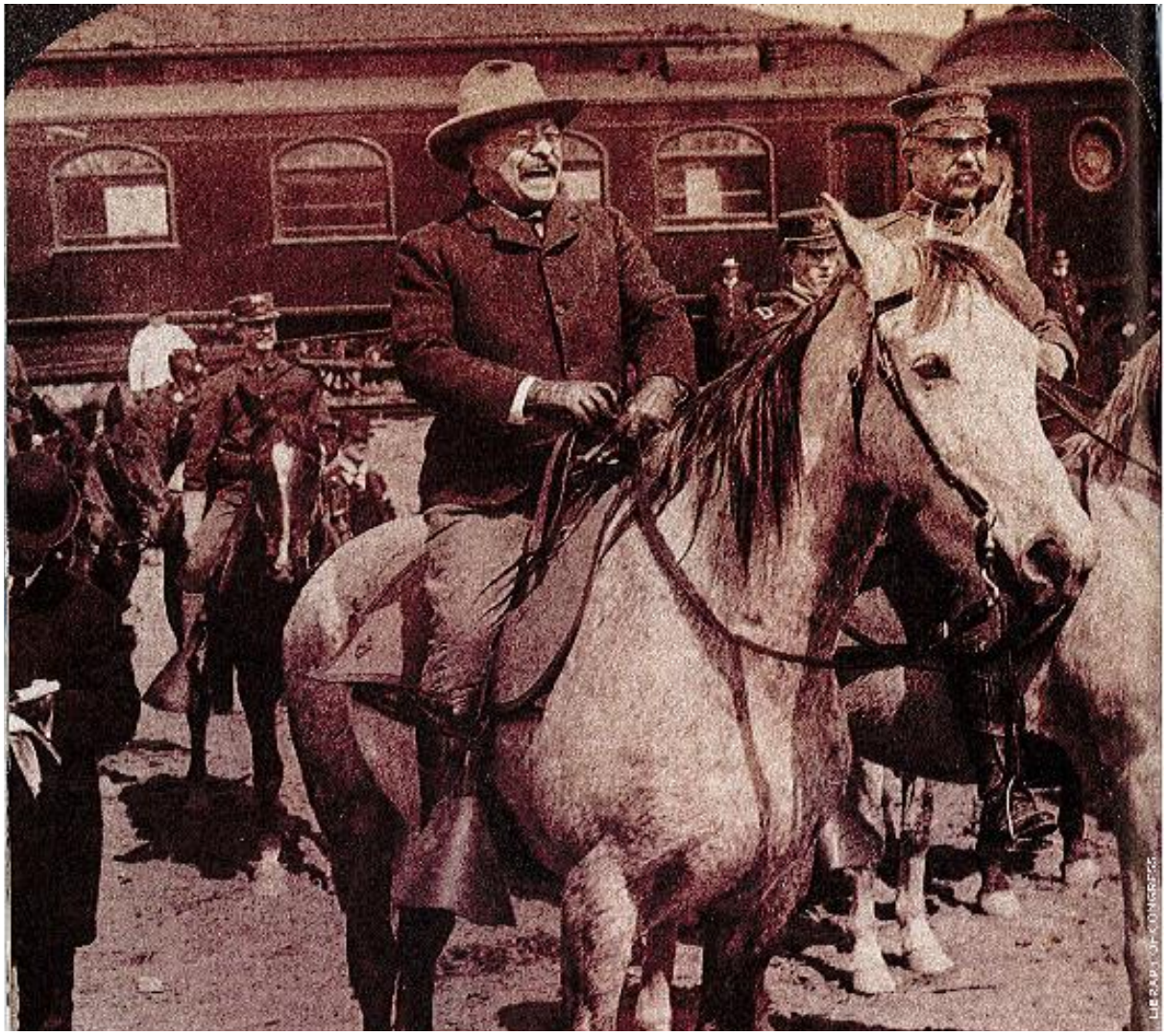
Smithsonian Associates

Theodore Roosevelt's North Dakota

Smithsonian Associates

October 7-11, 2023



Capital: Bismarck

Governor: Doug Burgum, R (to Dec. 15, 2020)

Senators: John Hoeven, R (to Jan. 2023); Heidi Heitkamp, D (to Jan. 2019)

U.S. Representatives: 1

Organized as territory: March 2, 1861

Entered Union (rank): Nov. 2, 1889 (39)

Present constitution adopted: 1889

Motto: Liberty and union, now and forever: one and inseparable

Nickname: Sioux State; Flickertail State; Peace Garden State; Rough Rider State

10 largest cities (2012 est.): Fargo, 109,779; Bismarck, 64,751; Grand Forks, 53,456; Minot , 43,746; West Fargo, 27,478; Dickinson, 19,697; Mandan , 18,978; Williston, 18,532; Jamestown, 15,323; Wahpeton, 7,800

Land area: 70,698 sq mi

Number of counties: 53

State parks: 17

2016 resident population est.: 757,952

Male: 339,864 (50.5%); **Female:** 332,727 (49.5%).

White: 605,449 (90.0%); **Black:** 7,960 (1.2%); **American Indian:** 36,591 (5.4%); **Asian:** 6,909 (1.0%); **Other race:** 3,509 (0.5%); **Two or more races:** 11,853(1.8%); **Hispanic/Latino:** 13,467 (2.0%). **2010 percent population 18 and over:** 77.7; **65 and over:** 14.5; **median age:** 37.0.

North Dakota was explored in 1738-1740 by French Canadians led by Sieur de la Verendrye. In 1803, the U.S. acquired most of North Dakota from France in the Louisiana Purchase. Lewis and Clark explored the region in 1804-1806, and the first settlements were made at Pembina in 1812 by Scottish and Irish families while this area was still in dispute between the U.S. and Great Britain. In 1818, the U.S. obtained the northeast part of North Dakota by treaty with Great Britain and took possession of Pembina in 1823. However, the region remained largely unsettled until the construction of the railroad in the 1870s and 1880s.

North Dakota is the most rural of all the states, with farms covering more than 90% of the land. North Dakota ranks first in the nation's production of spring and durum wheat; other agricultural products include barley, rye, sunflowers, dry edible beans, honey, oats, flaxseed, sugar beets, hay, beef cattle, sheep, and hogs.

Recently, manufacturing industries have grown, especially food processing and farm equipment. The state's coal and oil reserves are plentiful, and it also produces natural gas, lignite, clay, sand, and gravel.

The Garrison Dam on the Missouri River provides extensive irrigation and produces 400,000 kilowatts of electricity for the Missouri Basin areas.

Known for its waterfowl, grouse, pheasant, and deer hunting and bass, trout, and pike fishing, North Dakota has 20 state parks and recreation areas. Points of interest include the International Peace Garden near Dunseith, Fort Union Trading Post National Historic Site near Williston, Knife River Indian Villages National Historic Site in Stanton, the State Capitol at Bismarck, the Badlands, Theodore Roosevelt National Park, and Fort Abraham Lincoln State Park.

From: https://www.infoplease.com/us/states/north-dakota

INTERESTING FACTS

- Originally conceived of in 1928 by Dr. Henry Moore of Ontario, Canada, the International Peace Garden was intended to establish a memorial to perpetual peace between Canada and the United States. Encompassing 2,339 acres within North Dakota and the Canadian province of Manitoba, the park attracted 50,000 visitors to its grand opening and dedication on July 14, 1932.
- Attempts to drop the word "North" and rename the state "Dakota" were defeated by legislature in both 1947 and 1989.
- In 1999, a teenager discovered a "dinosaur mummy" on his uncle's ranch near Marmarth. The 67 million-year-old duck-billed hadrosaur was so well preserved that much of its bones, tendons and ligaments remained enclosed in skin.
- Theodore Roosevelt, who once credited his time spent in the North Dakota Badlands as critical to becoming the 26th president of the United States, fostered a legacy of resource conservation that has been memorialized by the creation of the Theodore Roosevelt National Park. Comprised of three distinct units in western North Dakota, the park covers more than 70,000 acres.
- The geographical center of North America—marked by a 21-foot monument constructed out of stones—lies in the town of Rugby, North Dakota.
- Agriculture is North Dakota's leading industry, which employed nearly 24 percent of the state's residents in 2010. The largest producer of about a dozen crops, North Dakota supplied 90 percent of the nation's canola and 95 percent of its flaxseed in 2010.

MISSOURI: AMERICA'S LONGEST RIVER

Map of the Missouri River and its tributaries in North America

Just west of Bozeman, Montana—where the Gallatin, Jefferson, and Madison rivers converge at Three Forks—America's longest river is born. The Missouri River will travel more than 2,300 miles before it joins the Mississippi in its namesake state at St. Louis, forming the world's fourth longest river system as it rolls south to the Gulf of Mexico.

Considered the "Center of Life" for the Great Plains, the Missouri has served as the main artery for exploration, food, trade, and transportation for millions of people over thousands of years. About one-fourth of all the agricultural land in the U.S. is found in the Missouri River watershed, which provides more than one-third of the country's wheat, flax, barley, and oats. Its significance to American culture past and future cannot be overstated.

The Missouri River long ago garnered the nickname the "Big Muddy," inspired by the enormous loads of sediment it pushed through the river system. However, the amount of sediment transported has diminished as dams, levees, and channelization increased over time. Today, the river might be more accurately described as a gentle giant.

Only in its upper reaches does the Missouri shed that image. There, even a slow-motion summer float through the Upper Missouri River Breaks National Monument can offer a back-to-the-wilderness sensation, where the 149-mile Wild and Scenic section of the river winds downstream from Fort Benton, Montana, to the Charlie Russell National Wildlife Refuge. Lewis and Clark spent three weeks in 1805 exploring the Wild and Scenic area now considered the premier component of the Lewis & Clark National Historic Trail. River runners can still camp at the same sites used by the explorers.

Fishermen may encounter some rare native species in the area, including prehistoric-looking paddlefish or the endangered pallid sturgeon among some 150 species of fish within the entire Missouri River Basin. The basin also supports 300 species of birds and a variety of mammals including trophy elk, whitetails, and mule deer that support a significant seasonal hunting economy.

Even the occasional wayward grizzly has been reported near Fort Benton. Several other threatened and endangered species are making a stand along the Missouri, although restoring fish and wildlife populations to historic levels will require flow modifications, protecting and restoring habitat, and adaptively managing the river system.

THE BACKSTORY

Major floods have always been a fact of life along the Missouri. And they've taught us many lessons on river management along the way.

For more than 75 years, Congress has directed the U.S. Army Corps of Engineers to administer flood control, navigation, and irrigation on the Missouri by impounding, channelizing, and dredging the river. The resulting series of massive reservoirs on the upper river and the deep, narrow channel on the lower river has actually made flood damages worse, putting surrounding communities, wildlife, recreation, and river health in jeopardy.

As flooding on the Missouri increases in frequency and severity with climate change, communities need better flood protection solutions. Levees and dams can no longer be the only line of defense. We need a smarter, more natural approach. Restoration of the Missouri's floodplains and wetlands, which absorb and store floodwater, must play a critical role in the next century of flood management.

