

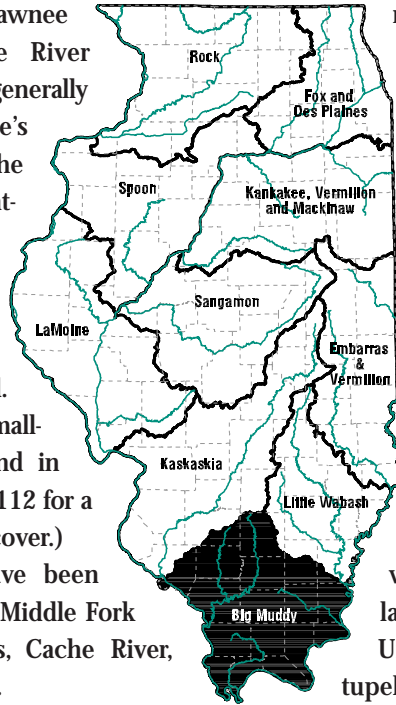
C H A P T E R T H I R T E E N

# Big Muddy, Saline and Cache Rivers Watershed

This watershed, featuring the Shawnee National Forest and the Cache River wetlands in southern Illinois, is generally considered to be among the state's richest ecological regions. It has the most acreage and the largest percentage of land devoted to upland and bottomland forest and surface water, and it has the second-highest acreage and percentage of land in grassland and non-forested wetland. Conversely, it also has some of the smallest acreage and percentage of land in cropland and urban uses. (See page 112 for a color map of the watershed's land cover.)

Five Resource Rich Areas have been identified in this watershed — the Middle Fork of the Big Muddy, Illinois Ozarks, Cache River, Shawnee Hills and Cretaceous Hills.

- The Middle Fork of the Big Muddy is a small, single watershed site covering 180 square miles. The significant natural features are the large tracts of forest located along the river.
- Covering 729 square miles, the Illinois Ozarks is one of the richest, most biologically diverse areas of the state. Many species found here are



rare and limited in distribution to this area of the state. This RRA encompasses the Mississippi River bottomlands, Ozark plateau, and unglaciated hill country. The Illinois Ozarks RRA shares a boundary with the Cache River RRA.

- The Cache River RRA is located at the southern tip of Illinois; it covers 693 square miles. The upper reach flows through the hills of the Ozark plateau; the lower Cache flows through flatter coastal plains where drainage is slow and wetlands become more abundant. Unique features include bald cypress-tupelo gum swamps and several species associated with the southern U.S.

- The Shawnee Hills RRA, covering 745 square miles, is a scenic wooded area in an unglaciated part of the state. An escarpment of sandstone runs east to west in this area. Bluffs, rugged hills, deep ravines, and clear streams support distinctive flora and fauna.



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**Table 48. Watershed Land Cover**

Land Cover	Acres	Percent of Watershed	Statewide Percentage*
Upland forest	991,770	26.6% (1)	24.0% (1)
Grassland	924,376	24.8% (2)	14.4% (2)
Non-forested wetland	50,302	1.4% (2)	14.2% (2)
Bottomland forest	227,037	6.1% (1)	25.9% (1)
Water	101,734	2.7% (1)	20.3% (1)
Urban/built-up	84,037	2.3% (8)	4.5% (7)
Cropland	1,350,312	36.2% (9)	6.3% (8)
Total acreage	3,729,571	100.0%	10.0% (5)

\* The watershed's percentage of the land cover type statewide, e.g., 24% of the state's upland forests are located in this watershed. Note: the watershed rank (1st-10th) is shown in parentheses.

- The Cretaceous Hills RRA, encompassing 137 square miles, is characterized by rolling hills of sand, gravel and clay and bottomlands along the Ohio River. Acidic seeps, which support some of the most interesting natural communities in the state, are found in this area.

