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# **History and land use practices in the Little Missouri Badlands and western North Dakota**

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## **Introduction**

The history and land use practices in the Little Missouri Badlands have been long and varied. It would be difficult to explain without the context of events and outside forces occurring in the surrounding area. The history and land use practices can be briefly explained by describing some of the major interactions of climate, vegetation, herbivores, early human cultures, and European settlement and the resulting changes that these forces have caused.

The climate of western North Dakota has been cyclical for the past 5,000 years between wet and dry periods. These changes in climate have caused the dominate vegetation to fluctuate between desert shrub, short grass, mixed grass, and tall grass prairies, deciduous and coniferous forests, and Rocky Mountain plant communities. These climate and vegetation changes have caused fluctuations in kinds and numbers of herbivores present, which in turn have effected the mechanisms that regulate plant growth to be selective for species that tolerate and compensate for herbivore activity. Plant species selectivity and competition effects development of plant communities. Limitations of climate, vegetation, and food animals and the development of technologies over time have caused human cultures to change in their methods of acquiring food, clothing, shelter, and energy from the land. Human technologies and life styles during the past 110 years have been able to effect several changes in western North Dakota.

All of these factors interact and change. The changes in these factors are the history and land use practices in the Little Missouri Badlands and surrounding area.

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Numerous published references have been consulted for information during the development of this paper and they are listed at the end of this manuscript.

## **Climate and vegetation**

The climate and geological activities have had vast changes over time in western North Dakota and have caused much variation in sedimentary deposition and erosion, and have altered the species composition of plant communities. The changes in climate since the last glaciation period, which occurred between 70,000 and 10,000 years ago, have strongly influenced the present conditions of the region. The maximum advance of the ice sheet was between 14,000 and 12,000 years ago. The geological evidence indicates that the ice margin extended near to the north and east banks of the present Missouri River Valley. A small area of southwestern North Dakota was not inundated by the Wisconsin glacial advance and this area has been categorized as unglaciated. Earlier continental glacial advances have extended further to the southwest. Evidence of these earlier ice margins has been eroded away and there has been some debate as to their extent. The only existing evidence has been the presence of glacial erratics in the form of scattered granite rocks and boulders.

Glacial advances occurred during periods when the snow accumulation on top of the glacier during the winter was greater than the amount melted during the summer. As glaciers advanced, they completely destroyed the existing vegetation and as they melted and retreated, they deposited dirt, rocks, and boulders that had been suspended in the ice. About 10,000 years ago, there was a sudden change in the climate to dryer and warmer summers, but colder winters. This change, speeded up the melting of the glacial ice. The vegetation at the ice margin was a spruce-aspen forest because of the cool moist conditions; this graded into a deciduous forest which graded into a grassland to the south.

The climate was much dryer and warmer for a period between 10,000 and 5,000 years ago. Between 8,500 and 4,500 years ago there was a sage and short grass plant community across North Dakota similar to parts of Wyoming. There were frequent summer droughts and extensive soil erosion from wind.

The climate changed about 5,000 years ago to conditions much like the present with cycles of wet and dry periods. The wet periods were cool and humid with greater amounts of precipitation. During the wet periods, the vegetation changed with increases in the amount of deciduous woodlands across North Dakota. A brief wet period occurred around 4,000 years ago. Relatively long periods of wet conditions have occurred between 2,500-1,800 years ago and from 1,000-700 years ago. A recent short wet period occurred in the 1960's. The dry periods have been warmer with reduced precipitation and recurrent summer droughts. During the dry periods, the vegetation changed with decreases in woodlands and increases in grasslands and a shift from taller grass species to shorter grass species. A widespread long drought period occurred between the years 1270-1299 AD and other more recent drought periods have occurred in the 1860's, 1930's and 1980's.

The climate pattern that we are presently in has occurred over the past 5,000 years and has been cyclical between wet and dry periods. These changes in amounts of precipi-

tation have caused very noticeable changes in the plant species composition from deciduous woodland species, to tall grass, mixed grass, short grass, and desert shrub plant communities.

