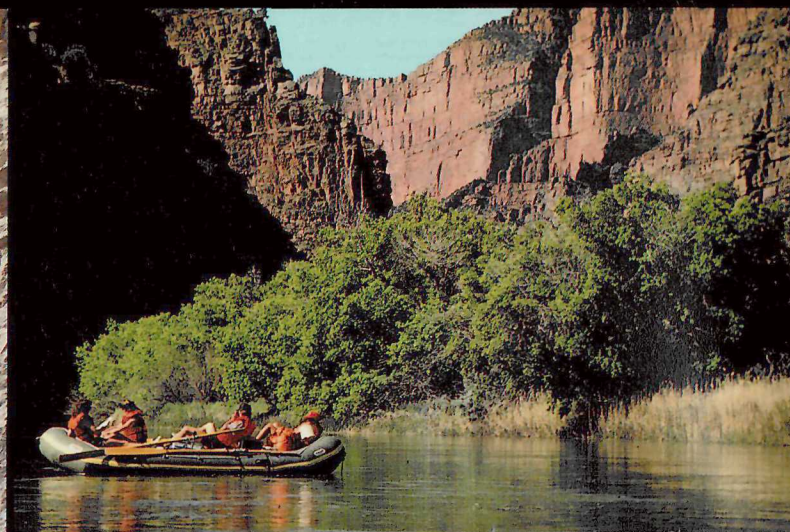




This is the only national park area set up to protect a historic dinosaur quarry. The tremendous diversity of plant and animal fossils here allows us to describe its ancient environment. © GEORGE H.J. HUEY



Diversity of life in Dinosaur National Monument's dry landscapes gets a boost from the rivers and streams protected as Congress enlarged the park over the years. NPS



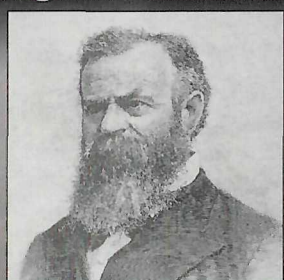
American Indian rock art reflects the long history of human occupation in Dinosaur's rugged terrain. The petroglyphs scattered around the park are about 1,000 years old. NPS



Bighorn sheep are adept at negotiating steep rock and narrow mountain ledges, making it easier for them to avoid or evade predators. © LARRY ANGER

Preserving the Diversity of Past and Present Ecosystems

Paleontologist Earl Douglass discovered and began excavating these fossils in 1909 for the Carnegie Museum. In 1915 the Carnegie Quarry's world-class bones of late-Jurassic dinosaurs were protected in 80-acre Dinosaur National Monument. In today's 210,000-acre national monument you can explore the quarry and the scenic and historic Green and Yampa rivers—their canyons, mountains, basins, and archeological sites—and 23 colorful rock layers of the Colorado Plateau. The greatly varied rock and soil types combine with elevation and topography to create many habitats with a startling diversity of plant and animal life.



John Wesley Powell (left) ran the Green and Colorado rivers and Grand Canyon in 1869 and in 1871. He helped map the Colorado Plateau, directed the U.S. Geological Survey, and set up the Bureau of American Ethnology in the Smithsonian Institution. Powell was a Civil War veteran.

Dinosaurs and More The dinosaur quarry is in a rock layer, the Morrison Formation, whose fossils were deposited in so many environments that scientists can reconstruct how the area looked 150 million years ago. About 5 million years ago, rivers began carving today's deep canyons, providing many habitats, including shaded ones, for life to exploit. Canyons shelter archeological sites. Evidence shows that people have lived in this area off and on for thousands of years, taking advantage of resources that helped them survive. From earliest times people valued the diversity of life so closely linked to geology here.