THE FUTURE

Sound science and public involvement are the keys to achieving smarter river management that safeguards communities and the environment. That begins with the recognition that levees, dredging, and impoundments actually increase the frequency and severity of floods.

The preferred alternative is to try to reconnect the naturally broad, shallow river to its floodplain wherever possible. That means removing some levees, changing the timing of dam releases to mimic the historic river flow, and reinvigorating the riparian cottonwood forests that absorb water and provide the richest wildlife habitat on the Great Plains. This adaptive approach will not only cost less to maintain but will also benefit fish, wildlife, and the recreation economy—resulting in a triple bottom line win.

Little Missouri River (North Dakota)

The **Little Missouri River** is a tributary of the Missouri River, 560 miles long, in the northern Great Plains of the United States. Rising in northeastern Wyoming, in western Crook County about 15 miles west of Devils Tower, it flows northeastward, across a corner of

southeastern Montana, and into South Dakota. In South Dakota, it flows northward through the Badlands into North Dakota, crossing the Little Missouri National Grassland and both units of Theodore Roosevelt National Park. In the north unit of the park, it turns eastward and flows into the Missouri in Dunn County at Lake Sakakawea, where it forms an arm of the reservoir 30 miles long called Little Missouri Bay and joins the main channel of the Missouri about 25 miles northeast of Killdeer.

The highly seasonal runoff from badlands and other treeless landscapes along the Little Missouri carries heavy loads of eroded sediment downstream. The sedimentary layers, which extend from the headwaters in Wyoming all the way to the mouth in North Dakota, vary in age, but most of the beds along the river belong to the Bullion Creek and Sentinel Butte formations, both deposited during the Paleocene (about 66 to 56 million years ago). The deposits include siltstone, claystone, sandstone, and lignite coal laid down in a coastal plain during the Laramide orogeny.

From: https://en.wikipedia.org/wiki/Little_Missouri_River_(North_Dakota)

Medora, North Dakota

Medora is a city in Billings County, North Dakota, United States. It is the county seat of, and only incorporated place in Billings County. This city is home to Little Missouri National Grassland. The population was 112 at the 2010 census. It is part of the Dickinson Micropolitan Statistical Area.

Medora was founded in 1883 along the transcontinental rail line of the Northern Pacific Railway by French nobleman Marquis de Mores, who named the city after his wife Medora von Hoffman. Marquis de Mores wanted to ship refrigerated meat to Chicago via the railroad. He built a meat packing plant for this purpose and a house named the Chateau de Mores, which is now a museum.

In the evening of April 7, 1903, President Theodore Roosevelt visited Medora on a presidential tour of the Western United States. Most of the Badlands' residents turned out to greet him on his whistle stop. Roosevelt later recalled that "the entire population of the Badlands down to the smallest baby had gathered to meet me… They all felt I was their man, their old friend; and even if they had been hostile to me in the old days when we were divided by the sinister bickering and jealousies and hatreds of all frontier communities, they now firmly believed they had always been my staunch friends and admirers. I shook hands with them all and…I only regretted that I could not spend three hours with them." A local hotel changed its name that same year to the Rough Riders Hotel. In 1986 the hotel was purchased and operated by the Theodore Roosevelt Medora Foundation.

The city of Medora is also home to the popular Medora Musical and the city has become one of the most popular tourist attractions in the state.

According to the United States Census Bureau, the city has a total area of 0.37 square miles, of which, 0.36 square miles is land and 0.01 square miles is water.

As of the census of 2010, there were 112 people, 56 households, and 27 families residing in the city. The population density was 311.1 inhabitants per square mile. There were 102 housing units at an average density of 283.3 per square mile (. The racial makeup of the city was 93.8% White, 1.8% Native American, 3.6% Asian, and 0.9% from two or more races.

There were 56 households of which 10.7% had children under the age of 18 living with them, 44.6% were married couples living together, 1.8% had a female householder with no husband present, 1.8% had a male householder with no wife present, and 51.8% were non-families. 46.4% of all households were made up of individuals and 16.1% had someone living alone who was 65 years of age or older. The average household size was 1.84 and the average family size was 2.63.

The median age in the city was 45.3 years. 11.6% of residents were under the age of 18; 10% were between the ages of 18 and 24; 27.8% were from 25 to 44; 32.1% were from 45 to 64; and 18.8% were 65 years of age or older. The gender makeup of the city was 47.3% male and 52.7% female.

The median income for a household in the city was $31,563, and the median income for a family was $61,250. Males had a median income of $26,042 versus $21,094 for females. The per capita income for the city was $23,399. There were no families and 4.8% of the population living below the poverty line, including no under eighteens and 15.0% of those over 64.

From: https://en.wikipedia.org/wiki/Medora,_North_Dakota

Badlands

The Chinle Badlands at Grand Staircase-Escalante National Monument in southern Utah

Badlands are a type of dry terrain where softer sedimentary rocks and clay-rich soils have been extensively eroded by wind and water. They are characterized by steep slopes, minimal vegetation, lack of a substantial regolith, and high drainage density. They can resemble malpaís, a terrain of volcanic rock. Canyons, ravines, gullies, buttes, mesas, hoodoos and other such geologic forms are common in badlands. They are often difficult to navigate by foot. Badlands often have a spectacular color display that alternates from dark black/blue coal stria to bright clays to red scoria.

Badlands are partially characterized by their thin to nonexistent regolith layers. The regolith profiles of badlands in arid climates are likely to resemble one another. In these regions, the upper layer is typically composed of silt, shale, and sand (a byproduct of the weathered shale). This layer can form either a compact crust or a looser, more irregular aggregation of "popcorn" fragments. Located beneath the top layer is a sublayer, below which can be found a transitional shard layer, formed largely of loose disaggregated shale chips, which in turn eventually gives way to a layer of unweathered shale. Badlands such as those found in the Mancos Shale, the Brule Formation, the Chadron Formation, and the Dinosaur Provincial Park can be generally said to fit this profile.

In less arid regions, the regolith profile can vary considerably. Some badlands have no regolith layer whatsoever, capping instead in bare rock such as sandstone. Others have a regolith with a clay veneer, and still others have a biological crust of algae or lichens.

In addition to lacking significant regolith, they also lack much vegetation. The lack of vegetation could very well be a result of the lack of a substantial regolith.

Formation

The formation of badlands is a result of two processes: deposition and erosion. The process of deposition describes the accumulation, over time, of layers of mineral material. Different environments such as seas, rivers, or tropical zones, deposit different sorts of clays, silts, and sand. For instance, the badlands formations in Badlands National Park, South Dakota, United States underwent a 47-million year period of deposition which spanned three major geologic periods (the Cretaceous Period, the Late Eocene, and the Oligocene Epochs), resulting in clear, distinct layers of sediment which serve as a dramatic display of the law of superposition. Once the deposited sediments have solidified, the sedimentary material becomes subject to erosion. It is sometimes erroneously taught that badlands erode at a steady rate of about one inch per year. In actuality, the precise processes by which the erosion responses take place vary depending on the precise interbedding of the sedimentary material. In 2010, researchers at Badlands National Park initiated a three-year project to learn more about the actual erosion rate of the specific badlands found in that park.

Toadstool Geologic Park in northwestern Nebraska

Locations

Some of the best-known badland formations can be found in Canada and the United States. In the U.S., Makoshika State Parkin Montana and Badlands National Park in South Dakota together form a series of extensive badland formations. Also located in this region is Theodore Roosevelt National Park, a United States National Park composed of three

geographically separated areas of badlands in western North Dakota named after former U.S. President Theodore Roosevelt. Among the Henry Mountains area, about 1500m above sea level, Cretaceous and Jurassic aged shales are exposed. Another popular area of badland formations is Toadstool Geologic Park in the Oglala National Grassland located in northwestern Nebraska. Dinosaur National Monument in Colorado and Utah are also badlands settings, along with several other areas in southern Utah, such as the Chinle Badlands in Grand Staircase-Escalante National Monument. A small badland called Hell's Half-Acre is present in Natrona County, Wyoming. Additional badlands also exist in various places throughout southwest Wyoming, such as near Pinedale and in the Bridger Valley near the towns of Lyman and Mountain View, near the high Uintah Mountains. Pinnacles National Park in California also has areas of badlands, as does the Mojave Desert in eastern California.

El Malpais National Monument in western New Mexico is named after the Spanish word malpaís, meaning bad lands.

Although most badland scenery is natural, there are some examples produced by mining, such as the Roman gold mine of Las Médulas in northern Spain. An example of badlands produced by poor farming practices is the Cheltenham Badlands in Caledon, Ontario.

From: https://en.wikipedia.org/wiki/Badlands

Badlands and history in North Dakota's Theodore Roosevelt National Park

This Sept. 3, 2017 photo shows bison grazing at Theodore Roosevelt National Park in Medora, N.D. The park's south unit has a 36-mile driving loop where visitors may see wildlife like prairie dogs and feral horses in addition to the bison. (AP Photo/Beth J. Harpaz)

By **BETH J. HARPAZ** | Associated Press

July 7, 2018 at 9:00 am

MEDORA, N.D. — For travelers looking to visit all 50 states, North Dakota is often one of the last to be checked off. It's not exactly on the way to anywhere else, and flying there is expensive.

It ended up being 49th on my 50-state quest (sorry, Idaho!). Part of the challenge was deciding what to do there and how to get there. I had to choose between visiting Fargo in eastern North Dakota (and the name of one of my favorite movies) or Theodore Roosevelt National Park in the west. It's 330 miles between them, and I didn't have time for both on a weeklong road trip that also included Montana's Glacier National Park and Idaho's Craters of the Moon.

In the end, Roosevelt Park won out. Photos of its badlands and prairies enchanted me, and the story of Teddy Roosevelt's sojourn there following the deaths of his wife and mother

on the same day intrigued me. What was it about this place that allowed this future president to grieve and recover — while at the same time inspiring him to become one of America's most influential conservationists? I needed to see it for myself.

GETTING THERE

My husband and I flew to Denver — by air from New York, the cheapest jumping-off point — and rented a car (unlimited mileage, of course). We then drove 600 miles north through Wyoming and South Dakota to the tiny North Dakota town of Medora (population 132), at the entrance to the park's South Unit.

This Sept. 3, 2017 photo shows a curving river at Theodore Roosevelt National Park in Medora, N.D., marking the landscape in colorful patterns as it interacts with soil and stone. (AP Photo/Beth J. Harpaz)

Fortunately, those 600 miles were easily done in a day, thanks to speed limits of 75 and 80 mph in many spots, and little traffic outside Colorado. Still, it felt like we were heading to a pretty remote place, and I wondered if the park would hold its own against national parks I'd visited in Alaska, Hawaii and the Southwest, not to mention Yellowstone and Yosemite. About 700,000 people visit Roosevelt Park yearly, compared to the more than 3 million annual visitors at places like Montana's Glacier Park.

THE LOOP AND WILDLIFE

Theodore Roosevelt National Park is open 24 hours daily. We arrived at 7:30 a.m. one day at the tail end of last summer. Map in hand, we drove the 36-mile scenic loop around the park's South Unit, stopping at many of the nearly 20 points of interest along the way.

