

# Microcosm of the Platte

a Guide to  
Bader Memorial Park  
Natural Area

by

William S. Whitney  
and  
Jan Whitney

Prairie/Plains  
Resource  
Institute

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Bader Memorial Park Natural Area*

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Dedicated to Blanche and Kermit Swanson  
in appreciation for their love of nature  
and the time and effort they gave toward  
the establishment of Bader Memorial Park.

**DEDICATION  
&  
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AREA  
MAP  
viii

## Introduction

1

## Part One: Historic Background

Geology	5
Ice Age	6
Prehistoric Life	7
Early Inhabitants	11
Recent History	15
Bader Park History	22

## Part Two: Local Geography

Hydrology	27
Geography	29
Climate	30
Soils	31

## Part Three: The Natural Area

RIVER MAP 36	Historic River	37
	Today's River	37
	Island Forming	39
	Recent Floods	40
	Platte Wildlife	41
	Managing the River	51

WOODS MAP 52	North Woods	53
	Prairie Grove	55
	Riparian Forest	57

SANDPIT  
MAP  
62

Sand Mounds	63
Sandpits	64

PRAIRIE  
MAP  
68

Tallgrass Prairie	69
Seasonal Succession	71
Underground Prairie	73
Plant Adaptations	75
Prairie Wildlife	77
Prairie Wetlands	86
Prairie Restoration	86
Prairie Fire	88

Experiencing Nature	89
Sensory Awareness	91
Flower Observation	92
Animal Behavior	92
Aquatic Study	93
Tasks	94

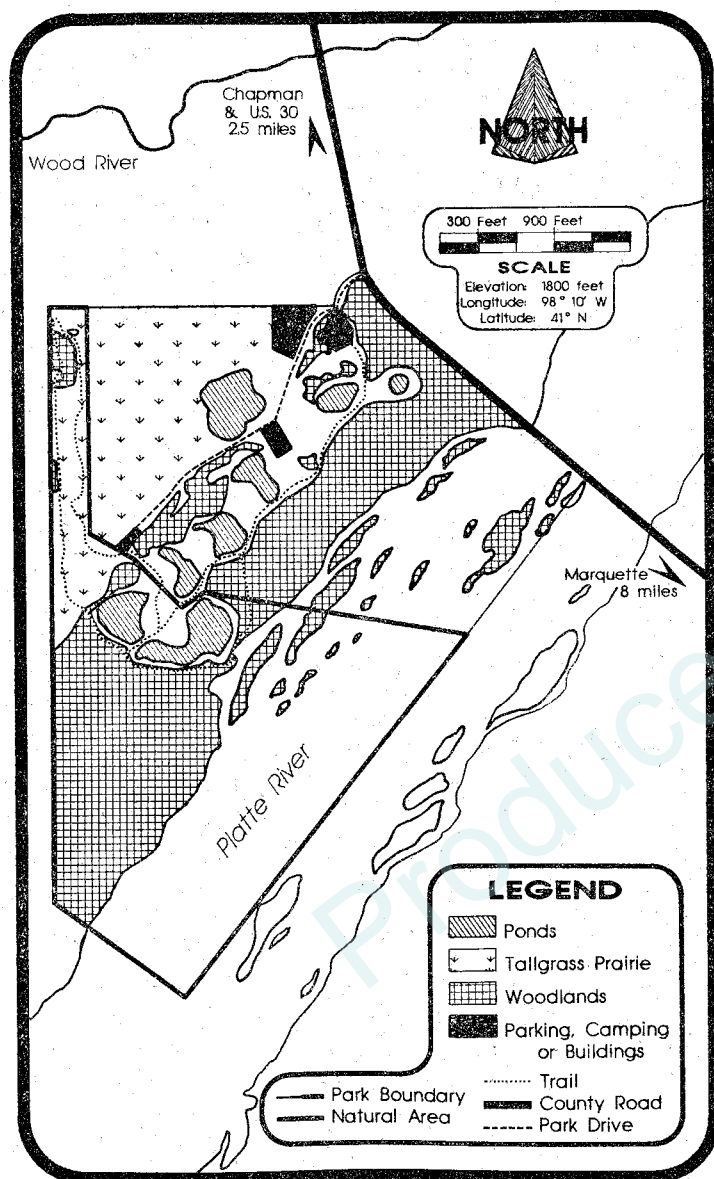
## Part Four: Illustrated Flora

Selected Species	98
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## Part Five: Appendix

Birds	124
Fish & Herps	126
Mammals	127
Plants	128
Useful References	135

# Bader Memorial Park and Natural Area



## INTRODUCTION

Bader Memorial Park Natural Area is a part of Bader Memorial Park, located in Merrick County, Nebraska. The 200 acre park, approximately 80 acres of which has been designated as the Natural Area, includes a stretch of the Platte River, riparian (riverbottom) woodlands, sand pits, and tallgrass prairie. With such a diversity of habitats, the Natural Area is a microcosm of the Platte, that is, a miniature representation of the greater Platte River. A visitor to the Natural Area can therefore experience the general environment of the Platte without having to cover a great distance. The aim of this guide is to enhance such an experience; to add to one's understanding of and appreciation for the river and its life.

The book is divided into five parts. Part One offers historic background information, including geology, prehistoric life, and human history of the central Platte area. Part Two contains local geographic background—hydrology, geography, climate and soils. Part Three is essentially a field guide to the Natural Area, describing basic plant and animal ecology, with illustrations of some Platte Valley flora and fauna. It also contains a special section about experiencing the Natural Area which offers ideas that a visitor may find helpful in tuning into what goes on in nature. It is intended to be a brief introduction for teachers using the area as an extension of their classrooms. Part Four has illustrations of Natural Area flora. Finally, Part Five, Appendix, includes references for suggested reading, curriculum materials available, and species lists of plants, birds, mammals, fish, reptiles, and amphibians.



## PART 1

HISTORIC  
BACKGROUND

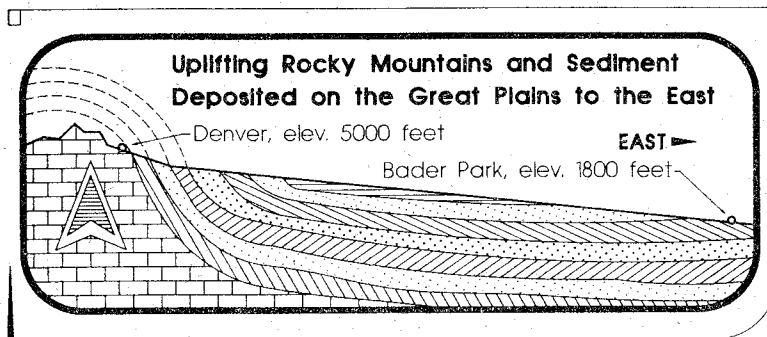
## GEOLOGY

Millions of years ago a sea covered much of the interior of North America. It was during this period that the layers of bedrock lying under Nebraska were formed. Particles of silt, clay, lime and sand, as well as shells and bones of ancient sea creatures settled to the bottom of the sea. These layers of sediment, through many years of compression, formed limestone, shale, and sandstone. About 70 million years ago the seas gradually disappeared and forces within the earth began to change the continent dramatically.

