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AMERICAN BISON
Wade Parsons

The Ancient Relationship between Grazing Animals and Grasslands

It has often been said tallgrass prairies are the result of fire and climate. That statement is true, but it is only part of the story. The development of plant communities on Kansas pasturelands involves a complex progression of factors still being investigated by scientists. Some of those processes began so long ago we seldom consider their importance in the establishment of North America's prairies.



For millennia the plains of Kansas were being shaped by large prehistoric herbivores. Before the first Herefords, beyond the arrival of Longhorns, and even predating the appearance of bison, the interior grasslands of America owe their existence to the presence of large grazing mammals.

Kansas was not always covered with wide prairies. According to science the first expansion of grass into small open

areas occurred during the Oligocene (34 - 24 million years ago). During this epoch a cooling trend prevailed into the Pleistocene Ice Ages causing tropical forests to decrease and deciduous woodlands to appear. The migration of animals between continents occurred, grazing animals increased in size, and members of the elephant family were making their first appearance in the tropical savannas of North America.

Scientists believe during the Miocene era (23.8 – 5.32 million years ago) a cooler, drier climate quickened the decline of forests and allowed a major expansion of savanna grasslands. Recognizable forms of grass appeared and flourished because they were able to process fluctuating levels of carbon dioxide more efficiently than woody plants. The amount of silica in their structure also increased, making them a less palatable food source. Only animals adapted for grazing would be able to use grasses as a major source of fodder. Grazing animals such as early horses and rhinoceros inhabited Kansas during this time and were the prey of saber-toothed cats.

During the Pliocene (5.3 – 1.8 million years ago) global climate saw a temperature drop of 10 degrees Fahrenheit and remained dry. Fires became more frequent and by the late Pliocene these conditions reduced woody browse, allowing treeless grasslands to appear. Only large-jawed, ruminant,

grazing animals with high-crowned, heavily-enameled teeth could prosper. The predominance of rhinoceros, camels, and horses in Kansas during this epoch is a strong indicator of an expanding grassland environment.

Throughout the Pleistocene (1.8 million – 10,000 years ago) a series of glacial periods advanced and retreated across the northern third of the United States. The Kansan, also known as the Independence Ice Age (480,000 – 230,000 years ago), was the absolute maximum extent of any ice sheet into the continental United States.

A lobe of that glacier ground a path into northeastern Kansas clearly leaving its mark on the land's surface. Based on pollen samples and fossilized plant remains, vegetation during this time would have been similar to modern conifer forests in Manitoba. Animal life included mammoths, rhinos, caribou, American lion, musk oxen, dire wolves, saber-toothed cats, and bison. Plants and animals requiring a warmer climate

retreated south with some species returning when the glaciers receded. Vegetation changed from conifers to oak forests to savannas and then prairies. During the late Pleistocene around 200 varieties of large herbivores became

Latifrons had horns that spanned over seven feet from tip to tip with skeletal remains indicating a creature 50% larger than modern bison.

extinct along with large carnivores that preyed or scavenged upon them. The reasons for these extinctions are still hotly debated, with climate-related vegetation changes and arrival of humans on the continent being considered as strong possibilities. Recent DNA research has suggested some mega-fauna continued to exist until a much later time. Smaller species of plants and animals show little evidence of

extinction during this epoch.

One of the Pleistocene creatures that dramatically decreased in body size and yet survived into modern times is the bison. The first bison in North America was *Bison priscus* or steppe wisent which crossed over from Asia. *Bison latifrons* also arrived from Asia and was the largest of known bison species in North America. *Latifrons* had horns that spanned over seven feet from tip to tip, with skeletal remains indicating a creature 50% larger than modern bison. Several of this species have been found in Kansas and according to radiocarbon dates existed until about 22,000 years ago.

Bison latifrons was followed by *Bison antiquus*, the most common herbivore on the continent between 18,000 to 9,500 years ago. Skeletal evidence indicates a creature about 25% heavier and taller than modern bison with horn cores spanning about three feet. These bison were herd animals hunted by Paleo-Indians. Numerous *Bison antiquus*

kill sites have been discovered including those near Folsom and Clovis, New Mexico.