This Sept. 3, 2017 photo shows a "Do not feed the prairie dogs" sign at Theodore Roosevelt National Park in Medora, N.D., with a view of the badlands in the background. Visitors will come across several prairie dog towns as they drive the 36-mile loop of the park's south unit. (AP Photo/Beth J. Harpaz)

Within minutes, we came upon a prairie dog town. Dozens of the tiny creatures scampered back and forth, popping in and out of little holes amid scrubby grasses. We'd see three more prairie dog towns before we completed the loop, along with wild horses grazing on a hill by the roadside and in another spot, a herd of bison. The wildlife encounters were thrilling and unexpected surprises.

THE LANDSCAPE

This Sept. 3, 2017 photo shows bright red foliage, gray-green sage and other grasses growing in a field at Theodore Roosevelt National Park in Medora, N.D. (AP Photo/Beth J. Harpaz)

The landscape was thrilling, too. The scent of sage perfumed the air, and bursts of red foliage punctuated the gray-green grasslands. Stripes of peach, cream and mud-brown earth and stone lined the curving banks of the Little Missouri River.

Framing it all were the famous badlands stretching to the horizon: flat-topped stone formations with striated slopes in tawny yellows and russet reds, dotted with bright green trees and patches of grass. They looked like the crusty paws of some massive alien creature on the verge of rising up.

We did most of the hikes along the loop drive, some just a few minutes' walk to an overlook, others 20 to 40 minutes along hilly trails covering a mile or more. At every stop, we were awed by the scenery, from the astonishing palette of earthy hues to the stone shapes etching land and sky.

ROOSEVELT'S STORY

An exhibit at the visitor center tells Roosevelt's story. On his first visit in 1883, he hunted bison and invested in a ranch near Medora. He'd been a state assemblyman in his native New York, but after his mother and wife both died on Feb. 14, 1884, he left politics and returned to the badlands to mourn his losses. He lived in a small ponderosa pine cabin now located just steps from the visitor center. It's furnished with period pieces and some of his belongings, including his traveling trunk, a replica of his writing desk and a rocking chair.

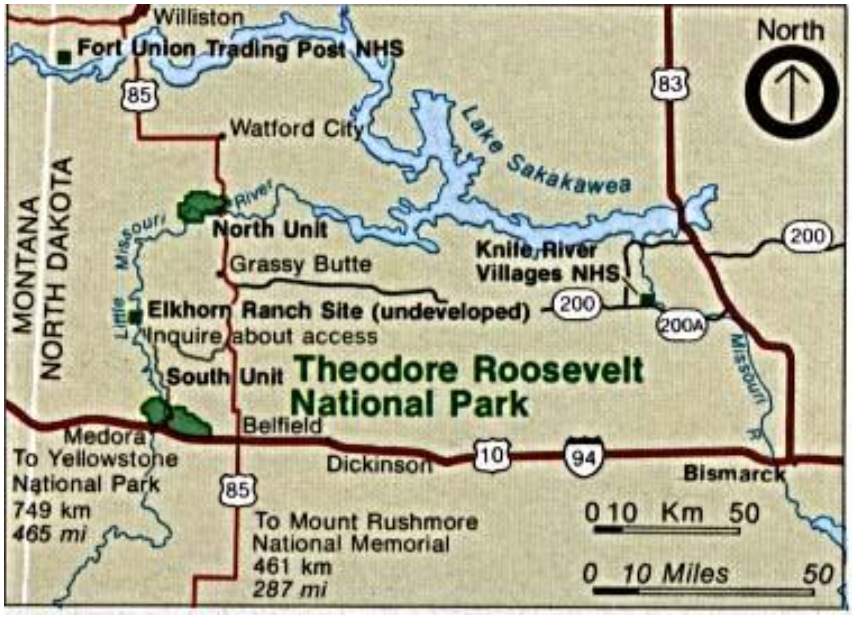
This Sept. 3, 2017 photo shows a cabin that Theodore Roosevelt lived in, open to visitors at Theodore Roosevelt National Park in Medora, N.D. Roosevelt spent time in the area to grieve after his wife and mother died the same day, and his experiences there turned the future president into one of America's greatest conservationists. He described the area as "a land of vast silent spaces _ a place of grim beauty." (AP Photo/Beth J. Harpaz)

Roosevelt lived the cowboy life, spending days riding and herding in what was considered America's last frontier. His experiences there were formative: He lost more than $24,000 when blizzards decimated the cattle he'd invested in. He witnessed the environmental damage done by overgrazing. And he realized that the bison, who once roamed the plains in the millions, had dwindled to the hundreds.

Roosevelt wrote three books inspired by his Western sojourn. He eventually returned to politics, serving as New York governor and from 1901-1909, as U.S. president. His accomplishments included the conservation of 230 million acres of land, a legacy that led to the creation of the National Park Service in 1916.

For me, Roosevelt Park ranks among the most interesting and beautiful I've seen. I wish I hadn't waited so long to visit, and I hope someday to go back and absorb more of the place that Roosevelt called "a land of vast silent spaces — a place of grim beauty."

https://www.twincities.com/2018/07/07/north-dakota-theodore-roosevelt-national-park-badlands-travel/

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MONTANA
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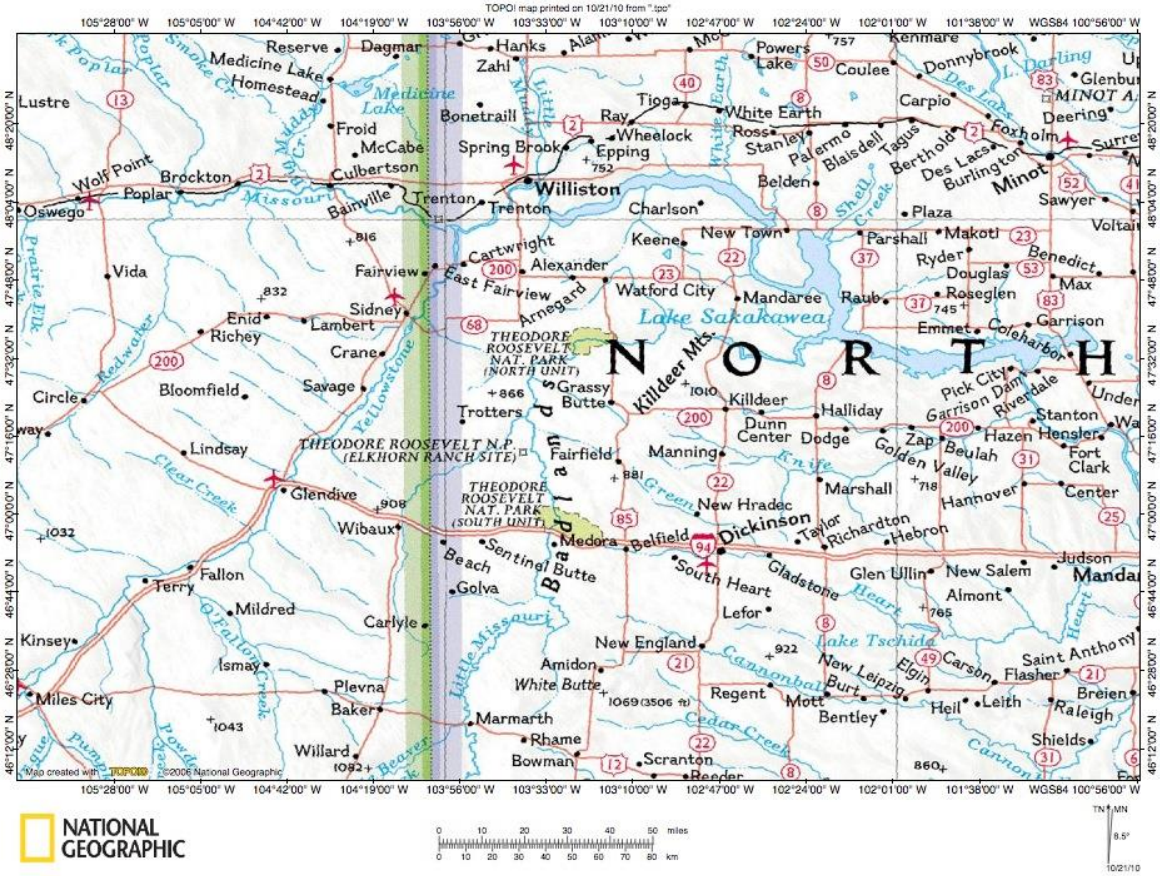
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THEODORE ROOSEVELT NAT. PARK (NORTH UNIT)
THEODORE ROOSEVELT NAT. PARK (SOUTH UNIT)
THEODORE ROOSEVELT N.P. (ELKHORN RANCH SITE)
Killdeer Mts.
Little Missouri
Badlands
Map created with TOPO!
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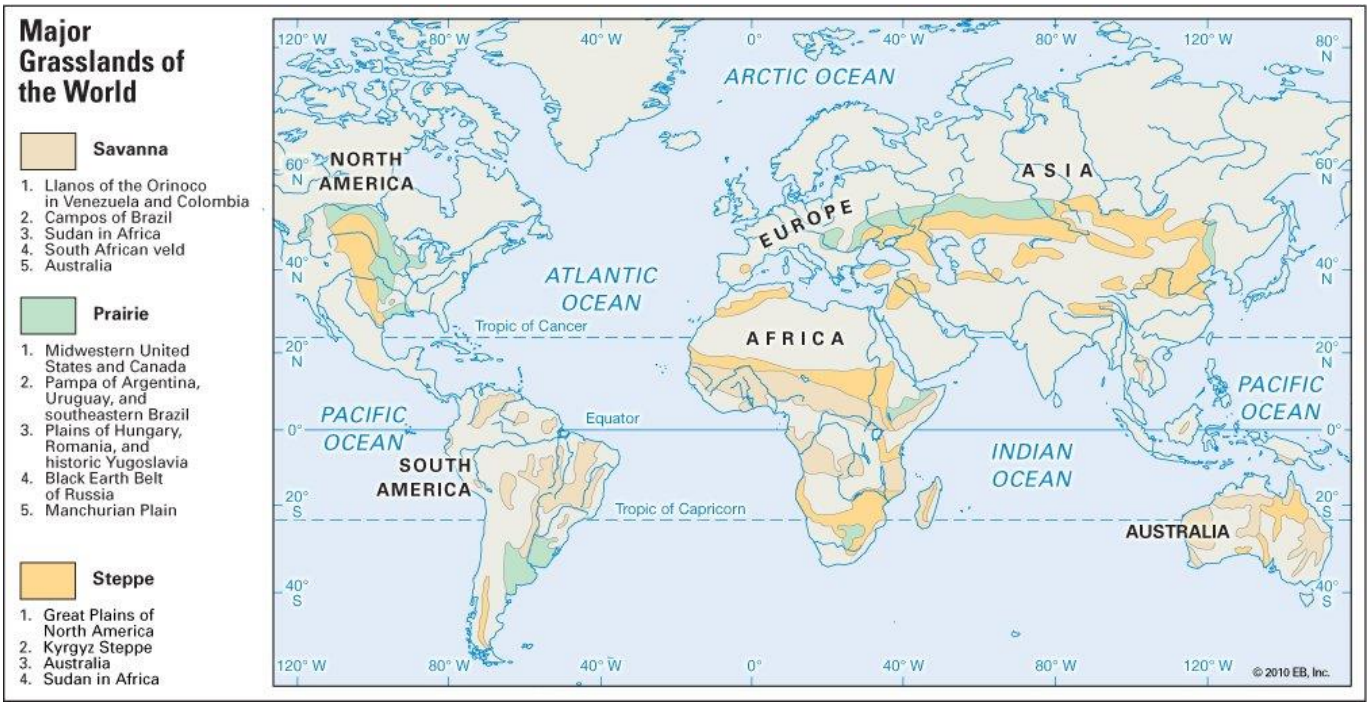
NATIONAL GEOGRAPHIC

