

Above the American Bottom: *The Bluffs and the Sinkhole Plain*



BY QUINTA SCOTT



Cross the Jefferson Barracks Bridge from St. Louis County, Missouri, into Monroe County, Illinois, and the American Bottom, that vast Mississippi River floodplain that extends from Alton to the Kaskaskia River. Ahead are the Mississippi River bluffs that mark the eastern edge of the floodplain, across which the Mississippi once meandered before settling into its modern channel. Drive south on Illinois Route 3 from Columbia. To the east are glaciated prairies; to the west, the Illinois Northern Ozark Natural Division, characterized by a sinkhole plain, a band of forest, hill prairies, and tall bluffs. At Waterloo, turn right on Illinois 156, cross the sinkhole plain, and descend to the bottoms through Dennis Hollow—named after Dennis Datchurst, who mined salt at Salt Lick Point in the eighteenth century—to Old Valmeyer. Connect to Bluff Road, which gives you access to the bluffs, the hill prairies, the bottoms, and the river. This is the American Bottom, a special place that offers prairies to hike, roads to bike, and lakes to fish, all within thirty miles of the Gateway Arch.

Sinkhole plain, bluffs, bottomland farmland between the bluffs and the river levees, the batture lands beyond the levees, and the islands at the river's edge: all the elements of the American Bottom are interrelated. This is the first of a series of photo essays on the landscape that forms the American Bottom.

Millions of years ago, the Mississippi severed Illinois' bluff lands to the east from Missouri's Ozark Plateau to the west. Three hundred thousand years ago, glacial ice pushed south from the Arctic, barged across the Midwest landscape, and flattened the northern two-thirds of the Illinois landscape. In Monroe and Randolph Counties, ice came up to the edge of the Illinois Northern Ozark Natural Division, but it left untouched a unique landscape that includes sinkholes, hill prairies, tall bluffs, rock falls, and colluvial slopes and terraces.

Humans arrived in this landscape and camped in the protection of the bluffs soon after the last of the great glacial floods expired 9500 years ago. They occupied sites at Salt Lick, high over the floodplain, and at the Modoc Shelter, under the bluff. The French settled Illinois Country in the early eighteenth century, at Kaskaskia on a peninsula between the Mississippi and Kaskaskia rivers in 1703 and Prairie du Rocher in the shadow of the bluffs in 1722.



The Mississippi Bluff Lands—Monroe and Randolph Counties, Illinois

As a glacier barged across the landscape, it ground rock into cobbles, gravel, sand, and silt—rock flour, which was stored under, in, and on top of the ice. When the last ice sheet wasted away, it sent pulses of outwash, water laden with rock flour, into the Mississippi as a valley train that filled the Mississippi gorge between the bluffs. In winter, when the outwash froze, westerly winds picked up the very lightest rock flour and deposited it as loess (“luss,” rhymes with russ), a dry, well-drained soil, on the eastern bluffs, almost forty feet thick near the edge of the bluff—the steep hill that characterizes the bluff tops, where prairie grasses took root. The deposits thinned to as little as five feet as the loess blew east across the sinkhole plain.¹



Sinkhole in the Upland

Illinois 156 crosses the sinkhole plain, which becomes evident a little over two miles outside Waterloo. Here, the loess, lying over a base of St. Louis limestone, thins to about 5 feet and offers farmers productive, well-drained soil. Water seeps down through the soil and into fractures in the rock, dissolving it and forming cracks, shafts, and caves. Should the roof of a cave collapse, a sinkhole follows. Should the sinkhole form in a stream, it becomes a losing stream and is swallowed up by the earth to flow underground through a cave. Eventually, the underground stream comes to the surface in a spring or emerges through a crevice in the valley wall. With all this water flowing underground, the bedrock in the sinkhole plain holds only small amounts of useable groundwater in aquifers.