The origin of the Great Plains dates back to the rise of the Rocky Mountains over 25 million years ago. The weathering of the Rockies loosened the bedrock covering the uplifting granite, and material was moved by wind or water and layered on other bedrock farther east.

The Great Plains of North America are vast, stretching from Canada to Texas, and from the Rockies to Minnesota and Iowa. Altitude along the Rockies' eastern foothills is more than 5000 feet, sloping to about 1800 feet at Bader Natural Area, an average drop of over 5 feet per mile.

Wind and water have continually moved soil from one place to another on the Plains. As one travels east through Nebraska the exposed bedrock layers are progressively more ancient, due to erosion removing the strata on top. At Bader Natural Area the underlying bedrock (the Pierre and Niobrara Formations consisting of limestone, chalk and marine shales) is covered with 90-300 feet of sand, gravel, and silt, typical along the Platte in central Nebraska. In western Nebraska the river cuts

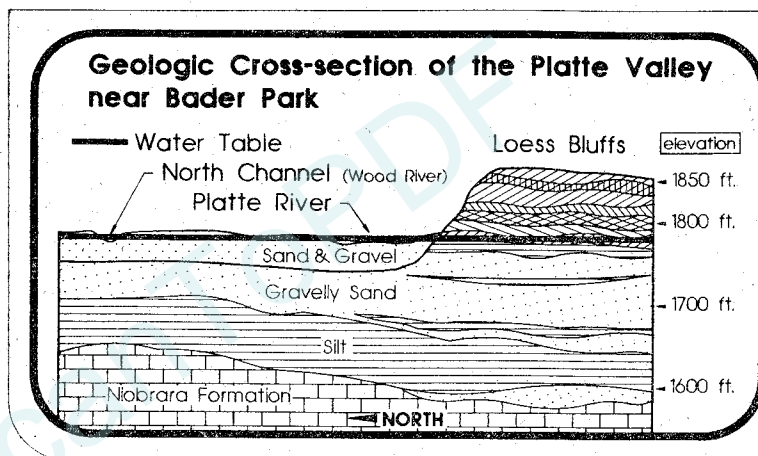


through exposed bedrocks known as the Ogallala and White River Formations, and in the east, near Ashland, Nebraska, through limestone and a red sandstone known as the Dakota Formation.

### ICE AGE

Approximately 2.5 million years ago the earth began a cycle of alternating cooling and warming trends marking the beginning of the Great Ice Age. During the cooling periods great sheets of ice covered much of North America and the high mountain ranges. These glaciers moved slowly from centers of great snow accumulations in Canada, scouring valleys, scraping and grinding rock, and plowing the earth's surface. There were four major continental ice sheets; each advance was followed by a warming period when the glacier melted and receded northward, leaving behind an altered landscape covered with rubble carried from as far away as the Hudson Bay in Canada.

There was no glacier in the Bader Park vicinity, but the deposits of sands, gravels and silts in the valley were indirectly caused by the glaciers, and, were in place before the Platte River as we know it came into existence. The first continental glacier, called the Nebraskan, dammed the east-draining valleys, causing them to fill with water. The resulting lake(s) overflowed, water eventually reaching a valley draining to the Gulf of Mexico. As streams entered the large glacier-caused reservoirs the sands and



gravels carried from the west settled and piled up in the valley bed. When the glacier melted, some of this deposited sediment was then covered with wind and water-borne materials, streams again flowed, entrenching and broadening their valleys. River flats, similar to those seen on the Platte River bed during very low flows, and unvegetated because of frequent flooding, were subject to wind erosion. Large quantities of silt were blown onto the lands next to the valley. Hamilton County, across the river south of Bader Park, is a level plain formed from windblown particles (loess) in this way.

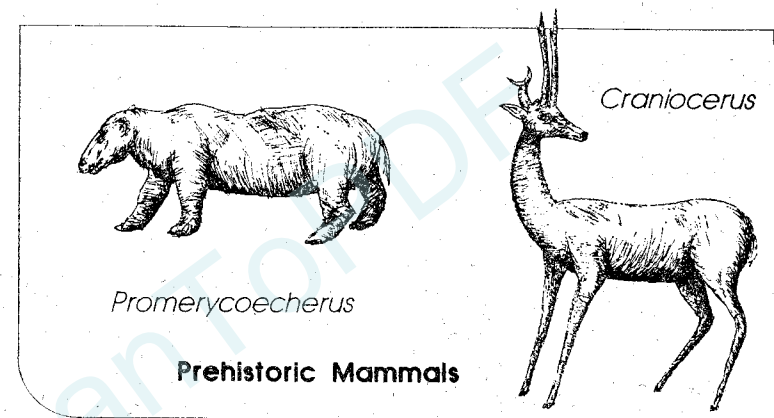
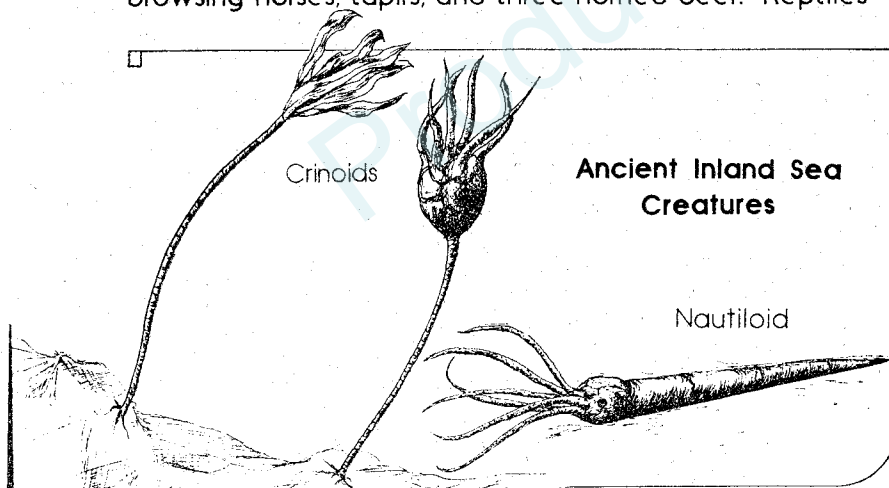
Three more glaciations—the Kansan, Illinoian, and Wisconsinan—created similar cycles of eroding and depositing of the earth. The modern channels of the Platte are carved in these sediments.