Grasslands

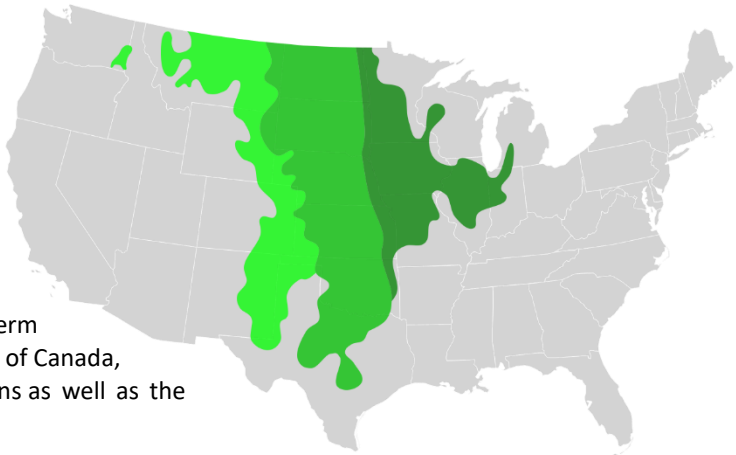
Grassland, area in which the vegetation is dominated by a nearly continuous cover of grasses. Grasslands occur in environments conducive to the growth of this plant cover but not to that of taller plants, particularly trees and shrubs. The factors preventing establishment of such taller, woody vegetation are varied.

Grasslands are one of the most widespread of all the major vegetation types of the world. This is so, however, only because human manipulation of the land has significantly altered the natural vegetation, creating artificial grasslands of cereal crops, pastures, and other areas that require some form of repetitious, unnatural disturbance such as cultivation, heavy grazing, burning, or mowing to persist.



From: https://www.britannica.com/science/grassland

Prairie



Prairies are ecosystems considered part of the temperate grasslands, savannas, and shrublands biome by ecologists, based on similar temperate climates, moderate rainfall, and a composition of grasses, herbs, and shrubs, rather than trees, as the dominant vegetation type. Temperate grassland regions include the Pampas of Argentina, Brazil and Uruguay, and the steppe of Ukraine, Russia and Kazakhstan. Lands typically referred to as "prairie" tend to be in North America. The term encompasses the area referred to as the Interior Lowlands of Canada, the United States, and Mexico, which includes all of the Great Plains as well as the wetter, hillier land to the east.

In the U.S., the area is constituted by most or all of the states of North Dakota, South Dakota, Nebraska, Kansas, and Oklahoma, and sizable parts of the states of Montana, Wyoming, Colorado, New Mexico, Texas, Missouri, Iowa, Illinois, Indiana, Wisconsin, and western and southern Minnesota. The Palouse of Washington and the Central Valley of California are also prairies. The Canadian Prairies occupy vast areas of Manitoba, Saskatchewan, and Alberta.

Approximate regional types of prairie in the United States Shortgrass prairie Mixed grass prairie Tallgrass prairie

Great Plains

The **Great Plains** (sometimes simply "the Plains") is a broad expanse of flat land (a plain), much of it covered in prairie, steppe, and grassland, located in America and Canada. It lies west of the Mississippi River tallgrass prairie in the United States and east of the Rocky Mountains in the U.S. and Canada. It embraces:

- The entirety of Kansas, Nebraska, North Dakota, and South Dakota
- Parts of Colorado, Montana, New Mexico, Oklahoma, Texas, and Wyoming
- The southern portions of Alberta, Saskatchewan, and Manitoba

The region is known for supporting extensive cattle ranching and dry farming. The Canadian portion of the Plains is known as the Canadian Prairies. It covers much of Alberta and southern Saskatchewan, and a narrow band of southern Manitoba.

The term "Great Plains" is used in the United States to describe a sub-section of the even more vast Interior Plains physiographic division, which covers much of the interior of North America. It also has currency as a region of human geography, referring to the Plains Indians or the Plains States.

In Canada the term is rarely used; Natural Resources Canada, the government department responsible for official mapping, treats the Interior Plains as one unit consisting of several related plateaux and plains. There is no region referred to as the "Great Plains" in *The Atlas of Canada*.[2] In terms of human geography, the term *prairie* is more commonly used in Canada, and the region is known as the Prairie Provinces or simply "the Prairies."

The North American Environmental Atlas, produced by the Commission for Environmental Cooperation, a NAFTA agency composed of the geographical agencies of the Mexican, American, and Canadian governments, uses the "Great Plains" as an ecoregion synonymous with predominant prairies and grasslands rather than as physiographic region defined by topography.[3]The Great Plains ecoregion includes five sub-regions: Temperate Prairies, West-Central Semi-Arid Prairies, South-Central Semi-Arid Prairies, Texas Louisiana Coastal Plains, and Tamaulipas-Texas Semi-Arid Plain, which overlap or expand upon other Great Plains designations.

From: https://en.wikipedia.org/wiki/Great_Plains

Steppe

In physical geography, a **steppe** is an ecoregion, in the montane grasslands and shrublands and temperate grasslands, savannas and shrublands biomes, characterized by grassland plains without trees apart from those near rivers and lakes. The prairie of North America (especially the shortgrass and mixed prairie) is an example of a steppe, though it is not usually called such. A steppe may be semi-arid or covered with grass or shrubs or both, depending on the season and latitude. The term is also used to denote the climate encountered in regions too dry to support a forest but not dry enough to be a desert. The soil is typically of chernozem type.

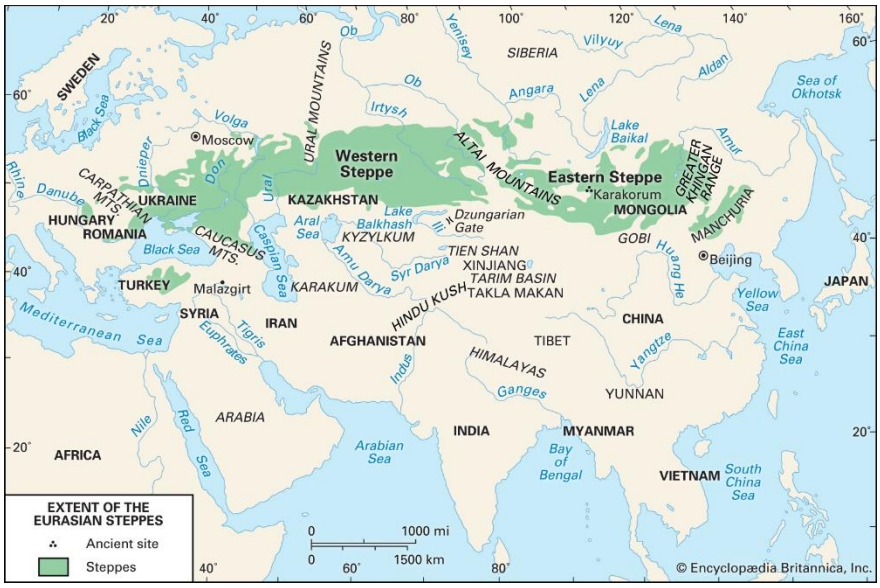
Steppes are usually characterized by a semi-arid or continental climate. Extremes can be recorded in the summer of up to 113 °F and in winter, −67 °F. Besides this huge difference between summer and winter, the differences between day and night are also very great. In both the highlands of Mongolia and northern Nevada, 86 °F can be reached during the day with sub-zero readings at night.

The mid-latitude steppes can be summarized by hot summers and cold winters, averaging 250–510 mm (10–20 in) of precipitation per year. Precipitation level alone is not what defines a steppe climate; potential evapotranspiration must also be taken into account.

Steppe can be classified by climate:

- Temperate steppe: the "true" steppe, found in continental areas of the world; they can be further subdivided, as in the Rocky Mountains Steppes
- Subtropical steppe: a similar association of plants that can be found in the driest areas with a Mediterranean-like climate; it usually has a short wet period

It can also be classified by vegetation type, e.g. shrub-steppe and alpine-steppe.



The Eurasian Grass-Steppe of the temperate grasslands, savannas, and shrublands had a role in the spread of the horse, the wheel, and the Indo-European languages. The Indo-European expansion and diverse invasions of horse archer civilizations of the steppe eventually led to the rise of Mycenaean Greece by amalgamation of Indo-Europeans with the autochthonous pre-Greek population and also its destruction during the Dorian invasion in the Late Bronze Age collapse, followed by the demise of the Achaeans, the spread of the Sea Peoples, and eventually the rise of Archaic and ultimately Classical Greece.

From: https://en.wikipedia.org/wiki/Steppe

Prairie Dogs

COMMON NAME: Prairie Dogs

SCIENTIFIC NAME: Cynomys

TYPE: Mammals

DIET: Herbivore

GROUP NAME: Town

AVERAGE LIFE SPAN IN THE WILD: 3 to 4 years

SIZE: Head and body: 12 to 15 inches; tail: 3 to 4 inches

WEIGHT: 2 to 4 pounds

These charismatic, rabbit-size rodents live on North America's prairies and open grasslands in only a fraction of their former numbers.

Underground Burrows

Prairie dogs live in underground burrows, extensive warrens of tunnels and chambers marked by many mounds of packed earth at their surface entrances. Burrows have defined nurseries, sleeping quarters, and even toilets. They also feature listening posts near exits, so animals can safely keep tabs on the movements of predators outside. Prairie dogs spend a lot of time building and rebuilding these dwellings. Other animals benefit from their labors. Burrows may be shared by snakes, burrowing owls, and even rare black-footed ferrets, which hunt prairie dogs in their own dwellings.

Family groups (a male, a few females, and their young) inhabit burrows and cooperate to share food, chase off other prairie dogs, and groom one another. These group members even greet one another with a prairie dog kiss or nuzzle. Young pups are very playful and can often been seen romping near their burrows.

Prairie Dog Species
Black-tailed prairie dogs, the best known of the five prairie dog species, live in larger communities called towns, which may contain many hundreds of animals. Typically, they cover less than half a square mile, but some have been enormous. The largest recorded prairie dog town covered some 25,000 square miles. That Texas town was home to perhaps four hundred million prairie dogs.
Another prairie dog species, the white-tailed prairie dog, lives in the western mountains. These rodents do not gather in large towns but maintain more scattered burrows. All species hunker down in winter and burn the reserves of fat they have stored during more plentiful seasons. White-tails may hibernate for up to six months on their mountain plains, while their black-tailed cousins sometimes emerge to feed on especially warm days.