Porcupine
© GERALD AND BUFF CORSI
CALIFORNIA ACADEMY OF SCIENCES



Canyon wren
NPS



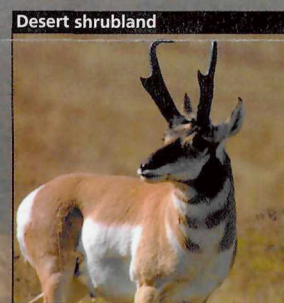
Yumboldt bat
© JEFFREY M. HILL
NAT CONSERVATION INTERNATIONAL



Bighorn sheep
© CALVIN FOX



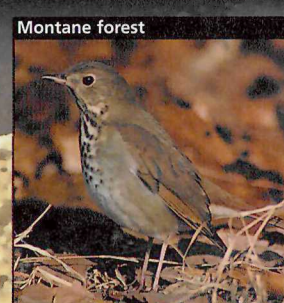
River otter
© TOM AND PAT LEESON



Pronghorn antelope
© GERALD AND BUFF CORSI
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Badger
© GEORGE WUERHNER



Hermit thrush
© BILL HORN



Sage grouse
© LOUIS SWIFT

ECOSYSTEMS

Montane forest

Higher elevation slopes that face north are cool, moist environments for Douglas fir and ponderosa pine—and elk in the hot summer. Ravens feed on carrion and on serviceberry.

Montane/semi-desert woodland

Drought-tolerant piñon pine and Utah juniper dominate. Mountain bluebirds fatten up on insects and berries for fall migration. Trees provide shade for mule deer. Phlox and penstemon vibrantly color the landscape in spring.

Semi-desert shrub-steppe

Sagebrush provides cover for nesting and courting grouse. A variety of birds and mammals find both food and shelter among shrubs, forbs, and grasses. Spring wildflowers add color to the land. Bighorn sheep seek shade and protection from predators on canyon walls. Fire converts sagebrush to grassland and a new cycle of life begins.

Desert shrubland

Plants and animals here rely on little moisture to survive. Arid land is harsh and unforgiving. Many animals are active at night to avoid the hot summer days. Prairie dogs scurry from mound to mound, wary of predators.

Riparian woodlands/wetlands

Cottonwood leaves shimmer and rustle in a breeze. A beaver slaps its tail. In winter bald eagles fly above, seeking prey. Songs of the lazuli buntings are heard. These greenways create vital transitions between water and land.

Aquatic

A river otter family frolics in the summer sun. An American dipper gleams insects from beneath the water surface. Ancient rivers are refuges for endangered fish that have lived here two million years.