Because loess drains so quickly into the cracks and crevices in the underlying St. Louis limestone, groundwater is recharged almost instantly and is not well filtered. Hence, agricultural fertilizers, pesticides, herbicides, and other contaminants also drain into the groundwater and spill out through the valley wall. Eventually, the nutrients end up in the Mississippi and flow to the Gulf of Mexico, where they nourish algae, which grow, die, decay, soak up the oxygen in the water, and create a dead zone. Fish, which cannot escape the oxygen-depleted water, die. Vegetative buffers around sinkholes would help soak up some of those nutrients and keep them out of the groundwater.²



Talus Slope: Terry Spring

From the sinkhole plain, water seeps into vertical cracks in the limestone, slides across horizontal bedding planes, and consolidates into an underground stream, which hollows out a cave. Finally, the stream spills out of the bluff in a conduit spring. For over 10,000 years, Terry Spring and others found in the valley wall above the American Bottom have been draining the sinkhole plain. Where you see V-shaped cuts in the wall, you can guess that it is a conduit spring. An axe-head or celt found at Terry Spring signals that Mississippians knew the spring a thousand years ago.

About eleven miles north of Old Valmeyer, Bluff Road crosses a culvert over the Terry Spring springbrook, which leads to the mouth of the Terry Spring cave. The cave opens up about 25 feet above the American Bottom, at a place where the valley wall is 130 feet high. Water springs from the bluff and falls six feet over a limestone ledge into a limestone bowl about 25 feet in diameter. Water quality at Terry Spring is good, with levels of fertilizers and herbicides that measure below EPA standards. Hence, its springhead hosts cave-dwelling macro-invertebrates: flatworms and a variety of small crustaceans.

Water in the limestone bowl spills into the very short springbrook. Like the springhead, the brook is also home to a variety of crustaceans. Trees common to the colluvial slope, which forms as soil washes off the bluff top in sheets and piles up at the base, shade the brook: sugar maple (*Acer saccharum*), chinkapin oak (*Quercus muehlenbergii*), hackberry (*Genus Celtis*), and some American elm (*Ulmus Americana*). A variety of forbs, grasses, sedges, and other wetland plants grow at the edge of the stream.³

Fults Hill Prairie—Loess Slope

Hill prairies are islands of grass surrounded by forests on the steep slopes of the western facing bluffs along the Mississippi and Illinois rivers in Illinois, but, in the Upper Mississippi Valley, they extend from St. Paul to the head of the Lower Mississippi Valley where the bluffs end. They can also be found in the Loess Hills region along the Missouri River in northwest Missouri, western Iowa, and southeastern South Dakota. Most are anchored in loess, but glacial drift, gravel, and sand provides the substrate for a few. Early settlers, who grazed their livestock on slopes too steep for cultivation, called them goat prairies. A. G. Vestal applied the term *hill prairies* to them in 1943.





Hill Prairie—Valmeyer (above)

Just south of Valmeyer, a prairie, covered with invasive cedar, rises above a bottomland pond.

A forested corridor, two to three miles wide, spreads across 35,000 acres atop the bluffs in Monroe and Randolph Counties. It is the largest contiguous forest remaining in Illinois. Plants and animals that are found nowhere else in Illinois, but are found in the Missouri Ozarks, are found here. The bluff lands provide habitat for eighty percent of Illinois' mammals and half its reptiles, amphibians, and butterflies. Two to three hundred species of birds visit the bluffs. Some are migratory, others permanent residents.⁴

In the last fifty years, their numbers have shrunk by half. We can attribute some of the loss to Smokey Bear, who has been warning Americans, "Only you can prevent forest fires," since 1944. The resulting fire suppression has allowed woody plants—red cedar (*Juniperus virginiana*), smooth sumac (*Rhus glabra*), and rough-leaved dogwood (*Cornus drummondii*)—to take over the prairies. Before Smokey, the lightning that started fires maintained the prairies. Native Americans burned them as lookout points and maintained the prairies. The goats grazed the hillsides and maintained the prairies in the eighteenth and nineteenth centuries. Today, we maintain the prairies with controlled burns.⁵

Hill Prairie undergoing Restoration, Salt Lick Land and Water Preserve (above, right)

Once cleared, the bare slope is seeded by volunteers, using seeds from plants that evolved in the local climate and are able to resist local pests and diseases. In the spring, when the ground reaches 55 degrees, they broadcast grass seed either by hand or by spreaders. Grasses become established more easily than forbs, which respond better to fall planting.

