

Of Time and the Badlands

For centuries humans have viewed South Dakota's celebrated Badlands with a mix of dread and fascination. The Lakota knew the place as mako sica. Early French trappers called the area les mauvaises terres à traverser. Both mean "bad lands." Conservation writer Freeman Tilden described the region as "peaks and valleys of delicately banded colors—colors that shift in the sunshine,...and a thousand tints that color charts do not show. In the early morning and evening, when shadows are cast upon the infinite peaks or on a bright moonlit night when the whole region seems a part of another world, the Badlands will be an experience not easily forgotten." Paleontologist Thaddeus Culbertson had another reaction: "Fancy yourself on the hottest day in summer in the hottest spot of such a place

without water—without an animal and scarce an insect stir—without a single flower to speak pleasant things to you and you will have some idea of the utter loneliness of the Bad Lands."

The peaks, gullies, buttes, and wide prairies of the Badlands can be challenging to cross, yet they have long attracted the interest and praise of travelers. "I've been about the world a lot, and pretty much over our own country," wrote architect Frank Lloyd Wright in 1935, "but I was totally unprepared for that revelation called the Dakota Bad Lands....What I saw gave me an indescribable sense of mysterious elsewhere—a distant architecture, ethereal... an endless supernatural world more spiritual than earth but created out of it."

The Badlands are a place of extremes. Your own travels here may produce conflicting responses. You may visit in summer and curse the heat and the violent lightning storms, yet be excited by the wildlife and wildflowers. You may come in winter, chilled by the cold and the winds that roar unhindered out of the north, and still marvel at the exquisite beauty of moonlight glistening on the snow-dusted buttes. Whatever your feelings about the Badlands, you will not come away unaffected. Stay awhile if you can, and let the Badlands reveal themselves to you. The so-called emptiness of the plains is full of traces of ancient life. You will also see eagles hunt, wings outstretched over grassland that seems to go on forever. And above all, you will experience quiet, the near absence of human noise. As you

explore, keep in mind that this is a national park. All fossils, rocks, plants, and animals must remain where you find them.

The more you observe, the more accustomed you will become to the Badlands landscape. With this familiarity will come a greater appreciation of the park's biological diversity. There is a rich and varied plant community here, including the largest remaining mixed-grass prairie in North America. Grassland wildlife abounds. Coyotes, butterflies, turtles, vultures, snakes, bluebirds, bison, and prairie dogs are a few of the mobile residents of the park's prairie. Approached with curiosity and care, the Badlands will provide you with endless pleasure and fascination.

cover photo: Jeff Grass



The creatures in the painting above are, from left to right: *Leptomeryx*, *Archaeotherium*, *Oreodonts* (above and free-standing), *Meshippus*, *Subhyracodon*, *Haplophoeus*, *Metamynodon*, *Cracid* (in tree), and *Paleolagus*. Illustrations: Douglas Henderson

The Shaping of the Land and Life

In the Distant Past Approximately 75 million years ago Earth's climate was warmer than it now is, and a shallow sea covered much of the region we know as the Great Plains. Stretching from the Gulf of Mexico to Canada and from western Iowa to western Wyoming, this sea teemed with life. In today's Badlands the bottom of that sea appears as a grayish-black sedimentary rock called the Pierre (pronounced "peer") shale. This layer is an incredibly rich source of fossils, for creatures sank to the bottom of the sea when they died and over a long course of time became fossils. Within the park, the fossilized

remains of a variety of animals have been found. *Baculites*, an extinct cephalopod, had a squid-like body with a long cylindrical shell tightly coiled at one end. Inside the shell were individual chambers containing either gas or liquid for buoyancy control. Clams, crabs, and snails in great numbers have also been found. Outside the park, the Pierre shale has yielded abundant remains of ancient fish; mosasaurs, giant marine lizards; pterosaurs, flying reptiles; *Archelon*, enormous sea turtles; and *Hesperornis*, a diving bird something like a modern loon. Why have the rocks inside the park, which are so rich in invertebrate fossils, yielded so few marine creatures with backbones? Questions like these puzzle paleontologists and earth scientists who continue to search in hope of answering some of the questions about the park's and the Earth's rich past.