### PREHISTORIC LIFE

Fossils of many types of plant and animal life have been discovered in bedrock layers throughout the state. While Nebraska was under a tropical inland sea there was an abundance of invertebrate life such as clams, corals, and more ancient creatures called crinoids and trilobites. Microscopic blue-green algae, green algae and diatoms produced food for these animals through the

process of photosynthesis. Fishes, amphibians, and later, reptiles inhabited the deep-water swamps and periodically-exposed land surfaces through the eons during which the sea level fluctuated. In some areas of land the warm, moist climate allowed tropical forests to flourish.

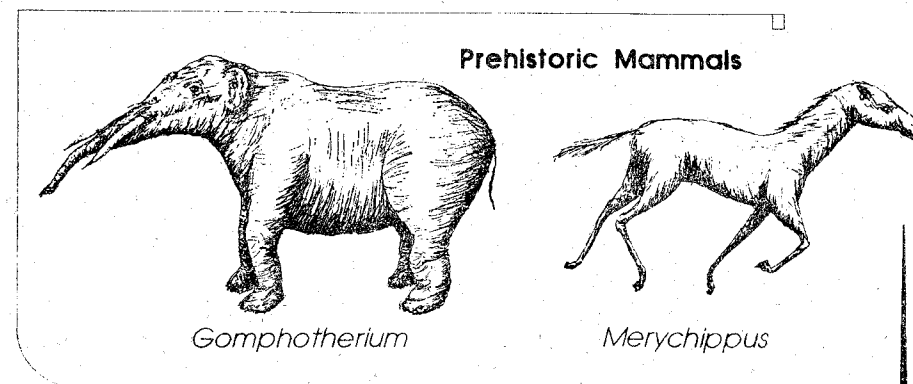
When the Rocky Mountains formed and the inland seas finally subsided, the climate also changed. Though still tropical it became drier because the mountains blocked the flow of moist westerly winds from the Pacific Ocean, creating what is called a rain shadow effect on the lands to the east. The drier climate was no longer favorable for the growth of trees. Forests that dominated the landscape gave way to a variety of hardy grasses and forbs (herbaceous flowering plants) that were able to immigrate from surrounding regions to occupy a harsher environment. The North American plains from 25 million years ago until the Great Ice Age have been compared to the African savannas of today. The terrain was relatively flat and the types of vegetation and animals were similar. Vegetation consisted of scattered trees in an ocean of grass, with woodlands mostly confined to streamsides. Animal life included grazers (grass eaters) and browsers (animals that feed on buds, bark or foliage of woody plants) as well as meat-eating predators and scavengers. Grazers such as camels and elephant-like mastodons flourished in vast numbers, preyed upon by large saber-tooth cats. Wooded lands were inhabited by browsing horses, tapirs, and three-horned deer. Reptiles



were those accustomed to heat: land tortoises and alligators.

This grassland savanna was altered during the Ice Age. With each of the four encroachments of ice some of the plants and animals were displaced to the south, some died out, while others were able to broaden their ranges. During interglacial periods distributions of species again changed. The natural history of the Great Plains and prairie (as for the entire earth in general) has thus been one of continual migrations, extinctions, adaptations and selections to the climatic and geologic conditions.

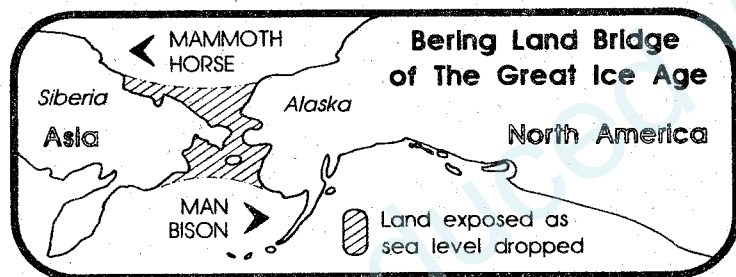
An incredible array of Ice Age mammal fossils have been preserved in gravel and loess deposits throughout Nebraska; examples of these are exhibited at the Nebraska State Museum in Lincoln. At any one time dur-





ing the Ice Age at least 30 kinds of mammals weighing over 100 pounds lived in the state. These included caribou, musk oxen, horses, bison, mammoths, mastodons, ground sloths, giant bears, lions, camels and many others.

Good examples of adaptation and migration can be seen among three Ice Age mammals: the horse, bison and woolly mammoth. Early horses of North America were browsing forest animals, but later descendants were adapted to plains life with its abundance of grass as a food source. This change in habitat was made possible by a development of sturdy teeth for chewing coarse grass, and the ability to run at high speeds in an open environment. The modern horse eventually developed sometime during the Ice Age but vanished from this continent about 25,000 years ago. By that time it had already migrated across the Bering Land Bridge into Asia and later, Europe, to be brought back to its ancestral range by the Spanish Conquistadors in the 1500's.



Conversely during the Ice Age the Asian ancestors of the modern bison crossed the Bering Land Bridge from Siberia to Alaska. Bison achieved wide-spread success on this continent; modern plains bison (*Bison bison*) reached populations estimated in the 1800's to be over 30 million.

Elephant-like woolly mammoths descended from early mastodons that inhabited the warm, dry savanna. Mammoths were adapted to the Ice Age climate, but they became extinct—possibly due in part to overhunting by man. Fossil teeth of the mammoths are occasionally found in the gravels mined from the Platte Valley, and may even be found around the ponds in Bader Natural

Area. Tusks have been unearthed from loess subsoils in nearby Hamilton County.

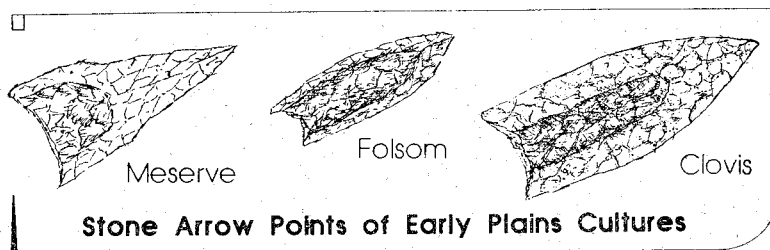
The last sheet of ice, or Wisconsin glacial stage, which barely reached into extreme northeastern Nebraska, melted about 10,000 years ago. This marked the beginning of the modern prairie and Great Plains environment. As the climate warmed following the glacier's retreat, spruce forests along the margin of the receding glacier gave way to grasses and forbs. Prairie plants and animals once again migrated north to occupy the central part of the continent, forming a rich grassland complex from the Mackenzie River of Canada to the highlands of northern Mexico; and from the Wabash River in Indiana to the Rockies in the west. The native hayland meadows and rangeland of the Platte Valley are remnants of this once-vast grassland.

