



*In time and with water,
everything changes.*
Leonardo da Vinci

California condor
© MARK DALY

Chuckwalla
© DOMINIC GENTILCORE

View of the Colorado River from
the South Rim in western Grand
Canyon.
NPS / GRCA

Adapting to Change

Ancient people hunted and foraged throughout Grand Canyon. They might have entered and left by some of the same trailheads in use today. Seasons, and perhaps tradition, guided their forays. Shifts in climate might have caused the extinction of some plants and prey important in their diet and material culture—but they weathered these and other changes by adapting.

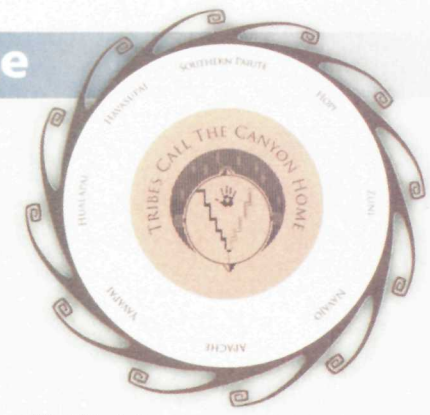
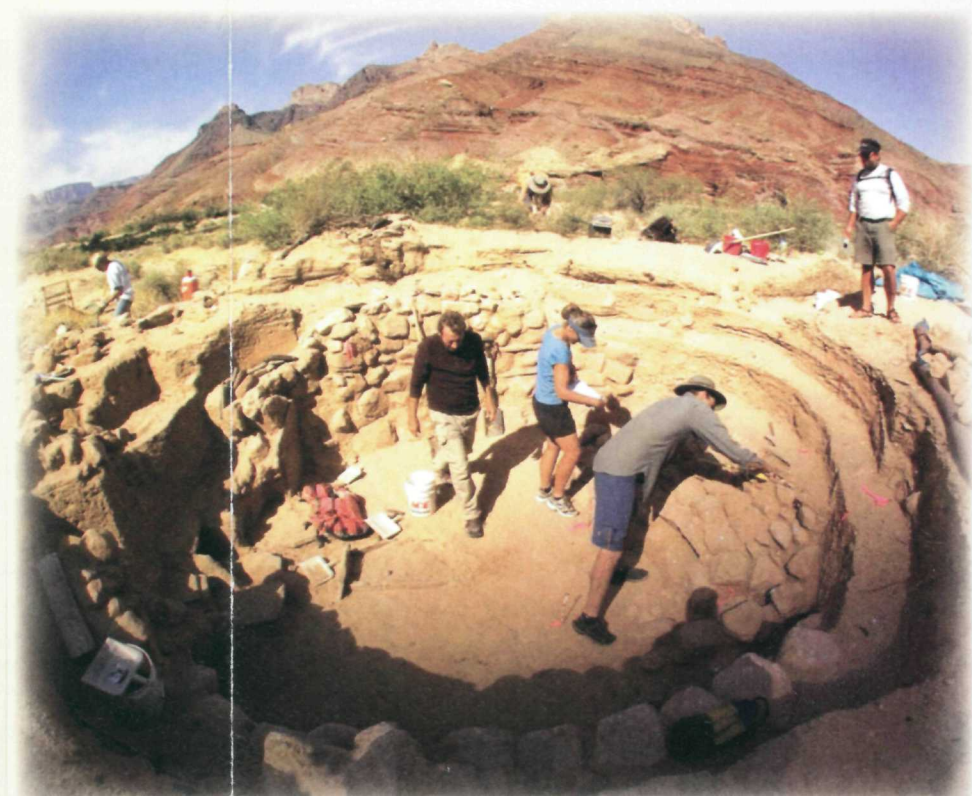
Totemic split-twig figurines (*below*) tucked away in dry caves, masonry structures, images drawn and etched into rock, and objects placed at the upper reaches of pinnacles show that the canyon sheltered, fed, and inspired people for millennia. The grand scale of the place and a gulf of time—600 generations deep—separate the early people of the canyon from us.



Hunters
A broken spear point (*upper right*) tells us that a hunter passed through Marble Canyon, at the park's north-eastern edge, about 11,000 years BP (Before Present). Some tribes associated with the canyon may be descendants of this hunter, who possibly used his spear to bring down now extinct large mammals such as mammoth and smaller game like deer and bighorn sheep. The broken point is one of the few artifacts found inside the park made by Paleo-Indians. (The earliest human inhabitants of North America, they probably came across a land bridge from Asia during the last ice age.)