Turtle shell fossil

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Land Emerges Eons pass. The pushing and shoving of continental plates leads to an active period of mountain-building in the ancestral Rocky Mountains. This causes the land under the inland sea to rise, and in turn, the sea retreats and drains

away. In time, the area that we now know as the Badlands is exposed to air and sunshine, yet it looks nothing like the landscape that we are familiar with today.

The climate is humid and warm, and rainfall is abundant. On the new land a subtropical forest develops, dense and dark. It flourishes for millions of years. Eventually, though, the climate slowly grows cooler and drier and the forest gives way, first to savannah, then later on to the grasslands so much more like the present landscape.

Today, after a heavy rain-storm in the Badlands,

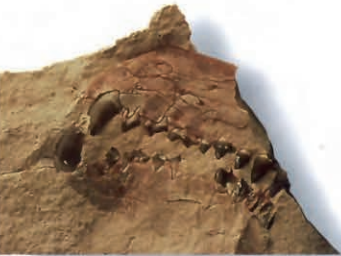


Fossils of two prehistoric creatures' jaws found in the Badlands.

vivid red bands stand out against the buff tones of the buttes. Geologists and paleontologists tell us that these are fossilized soils, which make up much of the Badlands rocks. Fossil soils can tell us a great deal about the climatic history of the Badlands; they also impart much of the colorful banding to Badlands rocks. Perhaps

the best of all, the loose, crumbling rocks formed from these ancient soils hold one of the greatest collections of fossil mammals on Earth.

Badlands Fossils An array of extinct animals, ranging from very enormous to very small, once ranged through the area now included in Badlands



National Park. Some lived in the subtropical forests that flourished after the retreat of the shallow inland seas, while others inhabited the savannahs and grasslands that came in the years afterward. Some of these creatures, whose fossils have been found in the Badlands, appear above in a scene based on the best scientific knowledge from the geologic epoch known as the Oligocene, that lasted from 23 to 35 million years ago. As scientists conduct research into the past and the fossil record reveals more about those bygone times, we can be assured that the view, such as the one shown above, will change with that knowledge. The details of vegetation and animal structure will be viewed differently in the years ahead. *Leptomeryx*, small, fragile, and deer-like, had even-toed hooves and browsed on the stems and leaves of early Oligocene vegetation. *Oreodonts*, sheep-like in appearance, were extremely abundant. Their name means "mountain tooth." *Archaeotherium*, a



distant relative of modern pigs, had sharp canines and fed on both plants and carrion. An ancestor of modern horses, *mesohippus*, had three toes instead of the one hoof. *Haplophoeus*, one of the earliest of the mammals to be called a saber-tooth cat, was about the size of a leopard. An agile rhinoceros, *subhyracodon* was a

plant-eater. *Ischomys*, a small squirrel-like rodent probably lived in trees and ate a diet of fruits and nuts. *Metamynodon* was a massive rhinoceros that, like the hippopotamus, spent much of its time in the water. *Paleolagus*, perhaps an ancestral rabbit, nibbled on plants.

The Prairie

"The prairie is not forgiving. Anything that is shallow—the easy optimism of the homesteader...the trees whose roots don't reach ground water—will dry up and blow away," wrote Kathleen Norris in *Dakota*. Badlands prairie contains about 56 species of grass, which are the anchor species for a complex community of plants and animals. The prairie once sprawled across one-third of North America. Today, the patchwork remnants of native grasslands represent adaptations to millions of years of changing conditions and sustain a diverse citizenry.

Grasslands, or prairies, occur in areas that are too

dry to support trees, but too wet to be deserts. Badlands National Park contains mixed-grass prairie, meaning that it contains tall grass, such as big bluestem and prairie cordgrass, and short-grass species such as blue grama and buffalograss as well as hundreds of species of wildflowers and forbs. The landscape, which was once forest, now contains a multitude of plants and animals uniquely adapted to what appears to be unforgiving and harsh conditions. Grasses, able to withstand high winds, long spells of dry weather, and frequent fires, thrived. Grazing animals became abundant and grasses, better suited to withstand



Martin Kleinsorge

constant trampling and grazing, spread and overtook the ancient forests. Today, many animals—black-tailed prairie dogs, muledeer, pronghorn

(commonly called antelope), bison, coyote, and bighorn sheep—adapt to, and even thrive under the conditions in Badlands National Park.