### EARLY INHABITANTS

During the Ice Age a large amount of the earth's water was locked up in the continental glaciers. This resulted in a lower ocean water level—enough to bare a strip of land connecting Asia and North America. Across this land bridge (in the Bering Strait locale) migrated a great number and variety of animals, three of which have been mentioned in the previous section. Following the herds were bands of people, the first Americans. The exact time of their arrival is uncertain; until recently it was thought to be from 20,000-40,000 years ago, however some scientists suggest much earlier dates. Waves of people at varying times resulted in a broad dispersal of the population to different parts of the continent, including the Great Plains. Early cultures were dependent on the large mammals of the Pleistocene, especially the woolly mammoth and giant bison.

Nebraska has been occupied for at least 12,000 years, a period marked by several climate changes and corresponding changes in plains cultures. Early hunters left few traces of their way of life other than stone spear points and butchering tools at animal kill sites. The spear points, called Clovis Points (they were first discovered





near Clovis, New Mexico), are distinctly chipped and fluted, that is, with a lengthwise groove on both sides.

By 10,000 years ago the Plains were drier and the mammoth was extinct. The people of this time (Folsom Period) used a more finely chipped fluted point to hunt the large ancestral bison and smaller mammals. These were possibly aided by spear throwers, a simple lever device that added thrust to the throw. Though still yielding small numbers of artifacts, archeological sites for Folsom man have revealed seed milling stones and stone ornaments along with points and hide scrapers.

From 10,000 to 8,000 years ago a number of other cultures of limited geographical distribution appeared in Nebraska, each lasting only a few centuries. Each exhibited individual identity in its tool and ornament making. There have been only a few archeological sites located from this period in Nebraska; one is 90 miles northeast of Bader Natural Area near the town of Plainview.

By 8,000 years ago the bison were indistinguishable from the modern bison and cultures changed to adapt to the post-glacial environment which became extremely hot and dry. People abandoned the High Plains of western Nebraska, settling in the less severe eastern part where they lived on a greater variety of plants and animals. They became foragers who processed seeds by grinding, thus setting the stage for the development of agriculture.

The period of A.D. 1 to A.D. 900 was the time of the Plains Woodland Culture, distinguished by the presence of pottery. The people were hunters and gatherers, subsisting on deer and a variety of plants. Later in this period maize, or corn, became a staple.

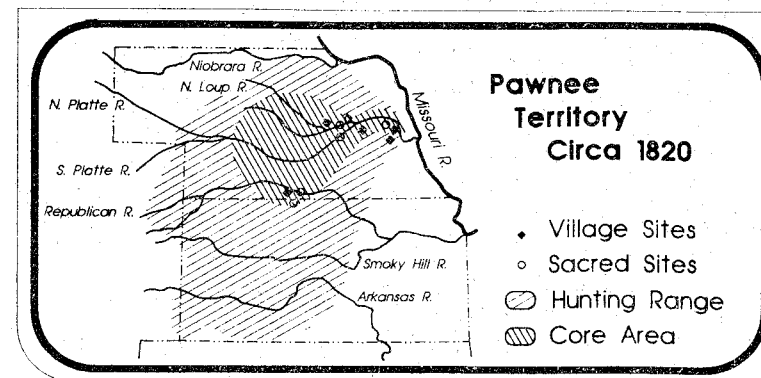
From 900 to 1500, the Plains Village Period, a change in lifestyle was triggered by the introduction of new kinds of maize and by earth-lodge construction. Settlements

along the streams became more permanent, and an abundance of staple foods allowed the people to increase their population and develop crafts. The bow and arrow was in use during this period, which made possible the hunting of larger game, the bison. Agriculture was also practiced on the valley terraces.

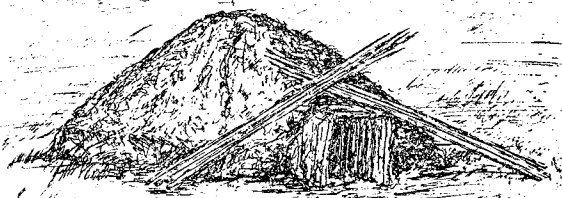
The end of this phase of Plains settlement came with severe droughts in the 1300's and 1400's, forcing people to move to more favorable areas, mostly to the north and south.

By 1500 climatic conditions again improved and former inhabitants moved back into central Nebraska, among them the ancestors of the Pawnee Indians. The Lower Loup Culture, as this period is called, was centered on the Loup River around present-day Columbus, northeast of Bader Park about 50 miles. Their economy was based on agriculture and hunting. These people showed influences from cultures in Minnesota and the Dakotas, and (by 1700) French fur traders who brought metal items and glass beads. Also, the horse had returned to its ancestral range with Spanish explorers, and its use spread rapidly among Plains tribes.

The Bader Park vicinity was part of a large region considered by the Pawnee, of the recent or Historic Era, to be their homeland. A large island in the Platte near Central City (just northeast of Bader Park) was considered a holy site and was the location of a sacred lodge. Powerful spiritual ties to the land, as well as the graves of ancestors around their villages, strengthened the Pawnee's attachment to the central Platte River area.



Possibly one of the oldest and most stable civilizations native to North America, the Pawnee lived in villages, raised ten varieties of corn, seven varieties of squash and pumpkins, and eight kinds of beans. Their characteristic shelter was a large round earthen lodge capable of housing up to 40 people. The lodge was a practical and sturdy habitation, lasting many years. It was also symbolic of the universe, the earthen dome being the sky and the circular walls the horizon. Its fireplace in the center symbolized the Creator's presence in the home.



Pawnee Earthen Lodge

Pawnee villages would be abandoned twice a year, except for the young and old, in order to hunt, trade, and raid on the borders of their territory. Campsites would be established and maintained until horse forage was exhausted, then they would move again or return to the village.

The hunting and farming cycle dominated Pawnee life. Bison and other wildlife provided meat, tools and fiber; crops provided fruits, tubers, medicines and ceremonial products. By 1820 the Pawnee were at the height of their power, but in 1831 one-half, or about 12,500 of their population, died of smallpox, a disease encountered upon contact with white people.

The U.S. government initially established Nance County north of Merrick County as a Pawnee reservation. Genoa was the reservation headquarters and the site of a government-run Indian school. Until their exodus from Nebraska to Oklahoma in 1874-75 the Pawnee were under constant threat of Lakota attacks, disease and the expanding white settlement pressures.