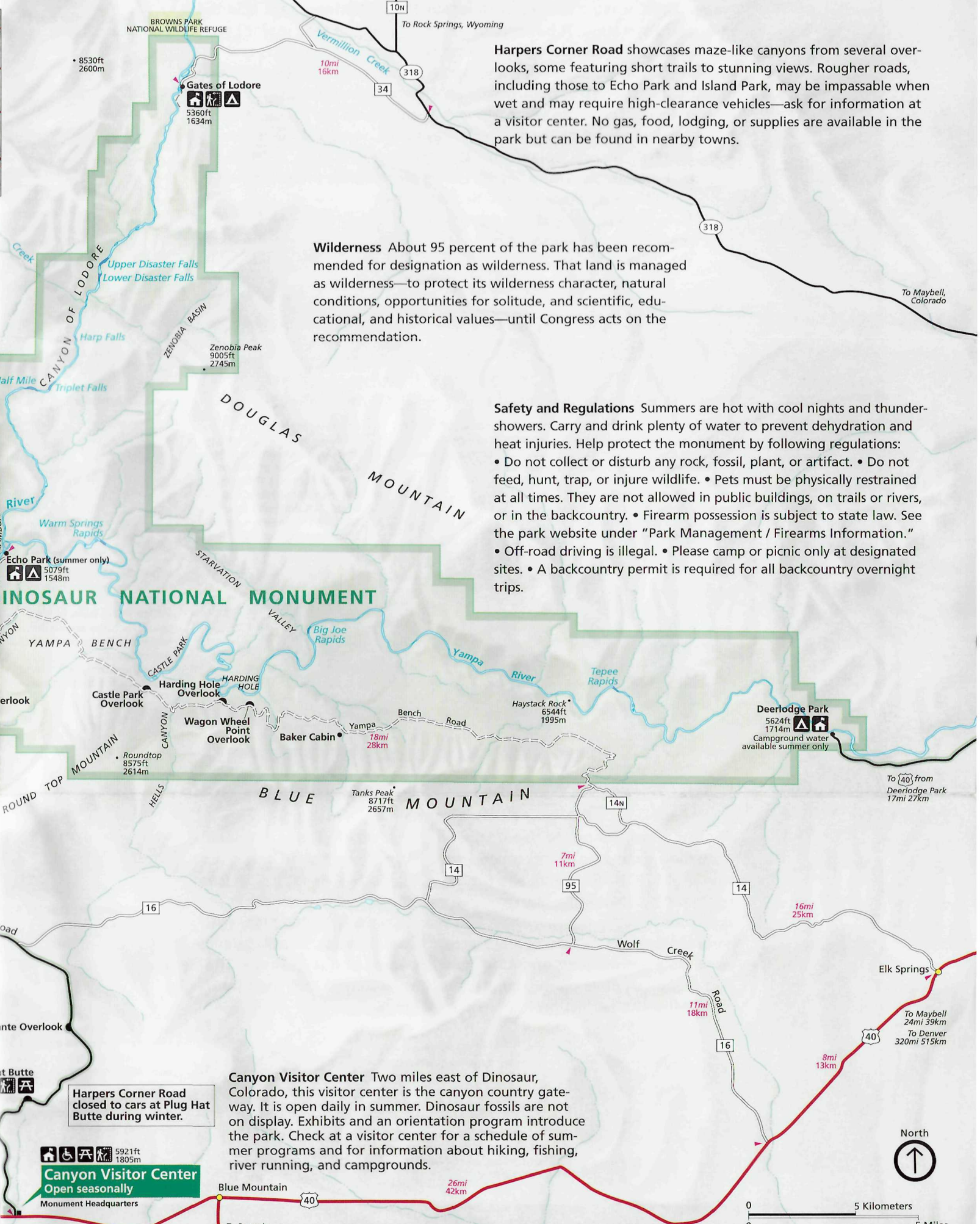
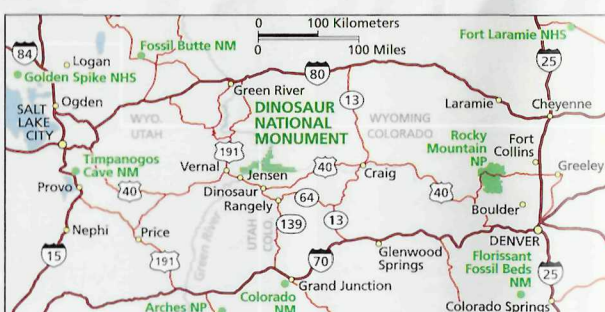
Aquatic
Razorback sucker
Bonytail chub
J.N. RINNE / U.S. FOREST SERVICE

So Much To See

After seeing dinosaur bones at the Quarry Exhibit Hall, take time to discover the monument's many other features. Over millions of years this part of the Colorado Plateau has been lifted up, warped, and eroded into a colorful, dramatic landscape that is home to a diversity of plants and animals. The Green and Yampa rivers—deeply cut into the rocks—reveal sheer cliffs and mysterious canyons that thrill rafters and hikers. Remnants of history abound, from enigmatic figures and shapes pecked in the cliff faces by ancient Fremont people to early ranching families' homesteads. Service animals are welcome.

More Information
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Dinosaur National Monument is one of over 390 parks in the National Park System. Please visit www.nps.gov to learn more about parks and National Park Service programs in America's communities.



Harpers Corner Road showcases maze-like canyons from several overlooks, some featuring short trails to stunning views. Rougher roads, including those to Echo Park and Island Park, may be impassable when wet and may require high-clearance vehicles—ask for information at a visitor center. No gas, food, lodging, or supplies are available in the park but can be found in nearby towns.