Martin Kleinsorge (both)

The narrow-leaf yucca (left), the landscape in the Sage Creek Wilderness Area (above), and a prairie dog (right) are all part of the Badlands.



Return of a Native

In 1981 the scientific community received astonishing news. Black-footed ferrets (right), thought to have become extinct since the last captive specimen died in 1979, were discovered to be alive and well in the wilds of Wyoming. The news was encouraging, but the long-term prognosis for the ferrets was not promising. Dependent on prairies as their prime habitat and prairie dogs as their food source, these relatives of the weasel remain the rarest mammals on Earth.

Shrinking prairie habitat, destruction of prairie dog colonies by humans, and the spread of diseases

had left the ferrets one step from the brink of extinction.

Soon after the Wyoming ferrets were discovered, disease ran through the colony. By 1985 only 18 ferrets survived. Braving controversy and accepting the risks accompanying intervention, U.S. Fish and Wildlife Service biologists and State of Wyoming authorities captured the ferrets and launched a campaign to save them. A measure of success came quickly. At seven breeding facilities, the ferrets flourished and multiplied. With high hopes and little fanfare, 36 black-footed ferrets were released in the park during the fall of 1994. A search in late

summer of 1995 yielded two litters of ferret kits born in the wild, an important milestone on the road to recovery for this species. Additional captive-raised black-footed ferrets will be released through 1998 with the goal of establishing a self-sustaining population. Like the reintroduced bison and bighorn sheep, the black-footed ferrets may again take their place and add their influence to the northern prairies.



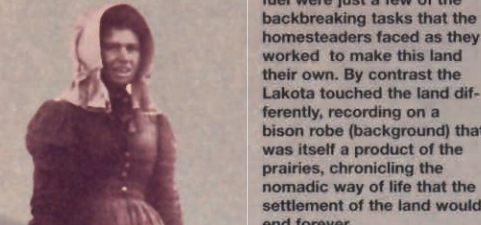
Life and Death in a Hard Country

"Tell me the landscape in which you live and I will tell you who you are." Though seemingly inhospitable at first glance, the Badlands have supported humans for more than 11,000 years. The earliest people to come into this area were ancient mammoth hunters. Much later they were followed by nomadic tribes whose lives centered on bison hunting. The Arikara were the first tribe known to have inhabited the White River area. By the mid-18th century, they were replaced by the Sioux, or Lakota, who adopted the use of horses from the Spaniards and came to dominate the region.

Though the bison-hunting Lakota flourished during the next one hundred years, their dominion on the prairie was short-lived. French fur trappers were the first of many European arrivals who, in time, would supplant the Lakota. Trappers were soon followed by soldiers, miners, cattle farmers, and homesteaders who forever changed the face of the prairie. After 40 years of struggle culminating in the Wounded Knee Massacre in 1890, the Lakota were confined to reservations. Cattle replaced the bison; wheat fields replaced the prairies; and, in time, gasoline-powered vehicles replaced the horse.



White homesteaders and the Lakota have shaped this land in terms of the impact that human beings have had here. Late 19th century photographers have captured on film the images of all these people as they created new lives for themselves and came into contact with one another, showing, unwittingly, the poignancy and hardwork that typified the process. The bison that had played such a vital role in the Lakotas' way of life were eradicated with the arrival of the white hunters, leaving only the paintings and drawings that they had earlier made to continually remind them of long-gone patterns of life and of ways that they related to their environment.



Building a log house, cutting sod bricks from the prairie, and collecting cow chips for fuel were just a few of the backbreaking tasks that the homesteaders faced as they worked to make this land their own. By contrast the Lakota touched the land differently, recording on a bison robe (background) that was itself a product of the prairies, chronicling the nomadic way of life that the settlement of the land would end forever.

Badlands



Carl Helman

The landforms, colors, and hues found here are always unexpected. Just when you think you know what to expect, you round the bend and come upon something new. These pictures are just a sampling of what is in store.



