that regularly occur in the state can be found here. Because of the geographical position of the area and the rather diverse array of habitats, several species of birds either reach or are near the northern (e.g., yellow-throated warbler, white-eyed vireo, northern mockingbird, and acadian flycatcher), or southern (e.g., sandhill crane, common snipe, least flycatcher, and clay-colored sparrow) limits of their range.

Seventy-six percent of the state’s mammal

species are likely to occur in the Sugar-Pecatonica area. The state threatened river otter has been observed here, and five T&E species of fish are found here — the blackchin, blacknose, and weed shiners, and the western sand and Iowa darters.

### Local economy and outdoor recreation

The two main counties in the basin, Stephenson and Winnebago, account for 2.6% of the state’s population. Since 1870 their combined population has quadrupled, compared to a 350% increase statewide. Most of this growth was in Winnebago County, where Rockford, the largest city of the area, is located.

Between 1970 and 1994, the local economy grew nearly 25% faster than the rest of the state. In 1994, the area supported 190,000 jobs and generated \$6.7 billion in personal income. The area is a net importer of workers, suggesting that Rockford is a key employment region for outlying areas.

Outdoor activities are popular. Lake Le-Aqua-Na State Park provides opportunities for fishing, boating, hiking, picnicking, camping, and other activities. The park attracts about 270,000 visitors a year, generating about \$3.2 million in economic output and 50 jobs a year. The Winnebago County Forest Preserve District also operates twelve sites that provide an array of activities.

### Threats

Agriculture and urbanization have changed the mosaic of forests, wetlands, savannas, and prairies that existed before European settlement. A few of the resulting ecological threats:

**Habitat loss** - Very few natural communities remain in the area. For example, in 1820 wetlands covered as much as 6% of Stephenson County and 14% of Winnebago County. Only 2.9% of the area remains in wetland today. Furthermore, only 0.01% of the total area remains as high-quality habitat, which is even more severe than the statewide level of 0.07%.

**Habitat fragmentation** - The lack of habitat leads to several other common ecological problems, particularly habitat fragmentation. Habitat fragmentation interrupts biological



*The state threatened river otter has been observed here, and five T&E species of fish are found here.*

interactions, ecological processes, and species migrations, and reduces habitat heterogeneity. The outcome typically is loss of species diversity.

**Exotic species** - Degraded natural communities are particularly vulnerable to being invaded by exotic species, which can overrun native plant communities and reduce biodiversity. Garlic mustard and reed canary grass are two exotic species known in the area; many of the remaining marshes and sedge meadows are threatened by these non-native species.

**Impaired water quality** - Only 12.4% of the Pecatonica River was rated as “full support” (water quality meets the needs of all designated uses protected by applicable water quality standards), and the remainder was rated as “Partial Support/Minor Impairment” (water quality has been impaired to a minor degree). Major water quality problems include municipal wastewater discharges, and phosphorous and siltation from agricultural runoff. However, of the 40 tributaries to the Pecatonica, 34 were rated as “full support” along their entire length.

### Opportunities

A large amount of wetland habitat in the area could be restored. This is especially true along the major stream and river corridors where restoring natural riparian vegetation and connecting existing wetland communities would increase habitat, as well as provide additional wetland functions — store floodwater and reduce siltation and nutrient loading. Reducing silt and chemical runoff will improve the water quality of the streams, thereby enhancing their ability to support fish, as well as minks and river otters. Restoring riparian zones will renew their ability to act as dispersal corridors for many animals, such as the gray fox and bobcat, thus reducing the effects of habitat fragmentation.

The continued acquisition of larger quality wetlands that remain in the area would allow the bird population to become more successful and self-sustaining, and provide large home ranges necessary to support bobcats and river otters. However, maintaining even small, temporary wetlands would benefit many animals, especially reptiles and amphibians. More information is needed on habitat remnants, particularly about the distribution, abundance, qualitative condition, and ecological trends among remnants.