As the grasses and forbs become established in the first and second years, volunteers work on weed control. They mow in the first year, but as the native grasses crowd out weeds, the weeds must be pulled by hand in the second year. After that, controlled burns keep the prairie thriving.

Salt Lick Point Quarry, Old Valmeyer (below, right)

The prairies are also losing out to development: quarrying, mismanagement of the steep slopes, pollution of the watershed, destructive forestry, and the invasion of exotic plants—specifically cedars, which love limestone—and bush honeysuckle. All threaten habitat for wildlife.

Rock City, on Quarry Road off Bluff Road a mile north of Old Valmeyer, is an abandoned quarry turned into a deep freeze for ice cream and military records.

Above it all, at the highest point in Monroe County, is Salt Lick Point, a 450-acre tract of bluff lands that protects a dozen hill prairies, seven limestone glades, racks of limestone cliffs, and runs of upland forest.

The Village of Valmeyer owns the land; the Illinois Department of Natural Resources and the Illinois Nature Preserves Commission manage it under an easement agreement with the village.

The Illinois Clean Energy Community Foundation and the Illinois Audubon Society are also involved in the project. The Valmeyer Boy Scouts are working to restore the bluff lands, removing invasive species of plants from the prairies and the glades.

A network of hiking trails that crisscrosses the bluff lands and runs along the base of the bluff is open from sunrise and to sunset.

At 827 feet in elevation, Salt Lick Point is the highest point in Monroe County and rises over 400 feet above the floodplain. Archeologists have found sixty-six shallow pits arranged in clusters and stone tools made from chert at a site atop the point, evidence of human activity 7000 years ago during the Middle Archaic Period.⁶





Talus Slope: Salt Lick Point

As the reclamation work happens above the bluff, springtime magic happens below the bluff. Sheer walls of Kimmswick limestone rise out of the colluvial slope. A moist or mesic forest—treed in white (*Quercus alba*) and red oak (*Quercus rubra*), chinquapin oak (*Quercus muehlenbergii*), sugar maple (*Acer saccharum*), and hickories (genus *Carya*)—takes root in the hillside at the base of the bluff.



Colluvial Slope: Salt Lick Point

A rich variety of spring ephemerals carpets the ground at the base of the bluff: Dutchman's breeches (*Dicentra cucullaria*), Virginia bluebells (*Mertensia virginica*), blue phlox, mayapple, white trillium (*White Trillium grandiflorum*), and wood poppy (*Stylophorum diphyllum*).



Talus Slope: Salt Lick Point Vernal Pool

As the bluff weathers, large and small rocks break off and slide down the slope, accumulating at the base of the bluff. This is the talus slope. A vernal pool, a wetland fed by runoff from the uplands, puddles against the fallen rocks at Salt Lick Point. It is ephemeral. Wet and shallow during the winter and spring, the vernal pool dries out during the summer and fall. Cattails (*Typha latifolia*) and bulrushes (*Cyperaceae*), which do well in static water, thrive in the pool. About half of all frogs and a third of all salamanders in Illinois breed in such wetlands. Wood ducks and mallards stop to feed on the insects, crustaceans, and seeds to fuel their migrations. Box turtles and eastern garter snakes dine in pools as they move from one to next. Bats, dragonflies, and swallows patrol for flying insects, particularly mosquitoes, which breed in the pools.⁸

White Rock Hill Prairie

Clifftop, a local conservation organization, and Southwestern Illinois Resource Conservation and Development purchased the White Rock Hill Prairie just south of Valmeyer in December 2010. They received partial funding through a State Wildlife Grant, a U.S. Fish and Wildlife Service program administered by the Illinois Department of Natural Resources (DNR). Additional funds came from the Illinois Clean Energy Community Foundation and the Grand Victoria Foundation Vital Lands program.