Bison *occidentalis* was somewhat smaller than *Bison antiquus*. *Occidentalis* was also hunted by humans, and a skull found in the Arkansas River near Tulsa, Oklahoma, had a Calf Creek projectile point imbedded in it. Experts believe the modern Bison bison, or Plains Bison, and Bison bison *athabasca*, or Wood Bison, descended from *Bison occidentalis*. Around 5000 BC bison had reached their current size. Questions regarding this decrease in body size remain, but the strongest correlation links bison size with a change in plant life. Prairie grasses were changing from predominant cool season varieties to the warm season species that characterize tallgrass regions today.

During the historic period bison were documented as a species of Flint Hills fauna. Frenchmen from Louisiana conducted a bison-meat and hide-processing operation from about 1730 to

1750 in a Wichita village near Newkirk, Oklahoma. This village and many others in the tallgrass prairie region are littered with butchered bison bone and hide scrapers indicating a close proximity to herds. In 1806 Zebulon Pike recorded in his diary the presence of bison in Chase County as did accounts from early settlers. Even today bison bones are frequently found along streams in the Flint Hills. Bison were clearly an integral part of the tallgrass environment for a very long time. The herds not only shaped the prairie, they also molded prehistoric cultures as the material and spiritual focus of plains tribes for centuries. Bison products were also important commodities in the market places of Kansas, the United States and Europe.

Many researchers believe bison are superior to cattle for maintaining healthy prairies and should play a dominant role on grasslands managed for conservation or restoration. Bison behaviors such as grazing close to the ground, wallowing,



MODERN BISON AND BISON LATIFRONS SKULLS
Wade Parsons

horning trees, covering wide areas, and preferring open spaces while grazing perform a beneficial role in maintaining grasslands. Before the last bison were eliminated from the Flint Hills, domesticated cows were being grazed on the region's lush grasses. Cattle in the Flint Hills are helping preserve a prairie environment in the absence of bison. Some environmentalists believe all large herbivores are destructive and should not be allowed to graze on public lands. In regions where the vegetation has been abused by profit-driven overgrazing, ecological problems clearly exist. However, removing all cattle or bison from tallgrass grazing areas for extended periods would generally be a poor land management decision. Careful grazing can reduce the presence of invasive plants, mitigate damage from range fires, and aid the growth of many native plant species. Bison grazing patterns are also an important factor in the diversity of grassland birds. A large number of studies have concluded that

well-managed grazing is an excellent tool for conserving rangeland health, and the absence of large herbivores has a negative impact on most grassland environments.

A recent survey discovered most of the public considers the bison a symbol

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of America that should be restored to portions of its former range. In 1987 the Konza Prairie Biological Station near Manhattan, Kansas, reintroduced bison to study the effects of their grazing on tallgrass prairie pastures. One of the data sets being collected is a plant species composition. Research indicates bison tend to consume a higher percentage of grasses and fewer forbs than cattle which

helps increase the prairie's biodiversity. Nearly all ecologists believe natural ecosystems become threatened when their variety of species decreases. On October 20th, 2010, the Tallgrass Prairie National Preserve in Chase County, Kansas, received 13 genetically-pure, disease-free animals from the Wind Cave herd in South Dakota. The six cows and seven bulls are probably the first bison to roam the preserve in 140 years. One hopes this herd and others will provide a more complete picture of factors that establish healthy prairie environments.

We know that over millennia Kansas grasslands were shaped by various forces of nature. The teeth, horns and hoofs of large grazing herbivores numbering into the millions also played their part. Just as grazing animals need the prairie, fully functioning grasslands also require the presence of bison or cattle.

Wade Parsons grew up exploring the tallgrass prairie, and the Kansas Flint Hills will always be his landscape of home. Wade taught in the Wichita school district and

is currently coordinating a native plant restoration/education project that connects high school students with land management scientists in southern Utah. He also works as an archaeologist on the plains, deserts and mountains of the American West. He is a talented artist and has done many of the wildlife and botanical drawings found in this journal.