## RECENT HISTORY

The first white people to reach the Hamilton-Merrick County area were the Spanish in 1720. An explorer named Villasur led an expedition north from Mexico to conquer the Plains region and annex it for the Spanish crown. The expedition followed Pawnee trails from Kansas to central Nebraska, and the Platte to the Columbus area where it met its fate at the hands of the Pawnee and Otoe, whose lands they had invaded. Written record of the expedition's trials was fortunately preserved and later discovered in the form of an officer's diary.

From the 1730's to the early 1800's there were Frenchmen living with Pawnee along the Platte. They were mostly interested in fur trading opportunities, mineral resources, and places to colonize.

The United States bought the Louisiana Territory from the French in 1803, beginning the era of exploration, subjugation and settlement of America's west. The first U.S. expedition along the Platte was that of Stephen Long in 1823, who did not "hesitate in giving the opinion, that it is almost wholly unfit for cultivation and of course uninhabitable by a people depending on agriculture for their subsistence."

Botanist and chronicler for the Long expedition, Edwin James described the middle Platte Valley as follows:

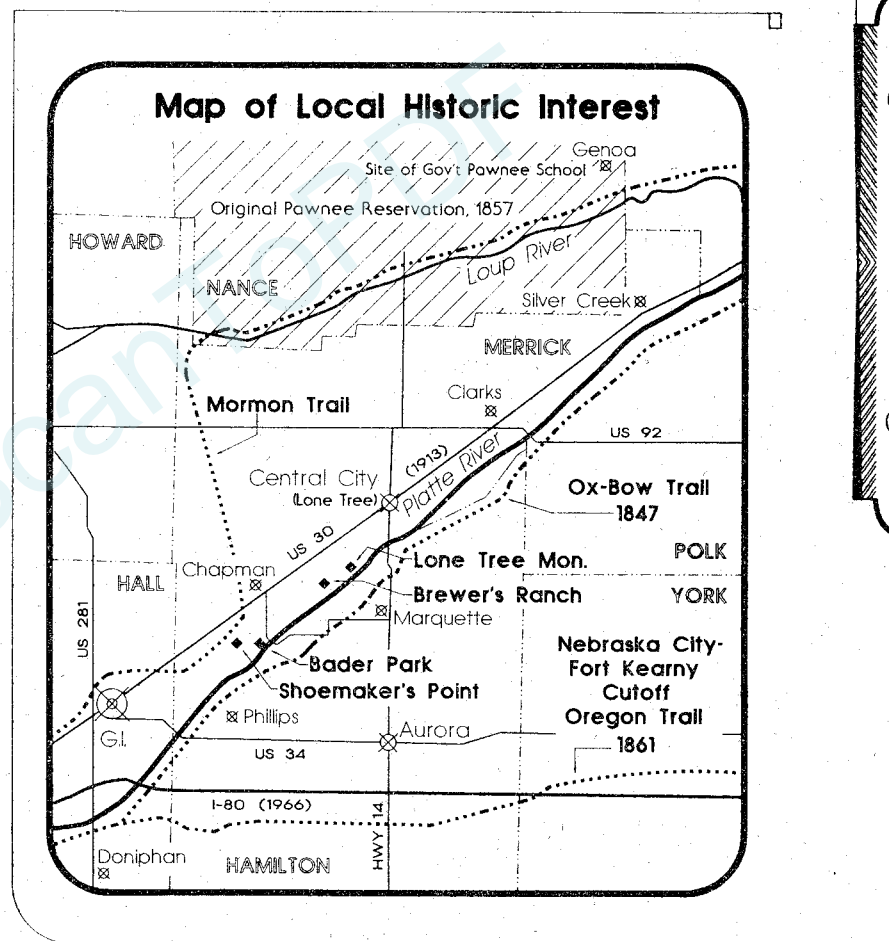
*Long crossed the Missouri north of present Omaha...and went over land to the Pawnee villages above Grand Island [a large island named La Grande Isle by French traders] on the Loup, then came straight south to Grand Island. The range of the Platte, from the extreme low to the extreme high water is considerable, manifestly not exceeding six or eight feet. This is about the usual height of its banks above the surface of the sand which forms its bed. The banks have sometimes overflowed, but evidently to no great extent. The rapidity of*

the current and the great width of the bed of the river preclude the possibility of any extensive inundation of the surrounding country. The bottom lands of the river rise by an imperceptible ascent on each side, extending laterally to a distance of two to ten miles where they are terminated by low ranges of gravelly hills running parallel to the general direction of the river. Beyond these are the surfaces of undulating plain, having an elevation of 50-100 feet and present the aspect of hopeless and irreclaimable sterility.

On Monday, May 19, we moved on, ascending the Platte about 30 miles, arrived in the evening at a place where the hills on the north side close in, quite to the bed of the river. On both sides they became more broken and elevated. On the north, they approached so near to the bed of the Platte that we were under the necessity of travelling across them. We were glad, however, of any change of scene. The monotony of the vast unbroken plain, like that in which we had now travelled, nearly 150 miles, is little less tiresome to the eye, and fatiguing to the spirit, than the dreary solitude of the ocean.

In 1847 the Mormon expedition, some 30 wagons led by Brigham Young, travelled across Nebraska following the north side of the Platte, fearing Indian attack less than persecution from other white pioneers on the Oregon Trail south of the river. Nevertheless Indians were avoided if possible, as indicated in one account whereby Hosea Stout, in charge of policing the expedition, was sent to warn a hunting party about the 500 Pawnee lodges on Grand Island that could be a danger to them. The Mormons, unlike Long's party, saw this land as bountiful and with potential, but they were, according to their religious faith, called to another land.

Sir Richard Burton, a literary and sophisticated European, came to the Platte, travelling across the northern branch of the Oregon Trail in 1850 to observe the Mor-



mons at Salt Lake City. Burton's descriptions of the Platte are a mixture of romanticism and objectivity, offering insight into the stark beauty as well as the general appearance of the Platte wilderness.

Approaching Fort Kearney about 40 miles west of Bader Park:

*The valley, here two miles broad, resembles the ocean deltas of great streams; it is level as a carpet, all short green grass without sage or bush. It can hardly be called a bottom, the rise from the*



water's edge being, it is calculated, about 4 feet per 1000. Under a bank, from half a yard to a yard high, through its two lawns of verdure, flowed the stream straight towards the slanting rays of the rising sun, which glittered upon its broad bosom and shed rosy light over half the heavens. In places it shows a sea horizon, but here it was narrowed by Grand Island, which is fifty-two miles long, with an average breadth of one mile and three quarters, and sufficiently elevated above the annual flood to be well timbered.