Clifftop volunteers will restore the preserve, remove woody plants through controlled burning, develop hiking trails and parking, and open it to public use at the end of 2011, all a part of the organization's efforts at land stewardship and outreach.⁹



Fults Hill Prairie: Kidd Lake Marsh

About seventeen miles south of Old Valmeyer and above the bluff is the Fults Hill Prairie State Nature Preserve; below is the Kidd Lake Marsh Natural Area, the remnant of an 800-acre lakebed.

The State of Illinois established its nature preserve system in 1963 to protect the state's few remaining high quality natural areas and dedicated Fults Hill Prairie as a preserve in 1970. In 1986 the U.S. Department of Interior recognized the prairie as a National Natural Landmark, a program established in 1962 to identify and preserve the nation's geological and ecological heritage.



Fulfs Hill Ravine

Forested ravines fragment the hill prairies. A wooden staircase running up the bluff of St. Louis Limestone through a ravine gives access to Fulfs Hill Prairie. A moist or mesic upland forest—treed in white and red oak, chinquapin oak, sugar maple, and pidgnot (*Carya glabra*) and shagbark (*Carya ovata*) hickories—anchors the soil in the colluvial slope. Redbud (*Cercis canadensis*), grey dogwood (*Cornus racemosa*), strawberry bush (*Evonymus americanus*), and spicebush (*Lindera benzoin*) populate the understory. Virginia creeper (*Parthenocissus quinquefolia*), bristly greenbrier (*Smilax hispida*), poison ivy (*Toxicodendron radicans*), and riverbank grape (*Vitis riparia*) crawl up the trees. Exotic species have invaded and degraded these hillside forests: the white mulberry tree (*Morus alba*) and the honeysuckles, both bush (*Biervilla sessilifolia*) and Japanese (*Lonicera japonica*). To stay moist, the forest depends on rain and runoff, which spills off the bluff in sheets that carry soil to the slope.

The staircase gives way to a short hike through a dry forest to the prairie.



Fulfs Hill Prairie: Limestone Glade

Where weather is hot and sunny, the soil is thinner at the edge of the bluff where the limestone becomes an outcropping.

The high mineral content of the soil that trickles down into the limestone crevices makes it very fertile. Tall grasses of the prairie give way to short side-oats gramma (*Boutelouca curtipendula*) and little bluestem (*Schizachyrium scoparium*) that must be able to root in the crevices in the rock. Ferns can be found in the rare puddles of shade, along with columbine (*Genus Aquiligia*) and dwarf larkspur (*Delphinium tricorne*). Many are plants that are typical to the Missouri Ozarks and found in Illinois only at Fulfs Hill Prairie.

The limestone glade must be maintained by controlled burning to weed out unwanted trees. Most of Illinois' glades have been lost to red cedar (*Juniperus virginiana*) and other trees that thrive on limestone.

It's hard work to reclaim a glade. The trees must be cut one by one. Bulldozers are a no-no. They tear up the thin soils and damage the rock formations underneath.

As on the hillsides, the cut cedar must be allowed to dry on the ground. Then, it is burned to rejuvenate the native plant community: American aloe (*Agave americana*), purple prairie clover (*Dalea purpurea*), false boneset (*Brickellia eupatorioides*), and Missouri orange coneflower (*Rudbeckia missouriensis*).

Fults Hill Prairie

Fults Hill Prairie Nature Preserve—532 acres of upland woodland, prairie, and glade communities—is the largest complex of loess hill prairies in Illinois. Every season brings new blooms to the prairie: woodland wildflowers in the spring, prairie wildflowers in early summer, grasses and wildflowers in late summer, and a blaze of color as the grasses and trees change in the fall. The list is long: tall anemone (*Anemone virginiana*), many asters (*Genus Aster*), blue hearts (*Buchnera Americana*), rough blazing star (*Liatris aspera*), spiked lobelia (*Lobelia spicata*), cleft phlox (*Phlox bifida*), a variety of goldenrods (*Genus Solidago*), and others. Of the threatened and endangered species, pale false foxglove (*Agalinis skinneriana*) and crested coral-root orchid (*Hexalectris spicata*) are only found on hill prairies like Fults.

Along with the seasonal blooms, new birds come to the prairies with each season as well: migrating warblers in the spring and hawks in the fall. By late fall, eagles might be seen soaring over the bluff.