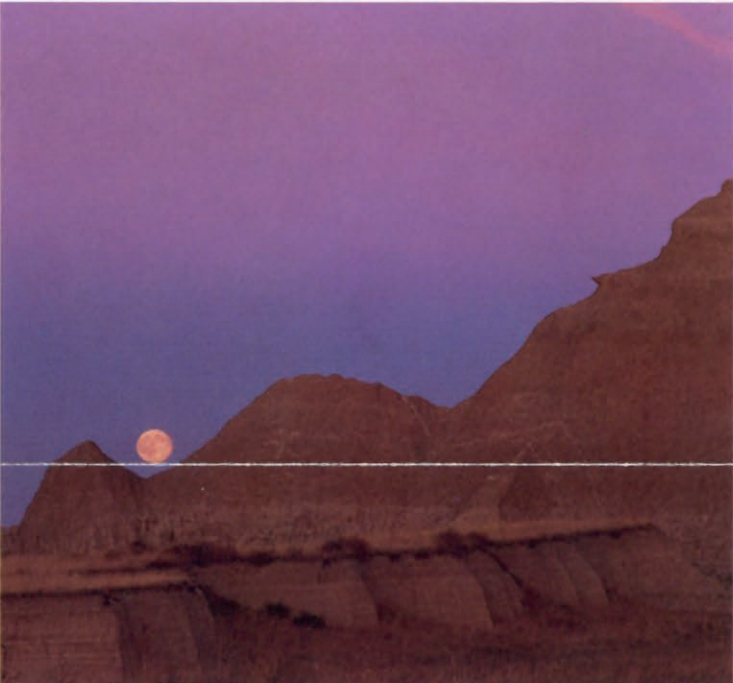
Martin Kleinsorge



Martin Kleinsorge



Martin Kleinsorge



Kathleen Norris Cook



Martin Kleinsorge

Exploring the Badlands

Travelers come to the Badlands for many reasons. Some are lured by the park's magnificent rock formations, which reminded Dr. John Evans, an early explorer, of "some magnificent city of the dead, where the labor and the genius of forgotten nations had left behind them a multitude of monuments of art and skill." Others come to camp, photograph wildlife, or search for birds or flowers. More than a few are professional or amateur paleontologists who come to study the fossil remains of Badlands' ancient life.

For all visitors there is much ground to cover. The park consists of three units totaling more than 240,000 acres. The North Unit, which is the best known and most easily explored, includes the 64,000-acre Sage Creek Wilderness Area, a loop road with numerous scenic overlooks and trail-

heads, and Cedar Pass, where you'll find the Ben Reifel Visitor Center, open year-round, and Cedar Pass Lodge, open seasonally. To the south, the Stronghold and Palmer Creek Units are located within the Pine Ridge Indian Reservation. The Stronghold and Palmer Creek Units are managed under a cooperative agreement between the Oglala Lakota and the National Park Service. In the Stronghold Unit, the White River Visitor Center is open seasonally.

There is much to do in the Badlands. When you drive the Badlands Loop Road, you will find overlooks and signs explaining some of what you see. You may walk a nature trail, set off crosscountry with a backpack, or attend a summer evening amphitheater program. Bring your binoculars! If you are lucky, you may spy bison or pronghorn

grazing, spot a coyote stalking rodents, or perhaps catch a glimpse of bighorn sheep delicately picking their way across a steep slope. A visit to Roberts Prairie Dog Town, five miles west of the Pinnacles Entrance on the unpaved Sage Creek Rim Road, gives you a chance to visit a different "home town."

Be advised that all plants, animals, rocks, minerals, and fossils within Badlands National Park are protected by federal law. Observe, photograph, and admire everything you see, but do not collect, pick, or disturb anything you find here. Do not feed park wildlife. They can easily become dependent on human food and will lose their ability to provide for themselves. More than one million visitors come to Badlands National Park each year, so it is important to follow these few rules to

preserve the wonders that you find here, and that we all want to leave for future generations.

A few precautions will ensure that your stay in the Badlands is a safe and happy one. Be aware that the weather in the park can be severe and can go from one extreme to another in a short period of time. Dress appropriately, drive with extra caution during stormy or icy conditions, and seek shelter from the thundershowers, hailstorms, and occasional tornadoes that sometimes descend on the Badlands with sudden fury. Theft is uncommon, but it is a good practice to carry valuables in your pockets or backpack, or lock them in the trunk of your car. Observing a bison up close in the wild may be a new and exciting experience for park visitors; it can also be dangerous. This is not a zoo, and the animals are wild and free. Never

approach a bison closely. They can run faster than 30 miles per hour. Prairie rattlesnakes, spiders, and stinging insects are also found within the park, and proper care should be taken to avoid an unpleasant encounter. Hikers are advised to carry maps, a compass, extra clothing, and lots of water, as there are no sources of potable water in the backcountry. Weather can change rapidly in any season and can turn out quite differently from the forecast posted in the visitor center. The sun's rays are strong here, even in winter, so use sun screen if needed. Badlands rock is soft and rock-falls are common. Admire the formations at a distance, rather than climbing on them; seemingly indestructible, these buttes are actually quite fragile. Enjoy the park—safely.

