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## Defining the Flint Hills

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PATTERNS IN FLINT  
*Jim Richardson*

## *Defining the Flint Hills*

The Flint Hills may be the best-loved natural area in Kansas. As the largest intact tallgrass prairie remaining in all of North America, it is also the state's most ecologically significant landscape. The Flint Hills stretch north to south across east-central Kansas, and even extend on down into Oklahoma (where they are called the Osage Hills). The region's width is relatively uniform, averaging perhaps 50 miles but reaching 75 miles at the widest.



But how, exactly, do you define the Flint Hills? And precisely where do they start and stop?

These might seem like simple questions, but they're not, really. The answers depend on the characteristics you take into account.

If asked to define the Flint Hills, some might say it is a region of bluestem

grass (tallgrass prairie) where layers of limestone have been sculpted by erosion. Others might assume that, by definition, the Flint Hills are a hilly region of pastureland where flint (also known as chert) is scattered about. Flint is embedded within limestone layers in the Flint Hills; both flint and limestone are sedimentary rocks. Because flint,

consisting of silicon dioxide, is much harder than the surrounding limestone, it often survives erosion and can be found littering the ground’s surface.

Lieutenant Zebulon Pike, who led an expedition across the Flint Hills in 1806, painfully discovered this fact. Pike remarked in his journal, “Passed very ruff [sic] flint hills. My feet blistered and very sore.” The underlying chert and limestone was neither appreciated by Pike nor his feet, but it is the principal reason the Flint Hills are still in native prairie. An Osage Indian reportedly once told a homesteader with a plow strapped to his wagon, “you won’t put that iron thing here.” While the homesteader may not have appreciated the quip, the land’s resistance to plowing turned out to be a blessing in disguise, ensuring that a landscape expression of tallgrass prairie would survive. Today, roughly two-thirds of what remains of the historic tallgrass prairie is found in the Flint Hills.

While thin, chert-strewn soils characterize a sizable area of the Flint

Hills, not every layer of Flint Hills limestone contains flint. And along the eastern flank of the Flint Hills, for example, one encounters a landscape that looks very much like the Flint Hills, but the rock layers that commonly contain flint are absent. So it may not be useful to define the Flint Hills according to the presence, or absence, of flint.

Geologists sometimes define regions according to the age of the rocks found there. In the case of the Flint Hills, all of the bedrock (the layers of limestone, shale, and other consolidated rocks that are common here) is Permian in age, deposited about 300 million years ago. The rocks just to the east are slightly older, deposited in the Pennsylvanian period of geologic history, and the rocks to the west are generally younger.

While it might be possible, at least geologically, to define the Flint Hills as an area of native prairie with rocks of Permian age, that definition would include some areas, particularly the west side of the Hills, where the landscape is



Map courtesy John Dunham, Kansas Geological Survey, University of Kansas

lacking rolling topography and flint-bearing limestones that are typically associated with the Flint Hills. What's more, some hilly areas of Pennsylvanian age east of the Flint Hills are virtually indistinguishable from the Flint Hills, such as the remnant prairies of Anderson County.

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The prairie really comes alive in early summer, with such species and colors as butterfly milkweed...

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Another geologic similarity across much of the Flint Hills is the lack of glaciation; most of the Flint Hills landscape lies south of the farthest advance of glaciers. But in the extreme northeastern portion, including northern Wabaunsee County, one can still see rocks called erratics that were left behind about 400,000 years ago when a glacier moved into northeastern Kansas. The most common is Sioux

Quartzite, a pink metamorphosed sandstone that dates back a billion years; occasionally other glacial hitchhikers are found, such as granite and agate.

These examples show that as important as geology is, it is not the only factor in defining the Flint Hills. A more modern approach to define and delineate a landscape like the Flint Hills is through shared climate and geology, a method typically used to define eco-regions; this approach assumes that geology and climate largely determine the distribution of plants and animals.

The Nature Conservancy uses a slightly broader definition that considers not only commonalities of geology, climate, and even land use (culture), but also ecological attributes (e.g., landscape ecological functional size and the distribution of flora and fauna). This approach describes the Flint Hills (or Greater Flint Hills) as a landform where intact, tallgrass prairie is the dominant vegetation type (as identified via interpretations of satellite imagery).

More specifically, the Greater Flint Hills is a contiguous landscape of tallgrass prairie with species characteristic of the Flint Hills eco-region.

This broader definition also characterizes the Flint Hills as a landscape sculpted by erosion with gently sloping hills, with an elevational relief of 300 to 500 feet in the more eroded areas. Climate is influenced by the landscape's position within the interior of the continent. Hot continental summer temperatures and cool winters (with occasional arctic blasts) are the norm. The Rocky Mountain rain shadow to the west is tempered by occasional moisture-laden airflow from the Gulf of Mexico. Annual precipitation varies from about 25 to 35 inches. Deeper soils adjacent to stream courses allow cultivation of crops, whereas ranching is the principal land use in the uplands. Cattle grazing and the frequent burning of prairies are common and accepted practices. And, of course, many of the outcroppings of rocks are limestone, cherty limestones, and shale.