Winter brings tracks in the snow from deer, rabbits, raccoons, opossums, squirrels, coyotes, and foxes. From spring to fall, all hikers should keep an eye out for snakes, particularly the Great Plains rat snake, which spends its days hiding under a rock, but forages on small mammals at night. Only the copperhead and the timber (*Illinois threatened species*) and the eastern massasauga (*Illinois endangered species*) rattlesnakes are poisonous.



Fults Hill Prairie/Kidd Lake

The common grasses—little bluestem (*Schizachyrium scoparium*), big bluestem (*Andropogon gerardii*), Indian grass (*Sorghastrum nutans*), and side-oats gramma (*Bouteloua curtipendula*)—anchor the well-drained loess. Forty feet thick at the top of the hill, the loess thins to almost nothing at the edge of the bluff. Exotic grasses—Canada bluegrass (*Poa compressa*), Kentucky bluegrass (*Poa pratensis*), and meadow fescue (*Festuca pratensis*)—must be controlled.

Managers burn the prairie to stop the encroachment of woody plants: black walnut (*Juglans nigra*), honey locust (*Gleditsia triacanthos*), red cedar (*Juniperus virginiana*), the oaks (*Genus Quercus*), roughleaf dogwood (*Cornus drummondii*), and smooth sumac (*Rhus glabra*). Controlled burning is done on many of the bluff top prairies on the American Bottom, even those not in state preserves.

The hike down to the edge of the bluff is very steep and the path very narrow, but it will take you to the limestone glade at the edge of the bluff.¹⁰





Fults Hill Prairie: Dry Upland Forest

On the upper slope of the prairies and on the ridges that surround the hill prairies and the limestone glades are dry-mesic upland forests, treed in black oak (*Quercus velutina*), post oak (*Quercus stellata*), and black hickory (*Carya texana*),

which is more common west of the Mississippi. These are slow-growing, drought-resistant trees that thrive on rocky ridges or in sandy soils and provide nuts and acorns—food for wildlife. Redbud (*Cercis Canadensis*), dogwood (*Genus Cornus*), black cherry (*Prunus serotina*), and sassafras (*Genus Lauraceae*) grow in the understory. Woody vines—poison ivy (*Toxicodendron radicans*), Virginia creeper (*Parthenocissus quinquefolia*), bristly greenbrier (*Smilax hispida*), and summer grape (*Vitis aestivalis*)—cling to the trees. Spring beauties (*Claytonia virginica*) blossom in April and disappear. So do woodland sunflower (*Helianthus divaricatus*), false Solomon's seal (*Smilacina racemosa*), Virginia spiderwort (*Tradescantia virginiana*), and bell wort (*Genus Uvularia*).

Once these forests were open savanna, woodlands scattered with large spreading trees, generally oaks, which had little competition as they grew. Fire suppression has allowed trees to fill the spaces between, and the oaks gave way to sugar maple (*Acer saccharum*), shagbark hickory (*Carya ovata*), and slippery elm (*Ulmus rubra*). Should logging and grazing occur, exotic species follow: Osage orange (*Maclaura pomifera*), white mulberry (*Morus alba*), the honeysuckles (*Genus Caprifoliaceae*), and multi-flora rose (*Rosa multiflora*).

Kaskaskia Quarry

South of Fults and a little north of Prairie du Rocher, Bluff Road runs along the valley wall. The Kaskaskia Quarry, just north of Prairie du Rocher, produces high quality, chemical-grade, crushed limestone, which is used for agricultural lime and which is carted directly to the Prairie du Rocher dock on the Mississippi where it is loaded into barges.





Modoc Rock Shelter National Historic Site

In the four miles between the villages of Prairie du Rocher and Modoc to the south, humans have lived in the shadow of the bluffs for the last 9,500 years. Twenty-three miles south of Old Valmeyer, three miles south of Prairie du Rocher, and immediately south of Barbeau Creek, the bluffs turned to soft Aux Vases Sandstone resting on Ste. Genevieve Limestone. Glacial floods, bursting out of clear lakes that covered northern Minnesota and stretched north into Canada, eroded shelters and overhangs into the base of the bluffs. Archeological studies in the 1950s and 1980s discovered that humans began occupying the site soon after the floods expired 9,500 years ago, ending the last ice age. Barbeau Creek, carrying soil eroded from its upland watershed, buried evidence of successive layers of human habitation as it deposited its alluvial fan on the floodplain.