The present vegetation has plant species with affinities to the tall grass, mixed grass, and short grass prairies, and deciduous and coniferous forests, Rocky mountain, and desert shrub plant communities. This wide mix of plant species in western North Dakota was formed from remnants of plant communities which reached periods of greater development during the periods of wet and dry cycles which had conditions that favored these various plant community types. This wide diversity of plant species in our native plant community permits the communities to be very dynamic and respond to changes in climatic conditions by increasing the plant species that are favored by any given set of conditions as they arise.

## **Early human cultures and changes in life style**

The early inhabitants of North Dakota were descendants of Asian immigrants that moved across the Bering Land Bridge between 19,000 to 14,000 years ago. They moved into North Dakota at the time of the retreating ice sheet. The members of the Paleoindian Culture (12,000-7,500 years ago) lived in well organized small family nomadic groups of no more than fifty people of all ages. Their average life span was 30 years. These people traveled and traded over long distances and did not appear to have claimed territories. They had the use of fire for warmth and cooking. Well made lethal weapons of stone-tipped spears were used to hunt large game animals and hunting was conducted as an efficient, coordinated group activity.

Several large mammals became extinct in North America between 10,000 and 8,000 years ago after the sudden climatic change that set off ecological changes in the vegetation communities. Most paleontologists believe that these large mammals could have adjusted to the climate change if it hadn't been for the extra pressure from human hunters that altered the birth-death ratios enough to push them into extinction. The mastodon, mammoth, camel, tapir, sloth, horse, large long horned bison, middle sized bison, and dire wolf all became extinct during this time. Caribou, musk oxen, and the small bison survived the climate change and hunting pressure. The dramatic success of the bison following this period was aided by the extermination of their previous prairie competitors.

The humans that remained on the grasslands during the Archaic period, (7,500-2,400 years ago), made a noticeable shift in their diet by increasing the use of plants because of the reduction of available game animals. The Archaic Indians were able to predict the correct seasons in which to gather seeds, fruits, and roots for food plants widely distributed across their territory. They developed atlatls to throw spears with greater force during hunting. Fire was intentionally used as a hunting aid to change the vegetation to attract herds of game animals to a desired region. They conducted well organized communal hunts that herded and drove bison off cliffs, or jumps. The Archaic Indians lived in small family groups that were nomadic over a territory. They lived in portable skin-covered tipis and used large dogs with travois to transport family goods. Several small groups from a region would come together to trade for necessities and for opportunities

for young and unmated individuals to develop pair bonds with individuals from outside their immediate family clan. The population of the Archaic hunter-gatherers was low on the prairie.

A change in life style came with the introduction of squash and gourds from the central Mississippi Valley area about 2,250 years ago. Currently, the earliest radiocarbon dated squash from North Dakota archeological sites is from 1,200 years ago. The Plains woodland hunter-farmers, (2,400-1,000 years ago), did not have permanent settlements but had small nomadic hunting territories, and planted and cultivated garden plots with domesticated squash and gourds. They learned to encourage growth of wild plants such as sunflower, goosefoot, pigweed, knotweed, and marsh elder in selected beds so that the plants produced more seeds or tubers than they would have without human encouragement and selection. Seeds from these and other cultivated wild plants were transported across most of the northern Great Plains. There was a climatic wet period between 2,500 and 1,800 years ago which most likely assisted them in the development of their garden produce. The garden plots were tended only when the group's nomadic travels came near, and at the various harvest periods for the different plants. Surplus food was preserved and stored by each nomadic group for later use. Pottery made from river bank clay was first used about 2,000 years ago. The bow and arrow was introduced through trade channels from the Eskimo culture about 1,400 years ago.

Horticultural practices developed and improved, and a larger portion of the diet came from cultivated gardens. Permanent villages were established near the gardens by the Plains Village Culture (1,000-700 years ago) so that the women could tend and cultivate their plots. There was a climatic wet period (1,000-700 years ago) during this cultural period. Domesticated corn and beans were brought into North Dakota about 920 years ago from the central Mississippi Valley after 120 day varieties were developed from the 200 day varieties grown in the Central Mississippi Valley Region. Currently, the earliest radiocarbon dated corn from North Dakota archeological sites is from 750 years ago. The three main cultivated domesticated plants, corn, squash, and beans, complemented one another in nutritive value and became the stable nutritional source needed by the North Americans to advance cultural development on the prairie. Small unfortified villages developed and expanded along bluffs of the tributaries of the Missouri River. Each family lodge had a garden plot of 3 to 5 acres usually located on a lower river terrace than the village site. The number of small farming sites increased in western North Dakota until the drought period of 1276-1299 AD.

