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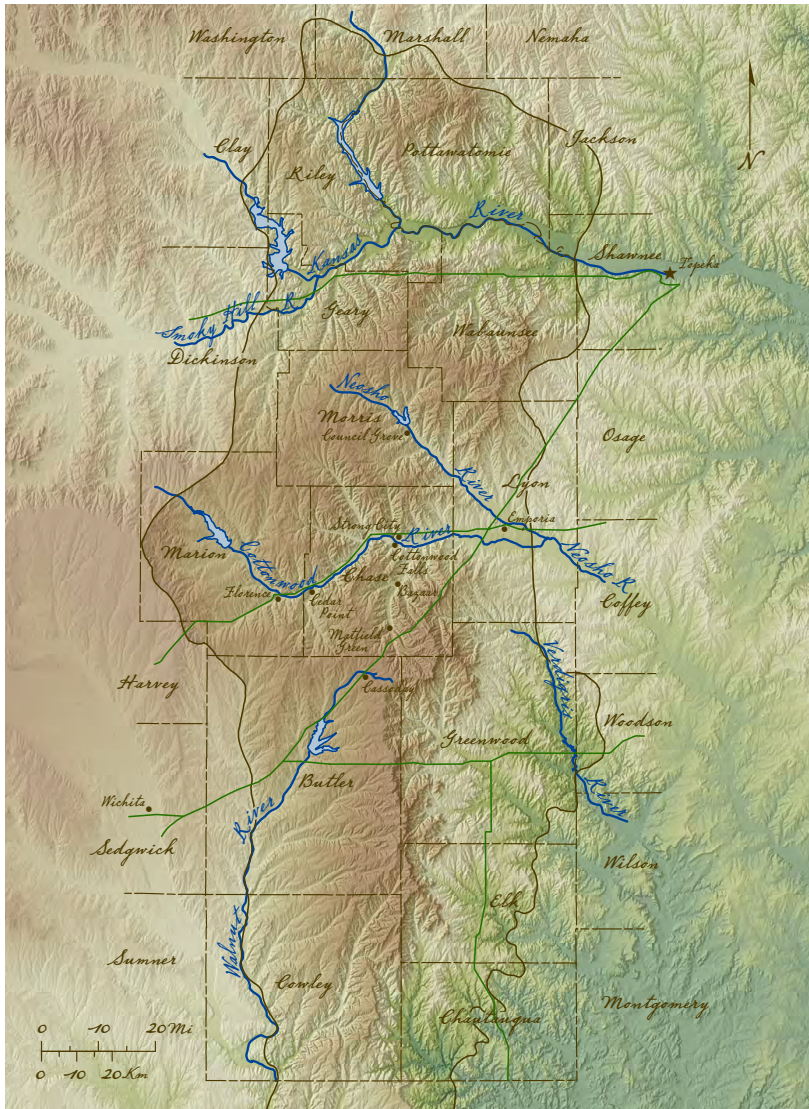
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THE TOPOGRAPHY AND MAJOR RIVERS OF OF THE KANSAS FLINT HILLS
 map courtesy of John Dunham, Kansas Geological Survey, University of Kansas

Water And The Flint Hills

Nobody wants rain tonight. But ask yourself, If rain fell here, where would it go? To truly understand a place, you must know something about its water. That's true for all of Kansas, and it's certainly true for the Flint Hills.



Water has long been integral to this place. About 290 million years ago, shallow oceans left behind the deposits that form today's rocks. More recently, water sculpted the hills through erosion, removing rock in some places, leaving it behind in others. Today, water keeps alive the plants and animals. It fills the creeks and rivers. Water sustains the people.

So what happens to the water that falls on the South Clements Pasture?

A gentle rain soaks into the ground, of course. If the water gets past the grass roots, it moves down until it hits a layer of rock. If that rock is limestone, the water might enter and stay in the pore

spaces, or the water might flow back out at the surface, through one of the springs or seeps that are common here.

Where the water seeps out, even high up on a hillside, it may support wetland vegetation, like the bright red cardinal flower, a plant more commonly found in creek bottoms. During a dry summer, you'll sometimes see swaths of bright green in the midst of dormant, brown grass on a hillside. That's a sign that water is moving from the subsurface, supporting plants even in drought.