Wilderness About 95 percent of the park has been recommended for designation as wilderness. That land is managed as wilderness—to protect its wilderness character, natural conditions, opportunities for solitude, and scientific, educational, and historical values—until Congress acts on the recommendation.

Safety and Regulations Summers are hot with cool nights and thunder-showers. Carry and drink plenty of water to prevent dehydration and heat injuries. Help protect the monument by following regulations:

- Do not collect or disturb any rock, fossil, plant, or artifact.
- Do not feed, hunt, trap, or injure wildlife.
- Pets must be physically restrained at all times. They are not allowed in public buildings, on trails or rivers, or in the backcountry.
- Firearm possession is subject to state law. See the park website under "Park Management / Firearms Information."
- Off-road driving is illegal.
- Please camp or picnic only at designated sites.
- A backcountry permit is required for all backcountry overnight trips.

- Unpaved road
- Unpaved road (High-clearance vehicles only)
- Distance indicator
- Trail
- Rapids
- Ranger station
- Picnic area
- Campground
- Primitive campground
- Wheelchair-accessible
- Nature trail

All unpaved roads are impassable when wet.

Quarry Visitor Center Seven miles north of Jensen, Utah, the visitor center is open daily except Thanksgiving, December 25, and January 1. Exhibits and a film here introduce the monument. Trips to see dinosaur bones in the Quarry Exhibit Hall depart from here. Staff can tell you about summer ranger programs, hiking, fishing, river running, and camping.

Fossils can be seen only at the Quarry Exhibit Hall. No camping allowed on Harpers Corner Road.

Canyon Visitor Center Two miles east of Dinosaur, Colorado, this visitor center is the canyon country gateway. It is open daily in summer. Dinosaur fossils are not on display. Exhibits and an orientation program introduce the park. Check at a visitor center for a schedule of summer programs and for information about hiking, fishing, river running, and campgrounds.



0 5 Kilometers
0 5 Miles

Snapshots in Stone

The 23 rock formations that are exposed here in Dinosaur National Monument (below) represent extinct ecosystems. Each is a window into the past life of this area.

12,000 Years and Counting . . .

The Thinnest of Human Veneers

If Earth's age were pictured as the length of a football field, human time would be one grass blade thick at the goal line. Archeological data goes back 12,000 years here—from Paleoindian to Archaic, Fremont, and modern Ute—in one of North America's most complete records of cultural development. The area's water sources and diverse plants, animals, and rocks provided food, fuel, fiber, and tools. People could garner the resources for living within a two-day walk. The horse, reintroduced from Spain by 1776, greatly changed Ute culture.



Weapon Evolution

Paleoindians used stone spear points. Archaic peoples used atlatl throwing sticks. Fremont peoples adopted bows and arrows. They and Utes after them made corner- and side-notched points from chert, quartzite, and obsidian. In historic time, Utes traded for metal arrow points.