As a transportation route:

Without excepting even the Missouri, the Platte is doubtless the most important western influent of the Mississippi. Its valley offers a route scarcely to be surpassed for natural gradients, requiring little beyond the superstructure for light trains; and by following up its tributary—the Sweetwater [in Wyoming]—the engineer finds a line laid down by nature to the foot of the South Pass of the Rocky Mountains, the dividing ridge between the Atlantic and the Pacific water-beds. At present the traveller can cross the 300 or 400 miles of desert between the settlements in the east and the populated parts of the western mountains by its broad highway, with never-failing supplies of water, and, in places, fuel. Its banks will shortly supply coal to take the place of the timber that has thinned out.

The Canadian voyageurs first named it La Platte, the Flat River, discarding, or rather translating after their fashion, the musical and picturesque aboriginal term, "Nebraska" [from an Omaha word, Nibthaska], the shallow stream.

There is not a tributary, not a ravine, in places not a tree to distract attention from

the grassy intermediate bottom, which, plain as a prairie, extends from four to five and even twelve miles in width, bounded on both sides by low, rolling, sandy hills, thinly vegetated, and in few places showing dwarf bluffs. In places it is a labyrinth of islets, variously shaped and of all sizes, from the long tongue which forms a vista to the little bouquet of cool verdure, grass, young willows, and rose bushes. The shallowness of the bed causes the water to be warm in summer; a great contrast to the clear, cool springs on its banks. The bed is treacherous in the extreme, full of quick sands and gravel shoals, channels and cuts, which shift, like those of the Indus with each year's flood; the site being of dark-colored silt, based, like the floor, on sand, are, though vertical, rarely more than two feet high. It is a river wilfully wasted by nature. The inundation raises it to about six feet throughout: this freshet, however, is of short duration, and the great breadth of the river causes a want of depth which renders it unfit for navigation of a craft more civilized than the Indian's birch or the Canadian fur-boat. Col. Fremont failed to descent it in September with a boat drawing only four inches. From the mouth to Fort Kearny, beyond which point timber is rare, one bank, and one only, is fringed with narrow lines of well grown cottonwoods, red willows, and cedars, which are disappearing before the immigrant's axe. The cedar now becomes an important tree.

Gold discoveries in California (1849) and Colorado (1852) multiplied traffic on the Oregon Trail and the Mormon Trail, later known as the California Trail. A prominent landmark on the Mormon-California Trail, the Lone Tree, was central to early Merrick County history. It was a large cottonwood 9 or 10 feet in circumference and 50 to 65 feet high, and, it was said that on a clear day travellers could see it for 25 miles. This gives an idea



about the number and relative size of other trees in the vicinity. Legend also has it that the Lone Tree was a council site for the Pawnee. During the westward migration pioneers camped under it and carved their initials and dates of passage in the bark. It died in 1863 and was commemorated with a monument (still standing) in 1915.

In 1858 Western Stage Lines selected the Mormon-California Trail as its route west and built a station, Merrick County's first permanent building, just west of the Lone Tree. Later that year the Nebraska Territorial Legislature in Omaha established Merrick County. Its first post office was located at Shoemaker's Point a mile west of Bader Park (an historical marker is now there); shortly thereafter it was moved to Brewer's Ranch west of the Lone Tree, also the site of the county's first grist mill powered by Platte River flow.

In 1866 the Union Pacific railroad laid track across Merrick County. Along this track were platted the settlements of Silver Creek, Clarks, Lone Tree (Central City) and Chapman, and, soon after the railroad was built each had its own post office.

The railroad was vital to the development of Merrick County. It owned large tracts of land which it strongly promoted for sale (\$2 to \$5 per acre) to the immigrants whom it transported. The railroad was the lifeline to civilization for the pioneer communities. Beef and grains could be shipped to distant markets and the frontier was supplied with freight items that improved the settlers' ability to cope with a rough plains life. Early locomotives were woodburners and wooden railroad ties were an important item in this relatively treeless area. Some individuals made income cutting and selling Platte River cottonwood timber to the railroad as cordwood and ties.

The settlement of the prairie, including Merrick County, was hastened by the government with passage of the Homestead Act in 1862, and later the Timber Culture Act of 1873. Both granted a settler 160 acres of land for living on it and making improvements; the latter provided title after planting 40 acres of trees.

Several national backgrounds were represented by the immigrants to the county. German immigrants were perhaps the greatest in number; however Welsh, Irish, Scotch, English, Swedish, Danish and Polish all settled and

are still represented to the 4th and 5th generation. Cultural patterns of the different ethnic groups were strong for two or three generations, then gradually dissolved into America's melting pot.

The new residents of the prairie were necessarily resourceful because the demands of the land were at times overwhelming. Buildings were constructed from Platte timber as it was available, and from sod. Wild game was abundant and contributed significantly to the diet of the population while a successful agricultural system was being developed. Farming was difficult because of its labor intensive nature and the climate. Crops were grown with the aid of oxen, mules or horses, which were fed on feed grains, pasture and prairie hay. The staple row crops were corn, wheat and oats grown for homestead needs, farm animals, and the market place.

Irrigation of Merrick County cropland began in earnest after the drought of the 1930's; by 1981 irrigated acres numbered 180,000. There are now fewer and larger farms (1000+ acres is not uncommon), with a higher level of specialization and dependence on technological innovations such as the center-pivot sprinkler. Corn is the dominant crop followed by milo, popcorn, soybeans, alfalfa, wheat, oats, and sweetclover. Land prices in recent years have climbed as high as \$2500 per acre for irrigated land, however, the ensuing agricultural depression of the mid-1980's resulted in a deflation of crop, livestock and land prices.

Two important developments in Merrick County and the Bader Park-Chapman area specifically, were the construction of the Platte River bridge at Chapman and the construction of Highway 30. Pilings of the original wooden bridge are still visible west of the current bridge. The original was completed in 1878; it was almost a mile long with turn-outs for passing. The best bridge on this part of the river at the time, it brought about a boom of trade as it linked Chapman to Aurora in Hamilton County, a viable and quickly growing trade center. In 1933 the old bridge was replaced with a concrete and steel structure with landfill approaches, and, in 1984 this was renovated and widened.

Highway 30 was planned in 1913 and built as the Lincoln Memorial Highway, the first transcontinental road for autos from Portland to Atlantic City, New Jersey. Until

the late 1960's brought about the completion of Interstate 80, U.S. 30 was the major east-west route through the Plains.

### BADER PARK HISTORY

During the 1950's and early 1960's Hamilton County owned a piece of land near the Chapman Bridge on the north side of the river for the extraction of gravel to be used on county roads. Large pumps lifted water and stream-bed sediments into a grading device that separated gravel from sand, which was left in huge piles around seven newly-formed ponds. Gravel mining ponds, or sandpits, are notorious for their depth and bank drop-off, those at Bader Park were probably over 30 feet deep when completed.