Foragers
The river could have been a touchstone for Grand Canyon's Paleo-Indians (from 12,000 BP) and Archaic peoples (from 9,000 BP). It provided drinking water and conditions where useful plants like willow, amaranth, mesquite, and salt bush could grow. (You may see many other species here today that are modern invaders.) Some Archaic and Basket-maker (from 2,000 BP) peoples from the uplands could have taken refuge in the canyon, close to the river, when the climate became warmer and drier.

Dwellers
Throughout the 277-mile (455-kilometer) river corridor inside the park, people built masonry rooms, hearths, and pits for roasting food or perhaps firing pottery (the earliest pottery found in Grand Canyon dates from about 1,500 BP, when Puebloan people farmed along the canyon rims and deltas). The combination of masonry rooms, pottery, tools, and hearths shows that some people not only hunted and foraged, but also lived full lives here.



Tribal Medallion

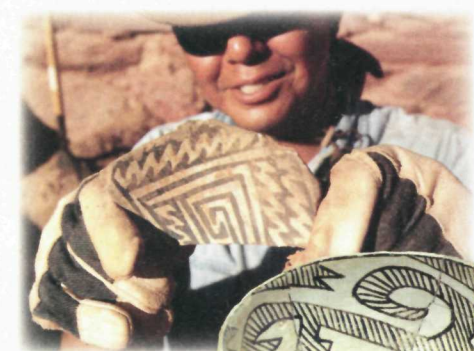
Eleven traditionally associated tribes—Yavapai-Apache, Havasupai, Hopi, Hualapai, Kaibab Paiute, Las Vegas Paiute, Moapa Paiute, Navajo, Paiute Indian, San Juan Southern Paiute, and Zuni—continue to live in or use the canyon for trade, to collect plants, minerals, and other traditional materials, and for ceremonial purposes.

Uncovering Human History
From 2006 to 2009, people of several tribes traditionally associated with Grand Canyon worked with park staff and the Museum of Northern Arizona on several excavations in the park. Although most tribes oppose any disturbance of their heritage, circumstances justified the Grand Archaeology project. The erosion of sediments in the river corridor had uncovered long-buried artifacts and structures, exposing them to damage by weather, and other dangers.

Through their traditional knowledge, tribal people enriched the project. They helped identify meanings and uses of artifacts, and discovered links with their ancestors.

How can understanding and preserving these artifacts have value for all of us?

Grand Canyon National Park preserves and protects wildlife, natural systems, and cultural resources for future generations.



CLOCKWISE FROM
UPPER RIGHT:
FOLSOM SPEAR
POINT BASE, CA
11,000 BP—NPS /
GRCA; ROARING
SPRINGS—NPS / MICHAEL
QUINN; KIVA, EXCAVATED
2008—NPS / GRCA; BOWL, EARTH-
ENWARE WITH SLIP-DECORATED INTERIOR, NPS /
GRCA; FRAGMENT, EARTHENWARE WITH SLIP DEC-
ORATION—NPS; SPLIT-TWIG FIGURINE—NPS / GRCA;
MEDALLION—NPS

ALL ARTIFACTS ILLUSTRATED HERE WERE FOUND IN
EASTERN GRAND CANYON.

A Canyon Carved by Water

The hunter's spear came to rest in a sublime, vertical landscape. Its broken point (*right*) was found halfway between the rim, where the canyon walls meet the surrounding plateau, and the bottom, where the Colorado River now runs.



Spear point,
ca. 11,000
BP, found at
Marble
Canyon

Six million years earlier, the river and its tributaries began to carve downward through the plateau.

Making Geological History
The story of Grand Canyon's formation is much deeper than six million years, and is still continuing. Since 65 million years ago, the entire Rocky Mountain-Colorado Plateau region has been rising. Immediately below the plateau's crust are the same sedimentary rocks you can see in the canyon's walls and in the diagram at right—sandstone, limestone, and shale. Shallow seas and changing rivers deposited the sediments over nearly two billion years.