Prairie restoration, coupled with the preservation of native prairie and other grassland habitats, would provide additional habitat for animals such as badger and red fox, and provide valuable sites for reintroducing Franklin’s ground squirrel. Larger grassland areas of at least 100 acres would benefit grassland birds most sensitive to grassland fragmentation. Exotic plant invasion can be addressed by restoring habitat with native plants, conducting controlled burns, treating them directly or using biological controls.

### Driftless Area



The Driftless Area encompasses approximately 996 square miles in extreme northwestern Illinois. Bordered by Wisconsin to the north and the Mississippi River to the west, the area includes nearly all of Jo Daviess County, most of western and northern Carroll County, the northwestern corner of Whiteside County, and small segments of western Stephenson County.

The Driftless area is so named because it has little or no “drift” — the sediments deposited across the remainder of northern and central Illinois by glaciers that bypassed this corner of the state. The rough, unglaciated terrain features wooded uplands, rolling hills, narrow valleys, numerous streams, springs, and even cliffs and bluffs.

Basin acreage - 637,115 acres

State land\* - 4,880 acres area

Federal land - 40,929 acres

Total natural areas - 33,311 acres

High-quality natural areas - 48.3 acres

Nature preserves - 723 acres

\* Does not include natural areas or nature preserves that may be state owned.

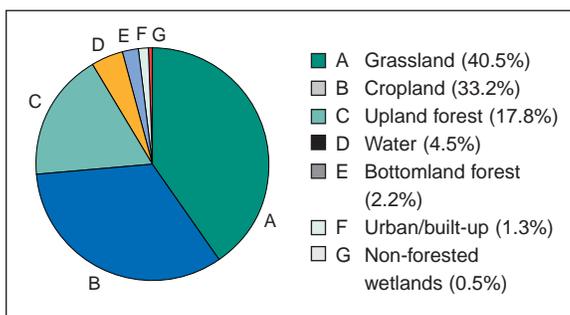
Agriculture is the dominant land use with croplands and grasslands (which are mostly pasture) combining for almost three-fourths of the land. Farm lands in this area are not as concentrated in row crops, which account for only 32% of agricultural land compared to 70% statewide. This is partly due to the difficulty of cultivating some of



*Only 12.4% of the Pecatonica River was rated as “full support” and the remainder was rated as “Partial Support/Minor Impairment”.*

the area's more rugged terrain. Forests account for one-fifth of the area's land cover, well above the statewide average of 11.3%. Most of the forested areas are found on the slopes along rivers and streams. Key features include:

- 70 miles of streams have been designated Biologically Significant because of their fish and mussel diversity,
- 30 acres of dry sand prairie and four acres of dry-mesic sand prairie are designated as high-quality ecological communities, accounting for 7.5% and 4.2% of the state acreage, respectively,
- diverse cliff communities provide an array of unique habitats, depending on orientation to sun and wind; the most unusual are a handful of aligific slopes which retain subsurface ice through most of the year and harbor northern and relict species,
- 191,814 acres have been designated a state Resource Rich Area.



**Figure 34.** *Driftless Area land cover*

### Plant and animal life

The area supports communities that are rare or nonexistent elsewhere in the state, notably sand prairies and cliff communities. Habitat is particularly good for birds. Of the approximately 271 species found here, 138 breed or formerly bred here, and 18 — 43% of the state total — are listed as state threatened or endangered. Other threatened or endangered species include the river otter and timber rattlesnake.

Approximately 42% (915 species) of Illinois' native flora occurs here, an area that comprises only 1.7% of the state's total land area. Fifty-five plants are state-endangered and 11 are state-threatened. Of these, 17 species are found in Illinois only

within the Driftless Area, mostly on aligific (cold-producing) slopes, sand prairies, and dolomite cliffs.

