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20,000 Years of Change: Plants, Animals, and People in the Flint Hills

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20,000 Years of Change:

PLANTS, ANIMALS, AND PEOPLE IN THE FLINT HILLS



MEGAFUNA ON A FLOODPLAIN IN THE FLINT HILLS 20,000 YEARS AGO

Artist: Barry Roal Carlsen, Courtesy University of Wisconsin-Madison

20,000 Years of Change

In September 1806, explorer Zebulon Montgomery Pike ventured into what is now Chase County and observed a rugged, rocky landscape he named the Flint Hills.



In his journal he described the tallgrass prairie and mentioned the buffalo, deer, elk, cabrie (pronghorn), and panthers he observed from a vista. We are fortunate to have his account of the plants and animals of the Flint Hills before Euro-Americans settled the region.

White hunters drove buffalo to the brink of extinction and replaced them with cattle. Elk and pronghorn also were overhunted and vanished from the Flint Hills; only recently have pronghorn been reintroduced. Today there are rare sightings of mountain lions because they avoid people, plus their numbers have been greatly reduced by hunting and habitat destruction. Although people have

been in the Flint Hills for at least 13,000 years, human-induced transformations of the plant and animal communities mostly occurred during the past 150 years.

But transformation isn't new to the region. The flora and fauna of the Flint Hills experienced major changes during and after the Ice Age—change not caused by humans.

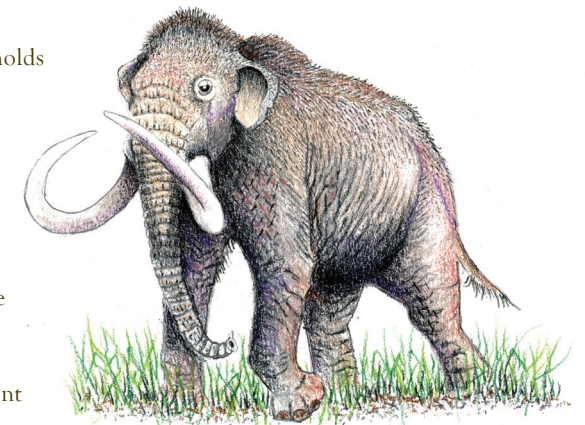
Unfortunately no written documents like Pike's journal provide a first-hand account of the vegetation or animals of the Flint Hills before the 1800s. However, paleoecologists like myself find ways to reconstruct ancient environments. For example, to understand vegetation we rely on plant remains, such as seeds,

stems, and logs that may be preserved for tens of thousands of years in saturated sediments. Also, soils and sediments may contain microscopic plant materials, such as phytoliths (pieces of silica that provide support in plants) and fossil pollen that can be used to reconstruct ancient plant communities. Even decomposed soil organic matter holds clues about past vegetation.

Determining the composition of ancient animal communities is fairly straightforward: find and identify fossil bones and determine their age by radiocarbon dating methods. Many localities in the Flint Hills have yielded the remains of Ice Age animals, creating a picture of a landscape dominated by giant mammals referred to as “megafauna.”

So what does the fossil record tell us about the biotic systems of the Flint Hills approximately 20,000 years ago, during the peak of the last advance of the continental ice sheet in North America? At that time

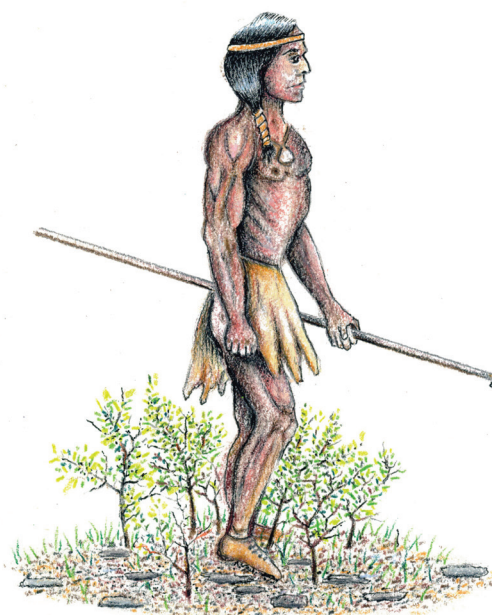
of the Pleistocene epoch, the ice sheet was at its southern limit about 350 miles north of the Kansas-Nebraska border. (The glaciers that did reach northeastern Kansas arrived much earlier, about 600,000 years ago). Although the ice sheet was far from the Flint Hills during the last glacial



PLEISTOCENE EPOCH
20,000 YEARS AGO

maximum (LGM), the glacial climate affected the biota of the region. Instead of tallgrass prairie, open pine parkland dominated the uplands of the Flint Hills, and spruce formed gallery forests along streams. The animal community consisted of large grazers, such as mammoth,

mastodon, shrub ox, American camel, and extinct forms of pronghorn and bison, and the large predators that hunted them, including dire wolf, American lion, and short-face bear. Also, a formidable predator arrived sometime before the end of the Ice Age: humans. Clovis people



PLEISTOCENE EPOCH
13,000 YEARS AGO

occupied the Flint Hills by around 13,000 years ago, and evidence suggests a human presence in the region before that time.