## ECOSYSTEM MONITORING

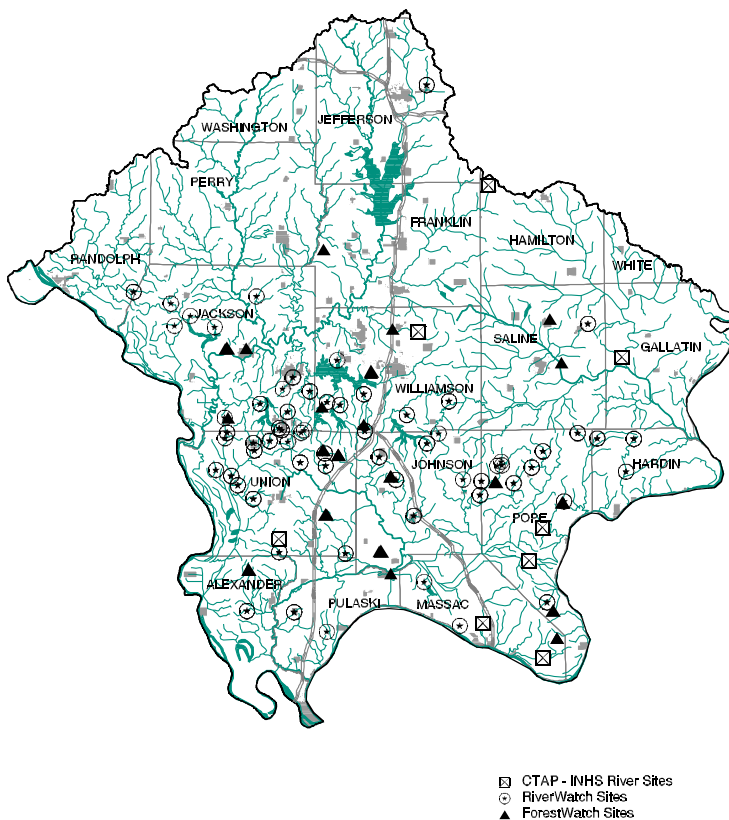
The Cache River basin contains some of the most pristine streams in Illinois, but many streams in the Big Muddy and Saline river basins are heavily degraded because the natural riparian corridor has been denuded, and streams have been channelized and polluted with nutrients from row crop agriculture. From 1997 through 1999 CTAP biologists sampled eight randomly chosen streams. They found that, overall, the watershed scored below average for EPT richness and HBI score. It scored slightly above average for total native fish and for habitat quality.

The site with the best habitat condition was an unnamed tributary of Lusk Creek near Golconda. Although it had a very good HBI score, EPT taxa

richness was lower than expected. This was probably due to the site being sampled later than usual for the region, with many species entering the egg stage of their life cycle. The worst site was Mud Creek near Unionville, which had low EPT and habitat quality.

**Table 49. Watershed Indicator Scorecard**

Indicator	Watershed Value	Statewide Value	Watershed Ranking
<i>Macroinvertebrates</i>			
HBI	5.6	5.2	9
MBI	5.2	5.7	1
EPT richness	6.4	7.1	7
EPT taxa (RW)	3.3	2.6	3
Taxa richness	9.4	8.9	3
Taxa dominance	77.2%	80.4%	1
<i>Fish</i>			
Native fish	16.0	13.6	3
Darter richness	1.8	1.9	5
Exotic species	0.3	0.2	6
<i>Habitat</i>			
Habitat score	94.0	88.6	5



**Figure 59. Monitoring sites**

Between 1995 and 1999 RiverWatch volunteers collected 208 macroinvertebrate samples at 79 sites along 68 streams. Most of the streams are located in the southern half of the watershed, either in the Cache River basin or within or near the Shawnee National Forest. Very few of the monitored streams flow through the heavily row-cropped areas of the Big Muddy or Saline river basins.