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Badlands Weather Averages			
Month	Temperature (F°)		Precipitation (inches)
	High	Low	
January	34	11	0.29
February	40	16	0.48
March	48	24	0.90
April	62	36	1.83
May	72	46	2.75
June	83	56	3.12
July	92	62	1.94
August	91	61	1.45
September	81	51	1.23
October	68	39	0.90
November	50	26	0.41
December	39	17	0.30

Travel in and about the Badlands

Westbound travelers to Badlands National Park on I-90 should use exit 131, S.D. 240, which leads to the park boundary and the Ben Reifel Visitor Center, becomes the Badlands Loop Road. After passing through the park, S.D. 240 rejoins I-90 at exit 110 in Wall. Eastbound travelers do the reverse, beginning in Wall and ending back at I-90 at exit 131.

Park roads are winding and steep in places, but most are paved. Use caution on unpaved roads in winter or during thunderstorms when the surface

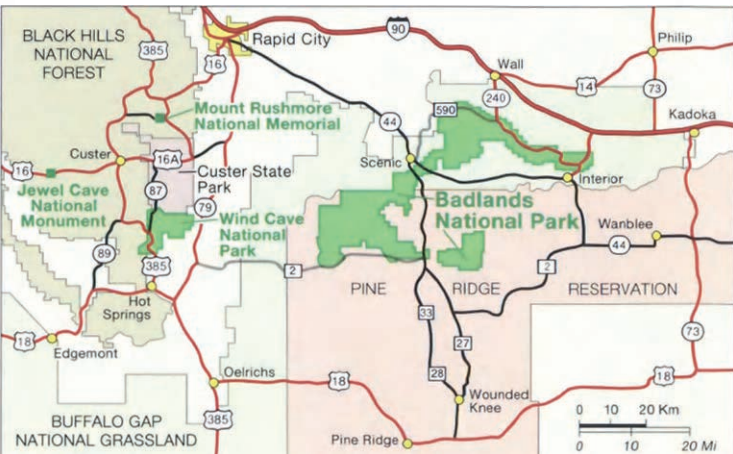
of these roads may become slippery and control may be hard to maintain.

Established hiking trails are short and of easy to moderate difficulty. Hikers considering crosscountry travel should have water, a map, a compass, and wear or carry appropriate clothing. You should discuss your route with a park ranger before beginning your hike.

Beyond the park boundaries are other nearby areas that you may wish to visit. Mount Rushmore National Memorial, Wind

Cave National Park, Jewel Cave National Monument, Black Hills National Forest, and Custer State Park are located south of Rapid City in the Black Hills; the town of Wounded Knee, South Dakota, is 25 miles south of the White River Visitor Center. Buffalo Gap National Grassland borders the park.

For more information, contact the park, whose address is P.O. Box 6, Interior, SD 57750-0006. Or call, 605-433-5361. Or www.nps.gov/badl on the internet.



Cedar Pass Area

The majority of visitors make a stop in the Cedar Pass area. Here visitors find the Ben Reifel Visitor Center and park headquarters open year-round with an information desk, exhibits, bookstore, and restroom. The Cedar Pass Lodge is adjacent to the visitor center and is open during the spring, summer, and fall months. The amphitheater and the Cedar Pass campground are also found within walking distance. Inquire at the visitor center for details.

Within five miles of the Ben Reifel Visitor Center are several trailheads, scenic overlooks, and three self-guiding nature trails. The Fossil Exhibit Trail is wheelchair accessible. The Cliff Shelf Nature Trail and the Door Trail are moderately strenuous explorations of the Badlands rock formations. A pamphlet for the Cliff Shelf Nature Trail provides a lively introduction to the wild plants and animals living among the Badlands rock formations.