The long widespread severe drought period forced the village farmers to abandon their small villages and move to a short stretch of the Missouri River Valley located between the Knife and Cannonball Rivers. There they developed larger earth-lodge fortified horticultural villages and eventually became the Mandan and Hidatsa tribes. The size of these organized Missouri River farming villages (1300 - 1738 AD) was limited by the available arable land and wood supplies. The men were responsible for hunting and providing meat for the household and for military protection of the village. Men planted and harvested tobacco which was used in most ceremonies. Extended communal group hunts were conducted during the spring, summer, and fall but hunting in the winter was generally on an individual household basis. Their primary hunting territory was the region between the Missouri and Little Missouri Rivers in North Dakota and extending near to the

Yellowstone River in Montana. Women were responsible for maintenance of the dwelling, care of children, production of vegetable food (cultivated and gathered), preservation of all foods, processing of skins and furs, and manufacturing of clothing, basketry, and pottery. Women owned, controlled, and worked the arable lands, and they provided the basic foodstuffs and surpluses.

Arikara tribes had a similar life style and lived and farmed along the Missouri River in South Dakota. They formed loose confederations with the Mandan and Hidatsa tribes for mutual protection from southern and eastern tribes. The Arikara moved north into North Dakota about 1825.

The Indians on the plains of North Dakota had European trade goods in the 1660's but the first Europeans didn't make contact until 1738 and regular trade wasn't established until the 1740's. The Mandans had acquired the horse by 1734 but didn't change their life style other than they were able to hunt over larger areas and transport larger loads.

The Cheyenne moved into North Dakota as a result of wars with Iroquois, Assiniboin, and Cree Indians from their former home area near Lake Superior where they were nomadic hunter-gathers. The Cheyenne developed permanent earth lodge villages along the Sheyenne River in southeastern North Dakota during the period of 1653-1750 and developed a horticultural base food supply with corn, squash, and beans. They acquired the horse in the mid 1700's and changed from a permanent horticultural village life style to full equestrian nomadic life style and moved from eastern North Dakota to central North Dakota and formed alliances and trade relations with the Missouri River Valley tribes and continued their move to western North Dakota and later to eastern Wyoming.

The Dakota Indians acquired the horse about 1750 when they were living a life style as hunter-gatherers in central and western Minnesota and northeastern North Dakota. In two generations, the Dakota changed their life style to equestrian nomads living in bison skin tipis and they moved into and occupied the plains of North and South Dakota and depended on the bison for most of their necessities.

There were very few hostility problems between the Indians and Europeans in North Dakota before the 1860's. The Indians of North Dakota were included in the Fort Laramie Treaty of 1851 when a major part of western North Dakota west of the Missouri River was assigned to the various tribes.

North Dakota grasslands have not had a period that has been free of human impact since the retreat of the last glacier. The different life styles and the changes in population densities have impacted the grasslands in many ways. Human cultures have used the land to provide the food, clothing, shelter, and energy that they needed to live.

## **Herbivore impact on grassland plant communities**

The first definitely known grass fossils have been obtained from the late Tertiary Period. Grass developed quickly and by the time of the lower Miocene Epoch, which was 20 million years ago, grass fossils had developed morphological characteristics similar to the present grasses and can be identified to modern genera. Grazing mammals appeared

in the fossil record at about the same time. Grass plants, grazing mammals, and grassland plant communities have all evolved together.

All the plant species present in North Dakota have had their origin in some other area and have migrated into this region by different mechanisms and at different times and rates. The plant communities that are present in North Dakota are a result of interactions between the climate, soil, plant competition, herbivore grazing, and human activity.