Sandpits along the Platte are major sources of recreation including fishing, swimming, boating, camping, and picnicing. The Chapman Bridge pits were no exception as local people began using the area regularly. In 1965 Hamilton County deeded the 146 acres of its gravel-mining site, and, local landowner, Alfred Bader, donated 48 acres of adjacent land to the State of Nebraska to develop as a state wayside recreational area. Named Longbridge State Special Use Area, it contained shanty restrooms, grills and garbage cans at the campground.

State development was not to last. Vandalism became a serious problem and the State found a new priority: developing recreation potential on the sandpits along Interstate 80 west of the Grand Island-Hastings interchange. In 1973 the 194 acres of Longbridge Special Use Area was conveyed to Merrick County.

Deprived of local parklands along the river, citizens of Merrick and Hamilton Counties combined efforts to develop the area and support it with both counties' funds. The counties, with additional aid from the Federal and State Land and Water Conservation Fund constructed a caretaker's home, restrooms, shower and storage, installed playground and campground equipment, and landscaped the residence. In addition, one pond was maintained as a swimming area and parking lots were made at several

sites. Bader Memorial Park was dedicated in 1976.

In 1979 the park board set aside approximately 80 acres at the west end of the park as an interpretive natural area. The purposes set forth were to preserve the plant and animal communities native to the area and make them accessible to the general public for observation, study and enjoyment—the Natural Area would be a living museum.

In 1982 Prairie/Plains Resource Institute began the project of which this book is part. Other aspects of the interpretive development have included guided tours, school field trips, trail work and other printed literature.

## PART 2

LOCAL  
GEOGRAPHY

## HYDROLOGY

**H**ydrology is the science dealing with water on the land; its properties, laws, and geographical distribution. A knowledge of Platte River hydrology is extremely important ecologically, agriculturally, and domestically because Platte River flows, originating from Rocky Mountain snowmelt runoff:

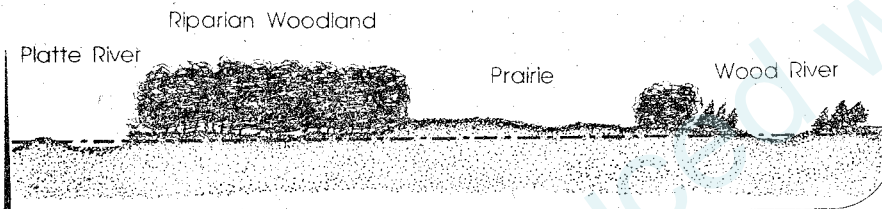
- annually replenish man-made reservoirs for irrigation and power plant cooling;
- replenish natural underground reservoirs (aquifers) that are tapped for irrigation and municipal water supplies;
- maintain river habitat for migrating and nesting birds, replenish wetlands and native wet meadows by raising the groundwater table, and provide feeding and spawning habitat for fish;
- dilute domestic waste from towns and cities along the river; and provide for public values of recreation, scenic enjoyment and spiritual enrichment.

Perhaps the most serious consideration regarding Platte River hydrology is the question of the river's capacity to support increasing irrigation development within as well as outside of its valley. High flows raise the val-



ley water table and also feed aquifers under Hamilton and other counties on both sides of the river. When irrigation activities are highest during the heat of summer, with the periodic droughts known to occur then, the water table drops below the river bed. This condition may upset the balance of consumptive uses, instream flow, and groundwater recharge. Decreasing demand for water after the irrigation season re-establishes a balance in the withdrawal versus recharge cycle, at least in areas near the river. However, farther away from the river overuse may be upsetting the equilibrium more permanently. Since deep well irrigation began 30-40 years ago the water table in Hamilton County has shown a continuing trend of decline.

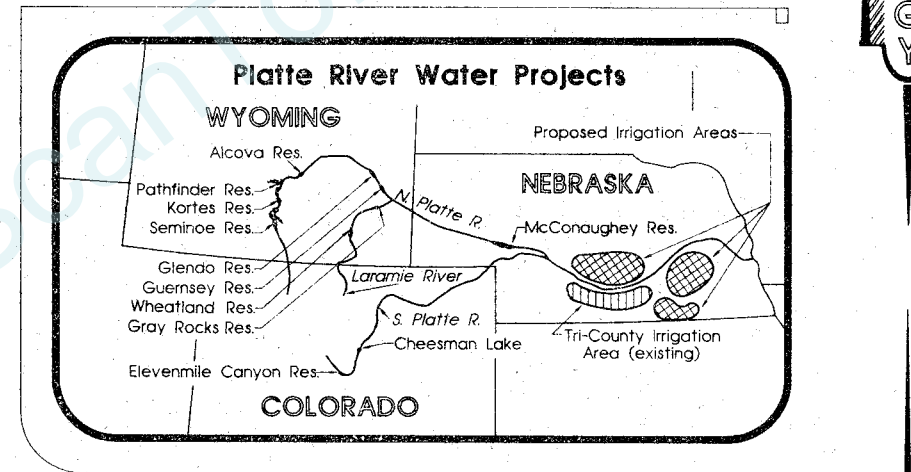
#### Underground Water Table at Bader Natural Area



By the early 1900's practically all the land that is now under cultivation along the river (including Colorado) was already cultivated. Many small diversions of Platte River water were already feeding the arid land's crops. In the early 1900's dams were built on the North Platte in Wyoming, beginning a series of major changes. More dams followed in Wyoming, Colorado and, in 1940, Nebraska. Kingsley Dam, north of Ogallala, Nebraska, backed up the North Platte River to form McConaughy Reservoir. Water is used for power generation and irrigation for counties in south-central Nebraska through the Tri-County Canal System. Since 1940 average flows of the river at the Bader Natural Area have dropped to approximately 30% of the pre-settlement flows, and the channel has narrowed by nearly the same proportion.

In addition to the existing demands for Platte River

water there are plans by other potential water consumers to withdraw more in all three Platte River states. However, serious questions remain to be answered: Who pays for the water development? Who is entitled to benefit from the water? What are the biological and social costs? Is there enough to go around? Who agrees on the information used to make the decisions?