Behavior
These large squirrels emerge from their burrows in daylight to forage and feed on grasses, roots, and seeds. They communicate with loud cries. A warning cry, for example, will send a town's denizens hustling to their holes at the approach of a badger, coyote, or other predator. A second, “all-clear” call alerts the community when the danger has passed.

Threats to Survival
Much of the Great Plains has been converted to farming or pastureland, and prairie dogs are not often welcome in such places. Because of their destructive landscaping, they are often killed as pests. During the 20th century, about 98 percent of all prairie dogs were exterminated, and their range subsequently shrunk to perhaps five percent of its historic spread.

From: *https://www.nationalgeographic.com/animals/mammals/group/prairie-dogs/*

8 surprising prairie dog facts

Exploring the complex world of the peculiar critters of America's grasslands

AUTHOR: Sarah Wade

Prairie dogs tend to be celebrated for their larger ecological virtues. In the grasslands across the central and western United States, their intricate underground colonies—called prairie dog towns—create shelter for jackrabbits, toads, and rattlesnakes. The bare patches of ground created by their grazing and burrowing attract certain insects that feed a variety of birds. And prairie dogs themselves are a key food source for everything from coyotes to hawks to endangered black-footed ferrets.

“These animals support at least 136 other species through their various activities,” said Kristy Bly, a WWF senior wildlife conservation biologist. “They’re basically the Chicken McNuggets of the grasslands.”

But these small, chubby-looking mammals are also fascinating in their own right. Check out these facts for a glimpse into their strange, surprisingly complex world.

1. They’re tough
Prairie dogs may look a bit like actual Chicken McNuggets, but in reality they’re fast, skilled fighters armed with sharp claws and powerful teeth. “The worst animal bite I’ve ever gotten was from a prairie dog,” said Jessica Alexander, a program associate in WWF’s Northern Great Plains office. “It takes a while for black-footed ferrets to learn how to catch them. Prairie dogs fight back.”

2. Their entire mating season is just an hour long
In contrast with popular perceptions of prairie dogs as fast-multiplying rodents, these animals actually mate just once a year, in early winter. Females go into estrus for a single hour. They then have litters of three to eight pups—usually only half of which survive their first year.

3. They live in tight-knit family groups called coteries
The average coterie tends to have one or two breeding males, several breeding females, and the females’ new pups. Males tend to jump from coterie to coterie—but the females stick together for life.

4. Their vocabulary is more advanced than any other animal language that's been decoded
To a human ear, prairie dogs' squeaky calls sound simple and repetitive. But recent research has found that those calls can convey incredibly descriptive details. Prairie dogs can alert one another, for example, that there's not just a human approaching their burrows, but a tall human wearing the color blue.

5. They're cousins of the squirrels in your backyard
All five species of prairie dog belong to the *Scuiridae* (squirrel) family. Their other biological relatives include groundhogs, chipmunks, marmots and woodchucks.

6. Their historical range has shrunk by more than 95%
There used to be hundreds of millions of prairie dogs in North America. European settlers traveling through the West wrote about passing through massive prairie dog colonies, some of which extended for miles. But over time, their range has shrunk to less than 5% of its original extent due to a host of pressures, including habitat encroachment by humans.

7. They're threatened by the same plague that caused the Black Death in Europe
In the late 1800s, the bubonic plague entered North America via rats aboard European ships. It quickly spread through wild mammal populations, including black-tailed prairie dogs in the northern Great Plains. The disease is still rampant in large tracts of the region and tends to wipe out entire prairie dog colonies when it strikes.

8. Black-footed ferrets depend on prairie dogs—and we're working to protect both species
Prairie dogs are the primary source of food and habitat for endangered black-footed ferrets. At Fort Belknap Indian Reservation in Montana, WWF is collaborating with tribal partners to monitor the health of prairie dog colonies where black-footed ferrets live—and identify new areas where ferrets could be released. In September 2015, new ferrets were released into a healthy prairie dog colony, and quickly darted down the holes.

From: https://www.worldwildlife.org/stories/8-surprising-prairie-dog-facts

American Bison

COMMON NAME: American Bison

SCIENTIFIC NAME: Bison bison

TYPE: Mammals

DIET: Herbivore

GROUP NAME: Herd

AVERAGE LIFE SPAN IN THE WILD: 12 to 20 years

SIZE: Head and body: 7 to 11.5 feet; tail:19.75 to 23.5 inches

WEIGHT: 930 to 2,200 pounds

SIZE RELATIVE TO A 6-FT MAN:

IUCN RED LIST STATUS: ?

CURRENT POPULATION TREND: Stable

Bison, symbolic animals of the Great Plains, are often mistakenly called buffaloes. By any name, they are formidable beasts and the heaviest land animals in North America.

Size and Diet
Bison stand some 5 to 6.5 feet tall at the shoulder and can tip the scales at over a ton. Despite their massive size, bison are quick on their feet. When the need arises they can run at speeds up to 40 miles an hour. They sport curved, sharp horns that may grow to be two feet long.

These large grazers feed on plains grasses, herbs, shrubs, and twigs. They regurgitate their food and chew it as cud before final digestion.

Herd Behavior
Females (cows) and adult males (bulls) generally live in small, separate bands and come together in very large herds during the summer mating season. Males battle for mating primacy, but such contests rarely turn dangerous. Females give birth to one calf after a nine-month pregnancy.

Cultural Importance
Bison once covered the Great Plains and much of North America and were critically important to Plains Indian societies. During the 19th century, settlers killed some 50 million bison for food, sport, and to deprive Native Americans of their most important natural asset. The once enormous herds were reduced to only a few hundred animals. Today, bison numbers have rebounded somewhat, and about 500,000 bison live on preserves and ranches where they are raised for their meat.

From: https://www.nationalgeographic.com/animals/mammals/a/american-bison/

What's the Difference Between Bison and Buffalo?

WRITTEN BY: Amy Tikkanen

It's easy to understand why people confuse bison and buffalo. Both are large, horned, ox-like animals of the Bovidae family. There are two kinds of bison, the American bison and the European bison, and two forms of buffalo, water buffalo and Cape buffalo. **However, it's not difficult to distinguish between them, especially if you focus on the three H's: home, hump, and horns.**

Contrary to the song "Home on the Range," buffalo do not roam in the American West. Instead, they are indigenous to South Asia (water buffalo) and Africa (Cape buffalo), while bison are found in North America and parts of Europe. Despite being a misnomer—one often attributed to confused explorers—*buffalo* remains commonly used when referring to American bison, thus adding to the confusion.

Another major difference is the presence of a hump. Bison have one at the shoulders while buffalo don't. The hump allows the bison's head to function as a plow, sweeping away drifts of snow in the winter. The next telltale sign concerns the horns. Buffalo tend to have large horns—some have reached more than 6 feet (1.8 meters)—with very pronounced arcs. The horns of bison, however, are much shorter and sharper. And, if you want to throw a B into the mix, you can check for a beard. Bison are the hipsters of the two animals, sporting thick beards. Buffalo are beardless.

From: https://www.britannica.com/story/whats-the-difference-between-bison-and-buffalo

Environmental Factors

The exposed layers of the Badlands are the result of many environmental factors. Some of these are direct, such as the ancient ecosystems of swamps and rivers deltas or the current Little Missouri River. Others are indirect, like distant volcanoes which formed the Rocky Mountains or glaciations altering river courses north of present-day park land.

Today, constant winds and sporadic, torrential rainstorms continue to alter the Badlands. Erosion causes land to shift and move, making road and building maintenance a constant challenge in the park. Prairie fires ignite underground coal seams, baking the surrounding rock into the erosion-resistant red-orange clinker.

Perhaps our most significant environmental factor is humankind. Western North Dakota is in the midst of a massive oil boom, bringing rapid growth and development to the region. Increased development brings **light pollution**, affecting the dark skies of Theodore Roosevelt National Park. As park staff assesses the ramifications of these impacts, we are challenged to question how this growth affects our relationship with ecosystems, both local and global.

https://home.nps.gov/thro/learn/nature/environmentalfactors.htm

Lightscape / Night Sky

"*In the soft springtime the stars were glorious in our eyes each night before we fell asleep.*"

Theodore Roosevelt

Theodore Roosevelt National Park is a great place to view the night sky. The park is over 30 miles from the nearest large city, so very little light interference affects night sky viewing allowing for better visibility of stars and other astronomical phenomena. On clear nights, the Milky Way, planets, stars, and many constellations are visible. The exceptional **air quality** in Theodore Roosevelt National Park also allows more astronomical features to be seen. In both units of the park, observers can drive to viewing areas on top of plateaus for a relatively unimpaired view of the night sky.

Even without a telescope, you can experience the mystery and wonder of the night sky. Use a star chart and discover the constellations that inspired countless myths and legends. See the moons of Jupiter through your binoculars as Galileo did. Lie on your back and watch for satellites or make a wish on a shooting star. You can even see the Andromeda Galaxy without a telescope. The park is an excellent place to watch meteor showers. Occasionally, the Northern Lights or *aurora borealis*, may be visible, adding startling color and movement to the night sky.

Theodore Roosevelt National Park is a great place to view the night sky, but, like other areas, there are threats to its relative darkness. Light pollution from oil and gas development surrounding the park is visible in some areas. Nearby towns including Medora, Belfield, and Watford City also produce light that limit the number of stars that can be seen. The farther you get from these sources of light pollution, the more astronomical features you will be able to see.

Increased light pollution may have negative effects beyond the impacts to stargazing. Light pollution may affect the ability for nocturnal animals, such as some owls, to function normally. Artificial light "tricks" plants into thinking the days are longer than they are, which may affect their growth and reproductive cycles.

Park rangers may offer programs about the night sky during the summer. Inquire at the visitor center or check park bulletin boards for information about programs currently being offered.

https://home.nps.gov/thro/learn/nature/lightscape.htm

The Bakken Oil Boom

This image was taken near the boundary of the park. Just outside the fence, equipment and infrastructure are tapping into the Bakken resources. NPS \ Joe Bruce

Surprised by all the traffic and construction? The past decade has brought great changes to this region. The Bakken formation of western North Dakota contains one of the largest oil deposits in the country. Recently, new technology has made it feasible to extract these resources. Most oil here is extracted by hydraulic fracturing - commonly known as "fracking." This technique fractures the bedrock, using a slurry of sand, chemicals, and water to extract the trapped oil. The Bakken oil boom has brought tens of thousands of new jobs to the area, endowing North Dakota with the highest employment rate in the United States. Rapid development rapid changes, and the park is not immune to the growing pains experienced by the land and communities which surround us.

Effects on the Park

The three units of Theodore Roosevelt National Park are small islands taking up less than 1% of the Bakken region, but they provide vital habitat for native plants and animals. Although oil development is not allowed in the park itself, the National Park Service has no regulatory authority over what happens outside of our boundaries. Visitors may encounter signs of oil development near the areas surrounding the park. Booming jobs means booming prices of goods and services, as well as increased pollution from traffic, noise, dust and light.

Some impacts are more obvious than others. Environmental impacts from spilled oil and fracking fluids are omnipresent with the fossil fuel industry. Many wells tap into natural gas reserves, but lack the infrastructure to collect and store this less-valuable fuel source. The gas is wasted as it is burned off by on-site flaring. The extraction and use of fossil fuels releases greenhouse gases, altering the global carbon cycle. As society struggles to cope with a changing climate, we must question our use of these critical resources - now more than ever.