RiverWatch biological indicators generally reinforce the area’s reputation as home to some of Illinois’ finest ecosystems. The watershed ranked first among the ten watersheds in MBI and third in the number of EPT taxa, two proxies for the level of organic pollution. Sowbugs, midges, and scuds were the three most common taxa; these species are common throughout the state and have low to medium tolerance for pollution. The watershed also ranked best in taxa dominance, a useful measure of species diversity. Overall, the indicators suggest that the Big Muddy/Saline/Cache watershed — at least the southern portion — is among Illinois’ best, rivaled only by the Spoon River watershed.

The average MBI declined from 6.2 to 5.0 between 1995 and 1999, indicating improved

stream quality (Table 50). However, the decline is not statistically significant. In addition, changes in several other indicators (including taxa richness and taxa dominance) suggest degradation, though these changes are also statistically insignificant. It will take more years of data before trends can be assessed with confidence.

**Table 50. MBI Values**

Statistic	1995	1996	1997	1998	1999	Overall
Average	6.19	5.5	5.35	4.88	5.01	5.22
Standard deviation	1.59	1.23	1.33	0.79	0.70	1.10
Minimum	4.63	3.44	3.19	2.09	3.04	2.09
Maximum	9.82	9.52	9.85	6.00	6.61	9.85
Number of sites	14	29	35	48	48	174

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

ForestWatch volunteers monitored 13 forest sites in the fall of 1998. Twelve were upland forests (nine oak-hickory, two tulip, one beech-maple) and one was an ash-cottonwood bottomland forest. Tree species richness ranged from seven to 17 species, with an average of 13 tree species per site, slightly above the statewide average of 11.8 species per site. The site with only seven species was a beech-maple upland with a relatively low tree abundance of 62 trees in a monitoring area of 1500 m<sup>2</sup> (the statewide average was 111 trees).

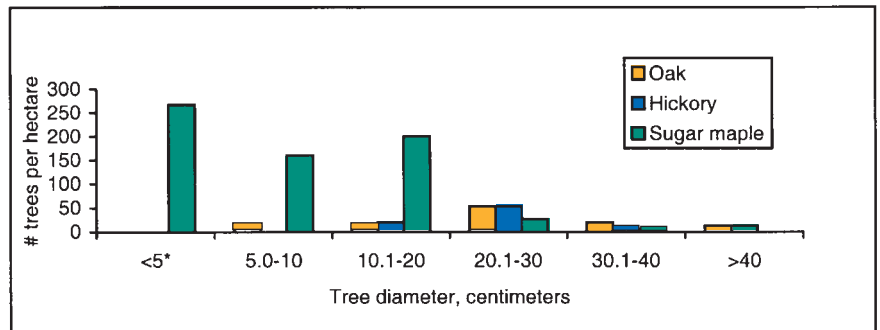


Forty-nine tree taxa were recorded in the watershed, the most in the state (75 taxa were reported statewide). This is not surprising since southern Illinois contains species found in both northern and southern latitudes. In general, the trees that were most abundant also had the largest basal areas and highest importance values (Table 51).

**Table 51. Tree Species with the Highest Importance Values**

Importance Value	Species	% of total trees counted (n=1,448)	% of total basal area (20.9m <sup>2</sup> /ha)
33.8	Hickory	16%	20%
28.3	White oak	8%	20%
16.3	Red oak	5%	11%
15.7	Sugar maple	10%	5%
13.8	Tulip tree	4%	8%
10.7	Ash	8%	6%
9.1	Flowering dogwood	6%	1%
7.7	Winged elm	5%	2%
6.9	Southern red oak	2%	6%
5.9	American beech	2%	3%

Only one site showed clear signs of maple takeover (Fig. 60), with the three smallest size classes dominated by sugar maples. Maple takeover is not a factor, however, in most forests in the watershed.