In two different areas, 150 feet apart, archeologists dug down through the layers to discover hearths where people have

gathered over the last 9,000 years. The earliest were small groups of hunters who camped in the shelter, probably for short stays in the fall. They hunted deer, raccoon, opossum, ducks, geese, and swans; caught fish; dug freshwater mussels; and ate pecans, walnuts, and hazelnuts. People of the Woodland Culture occupied the site beginning about 4,000 years ago. This period saw the beginnings of agriculture and the use of pottery. Wild game still made up most of their diet.

Beginning about 800 years ago, farmers occupied the site. They grew corn to supplement their diet of wild game. They created tools, ornaments, and utensils from bone, fashioning awls from splinters of the long bones of deer. Using stone, they made hammers and choppers. They cut beads from the hollow wing and leg bones of turkeys, eagles, and swans. Archeologists found evidence of birds in the shelter, birds rarely seen in Illinois today: the Brown Pelican, the Mississippi Kite, the Sandhill Crane, and the extinct Passenger Pigeon.¹¹

Doiron/Bienvenue House south of Prairie du Rocher

A terrace of either glacial outwash or colluvium or both rests against the bluff and rises five to twelve feet above the floodplain. French settlers who arrived in the eighteenth and nineteenth centuries found protection here when the Mississippi inundated the floodplain from valley wall to valley wall. French priests settled on the American Bottom at Kaskaskia in 1703 on the peninsula between the Mississippi and Kaskaskia rivers. Prairie du Rocher, which gives its official founding as 1722 and draws its name from the rocks that rise above it, emerged as a hamlet early in the 1730s. For mutual protection, the early French settled in nuclear villages, farmed common fields, and pastured their livestock in common lots. Few located "habitations" outside the villages. That pattern began to break down by the mid-1780s as new arrivals settled outside the compact villages and built farms. Joseph Doiron migrated from Canada in 1839 and built a small French vertical post house (*poteaux-sur-sole*) with brick fill on a low rise of colluvium at the base of the bluff. Here, his house would be protected from flooding on the bottoms. The Bienvenu family, which owned the house at a later time, descended from Antoine Bienvenu of Kaskaskia, who built one of the original "habitations" outside of Prairie du Rocher after he received land grants between the bluff and the river in 1737.¹²





After a long hot summer with little rain, the moist soil that held water so well in the vernal pools dries out and can carry the weight of a person walking through the forest.

Before the Village of Valmeyer purchased the Salt Lick Land and Water Preserve from Columbia Quarry, hikers had to bushwhack through the woods to get to the highest point in Monroe County. Now volunteers have started blazing hiking trails and reclaiming its hill prairies and glades. It's demanding work: They take chain saws to elm, maple, and pin oaks, cutting them one by one and running the felled trees through a wood chipper. Once they cut cedar, it has to be allowed to dry on the ground. Then, it is burned. They attack bush honeysuckle aggressively. If they don't, it will return and spread like wildfire. And they learn what keeps forbs like the crested coral root orchid endangered in Illinois.⁷