Expanding towns and 24-hour facilities increase the amount of light pollution and make it harder for wildlife and visitors to experience natural darkness.
NPS \ Jeff Zylland

Increased development has a direct impact on the park's night skies. Gas flares and 24-hour facilities attribute to light pollution which obscures the formerly dark skies of North Dakota. The oil boom challenges us to wonder: how can we develop energy resources while still protecting natural habitats?

We explored this question in a series of videos about the impacts of the oil boom on the park. We invite you to watch these videos, share them with friends, and take part in the discussion by leaving your comments. Visit our YouTube playlist to watch and learn more about how the Bakken oil boom is affecting your national park.

https://home.nps.gov/thro/learn/nature/bakken-oil.htm

Natural Features & Ecosystems

Geologic Features

"The Bad Lands grade all the way from those that are almost rolling in character to those that are so fantastically broken in form and so bizarre in color as to seem hardly properly to belong to this earth."

Geologic Formation

As you drive or hike through western North Dakota, the gently rolling hills open up dramatically into the varied and colorful layers of the badlands. Curiosity might lead you to take a closer look at the rocks making up the layers. This closer look takes you back millions of years to an ancient world of swamps and forests.

The story of the badlands begins over 65 million years ago during the Paleocene Epoch. The dinosaurs had just become extinct at the end of the Cretaceous Period. The western half of North America was buckling and folding to create the Rocky Mountains. Large amounts of sediments were forming as water, wind, and freezing worked to break down the mountains. These sediments, mostly sand, silt, and mud, were carried off the eastern slopes by ancient rivers and deposited here in layers. Volcanoes in South Dakota, Montana, Idaho, and across the west were also erupting during this time, spitting out huge amounts of ash. Some of this volcanic ash was blown or carried by rivers into North Dakota and accumulated in standing water. Over time, the sediments turned into the sandstone, siltstone, and mudstone layers now exposed in the park, while the ash layers became bentonite clay.

During the epochs that followed, the land continued to change. Deposition from the mountains in the west continued throughout much of the Eocene, Oligocene, and Miocene epochs. Then as the Pliocene Epoch began, erosion dominated and the layers began to be stripped away. Rivers meandered through broad, shallow valleys across the western Dakotas and eastern Montana plains. Although the rivers changed their courses many times, when the Pliocene Epoch came to a close about two million years ago, one of these rivers existed in almost the same position as the modern Little Missouri River. This river flowed northward to merge first with the ancestral Yellowstone River near Williston, North Dakota, and then merged with the Missouri River, continuing northeastward through Saskatchewan and Manitoba to Hudson Bay.

Rivers and streams carve through the soft bentonite clay. *NPS Photo*

In the Pleistocene Epoch, the time period of numerous Ice Ages, which began about two million years ago, great continental ice sheets advanced southward from present-day Canada and reached as far as the upper North Unit boundary in the park. The ice blocked the flow of the north-flowing rivers, forcing them to create new courses eastward and southward, causing them to empty into the Mississippi River instead of Hudson Bay. By the time the ice retreated, the northern portions of both the Little Missouri and Missouri rivers were entrenched in their new channels. The Little Missouri's new course to the north followed a steeper course, causing the whole river to flow faster and begin cutting deeply into the land. Slicing easily through the soft sedimentary rocks, the river and its tributaries carved the fantastically broken topography that is today's badlands.

The Fossil Record

You might wonder how scientists can tell how old the rocks are and what the environment was like when they formed. The sediments in the rocks give some clues, but the best clues are fossils. The North Dakota badlands contain a wealth of fossil information including bands of lignite coal and petrified trees plus fossils of freshwater

clams, snails, crocodiles, alligators, turtles, and champsosaurs. Each fossil is like a piece in a giant puzzle that scientists have used to reconstruct the ancient history of the park. These clues indicate that the park was once on the eastern edge of a flat, swampy area covered with rivers that fanned out into a broad, sea-level delta. This swampy region contained dense forests of sequoia, bald cypress, magnolia, and other water-loving trees growing in or near the shallow waters.

Leaves and branches would fall into the still waters of the swamps and build up until they formed a dense layer of vegetation called peat. Over time, pressure from overlying sediments compacted the peat and caused chemical changes to transform it into a soft, woody-textured coal called lignite (from the Latin ligneous, meaning wood). When Theodore Roosevelt lived in the badlands in the 1880s, he and his ranch hands shoveled lignite coal from the hillsides to use in their stove.

Petrified wood remains from the badlands' swampy history. *NPS Photo*

Some forests were buried by flood deposits or volcanic ash falls. When a plant or animal is buried quickly, it is protected from decaying and has a better chance of becoming a fossil. Groundwater moving through the silica-rich volcanic ash and other sediments can dissolve the silica, or quartz. When this silica-rich water soaked into the trees, organic compounds in the wood were dissolved and replaced by very small crystals of quartz. In some cases, the quartz crystals are so small that much of the internal structure of the trees is preserved, including the growth rings. This process of quartz replacing wood is called petrifaction. Click on **Fossils** for more information.

The Present Landscape

Geologic processes continue to shape the badlands. Yearly precipitation in the badlands averages 15 inches. Rain, though infrequent at times, usually comes in heavy, erosive downpours. Water running down slope forms gullies, while some soaks into clay-rich rocks and soils. The added weight of water sometimes causes portions of hill sides to break loose and flow downhill.

Relatively hard porcelanite, or "scoria," tops many of the buttes because it is more resistant to erosion than the softer clays.
NPS Photo

Lightning strikes and prairie fires can ignite coal beds, which then may burn for many years. When a coal bed burns, it bakes the overlying sediments into a hard, natural brick that geologists call clinker, but is locally called "scoria." The red color of the rock comes from the oxidation of iron released from the coal as it burns. The burning lends both color to the badlands and helps to shape them. These hardened rocks are more resistant to erosion than the unbaked rocks nearby. Over time, erosion has worn down the less resistant rocks, leaving behind a jumble of knobs, ridges, and buttes topped with durable red scoria caps.

Theodore Roosevelt National Park preserves a wealth of geologic information that can be enjoyed by visitors and studied by scientists. Much of that information tells us about events that occurred long ago, while some small-scale processes can be seen occurring over days, weeks, months, or even years. Just a short visit here can give visitors insight into the past, instill wonder, and inspire questions and a desire to learn more.

You are welcome to explore Theodore Roosevelt National Park and make your own discoveries about the rocks and fossils found here. Please remember, however, that each rock and fossil may be a clue to the geologic history of the park, and must be left where they are found for other visitors to view and for scientists to study. **Collecting of any park resource is not allowed.**

https://www.nps.gov/thro/learn/nature/geologicformations.htm#:~:text=Some%20of%20this%20volcanic%20ash,ash%20layers%20became%20bentonite%20clay.

Glaciers / Glacial Features

Although glaciers are not to be found in Theodore Roosevelt National Park, the evidence of their geologically recent presence is throughout the park's landscape. During the Pleistocene Ice Age, tremendous ice sheets advanced from the north, redirecting the course of the Little Missouri River. Its new course caused the Little Missouri to carve more sharply into the soft sedimentary rock in the badlands, creating much of the broken topography found throughout the park.

Direct evidence of the glaciers' recent presence is found in the North Unit. There, at the north rim of the the Little Missouri River Valley, the Pleistocene ice sheets reached the southernmost point of their advance. As the ice sheets stalled there, the conveyor belts of ice continued to transport rock from far away, depositing it at the foot of the glacier. Some of the rocks carried and deposited by the glaciers in this manner are called glacial erratics. These rocks are particularly noticeable because they are made of granite, an igneous rock found nowhere else in Theodore Roosevelt National Park's sedimentary rock layers.

https://home.nps.gov/thro/learn/nature/glaciers.htm

Fossils

Note: *Collecting fossils, petrified wood, rocks, or any other materials in Theodore Roosevelt National Park is prohibited by law.*

A pullout along the North Unit Scenic Drive highlights the presence of glacial erratics left behind by the Pleistocene ice sheets. *Nathan King, NPS*

If you have ever stood in the badlands on a hot, dry summer day or a freezing, blustery winter day, a warm, wet, and humid swamp might be the most opposite type of climate and environment you could imagine. Despite its stark contrast with today, fossil evidence in Theodore Roosevelt National Park strongly suggests that a swampy environment is exactly what used to be here in today's badlands. The fossil record shows that in the Paleocene Epoch, just after the time of the dinosaurs, this area was a vast swamp teeming with turtles, crocodilians, and bald cypress trees. A three-year cooperative paleontological survey conducted in Theodore Roosevelt National Park by the North Dakota Geological Survey shed light on this part of North Dakota's geologic history.

The fossilized remains of a crocodile-like reptile named *Champsosaurus* were excavated from a hillside in the South Unit in October 1995 by Dr. John Hoganson, paleontologist with the North Dakota Geological Survey, and his assistant, Jonathan Campbell. The ancient reptile once inhabited the fresh waters in what is now western

North Dakota about 55 million years ago during the Paleocene epoch. At that time, the climate was subtropical, similar to that of present day Florida.

The long, narrow snout and large powerful back legs would have enabled the *Champsosaurus* to feed on fish, snails, mollusks and turtles. Paleontologists believe that this ten-foot-long predator spent much of its time submerged in water waiting for prey, much like modern crocodiles. Champsosaurus could lunge from the bottom using its powerful back legs. A turtle shell with bite marks also found during this survey provides a vignette of life from this era.

The Fossil Lake Wannagan mural depicts an artist's rendering of the swampy environment preserved in Theodore Roosevelt National Park's fossil record. The mural, on display in the South Unit Visitor Center, includes reptiles, birds, fish, swamp trees, and extinct mammals such as multituberculates and condylarths. *NPS*

During the paleontological inventory, more than two hundred fossil sites were identified and mapped from the rock layers known as the Sentinel Butte and Bullion Creek formations. The sites contained two other partial *Champsosaur* skeletons plus numerous freshwater mollusk remains, turtles (snapping and soft-shelled), parts of crocodiles and alligators, and plant fossils. The most common fossil found was petrified wood, including large tree stumps measuring seven to eight feet in diameter. It is believed that most of these trees were conifers, such as bald cypress and sequoia.

The paleontological investigation enhanced our view of the park's geologic story. By identifying what creatures and plants existed here, one can get an impression of what life was like millions of years ago. With a clearer picture of the past, we gain a better perspective on this continuously changing environment.

https://www.nps.gov/thro/learn/nature/fossils.htm

Ecosystems

Flood Plains

The Little Missouri River is a prominent feature in all three units of Theodore Roosevelt National Park, and its floodplain is an important feature that contributes to the diversity of habitat, plants, and animals in the park. The sediment-heavy Little Missouri River constantly winds within its banks, slowly changing course over the years. Periodically, the river overflows its banks and onto its floodplain. This periodic flooding has helped trees such as the cottonwood to become established on the floodplain.