ALL IMAGES NPS EXCEPT AS CREDITED

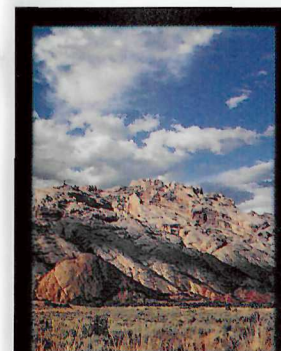


Future Earth in 50 million years

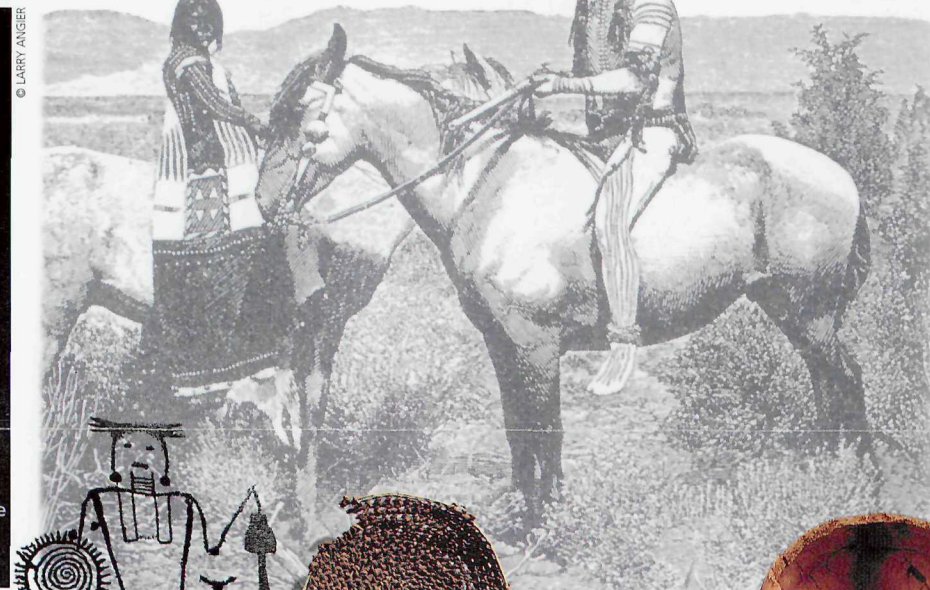


Earth Today present

Earth itself shows the great change through time that other forms of life exhibit. Our planet's crust is a series of great plates that move—sometimes in big jolts—on the globe's surface. Experts in plate tectonics can predict future continental positions (top) and reconstruct their past positions (below).



Petroglyphs (right), rock art of the Fremont Culture



A basket (left) and pottery (right) of the Fremont Culture



Josie Bassett Morris chops wood near her cabin at age 80.

A Landscape of Extinct Ecosystems

Since 1990, paleontological science at Dinosaur National Monument has focused on reconstructing the ecosystem of 150 million years ago (mya) here, not just on quarrying dinosaur bones. This work is possible because the Morrison Formation produces so many fossils, in addition to dinosaur bones, that were deposited in diverse environmental settings. In fact, all 23 of the geologic formations exposed here represent extinct ecosystems. Ecosystems change over time: Today's arid land may have been fern-filled or under fresh-

Ecosystem: the sum of a biotic community and its physical environment.

Biological diversity includes the variety of life forms, the ecological roles they play, and their genetic diversity.

or saltwater seas in the past. The geologic story here reflects both the diversity of past life and today's biological diversity. Geologic formations weather to become soils to whose chemistry plants adapt. Big wild buckwheat, for example, grows *only* in soil from Mowry Shale, and park rockcress lives *only* in soil from Weber Sandstone. Remnants of ancient ecosystems, captured in the geological record, continue to influence the park's diversity of life.

Origins of the Modern Landscape

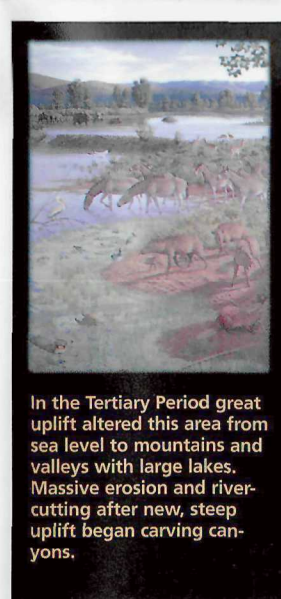
Rivers Mold the Landscape

Ecosystems change through time. Dinosaurs went extinct 65 million years ago. By five million years ago grasslands spread in a climate cooler and drier than in dinosaur days. Ancient forms of horses and rhinos prospered. In recent geologic time rivers predating the Green and Yampa cut into the mountains. Today's rivers still shape the land. At scenic Harpers Corner Overlook (see map on other side) you stand on fossils of ocean life that now rest 2,700 feet above the Green River. The river may one day cut through Steamboat Rock (see photo, far right).