### Local economy and outdoor recreation

In 1990, the population of Carrol and Jo Daviess counties, the two main counties in the area, stood at 38,600, 10% below that of 120 years ago. The area is rural, with only one-quarter of the population living in urban areas. In 1994 the area economy supported nearly 21,000 jobs and generated \$541 million in personal income. The services sector almost doubled in size, growing from 11% of employment in 1970 to its present share of 23%. Unlike many other parts of the state, manufacturing employment also grew, by about 1.5% annually. Although farming employment has declined it continues to be an important part of the local economy, with 10-12% of workers employed on area farms.



*Although farming employment has declined it continues to be an important part of the local economy.*

Outdoor recreation opportunities are largely shaped by the area's rough terrain and its major streams, especially the Mississippi River. The river, its floodplain, and diverse habitats attract a variety of wildlife and provide ample opportunities for boating, hunting, and fishing. Two major state parks, Mississippi Palisades and Apple River Canyon, collectively attract 840,000 visitors annually, generating \$8.6 million in economic output and 130 jobs. The Upper Mississippi National Wildlife and Fish Refuge also stretches along the river, providing habitat for fish and waterfowl. Much of the 14,000-acre Savanna Army Depot will eventually be transferred to the refuge.

### Threats

While the Driftless Area's topographical complexity and array of habitats are unique, its ecological threats are familiar: erosion, water contamination,

and fragmentation and degradation of habitat.

**Erosion** - Soils here are relatively thin, and steep slopes promote soil erosion and sedimentation in streams and rivers. One study found that more than half of Jo Daviess County has a slope of more than 7%, and nearly one-third exceeds 18%. Careless management in the 1930s led to the creation of large gullies, with associated problems of soil loss, flooding, and sedimentation. Since then, farmers have increasingly used conservation tillage, vegetation has been planted on some of the more sensitive slopes, and gullies have been repaired by installing retaining structures and by adding fill. Some evidence suggests that improved land management practices have helped to reduce flooding as well as soil loss.

*While the Driftless Area is blessed with a variety of habitats, they are often separated by agricultural or developed land.*



**Water quality** - Sections of the Apple and Mississippi rivers, and most of the Galena River, were rated by the Illinois Water Quality Report as “Full Support,” indicating that water quality meets the needs of all designated uses. The Plum River and Carroll Creek were downgraded slightly for phosphorous contamination from municipal wastewater discharges.

There is some concern that large-scale livestock operations may threaten groundwater and surface water in the area. Two hog facilities with 4,000 animals each are located near the headwaters of the Apple River and neighbors and health officials are concerned about the potential impact of large volumes of animal waste. Local geology adds to the concern — most of the area lacks the thick layer of glacially deposited till that filters out most contaminants. Nearly 60% of the area is

highly or excessively vulnerable to aquifer contamination, and another 8% is moderately vulnerable.

**Habitat degradation and fragmentation** -Almost all of the original prairie has been destroyed and many of the area’s wetlands have been drained for agriculture or flooded for navigation. Fire suppression has fostered maple invasion of oak forests, and subdivisions are carving up ecosystems to provide homes for people drawn, in part, by the area’s scenic beauty.

### Opportunities

Vast potential exists for prairie restoration, especially sand prairies and various hill prairies. The few remaining large expanses of prairie, including the sand prairies at the Savanna Army Depot, should be protected — fragmented plots tend to support only small populations of species that are vulnerable to local extinction. Actively managing prairies, including prescribed burning, will limit encroachment by invasive species such as woody plants.

Reestablishing native vegetation along river corridors could bring significant benefits. Siltation, desiccation, and higher than normal temperatures would all be reduced to acceptable levels if streams were lined with native plants that shaded the stream, stabilized the banks, and filtered sediment and chemicals from runoff before they reached the stream.

Measures to improve the integrity of rivers and their banks would do more than improve habitat for aquatic wildlife; they can also serve to improve the corridors between diverse habitat, mitigating the threat of fragmentation. While the Driftless Area is blessed with a variety of habitats, they are often separated by agricultural or developed land. This is problematic for species such as amphibians, which often travel long distances between breeding and non-breeding habitat. Two of the area’s most notable species, the timber rattlesnake and the bobcat, also demand a variety of habitats for foraging, breeding, and resting.