North Unit *Mary Brazell, NPS*

The cottonwoods on the floodplain provide valuable habitat for other plants and for animals, too. White-tailed deer prefer the heavily wooded habitat of the cottonwood forests. Numerous species of birds are attracted to the forests in the Little Missouri floodplain because of the diverse and abundant food sources and easy access to water. These large forests are home to year-round feathered residents such as black-capped chickadees,

white-breasted nuthatches, and great-horned owls, and provide seasonal homes for nesting Baltimore orioles, waxwings, and a variety of warblers. Porcupines and beavers also use the cottonwood trees themselves for cover and food.

The flat, grassy areas on the floodplains also provide grazing opportunities for the park's numerous grazing mammals, including bison, deer, horses, and elk. Prairie dog towns are also located in some areas on the floodplain.

https://home.nps.gov/thro/learn/nature/floodplains.htm

Forests

Juniper berries, *Nathan King, NPS*

Forests are not the dominant habitat type in Theodore Roosevelt National Park, but they form an important component of the park's habitat diversity. There are primarily two types of forests in the park: juniper woodlands and hardwood forests.

Rocky Mountain juniper woodlands are the most common forest type in the park because the junipers benefit from a microclimate created on the north face of the buttes. There, the sun's heat is less intense and water evaporation is lower. Conversely, the south faces of the buttes are hotter and drier, and junipers are less common. Juniper woodlands on the north faces of buttes also slow the effect of erosion, and the north faces of the hills are not as steep as the south faces where junipers are not prevalent. Elk prefer juniper woodlands where they can escape the heat of summer and the cold winds of winter. The berries produced by junipers are a critical food source for birds including Townsend's solitaires, cedar waxwings, bohemian waxwings, and American robins.

Rainwater drains through the draw pictured above, allowing these hardwoods to survive.

The dry climate of the North Dakota badlands limits the amount of hardwood forests. Hardwoods including green ash, American elm, box elder, and cottonwoods cling to the riverbottoms and draws where water is more available. These larger trees allow shrubby vegetation to grow beneath them, and the habitat favors some animals such as white-tailed deer, porcupines, and forest-dwelling birds.

https://www.nps.gov/thro/learn/nature/prairies.htm

Prairies and Grasslands

Grasslands are the most abundant habitat type found in Theodore Roosevelt National Park. Grasses are able to cope with the low annual precipitation, going dormant as the relatively wet spring gives way to the dry, hot summer. At first glance, grasslands may appear monotonous, but, in fact, the grasslands encompass a rich and constantly changing diversity of plants and animals.

Natural Features & Ecosystems

A native grasses and many species of forbs and shrubs comprise the most diverse array of plant life in the park. Grasses including saltgrass, Western wheatgrass, needle-and-thread, and little bluestem provide valuable forage for many grazing animals including bison, wild horses, elk, mule deer, and prairie dogs, not to mention a rich array of insect life. The grazing animals and insects of the grassland in turn attract predators; prairie dogs are under constant threat from badgers, coyotes, hawks, and eagles, and insects are eaten by birds such as flycatchers and swallows.

Over time, woodier plants such as sagebrush and wild rose become established in grasslands, changing the forage available to grazing animals. Periodic fire, whether natural or **prescribed** by the park, is necessary to improve habitat and forage diversity. Fires reduce woody vegetation and allow early successional grasses and forbs to re-establish themselves.

https://www.nps.gov/thro/learn/nature/prairies.htm

Rivers and Streams

"The stream twists down through the valley in long sweeps, leaving oval wooded bottoms first one side and then on the other." Theodore Roosevelt

Little Missouri River *NPS Photo*

The Little Missouri River is a key feature of all three units of Theodore Roosevelt National Park. In the semi-arid environment of the badlands, the power of the river to shape the landscape and to sustain life underscore its importance.

The ever-changing Little Missouri River varies from a muddy trickle to a raging flood to a frozen highway at different times of the year. As the river carves through the soft clay of the badlands, it cuts away at its banks, constantly changing shape as it snakes northward to the Missouri River.

The Little Missouri River supports a wide variety of plants and animals. Beavers, catfish, minnows, a variety of ducks and geese, and occasionally bald eagles and white pelicans utilize the river. The Little Missouri River represents the only aquatic environment in the park that can support fish. Many of the park's large animals, such as bison, wild horses, and deer, find water in the river.

The flat lands adjacent to the Little Missouri River are part of its floodplain. These areas that occasionally flood are a unique habitat type in the park consisting of large cottonwood groves and meadows. See Floodplains for more information.

Some popular visitor activities on the Little Missouri River include float trips, fishing, and wildlife viewing. Great places to view the river include the Wind Canyon Overlook in the South Unit, and the River Bend Overlook and Oxbow Bend Overlook at the North Unit.

A number of small creeks also cut through the badlands. These streams feed rain and melting snow into the Little Missouri River. Creeks may flow with water from storms, but can often be completely dry. The channels allow plants that need relatively more water to survive in the narrow channels, and provide wildlife with an often temporary source of drinking water. The occasional mud makes for a great opportunity to find animal tracks, a record of the recent wild visitors to the area.
https://home.nps.gov/thro/learn/nature/rivers.htm

Plants

"...wild flowers should be enjoyed unplucked where they grow." Theodore Roosevelt

The topography of the badlands in Theodore Roosevelt National Park provides for a surprising diversity in plant life. From the sunny and drier south faces of buttes to their forested and cooler north slopes, from floodplains to grasslands, and in prairie dog towns, over 400 species of plants have been identified within the park. As many as 500 species of plants may inhabit the park. What will you discover?

The abundance of prairie plants provides for impressive wildflower displays in the late spring and summer months. The pasqueflower is the first to bloom, in April, portending the coming of spring. Soon after, from May to September, a broad range of flowers appear on the landscape. Many flowers bloom in June and July, the peak months for flower viewing. Some flowers, such as sunflowers, asters, and rabbitbrush, hold out for the late summer months of August and September. In late September, as the seasons begin to change, cottonwood leaves turn a brilliant gold color before falling to the ground.

The broad palette of plant life sustains a bountiful wildlife population in the park. Large grazing mammals including bison, pronghorn, and wild horses can often be found eating grasses. Deer and elk graze in the grasslands and browse on woodier plants. Smaller mammals like cottontail rabbits, least chipmunks, voles, and mice feed on the plants and the berries and seeds the plants produce. Prairie dogs have a noticeable effect on the plants near their towns, fostering the growth of fast-growing forbs over other plants because of the rodent's continuous grazing.

A wide variety of birds benefit from plants, their berries and seeds, and the insects the plants support. Warblers eat insects attracted to the flowering plants, a wide variety of sparrows and other birds eat the seeds, and birds including cedar waxwings and Townsend's solitaires eat berries.

The plants that provide food for many of the park's animals must be protected from overgrazing and from being overrun by non-native plants. To do so, park officials study the effects of animals on the plant communities and initiate wildlife management actions when necessary. Park officials also track and combat non-native plant threats in order to protect the native ecosystem. Plant identification field guides are available in the park's bookstores.

Please practice Leave No Trace principles. Picking flowers or collecting plants are prohibited within the park.
https://home.nps.gov/thro/learn/nature/plants.htm

Animals

A wide diversity of animals make their home in Theodore Roosevelt National Park. An abundance of native grasses provide sustenance for grazing animals both large and small while the tapestry of different habitats attracts a great number of birds. The terrain of the badlands creates microclimates of warm, dry slopes, relatively cool and wet juniper woodlands, and riverbottoms.

Amphibians - North Dakota has a sparse fauna of amphibians and reptiles. While individual populations may get quite high, species diversity is low. The semi-arid climate provides only marginal conditions for breeding and hibernation of amphibians, while low winter temperatures and the short growing season appear to be

Bison freely roam the North and South Units of Theodore Roosevelt National Park *NPS Photo*

primary limiting factors for reptiles. Several of the species listed below are very rare or infrequently found and are in quite localized populations.

AMPHIBIANS	Tiger Salamander	*Ambystoma tigrinum*
	Plains Spadefoot Toad	*Scaphiopus bombifrons*
	Great Plains Toad	*Bufo cognatus*
	Rocky Mountain (Woodhouse's) Toad	*Bufo woodhousei*
	Boreal Chorus Frog	*Pseudacris nigrita*
	Leopard Frog	*Rana pipiens*

https://home.nps.gov/thro/learn/nature/amphibians.htm

Birds - Theodore Roosevelt National Park's habitat diversity provides homes and food sources for abundant bird life. More than 185 different bird species may be seen in the park at different times of the year. Most of the park's birds are migratory, meaning they move around from one season to the next in search of food, nesting sites, and the right kind of climate. Some birds are adapted to the cold North Dakota winter and may be found year-round in the park.

Some notable year-round residents include golden eagles, wild turkeys, black-capped chickadees, white-breasted nuthatches, and great-horned owls. A great variety of migratory birds pass through the park in spring and fall, including white-throated sparrows and huge flocks of sandhill cranes. Summer migrants include insect-eating birds such as flycatchers, warblers, and swallows. Some birds migrate south to winter in the park including juncos and redpolls.

Grab your binoculars, your favorite field guide, and see what Theodore Roosevelt National Park's birds are up to! You can also view and print a **Bird Checklist** to help you keep track of what you saw.
https://home.nps.gov/thro/learn/nature/birds.htm

Mammals - Many of the iconic animals in Theodore Roosevelt National Park are mammals. Animals such as the American bison and the black-tailed prairie dog are relatively easy to spot. Others such as big horn sheep or elk are more difficult to find, due to their behaviors and/or preferred hours of activity.

Many of the large mammals living in the park today were not present at the time of the park's establishment in the 1940s. Bison, elk and bighorn sheep had all been extirpated from this region. Deer and pronghorn were rare. Various reintroduction programs proved successful in returning native wildlife to the ecosystem. Not only do they represent the experiences of Theodore Roosevelt, but they provide visitors with their own experience of a wild prairie.

Mammals which are noticeably absent from the ecosystem are the apex predators: wolves, brown bears and mountain lions. Although an occasional mountain lion may roam through the park, the absence of these predators requires the park to **manage our large mammal populations**. These programs are necessary for ecosystem health and diversity.

The park maintains two animal populations as Livestock Demonstration Herds. Longhorn cattle can be viewed in the North Unit and horses live in the South Unit. Although neither animal is native to the prairie ecosystem, they are representative of the ranching industry which brought Theodore Roosevelt to the Dakota Badlands.

- **Bison**
- **Elk**
- **Prairie Dogs**
- **Horses**
- **Longhorn Steers**

https://home.nps.gov/thro/learn/nature/mammals.htm

Reptiles - Several varieties of snakes and lizards dwell in the semi-arid climate of western North Dakota.
"Rattlesnakes are only too plentiful everywhere; along the river bottoms, in the broken, hilly ground, and on the prairies and the great desert wastes alike...If it can it will get out of the way, and only coils up in its attitude of defence when it believes that it is actually menaced." Theodore Roosevelt

North Dakota has a sparse fauna of amphibians and reptiles. While individual populations may get quite high, species diversity is low. The semi-arid climate provides only marginal conditions for breeding and hibernation of amphibians, while low winter temperatures and the short growing season appear to be primary limiting factors for reptiles. Several of the species listed below are very rare or infrequently found and are in quite localized populations.