The composition of the late-glacial

animal community dispels a common myth about the climate during the Ice Age. One might assume that continental glaciation was accompanied by a harsh, cold climate. But that was not the case everywhere. In unglaciated regions like the Flint Hills, summers actually were cooler and winters were warmer during the LGM than they are today. These less extreme seasons—or reduced seasonality—allowed plants and animals to have broad ranges, resulting in unusual intermingling of species. For example, animals like woolly mammoth, adapted to cooler conditions, coexisted with animals like the American camel that appreciated warmer climes. Woolly mammoths could not tolerate the extreme heat so typical of our modern summers, nor could American camels survive our harsh winters.

In short, the climate of the Flint Hills was more comfortable during the LGM than today, allowing many different species of plants and animals to coexist. Dr. Larry Martin, a vertebrate paleontologist at the University of Kansas

Museum of Natural History, refers to the resulting eclectic group of animals as a “disharmonious faunal assemblage.” That is, modern relatives of these animals would not be found living together today.

The continental ice sheet began retreating soon after 20,000 years ago, and beginning around 12,000 years ago, the complex Pleistocene biota began to break up in the Flint Hills. Trees quickly vanished from the landscape, except along rivers, where spruce was replaced by hackberry, elm, oak, cottonwood, and other deciduous species. By around 10,000 years ago, which marks the beginning of a period referred to as the Holocene, the modern assemblage of prairie plants and animals was in place.

The demise of Ice Age plant communities was accompanied by the extinction of over half of the species of North American large mammals. Mammoth and mastodon vanished, as did many of their predators, including the dire wolf and American lion. However, one of the major predators, humans,

survived at the end of the Ice Age, and some scientists argue that people caused the extinction of the megafauna



HOLOCENE EPOCH
10,000 YEARS AGO

by overhunting them. A more widely accepted explanation for Pleistocene extinction is that people put hunting pressure on animals that were already on their way out because of climate change.

Beginning around 12,000 years ago, the climate of the Flint Hills began to change to modern highly seasonal conditions. Summers became long and hot, and winters became cold and relatively dry. This increased seasonality probably affected the people who occupied the region

during the first 8000 years of post-glacial time: the Archaic hunters and gatherers. Storing food probably was a greater need as seasonal extremes made it temporarily difficult to hunt or to gather. On the other hand, seasonal migration of game, such as



ALTITHERMAL
(EARLY-MIDDLE
HOLOCENE EPOCH)
8,000-5,000 YEARS AGO

bison, and seasonal fruiting of plants, like the production of acorns on oak trees in the fall, may have made some resources locally abundant for short periods.

From about 8000 to 5000 years ago, the regional climate became progressively warmer and drier. This climatic episode—the Altithermal—caused short and mid-size grasses to move eastward into the Flint Hills, creating a mixed-grass prairie. Bison

appreciated this change in vegetation because short but nutritious leafy grasses replaced much of the stem-dominated tall grasses. For the Archaic hunters and gatherers, however, this period of frequent, intensive drought made life stressful.

People did not, however, abandon the region. Instead, they adapted to the changing conditions, and probably were tethered to reliable sources of water, such as springs and perennial streams.

Climatic conditions began to improve by 4500 years ago, and the modern climate was in place by 4000 years ago. Temperatures became cooler and annual precipitation increased.

The short grasses retreated westward and the tall, bluestem prairie became established in the Flint Hills. Relatively brief climatic fluctuations over the past 4000 years, including the Medieval warm period (A.D. 950 to A.D. 1250) and the Little Ice Age (A.D. 1550 to A.D. 1850), probably had short-lived effects on biota.

Increased seasonality over the past 4000 years may have promoted the

banding together of people to cooperate and utilize more fully seasonal resources. Native Americans formed villages in the Flint Hills by about 2000 years ago, when pottery appears in the region's archaeological record. Perhaps increased seasonality favored the development of more efficient food storage, cooperative seasonal acquisition of food resources, and the evolution of sedentary cultures that ultimately led to agriculture.

So, is the tallgrass prairie a permanent fixture of the Flint Hills landscape? No. Transformation is on its way. Continental glaciation is driven by cyclical changes in the earth-sun relationship, and despite

modern global warming, we are due for another Ice Age within the next 1000 years. Such an event will yet again change the flora and fauna of the Flint Hills, and if people are still around, they will have to adapt to an icy world.

Rolfe Mandel is the Executive Director of the Odyssey Geoarchaeology Research Program at the Kansas Geological Survey and a Professor in the KU Anthropology Department. He has spent much of his career studying post-glacial landscape evolution in the Great Plains, and he is an authority on how earth-surface processes have affected the archaeological record of the Plains and Midwest.

Illustrations by Wade Parsons



HOLOCENE EPOCH
2,000 YEARS AGO