Grazing activity from herbivores has placed selective forces on grass plants. During the evolutionary process, grasses have developed hormonal growth regulation, and symbiotic soil organism relationships as mechanisms to compensate for defoliation by grazing herbivores. There were many types of herbivores on the grasslands of North America until about 10,000-8,000 years ago when several became extinct. The small bison was the dominant herbivore between 5,000 and 110 years ago. Knowledge of the bison population dynamics and seasonal patterns of movement would have helped grassland managers develop and understand management strategies of our present plant communities but we will probably never know the actual numbers and their movement patterns other than speculated generalities.

Many authors have estimated a peak population between 50 and 75 million bison in North America before the arrival of European immigrants. These estimates were based on an assumption that bison grazed over an area of 1.5 million square miles of plains, 0.5 million square miles of prairie, and 1.0 million square miles of forest for a total of 3.0 million square miles of bison range in North America. These estimated land area values were too large. The physiographic regions of the Great Plains and the Central Lowlands contain 575,000 and 650,000 square miles, respectively. These two provinces extend from the foot of the Rocky Mountains to the Appalachian Mountains, and from southern Texas to the Canadian Shield in Manitoba, Saskatchewan, and Alberta, and contain a total of 1,225,000 square miles. These two regions contain all of the tall grass, mixed grass, and short grass prairies, and parts of the eastern deciduous forest and aspen parkland. A few bison ventured into the Appalachian and Rocky Mountains but the vast majority of the bison herds stayed on the Great Plains and Central Lowlands Physiographic Regions, which are not 3.0 million square miles in size.

The average stocking rate of an estimated 60 million bison on 1.2 million square miles of plains and prairie would be 1.1 acres per month or 13.1 acres for a year of grazing per bison. This would be a high stocking rate using modern standards. A more conservative estimate in stocking rate which would allow for an average of about 24 acres per bison per year would bring the estimated peak population closer to 30 million bison plus about 4 million animal unit equivalents for elk, deer, and pronghorn living on the Great Plains and Central Lowlands of North America.

Bison were viewed as the commissary of the plains Indians and were also considered as a hindrance to the development of the United States as a Nation. The bison were eliminated in a very short period of about 150 years. The last two bison east of the Mississippi River were killed by Indians in 1832. The area east of the Missouri River was nearly empty of bison in 1840. The vast majority of the bison killed before the end of the Civil War were taken by Indians for provisions and trade for European goods. Beaver pelts were the primary trade commodity for Indians and bison robes were a secondary

commodity. In the 1820's, about 200,000 bison were killed per year for trade as robes, tongues, and meat in North America. At that time, less than 5,000 per year were killed by white men. In the 1830's, about 50,000 bison robes were shipped down the Missouri River from trading posts per year. One Indian lodge could process about 20 bison robes per year. Only hides taken from November through February were made into robes. Very few white men knew how to process bison hides into robes and concentrated their efforts on trapping beaver. In 1840, Europeans started trading for silk with China which caused a large drop in the demand for beaver pelts. This caused a shift to bison robes as the primary trade commodity. The American Fur Company was trading about 100,000 robes per year from the northern plains in the 1840's. The last large Red River bison hunt occurred in 1840 when 1,630 persons killed and processed 3,500 bison into robes, tongues, dried meat, and pemmican. In the 1850's, about 100,000 bison robes reached St. Louis annually, with about 75,000 robes coming from the upper Missouri River. The Indians were killing about 1.3 million bison per year from the Upper Missouri River Area at this time.

The bison were split into two herds (north and south) by the heavy wagon train traffic which started in 1849 and which followed the North Platte River on its way west to search for gold and fortune, and later by the construction of the Union Pacific Railroad in 1865-1869. Bison meat was one of the primary foods of the railroad construction workers. The completed railroad provided access to the bison herds by European settlers and many made special trips to look at the large herds and kill a souvenir bison. Some passengers shot bison from open windows as trains passed herds.