**Figure 60. Maple takeover in an oak-hickory forest**

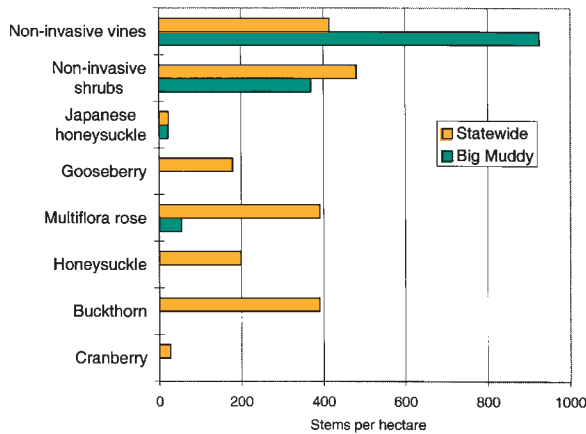
There were no signs of gypsy moths at any site, but about half of the flowering dogwood trees at one site showed signs of dogwood anthracnose. Because flowering dogwoods are relatively abundant in the watershed and anthracnose has been found elsewhere, it is likely that other forests in the watershed have the disease. Future monitoring will provide more information on the extent of dogwood anthracnose.

This watershed had the fewest number of invasive shrubs and vines recorded during fall monitoring — only 13% of the 534 shrubs and vines recorded. Multiflora rose was the only non-native

shrub recorded and Japanese honeysuckle the only non-native vine. Spring monitoring, at five sites, also recorded few invasive species among ground cover plants. Ground ivy, a non-native invasive species, was recorded at one site. Another site had two disturbance-sensitive plants — bleeding hearts and doll’s eyes — while two other sites had one disturbance-sensitive plant, the Virginia spiderwort.



*The area is home to unique and extensive complex natural communities that have earned state, federal, and international recognition for their biological significance.*



**Figure 61.** Number of invasive and non-invasive shrub and vine stems

## REGIONAL ASSESSMENTS

One regional assessment has been conducted in this watershed — for the Cache River basin.

### Cache River Basin

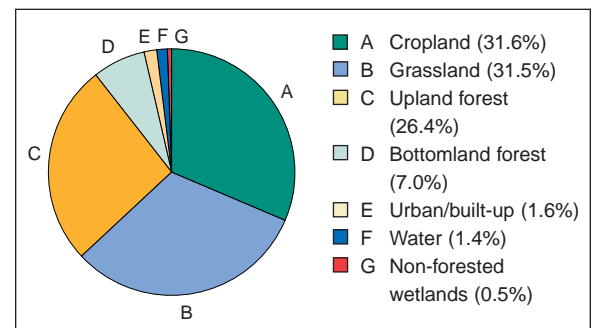


The Cache River originates in Union County and runs 110 miles before it empties into the Ohio River. The basin drains nearly the entire southern tip of Illinois and includes nineteen watersheds covering approximately 835 square miles. Sixty-four percent of the land is either cropland or pasture; statewide, 77% of the land is agricultural. Twenty percent of the land is owned by state or federal agencies, primarily the U.S. Department of Agriculture (Shawnee National Forest) and the U.S. Department of the Interior (Cypress Creek National Wildlife Refuge).

The area still has a third of the land in forest, two and a half times higher than the state average, and it has a relatively large percentage of the state’s unique habitats. Although it makes up only 1.5% of the land area of Illinois, it contains 23% of the state’s remaining high quality barrens, 11.5% of the high quality floodplain forest, 91% of the state’s high quality swamp and 42% of the shrub swamp. Also, though caves are scarce in the rest of Illinois, there are 43 caves known here.

Given its relatively large amount of forest, including significant bottomland forest, the area is home to unique and extensive complex natural communities that have earned state, federal, and international recognition for their biological significance. For example:

- the United Nations Educational, Scientific, and Cultural Organization added the Cache River and Cypress Creek wetlands to its list of 15 “Wetlands of International Importance” in the United States because of their crucial role in sustaining waterfowl and shorebirds that use the Mississippi flyway;
- the National Park Service designated three areas of the Cache River basin as National Natural Landmarks because they represent nationally significant types of vegetation and habitat;
- most of the area (443,616 acres) has been designated a state Resource Rich Area;
- 52 miles of Biologically Significant streams are recognized including segments of the Cache River, Limekiln Slough, Horseshoe Lake, Lake Creek, and the Ohio River.