If the rain falling on the South Clements Pasture isn't captured by plants, if it doesn't evaporate, or if it comes in a

downpour and runs off (not too unusual this time of year), its eventual destination is a tributary of the Coyne Branch of the Cottonwood River. Because so much of the Flint Hills remains in native grass, streams like Coyne Branch often run clear and clean, unlike silt-laden streams in places where more ground is cultivated.

Coyne Branch meanders north-northwest, but our water isn't part of Coyne Branch for long. Just south of Clements, Coyne Branch meets up with the Cottonwood River.

The river is named after the tree, of course, but the tree also supplied the name for the Cottonwood limestone, a thick, blocky limestone that was used for construction of the Chase County courthouse in Cottonwood Falls and lots of other structures, including the graceful doubled-arched bridge near Clements. Completed in 1888, the bridge spans the Cottonwood River, and our water, now part of the Cottonwood River, flows beneath that bridge.

The Cottonwood heads generally

northeast, then east, taking in contributions from Middle Creek and Diamond Creek. Near the small town of Saffordville, between Cottonwood Falls and Emporia, the main stem of the Cottonwood is joined by the South Fork of the Cottonwood. The book, *PrairyErth*, William Least Heat Moon's magnum opus about Chase County, includes a chapter about flooding in Saffordville. The Cottonwood River was responsible for those floods.

Flint Hills floods are nothing new. Average precipitation here is over 30 inches per year. But average is a tricky term. In 1999, precipitation at Cottonwood Falls totaled 48 inches. In 2006, it was 27.

The Cottonwood River reflects that. In 1999, flow at Plymouth (just west of Emporia) averaged more than a million gallons a minute for the entire year.

In 2006, flow at the same spot was 1/10th of that.

At Emporia, our South Clements Pasture water moves from the Cottonwood

into the Neosho River. The Neosho, which starts north of Council Grove, is one of many rivers born in the Flint Hills. The headwaters of the Verdigris are on the Flint Hills' east flank. The Walnut River flows down the Flint Hills' west side. Because of their elevation, the Flint Hills form something of a topographic divide. Most rivers tend to flow away from the hills, down one side or the other. Only

the Kansas and the Cottonwood rivers cut entirely through the Flint Hills.

Of the rivers that start in the Flint Hills, the Neosho is the biggest.

It's second only to the Kansas River in terms of the amount of water carried out of state.

By now our rain has journeyed from the South Clements Pasture to the Neosho, where it reverses field, turns



CLEMENTS BRIDGE OVER THE COTTONWOOD RIVER
Stephen Perry

southeast, and enters John Redmond Reservoir in Osage County. For our water to get stopped behind a dam isn't unusual, either. In parts of Kansas, as much as 80% of the water winds up behind a dam at some point in its trip out of the state.

By John Redmond, our Chase County water has left the Flint Hills. The path of the Neosho is winding and meandering. Mark Twain once called the Mississippi River the crookedest river in the world, but some of the rivers in Kansas, like the Neosho, can't be too far behind. From John Redmond the Neosho continues southeast, leaving the state just north of Miami, Oklahoma.

After passing through several more reservoirs, our water joins the Arkansas River, which in turn dumps into the Mississippi.

A few miles make a big difference in where the water goes. Rain that falls only about 50 miles north of here is captured by streams that flow to the north. These are tributaries of the Kansas River, which joins the Missouri and dumps into the

Mississippi at St. Louis. So two drops of water, separated by only 50 miles at birth, take two dramatically different routes to the sea. One sees St. Louis and Memphis, the other Tulsa and Little Rock.

Though the water that falls here may leave, it may also come back, lifted by evaporation into the atmosphere, falling again to the land in the timeless repetition of the water cycle. Maybe the same water that left here will return, perhaps as rain to support the people, plants, and animals of the Flint Hills. Maybe, in the process, it'll teach us about this place.

But for tonight, let's hope the rain stays away.

Rex Buchanan is the Interim Director of the Kansas Geological Survey. He is co-author of Roadside Kansas and Kansas Geology, both published by the University Press of Kansas.

Bob Sawin is a Senior Research Associate at the Kansas Geological Survey. He is most recently the author of a map of the surficial geology of the Tallgrass National Preserve in Chase County.

NOTES



BLUE GRAMA
Wade Parsons

2002.10