A high demand for bison hides occurred after 1871 when a breakthrough technique in the European tanning process was devised that could make good leather from green dry bison hides. This permitted European settlers unskilled in tanning hides into robes to enter the market, and they could sell green hides from animals killed during anytime of the year. The southern herds of eastern Colorado, southwestern Nebraska, and western Kansas were decimated between 1871 and 1873 when 3 million bison were killed for hides by European hunters and one million bison were killed by Indians for provisions and trade. The average price was \$1.00 to \$3.00 per hide. Sport hunters killed about 150,000 bison during this time. The Texas herds were eliminated between 1876 and 1879 when 200,000 hides were taken. The northern herds were west of the Missouri River and were eliminated between 1880 and 1884 when 1,500,000 head were killed. There were 5,000 buffalo skinners in Bismarck in 1882. The last large bison herd of between 50,000 and 80,000 head was seen between the Little Missouri and Yellowstone Rivers in the spring of 1883. By fall there were only a few scattered stragglers remaining. Theodore Roosevelt had to hunt for several days in September 1883 to find and kill a solitary bull. The last carload of hides containing the skins from the last herd of 300 free roaming bison was shipped from Dickinson, North Dakota in 1884.

## **European settlement**

The United States Government was faced with a dilemma on how to collect enough revenue to operate the country. They debated as to whether to sell the public domain lands and use the money from the sale, or to people the public domain and then tax the people. Much of the public domain was "vacant, unoccupied, and, for lack of transporta-

tion largely unusable and unsalable.” The government decided to use a portion of the public domain to encourage and assist in the building of railroads across the country and to provide free or low cost land to encourage settlement.

In 1864, Congress passed the Federal Railroad Land Grant Act. Under that act, the Northern Pacific Railroad was given a grant of 39 million acres in a checkerboard pattern from Duluth, Minnesota to Puget Sound, Washington. Construction of the railroad was delayed because of the Civil War and the following economic depression. Construction started in 1870 at Superior, Wisconsin and reached Moorhead, Minnesota in December 1871. The tracks reached Bismarck, North Dakota in June 1873 and halted there so that the company could reorganize and clear some of the railroad’s debts, and because of “Indian trouble” in western Dakota and Montana. The construction of the tracks started again in 1879 and reached Green River, 10 miles east of Dickinson, that year. In 1880, President Hayes removed a strip of land 200 miles wide by 300 miles long west of the Missouri River along the railroad from the Indian reservation lands which had been given to the various tribes in the treaty of 1851. The tracks reached the Montana border in 1881. This opened western North Dakota for settlement. The first to use the railroad to enter western North Dakota were the bison hide hunters. The hide hunters were active from 1881-1884 and shipped their bison hides by rail to eastern markets.

The next settlers to come were the large cattle outfits that trailed large herds up from Texas to be fattened on the open range grass of western North Dakota and eastern Montana and then shipped to eastern markets by rail. Several large herds of mostly 2-4 year old steers or dry cows were trailed north in 1882-1883. The first regional roundup in western North Dakota was conducted in the spring of 1884. The estimated population of cattle was 30-40,000 head in a district that was 100 by 50 miles with Medora, North Dakota near the center. This provided a stocking level of 80 to 100 acres per head for a year of grazing. During the fall meeting in 1886, the Little Missouri Stockmens Association declared the range in their district fully stocked and that members would not cooperate with any new outfits bringing in cattle or horses.

The winter of 1886-1887 was very severe with numerous blizzards starting in November and very strong winds in January and long spells of bitter sub-zero temperatures. By spring, 50 to 75% of the cattle were lost. This single event changed livestock operations in the Northern Great Plains. Most of the absentee owners pulled out. The remaining outfits were smaller and locally owned and operated. Western North Dakota did not have a very long period with large cattle outfits with absentee owners operating on open range. The smaller cattle operations that remained had a tough time during this early period. It was hard to find financial backing to build up herd numbers after the blizzard and the region had drought conditions during 1891-1893 which reduced cattle numbers.

The human population of western North Dakota greatly increased between 1898 to 1915. Title to land was transferred from the U.S. Government to private citizens through the Homestead Act and its many revisions. The peak period of activity was between 1900 and 1910. The Northern Pacific Railroad was granted 10,697,490 acres in North Dakota which was 23.7% of the state. Between 1875 and 1895 the railroad sold 4,352,000 acres for an average price of \$3.90/acre.