NOTES

- ¹ Quinta Scott, *The Mississippi: A Visual Biography* (Columbia: University of Missouri Press, 2009), chapter 1, “Assembling the Basin.”
- ² *Sinkhole Plain Area Assessment*, Vol. 1, Geology (Champaign: Illinois Department of Natural Resources, Office of Scientific Research and Analysis, State Geological Survey Division, 1998); *Sinkhole Plain Area Assessment*, Vol. 2, Water Resources (Champaign: Illinois Department of Natural Resources, Office of Scientific Research and Analysis, State Geological Survey Division, 1998); *Sinkhole Plain Area Assessment*, Vol. 3, Living Resources (Champaign: Illinois Department of Natural Resources, Office of Scientific Research and Analysis, State Geological Survey Division, 1998); *Sinkhole Plain Area Assessment*, Vol. 4, Part III, Archaeological Resources (Champaign: Illinois Department of Natural Resources, Office of Scientific Research and Analysis, State Geological Survey Division, 1998).
- ³ D. W. Webb, M. J. Wetzel, P. C. Reed, L. R. Phillippe, and T. C. Young, “Karst Springs in the Sinkhole Plain of Illinois: Their Community Diversity and Hydrogeology,” Technical Report 1996, *Illinois Natural History Survey*, Center for Biodiversity, Carbondale, 1996; Timothy R. Pauketat and Susan M. Alt, “The Making and Meaning of a Mississippian Ace-Head Cache,” *Antiquity* (December 2004).
- ⁴ “Clifftop: Protecting Our Bluffs in Monroe and Randolph Counties,” *Natural History Survey of the Renault Grant*, <http://clifftopalliance.org/nhsurvey/nhsurvey.htm>.
- ⁵ Kenneth R. Robertson, Mark W. Schwartz, Jeffrey W. Olson, Brain K. Dunphy, and H. David Clarke, “50 Years of Change in Illinois Hill Prairies,” *Erigenia: Journal of the Illinois Native Plant Society*, no. 14 (January 1996), 41-52, <http://www.inhs.illinois.edu/~kenr/hillprairie.html>.
- ⁶ Dale L. McElrath, Andrew C. Fortier, Brad Koldehoff Emerson, and Thomas E. Emerson, “The American Bottom: An Archaic Cultural Crossroads,” in Thomas E. Emerson, ed., *Archaic Societies: Diversity and Complexity across the Midcontinent* (Albany: State University of New York Press, 2009), 338.
- ⁷ Maddox, Teri, “Blufftop treasure: Volunteers build trails to Valmeyer’s Salt Lick Point,” *Belleville News-Democrat*, October 31, 2010, <http://fefwww.istockanalyst.com/article/viewiStockNews/articleid/4625953>.
- ⁸ Thomas R. Biebighauser, “A Guide to Creating Vernal Ponds,” OPFW Center for Reptile and Amphibian Conservation and Management, <http://herpcenter.ipfw.edu/outreach/VernalPonds/VernalPondGuide.pdf>; F. B. Denny, R. J. Jacobson, and W. J. Nelson, 2009, Bedrock Geology of the Valmeyer Quadrangle, Monroe County, Illinois: Illinois State Geological Survey, Illinois Geologic Quadrangle Map, IGQ Valmeyer, 2 sheets, 1:24,000, <http://www.isgs.illinois.edu/maps-data-pub/isgs-quads/v/pdf-files/valmeyer-bg.pdf>.
- ⁹ “Clifftop: Protecting Our Bluffs in Monroe and Randolph Counties, Illinois,” <http://www.clifftopalliance.org/>.
- ¹⁰ Jason Ney and Terry Nichols, *America’s Natural Places: The Midwest* (Santa Barbara, California: Greenwood Publishing Group, 2010), 9-10.
- ¹¹ Steven R. Ahler, “Stratigraphy and Radiocarbon Chronology of Modoc Rock Shelter, Illinois,” *American Antiquity* 58 (July 1, 1993); Timothy R. Pauketat, “A Tour Guide to the Prehistory and Native Cultures of Southwestern Illinois and the Greater St. Louis Area, Springfield, Illinois,” Illinois Humanities Council, Illinois Historic Preservation Agency, 1993, 38-39; Melvin L. Fowler, “Modoc Rock Shelter: An Early Archaic Site in Southern Illinois,” *American Antiquity* 24 (1959), 257-70.
- ¹² Conversation with Ruth Bienvenue Menard, August 29, 2011, at Ruma, Illinois; Carl J. Ekberg, *French Roots in the Illinois Country: The Mississippi Frontier in Colonial Times* (Champaign: University of Illinois Press, 2000), 109; William Rector, Surveyor, Common Field Lands and Low Land Commons of Prairie du Rocher, 1810, http://www.visitprairiedurocher.com/history/maps/pdr_commons_map_1810.html.



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