**Figure 62.** Cache River basin land cover

## Plant and animal life

Diversity in habitat leads to a diverse flora and fauna. For example, the Cache River bottomlands support the greatest diversity of tree species of any bottomland stream system in Illinois. Consequently, the area is home to 128 native bird species while another 129 migrate to the area.

Basin acreage - 534,786.3

State land\* - 24,773 acres

Federal land - 34,775 acres

Total natural areas - 19,074 acres

High quality natural areas - 3,200 acres

Nature preserves - 3,465.6 acres

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

With so much rare habitat, it is no surprise that the area also shelters many rare creatures — 104 species whose survival in Illinois is considered endangered or threatened, and seven species recognized by federal authorities as endangered or threatened throughout the U.S.

Among the many unique species that live in the area:

- river otters — they persisted in the Cache River basin when they were disappearing from the rest of the state (they have since been reintroduced in several areas);
- bald eagles — 20 to 50 winter in the cypresses lining Horseshoe Lake;
- bobcats — with a home range as much as 3.25 square miles, the Shawnee Hills is one of three places in Illinois that offers this animal enough space to roam;
- the green treefrog, bird-voiced tree frog, cottonmouth and mole salamander — they all reach the northern limits of their distribution here and are restricted to the cypress-button-bush swamps and adjacent watersheds.

## Local economy and outdoor recreation

The area is uniquely rural. Today the population is about the same as it was in 1870 and population density is only one-fifth that of the statewide average. The slow-growing population may be traced to a slow-growing local economy. In recent years, the local economy grew less than one-half as

much as the state overall. The five main counties in the basin — Union, Massac, Johnson, Alexander and Pulaski — ranked among the 15 poorest counties in Illinois in 1990.

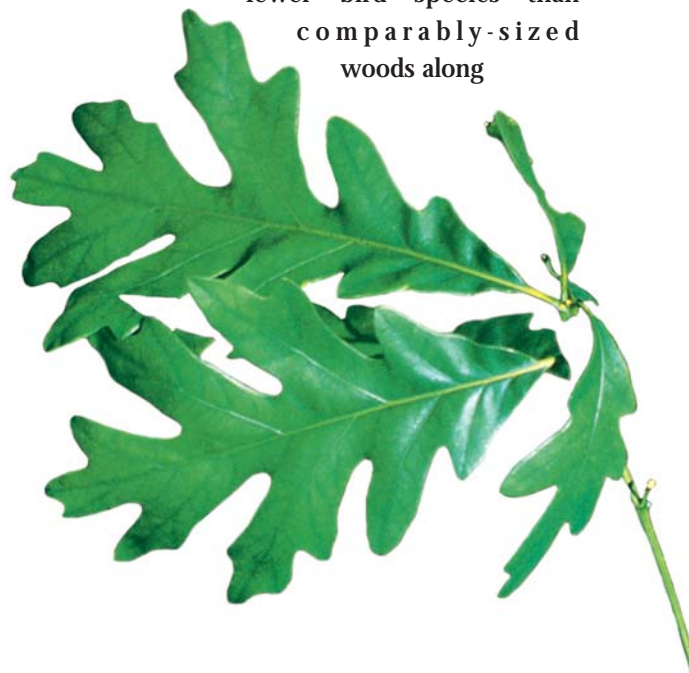
Contributing to the local economy are numerous outdoor recreational opportunities. The area attracts many anglers and hunters, including many from Kentucky, Indiana, and Missouri, and many people visit the three state parks for activities such as sightseeing, hiking, cross-country skiing, and picnicking. In 1994, more than 2.6 million people visited the area's state parks and conservation and natural areas. The parks generated \$14.9 million in economic output, created about 396 jobs and increased personal income by more than \$8.46 million.