Because it can grow so tall, big bluestem is the grass most people identify with tallgrass prairie, but little bluestem, Indiangrass, sideoats grama, and switchgrass are also common, along with the many lesser known grasses (nearly 90 species in all) and an ever-changing panorama of flowering plants (wildflowers). In the early spring, there's the showy yet delicate yellow to orangish flowers of Missouri evening primrose, petite pink to purple flowers of ground-plum milk-vetch, and lavender petals of spiderwort, to name just a few. The prairie really comes alive in early summer, with such species and colors as butterfly milkweed (yellow to deep orange), lead plant (blue to violet), wild alfalfa or scurfy pea (light blue to purple), compass plant (yellow), and blue wild indigo (purplish blue). In autumn, light blue blossoms of pitcher sage and bright yellow Maximilian's sunflower stand out against the dormant reddish-gold grasses. So, with this new, broad definition in mind, where did you enter the Flint

Hills on your way here today (except, of course, for those of you who started your trip already in the Flint Hills)?

If you came from the east on U.S. Highway 56, you entered the Flint Hills just north of the town of Admire, a few miles west of the intersection between the Kansas Turnpike and U.S. 56. The landscape takes on a rolling aspect, and the rocks are Permian in age. The predominant land use is cattle grazing on tallgrass prairie; relatively little ground is cultivated here.

Even though that's about where the Flint Hills start, you didn't encounter your first flint-bearing limestone until you were about ten miles west of Admire, where U.S. 56 cuts through a rock layer called the Threemile limestone, which is loaded with chert. In fact, the hills west of Bushong include layers of this cherty Threemile limestone. (See page 31)

Coming in on U.S. 56 from the west, you'd first encounter the Flint Hills around the town of Marion, where the county courthouse is built out of Cottonwood limestone, a thick blocky

limestone that is identified strongly with the Flint Hills (even though it contains relatively little chert).

Coming up the Kansas Turnpike from Wichita, the Turnpike runs through Permian rocks around Wichita, but this flat landscape is very different from the Flint Hills, which you would first encounter about ten miles east of the Sedgwick County/Butler County line, where the landscape again takes on the rolling aspect that characterizes the Flint Hills. This is also about where you would see the Winfield Limestone (named for the town of Winfield), which includes layers of chert.

If your route included Interstate 70 from the east, you first encountered the Flint Hills at about milepost 339, where a humpy hill called Buffalo Mound is a landmark (though you had to drive another ten miles or so before you saw the Cottonwood limestone). On I-70 from the west, the Hills start around Chapman. And when you're westbound on curvy, winding Kansas Highway 4, you hit the Hills around Eskridge.

Obviously you could enter and experience the Flint Hills in other ways, just as there are different ways to define the Flint Hills. Because definitions are subjective and maps will likely be refined by future mapmakers, maybe a "know-it-when-you-see-it" approach is the best way to confirm your arrival.

But, here are a few indicators that might help. You might be in the Flint Hills where there are miles upon miles of intact, native tallgrass prairie carpeting smooth-sculpted, rolling hills; where a wind-swept, prairie ridge comes alive each spring morning with the mating calls and dances of greater prairie-chickens; where an orange horizon and the smell of prairie smoke does not cause panic, but is rather a sign that winter has waned; where slabs of limestone form a rim along pasture hillsides; where you can still watch real cowboys moving cattle on horseback; and where an Osage orange (hedge) post is the tallest perch around for an upland sandpiper to perch, raise its wings, and exhale its distinctive "wolf-whistle."

*Rex Buchanan grew up near Little River, in Rice County, Kansas, on the edge of the Smoky Hills. He has an undergraduate degree from Kansas Wesleyan University and graduate degrees from the University of Wisconsin-Madison. He has been at the Kansas Geological Survey, based at the University of Kansas, since 1978, and is currently the Interim Director. He has been president of the Kansas Association for Conservation and Environmental Education (KACEE), the Kansas Academy of Science, and the Association of Earth Science Editors. In 2008 he was named a Fellow of the Geological Society of America.*

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*Brian Obermeyer is the Director of The Nature Conservancy's Flint Hills Initiative. Brian works with ranchers, landowners and other stakeholders to help preserve the biological integrity of this impressive landscape. In addition to his work to secure conservation easements, Brian oversees stewardship activities on 13,000 acres of Conservancy-owned land, including the Tallgrass Prairie National Preserve. Brian holds a master's degree in Environmental Biology from Emporia State University.*