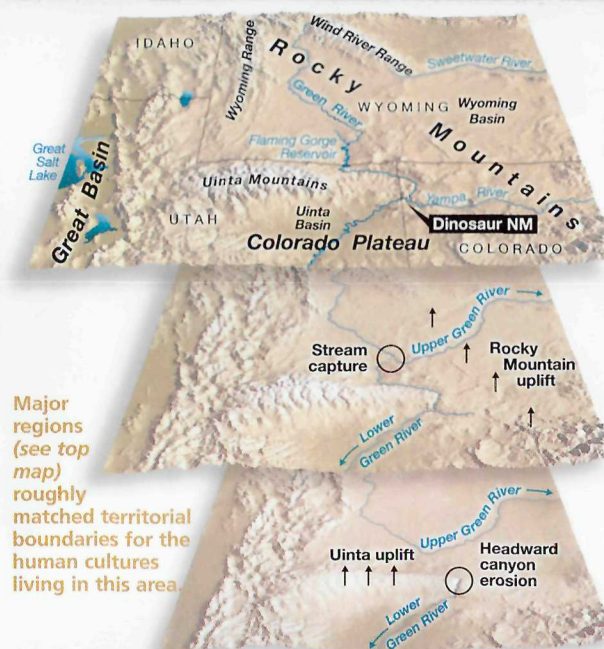


Tertiary Earth at 10 mya

During the Tertiary Period—66.4 million years ago to two million years ago—the continents moved close to their present positions. What is now the park lay roughly at today's latitude and longitude. The Rocky Mountains had begun their rise here as the Tertiary Period began.



In the Tertiary Period great uplift altered this area from sea level to mountains and valleys with large lakes. Massive erosion and river-cutting after new, steep uplift began carving canyons.



Major regions (see top map) roughly matched territorial boundaries for the human cultures living in this area.

Wandering Rivers, Converging Regions

The ancestral Upper Green River once flowed east to the North Platte River (see bottom map). Eventually headward erosion of the ancestral Lower Green River and the uplift of the Rocky Mountains (see middle map) caused the drainage to flow southward, as it does today.



Path of Least Resistance
Will the Yampa and Green rivers cut through the long fin of Steamboat Rock (see photo) like they did the knob to its left? A great conservation struggle defeated a dam proposal here at Echo Park in the 1950s and saved the Yampa—now the only naturally flowing river in the entire Colorado River system.

Mesozoic Era: The Age of Dinosaurs

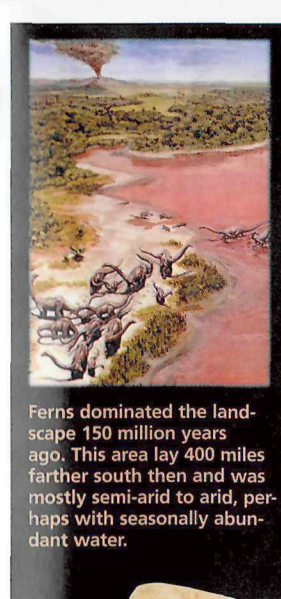
A Glimpse of Late-Jurassic Dinosaurs

A gold rush-like quest for dinosaur bones swept America's West in the late 1800s and early 1900s. Rock of the Morrison Formation has yielded a wealth of dinosaur fossils. Laid down from 147 to 155 million years ago, outcroppings of this rock occur in eight western states. The Carnegie Quarry at Dinosaur National Monument is in the Morrison Formation. It has produced fossils from all four major Late-Jurassic dinosaur groups: plant-eating sauropods, stegosaurs, and ornithomimids and flesh-eating theropods. Fossil pollen and spores now identify 250 species of plants from all of the Morrison ecosystem. The 34-ton *Apatosaurus* ate ferns, the dominant plants then. Fossils show that dinosaurs lived at the same time as clams, snails, algae, ostracods, crayfish, insects, salamanders, frogs, lizards, turtles, crocodiles, and small mammals. Those fossils tell us more about the Morrison ecosystem than do dinosaur fossils. New fossil finds here help us reconstruct the ecosystem that existed 150 million years ago.