The Homestead Act of 1862 provided that a person could claim 160 acres of public domain lands after filing and “prove up” on it in five years. During the period that much of North Dakota was settled, there was a provision in the Homestead Act that allowed a person to commute the homestead by a preemption right and pay the regular price of \$1.25 or \$2.50 per acre anytime after six months from the date of filing. About half of the acreages changing from public domain to private ownership in North Dakota from 1900 to 1910 were commuted acres. The proceeds from a single crop of wheat or flax could pay for the purchase price.

The Homestead Act had many revisions in attempts to adjust the law to meet the needs of the people and the natural resources. None of the many revisions of the Homestead Act ever met the needs of the parts of the country that were west of the 100th Meridian. Families could not support themselves on 160 acres in the semi-arid regions of the nation. Some people remained on their homestead and tried to make it work but they had a tough time. The nation had economic depressions in the 1920’s and 1930’s. There was a widespread severe drought in the 1930’s and the homesteaders living on submarginal farm land had extreme hardship during that period.

Congress needed to address the problems that the homestead act had presented to the nation and passed several laws intended to help the people and natural resources of the country. The Taylor Grazing Act of 1934 removed all unappropriated public domain lands from homestead, set up grazing districts, and started a new federal agency, the Grazing Service. The Land Utilization Project was established in 1935 and a resettlement plan was completed that same year. The Bankhead-Jones Farm Tenant Act was passed by Congress on 22 July 1937. This legislation provided for the acquisition of submarginal farm lands and a follow up program of land conservation and utilization. Under these legislative acts, 1,104,789 acres were purchased in North Dakota. These lands were first administered under the direction of the Soil Conservation Service and later turned over to the U.S. Forest Service as National Grasslands. They are currently being managed in four ranger districts with the assistance of local grazing associations.

The land that had not been filed on under the Homestead Act was placed under the management of the General Land Office. In 1946, the General Land Office and the Grazing Service merged to form the Bureau of Land Management. In North Dakota, the BLM manages 68,442 acres of land that was never removed from public domain.

Theodore Roosevelt National Park was formed in 1947 and placed under the National Park Service for management. The park has 69,528 acres in two units. The Park Service also manages 1,495 acres of National Historic Sites. North Dakota has 1,082,163 acres managed by other federal agencies. There are 874,717 acres managed by state agencies.

North Dakota has 45,225,600 acres within its borders. State agencies manage 2%, federal agencies manage 5%, 2.5% has been used for urban development, and 89% is privately owned and used in agricultural production of both livestock and crops.

Rangeland makes up about 31% of the state with most of this in western North Dakota. About 7% of the state is used as domesticated perennial grass pasture and hayland. Most of the rest of the state is cultivated for annual crop production managed with currently recommended conservation practices.

The average size farm in North Dakota in 1910 was 382 acres, in 1920 it was 466 acres. The average size farm-ranch in North Dakota in 1992 was 1,224 acres operated by 33,000 families, which was only 5 % of the state's population. Most of North Dakota is managed as privately owned farm-ranch operations.

## Summary

The interaction of several forces (climate, vegetation, herbivores, early human cultures, and European settlement) have come together over time in western North Dakota and formed what we have today. These forces have not been constant and they have caused many changes during our history.

Our climate has fluctuated from wet to dry periods. These changes have been far enough apart to cause major shifts in the abundance of the various plant species present. The wet periods have had enough precipitation to support deciduous and coniferous woodlands on the prairie. The dry periods have been dry enough to cause shifts to short grass prairie or desert shrub plant communities. These weather cycles have effected the animal populations and caused changes in species of herbivores present and numbers of each. Herbivores in turn have effected the plant species' mechanisms that regulate plant growth and have been selective forces for species that tolerate and compensate for herbivore activity. The weather cycle, vegetation, type and abundance of food animals have all effected the life styles of the human inhabitants of western North Dakota. The development of various human technologies have caused changes in life styles and effected the animals and vegetation.

Humans need and acquire food, clothing, shelter, and energy from the land. These needs have been a major driving force in the land use of the Little Missouri Badlands and western North Dakota for the past 12,000 years. Climate, vegetation, herbivores, and technological development have been dynamic forces that have altered and modified the different land use practices over time.

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