Reptiles are some of the most feared and misunderstood members of the animal kingdom. The prairie rattlesnake (*Crotalus viridis*) is the only venomous reptile in Theodore Roosevelt National Park, and they are not as common as they were in Theodore Roosevelt's time. They have more reason to fear us than we do them. The rattlesnake will ignore or avoid humans unless surprised or provoked. Do not attempt to capture or kill snakes. Observe and enjoy them from a distance and remember that **all** wildlife is protected in a national park.
Common sense and an appreciation for the benefits and beauty of reptiles and amphibians will protect both them and you.

Order	Common Name	Scientific Name
Testudines	Common Snapping Turtle	*Chelydra serpentina*
	Western Painted Turtle	*Chrysemys picta*
	Soft-shelled Turtle	*Trionyx muticus*
Squamata	Sagebrush Lizard	*Sceloporus graciosus*
	Short-horned Lizard	*Phrynosoma douglassi*
	Western Plains Garter Snake	*Thamnophis radix*
	Red-sided Garter Snake	*Thamnophis sirtalis*
	Smooth Green Snake	*Opheodrys vernalis*
	Plains Hognose Snake	*Heterodon nasicus*
	Eastern Yellow-bellied Racer	*Coluber constrictor*
	Bullsnake (Gopher Snake)	*Pituophis catenifer*
	Prairie Rattlesnake	*Crotalus viridis*

https://home.nps.gov/thro/learn/nature/reptiles.htm

Wildlife Management - The park works to keep the population of certain species balanced to maintain a healthy ecosystem.
"The National Park Service will preserve and protect the natural resources, processes, systems, and values of units of the national park system in an unimpaired condition to perpetuate their inherent integrity and to provide present and future generations with the opportunity to enjoy them."
- National Park Service Management Policies, 2006

Overview
Resource management is a fundamental function of the National Park Service. Theodore Roosevelt National Park uses a science-based approach to protect the park's resources. Resource management extends to a number of interrelated areas of interest including:

- exotic plant control
- fire ecology
- habitat restoration
- mitigating human impacts
- wildlife management

Wildlife Management
Park service management philosophy allows for self-regulation of ecosystems within the the park whenever possible. With the absence of many natural predators, species such as bison and elk must be actively managed by the park. Roundups and culling methods are all utilized to manage animal populations.
Proactive and research-based approaches to wildlife management help establish and maintain the wildlife visitors enjoy in the park today. Native animals including pronghorn, elk, bighorn sheep, and bison have all been successfully reintroduced in the park since its establishment in 1947. A team of scientists, geographic information systems technicians, and resource management professionals work together to better understand the park's wildlife and the issues affecting them. These issues include:

- population dynamics
- wildlife movement and distribution
- impacts on vegetation

The park has active management programs for its several large mammal populations. You can learn specifics of these programs by clicking on the links below:

- Bison management
- Elk management

Park Fence
Under North Dakota state law, livestock animals are not permitted to "run at large." Livestock animals include bison, cattle and horses. The South and North Units of the park are fenced to prohibit the movement of these animals across park boundaries. Incursions by these animals onto private lands should be reported to the park. Other animals including deer, elk, and pronghorn are able to pass over, under, or through the fence.
https://home.nps.gov/thro/learn/nature/wildlife-management.htm

You can learn more about the habitats that these animals use on the Natural Features & Ecosystems page. If you want to know where and when to look for animals in the park, check out the Wildlife Viewing page for advice.
https://home.nps.gov/thro/learn/nature/animals.htm

Wildlife Viewing

"...We get exactly as much in hunting with the camera as in hunting with the rifle; and of the two, the former is the kind of sport which calls for the higher degree of skill, patience, resolution, and knowledge of the life history of the animal sought." Theodore Roosevelt, 1901

Theodore Roosevelt National Park has abundant watchable wildlife. What you see depends on the season, your patience and luck. Binoculars are helpful, but not essential.
Remember: all wildlife in the park are wild and potentially dangerous. Keep a safe distance from all wildlife. Some animals like bison, feral horses, and prairie dogs may seem tame, but they are wild animals and can be dangerous. People who get too close to them may be gored by antlers and horns, trampled by hooves, or bitten by sharp teeth. Maintain at least 25 yards distance from all wildlife. Use binoculars, spotting scopes, or telephoto lenses for safe viewing and to avoid disturbing them. If an animal moves away from you as you approach, you are too close! Respect all wildlife. The park is their home.
Also:

- Keep pets in your vehicle. Pets may scare wildlife, and wild animals can hurt pets.
- Use of wildlife calls and spotlights is illegal. They stress animals and alter their natural behavior.
- Drive slowly. Watch for animals crossing the road. Deer, elk, pronghorn, and feral horses are seldom alone. If you see one animal, look for others that may follow.

Below is a list of some of the animals you might find in the park and some guidelines for where and when to look. What will you discover on your visit?

Wildlife	Details
Bison	Bison roam throughout the North and South units of the park, and most visitors see them as they drive the park roads. They should be given a wide berth if met along the trail. Check at the visitor centers for recent sightings!
Mule deer	More common than their white-tailed cousins, mule deer are often seen between dusk and dawn anywhere along the park road in open areas. They usually seek shade in dense juniper groves during the heat of the day.
White-tailed deer	Deer prefer thick wooded areas and river bottomlands and may be seen in the campgrounds and picnic areas in the evening and early morning hours.
Elk	In the South Unit only, elk are most often seen feeding in early morning or evening on open grassland sites in the Buck Hill area and in the southeastern quarter of the park visible from I-94. Elk generally seek the shade of hardwood and juniper draws during the day.
Horses	Feral horses inhabit the South Unit only. Originally descended from domestic stock, horses are maintained in the park today as a cultural resource. They are often visible from the Scenic Loop Drive and from I-94.
Longhorns	A small demonstration herd is kept in the North Unit as a cultural resource. They may be spotted around mile marker two of the scenic drive as they graze across the open grassland.
Pronghorns	The fastest land animal in North America, pronghorn are often sighted in the greater Little Missouri Grasslands. Small groups or individuals will occasionally enter the park, so keep your eyes open!
Coyotes	These wild canines are more often heard than seen. Listen for their howl after night falls or look for them in prairie dog towns during twilight hours.
Bobcats	Consider yourself very lucky if you see a bobcat! Only a few are seen each summer. Look for them on the barren rocky slopes, especially at night.
Badgers	Badgers feed on rodents and are most often seen near prairie dog towns at dawn or dusk.
Beavers	These aquatic rodents may be seen in the North Unit's Squaw Creek and along the Little Missouri River.
Porcupines	Porcupines are often found in trees and bushes feeding on twigs and cambium. They come to the ground more often at night and are frequently observed along the park roads.
Prairie dogs	The park road passes through three large prairie dog towns in the South Unit. No dog towns can be seen from the North Unit road; the nearest is a one-mile hike from the Caprock-Coulee parking area - be sure to follow the signs.
Golden eagles	Always check the sky for glimpses of soaring golden eagles along the Little Missouri River floodplain and at the North Unit's River Bend Overlook.
Birds	Many different species of birds inhabit the park campgrounds where there is plenty of food and shelter in the thick brush and trees adjacent to the Little Missouri River. Mornings and evenings provide the best **viewing** times. It is also good birding where two habitat zones meet such as the edge of the trees and the grasslands.
Snakes	Snakes enjoy the tall grass and shrubs of the prairie ecosystem. It is also common to see them on the park roads, so please drive carefully. The park is home to one species of venomous snake (prairie rattlesnake), but bullsnakes and racers are most commonly seen.

https://home.nps.gov/thro/planyourvisit/wildlife-viewing.htm

This is short list of things to see and do in and around Bismarck, Medora, and the region if you find yourself with some extra time before or after the trip officially starts/ends. This is by no means a comprehensive list - simply a compilation of sites suggested by your fellow travelers and study leader:

Things to do in and around Bismarck, ND:

*Note: Most of these sites require transportation to access. Estimated times are using the Radisson Hotel, Bismarck (605 E Broadway Ave., Bismarck, ND) as the origin point. **Please check sites prior to visiting for availability based on your schedule.**

-Bismarck Visitor's Information

-Knife River Indian Villages (appx. 1 hour north by car)
-Fort Mandan, part of the Lewis and Clark Nat'l Historic Trail (appx. 45 minutes north by car)
-Fort Abraham Lincoln Custer House (SW of Bismarck. appx. 30 minutes by car.)
-Former Governors' Mansion (downtown Bismarck. appx. 3 minutes by car.)
-Lewis and Clark Riverboat (SW of downtown Bismarck, on the Missouri River. appx. 10 minutes by car.)
-Bismarck Art & Galleries Association (downtown Bismarck. appx. 10 minutes by car.)
-Pioneer Overlook Park (SW of downtown Bismarck, on the Missouri River. appx. 10 minutes by car and 3 minutes by car from the Lewis and Clark Riverboat). Park with walking trails along the Missouri River.
-North Dakota Heritage Center & State Museum (downtown Bismarck. appx. 5 min by car)
*Note – You will have the opportunity to visit the ND Heritage Center & State Museum Wednesday before your flights (the bus will drop folks here who have free time before they need to go to the airport).
-Keelboat Park (along the Missouri River, appx. 10 minutes by car)

In Medora:

-The Chateau de Mores State Historic Site

-There are numerous historic sites in Medora, with informative plaques, and a great western bookstore.

If you go farther afield:

-North Dakota Tourism Website

-In South Dakota, Badlands National Park, Wind Cave National Park, and in Black Hills: Custer State Park; Crazy Horse Mountain; Mount Rushmore.

Smithsonian Associates

Recommended Reading for the North Dakota Trip

Our study leader recommends the following books to acquaint you with Theodore Roosevelt as a naturalist, conservationist and adventurer, and North Dakota. Reading any of these titles is totally optional!

The Language of Cottonwoods: Essays on the Future of North Dakota by Clay Jenkinson

Theodore Roosevelt in the Dakota Badlands: An Historical Guide by Clay Jenkinson

The Naturalist: Theodore Roosevelt, A Lifetime of Exploration, and the Triumph of American Natural History by Darrin Lunde

Theodore Roosevelt, Naturalist in the Arena, Edited by Char Miller and Clay Jenkinson

The Wilderness Warrior: Theodore Roosevelt and the Crusade for America by Douglas Brinkley

Mornings on Horseback by David McCullough

Brave Companions: Portraits in History by David McCullough, Part II, "The Real West," Chapter Four: "The Glory Days in Medora"

Theodore Roosevelt, An Autobiography by Theodore Roosevelt

Books featuring Theodore Roosevelt's adventures and naturalist explorations close to home in Washington, DC by our study leader, Melanie Choukas-Bradley:

> *Theodore Roosevelt, Naturalist in the Arena* (mentioned above), Chapter Four, "Urban Wild: Theodore Roosevelt's Explorations of Rock Creek Park"
>
> *Finding Solace at Theodore Roosevelt Island,* a year-long exploration of Roosevelt's island memorial

Other book of interest about TR, the explorer:
River of Doubt: Theodore Roosevelt's Darkest Journey by Candice Millard