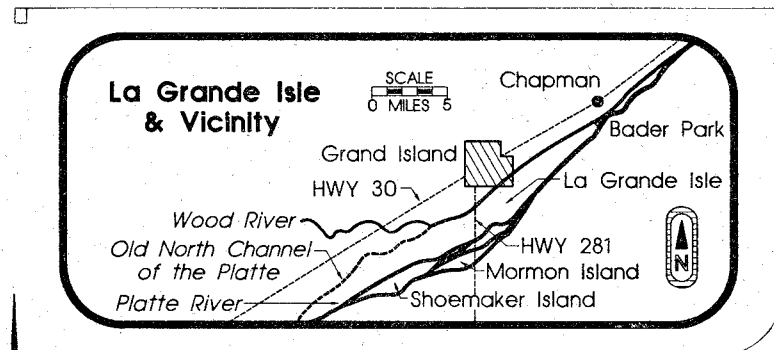
#### GEOGRAPHY

**B**ader Memorial Park is located 3 miles south of Chapman in Merrick County, Nebraska. It lies at the east end of a large Platte River island, named La Grande Isle by early French traders, from which the nearby city of Grand Island received its name. La Grande Isle is bordered on the south by the main channel and on the north by the old north channel of the Platte that now receives flow from the Wood River and from Grand Island's municipal sewage treatment plant.

The Platte Valley to the north is broad and level; the island as well as land extending many miles north is less than 10 feet above the river bed. Although it could be called a bottomland, the surface of La Grande Isle is



never flooded by the river itself. However, old stream channels, cutoffs, and shallow depressions on its surface occasionally fill from precipitation or high stream flows. Unusually high water table conditions may also cause short-term inundation.



Across the river south of Bader Park the land rises approximately 100 feet with an immediate transition to the level loess plain typical of Hamilton County. This plain is drained by the Big Blue River and its tributaries.

## CLIMATE

Average annual precipitation in the Bader Park vicinity is 24 inches, of which 80% falls from April through September. More than half of this precipitation may come from intense thundershowers between April and late June. Spring and early summer rains are normally well distributed, but periods of drought are common. Late summer and autumn rainfall is less uniform. The other 20% of the annual moisture comes in the average annual snowfall of 25 inches, most of which occurs in February and March.

Prevailing winds are southerly in summer and northwesterly in winter. They are usually moderate to strong during summer and are hot and dry, causing rapid loss of soil moisture and high evapotranspiration (loss of moisture through plants). Winds can be especially damaging

during thunderstorms, and tornados are possible.

Average annual temperature at Grand Island (where records have been kept since 1895) is 51°F; extremes of 110°F and -25°F have been recorded. The last frost is generally around April 28, and the first autumn frost is about October 3, allowing a growing season of about 160 days.

Nebraska is known for its turbulent and changeable weather. This is because it is in the center of the continent where large air masses pass through quickly and sometimes collide. Cold air comes down from the arctic in winter, hot and dry air may come from the desert southwest in summer, or hot, humid air may come from the Gulf of Mexico. During springtime turbulent thunderstorms and tornados result from cooler northern air clashing with gulf air. A similar pattern may cause winter blizzards of legendary intensity and extent.

## SOILS

Soil is what is formed on the top layer of earth that has undergone processes of weathering and incorporation of organic matter derived from the growth and death of plants, animals and microorganisms.

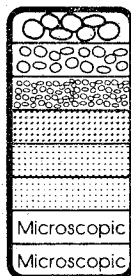
The material from which a soil is created is called its parent material. For example, a typical profile of soil from Hamilton County south of Bader Park shows the parent material, loess (a fine-grained wind-blown material), at the bottom, a gradual darkening of the soil, then a distinct layer of dark soil, or topsoil, on the surface. The topsoil was created over the last 10,000 years by tall-grass prairie plants and animals that gradually concentrated minerals and organic matter in the upper root zone. This soil is extremely rich and is responsible for the agricultural success of the area.

Hamilton County soil can be contrasted to the Platte Valley soils created from alluvial, or water-deposited, parent materials of silt, clay, organic debris, sand, and gravel or any mixture of these. Platte Valley soils also developed under tallgrass prairie and in places are also very rich. They are more variable, though, because the river

did not always deposit uniform layers of any one parent material. Very sandy sites do not have the richness of loamy sand sites which contain more organic matter, silt and clay.

### Soil Particle Size

Description	Diameter
Gravel	> 2.0mm
Very Coarse Sand	1.0-2.0mm
Coarse Sand	0.5-1.0mm
Medium Sand	0.25-0.5mm
Fine Sand	0.125-0.25mm
Very Fine Sand	0.0625-0.125mm
Silt	0.004-0.0625mm
Clay	< 0.004mm

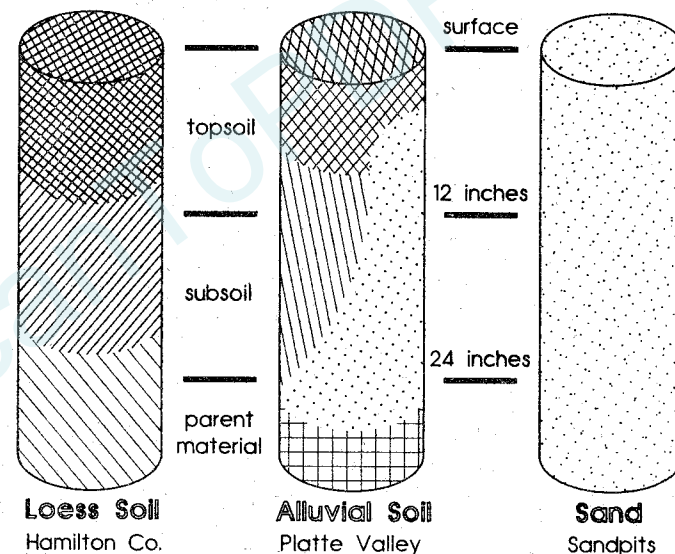


A third soil parent material is one that has resulted from gravel mining and can be observed at Bader Natural Area—the coarse sands around the ponds. There has not been enough time for soil to form on the sand much less a permanent cover of perennial vegetation (plants renewing growth each year from woody stems or roots). One can get a glimpse of early stages of soil formation by looking at the plants that have taken root in the sand and the burrowing activities of insects. Gradually plants will occupy the sand piles and a soil will develop.

Bader Natural Area exhibits a variety of alluvial Platte Valley soils. In the flooding history of the river irregular bands of material were deposited across the valley and parallel to the river. Some bands of newly deposited material were already a rich medium for plant growth; they did not require further soil development to support luxuriant vegetation. Other strips of sands and gravels had little fertility; soils have developed slowly or not at all, and they still support less abundant vegetation. Lighter sands have been prone to drifting by wind action, a phenomenon that may be partly responsible for the ridge that crosses the middle of the Natural Area prairie.

Only 40 years ago the forested south portion of the

### Typical soil profiles in the Bader Park area



Natural Area was the river bed. Therefore its soils are very young and undeveloped. Here, too, there are bands of alluvial material reflecting variable fertility and drainage characteristics.