## Threats

Logging, water draining, and conversion to agricultural uses have led to a considerable change since pre-settlement times. Approximately 80% of the area was densely forested when settlers arrived; today only a third of the area is forested. Very little of the swamps and floodplain forests remain in pre-settlement condition. These physical changes to the landscape have had a profound ecological effect.

**Fragmentation** - Fragmentation renders habitats too small to supply a sufficient food supply, to protect animals from predators, or to accommodate genetically varied breeding species. For example, small isolated tracts of forest had 40% fewer bird species than comparably-sized woods along

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the Cache corridor. Nests of forest-dwellers in the basin, such as the yellow-billed cuckoo and indigo bunting, suffer more than 60% losses to predators. Losses are lower in the larger wooded tracts.

Non-native species - Many of the plants that grow in the basin were introduced to the area, although the Cache River basin does not suffer infestations as severe as other parts of Illinois. Autumn olive is a significant problem throughout the area, and in the Cache River Natural Area in particular. Black locust, planted to enrich depleted soils and to provide firewood, is a pest in such areas as the Halesia Nature Preserve.

*The cypress-tupelo forest and the associated species of the swamps and sloughs are found only in the basin and are totally dependent upon the natural hydrologic cycle of the Cache River.*



Altering water flow - No change made in the past 190 years has affected the ecosystem more drastically than the reordering of the presettlement hydrology undertaken to cure the area's chronic flooding. These alterations speed the flow of water from where it falls into the nearest stream channel. Rushing the water downstream has caused massive bank erosion and gulying in the Upper Cache River channel and led to excessive sedimentation and channel aggregation in the Lower Cache River Natural Area. The continued gully formation and deepening of stream channels drains wetlands (e.g., Bird Spring Pond, Heron Pond), whose elevation becomes significantly higher than the stream channel because of channel bed scour. Draining wetlands takes away the natural water control functions they provide, such as slowing moving water and moderating the extremes of flood and drought. It also diminishes habitat for migrating geese, bald eagles, and other waterfowl.

Sedimentation - The reduced flow of the Lower Cache River area has caused most of the sediment from tributaries draining into it to deposit near the mouth of the tributary streams and within the Lower Cache. This has reduced the depth of water within the Lower Cache and degraded the aquatic and plant habitat within the area. The cypress-tupelo forest and the associated species of the swamps and sloughs are found only in the basin and are totally dependent upon the natural hydrologic cycle of the Cache River. This unique vegetation will continue to be threatened unless some favorable hydrologic conditions are recreated in the basin.

Diminished water quality - Nearly all Cache basin stream segments monitored for water quality by the Illinois Environment Protection Agency were rated as "partial support/minor impairment" (water quality has been impaired to a minor degree). Exceptions include all of Lick Creek which received the highest rating of "full support" and a segment of the upper Cache that was rated as partial support/moderate impairment. Reasons for less than full support ratings include siltation and turbidity from agricultural runoff and erosion in the Upper Cache, and siltation, turbidity, channelization, and sedimentation in the Lower Cache.

## Opportunities

Given the many unique natural communities and plant and animal species in the Cache River area, there are many opportunities to preserve and enhance natural resources. For example, preserving and restoring large habitat areas will prevent further habitat fragmentation. Larger tracts of forest and wetland would provide for a greater number of bird species and provide habitat for the state-threatened river otter, which requires large tracts of habitat.

Improving hydrologic conditions — reducing bank erosion, entrenchment, and gulying in the Upper Cache and sedimentation and channel aggregation in the Lower Cache — will in turn improve the water quality of streams and wetlands, prevent further loss of wetlands, and preserve habitat for fish, waterfowl, and other animals.