Late-Jurassic Earth at 150 mya

Pangea, the single supercontinent, started to break up during the Triassic and continued throughout the Jurassic. The rift developed first between Europe and North America and then between South America and Africa—and began the opening of the North Atlantic.



Ferns dominated the landscape 150 million years ago. This area lay 400 miles farther south then and was mostly semi-arid to arid, perhaps with seasonally abundant water.



Camarasaurus

Look for this neck and skull (left) of a *Camarasaurus* in the Quarry Visitor Center. Below, the *Camarasaurus* ("chambered lizard") is being attacked by *Allosaurus*, the most common predator in North America during the Jurassic Period.



Mudstone of the Morrison Formation

Tooth (right, actual size) from a *Torvosaurus*, which may have been similar to the meat-eating *Allosaurus*



Allosaurus tooth (actual size)

Plants of the Morrison Ecosystem

The Morrison ecosystem's climate was warm. Pine-like *Araucaria* that grew up to 150 feet tall, were dominant trees, with ginkgos, tree ferns, horsetails, cycads, and mosses. Ferns were the principal vegetation and were probably the major food for

the plant-eating dinosaurs. Horsetails are one of the Jurassic plants still found here today.

Belemnites

Belemnites were invertebrates with an interior skeleton. Their fossils show that there was an ocean here before the terrestrial Morrison ecosystem developed. Belemnites are relatives of the modern squid (see drawing below).



Ancient Rocks and Ancient Life

Fossil Evidence of Very Early Life

Earth's age—4.6 billion years—boggles the mind. Permanent rocks did not form until 3.9 billion years ago. Single-celled life forms appeared 3.5 billion years ago. Multi-celled forms did not proliferate and diversify until 570 million years ago (mya), in the Cambrian explosion (see bottom black band). By 500 mya marine animals developed shells and skeletons that readily fossilized. Life moved onto land 400 mya, with early land plants, followed by insects and amphibians. Reptiles developed from amphibians, and dinosaurs appeared about 233 mya. The first mammals developed from reptile forms 200 mya and then flourished after the extinction of dinosaurs 65 mya.



Cambrian Earth at 570 mya

Narrow strips of crust exposed above the ocean surface had begun to expand as continents 3.5 billion years ago. Most continents were in tropical latitudes during the Cambrian Period, when large pieces of present continents can first be plotted.



During the Cambrian Period the environment in what is now the park was marine, and tropical. Thick marine sediments laid down then make up the rock of the Lodore Formation, which contains small marine fossils.

Cambrian Life

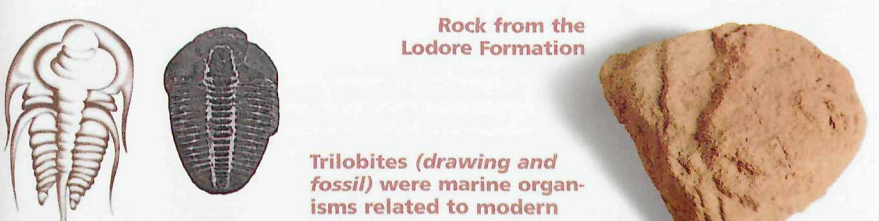
Forms of life diversified so quickly in the early Cambrian that this time is known as the "Explosion of Life." Life had not moved onto land, but many complex organisms had evolved and were well adapted to the environment. Many later went extinct, for

reasons not well understood. By Cambrian times some animals had developed hard shells or external skeletons that fossilized readily. Primitive members of the group Chordata were forerunners of vertebrates and, eventually, mammals.

From Earth's Formation . . . to You

To understand the graph shown along the black band below, think of the history of the Earth as though it were the width of this sheet of paper. At such a scale, humans have inhabited the planet for less time than the thickness of this paper. See how long it took, after

the Earth formed, for life to arise . . . and then for multicellular life to arise. This park introduces you to many complex ideas. Be sure to ask questions of park rangers and attend the programs they offer. We hope you find enough ideas here to engage you for life.



Trilobites (drawing and fossil) were marine organisms related to modern crustaceans.