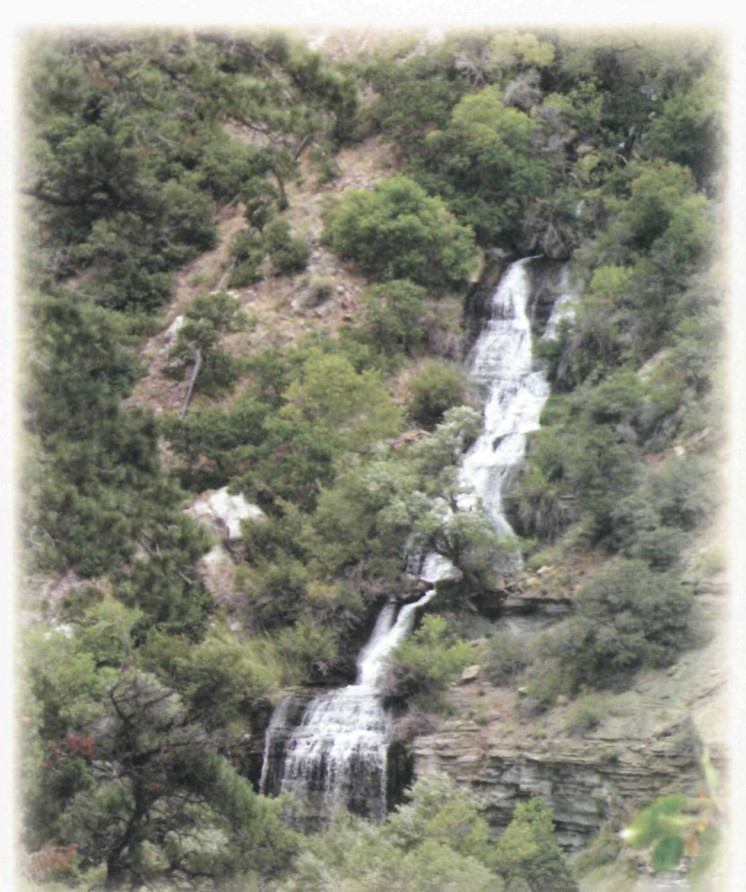
The Colorado and its tributary rivers flowed across and cut into the plateau, revealing flat-lying, multicolored rocks formed in the Paleozoic era (about 541 to 252 million years BP). These layers, visible from both North and South rims, contain marine fossils that record some of Earth's earliest life forms.

Below the Paleozoic rocks are the tilted layers of the Grand Canyon Supergroup, which formed about one billion years BP. You can see them from Desert View Drive and at the Yavapai Geology Museum.

Below the Supergroup, at the canyon bottom, the river cut through some of the plateau's oldest, or "basement," rocks, formed as much as 1.84 billion years BP.

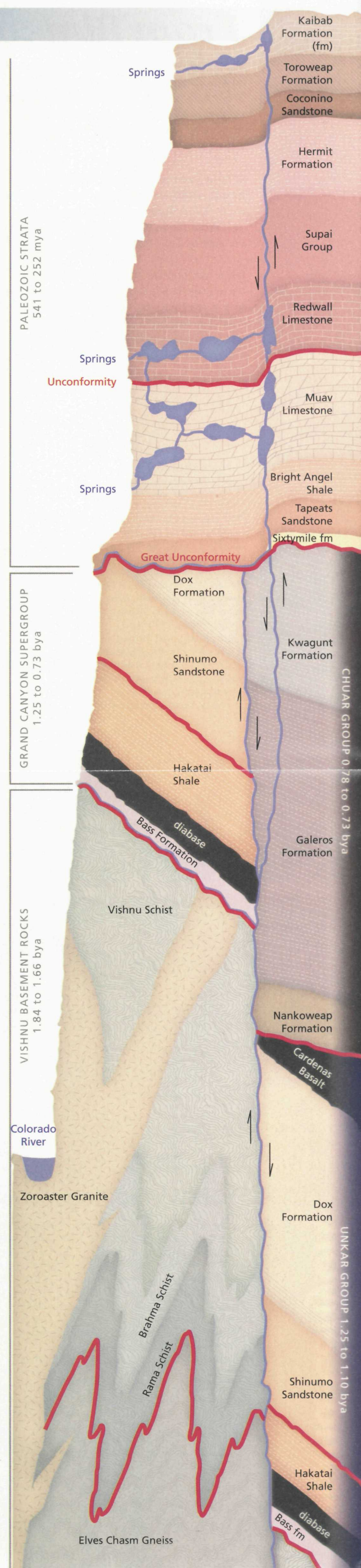
Water in the Rocks
Precipitation falling on the Coconino (South Rim) and Kaibab (North Rim) plateaus becomes Grand Canyon's groundwater. It percolates through porous, faulted, or fractured rock. Some water exits from the canyon walls, far below the rims, as springs or seeps.

Roaring Springs (*below*) is one of Grand Canyon's 700 seasonal and perennial seeps and springs. It emerges from a limestone cave 3,500 feet (1,067 meters) below the North Rim in eastern Grand Canyon. A pipeline built in the 1960s travels through Phantom Ranch at the canyon bottom before it reaches the South Rim. It is the only local source of drinking water for both rims and the inner canyon. Breaks and repairs sometimes interrupt water delivery.



The youngest rocks are at the top of Grand Canyon; the oldest at the bottom. The rock types include sandstone, limestone, shale, schist, basalt, gneiss, and granite.

The red lines in the diagram to the right indicate "unconformities," or interruptions in the geological record. At the Great Unconformity, between the Tapeats Sandstone and the tilted Supergroup layers, 200 million years of geological history are lost.

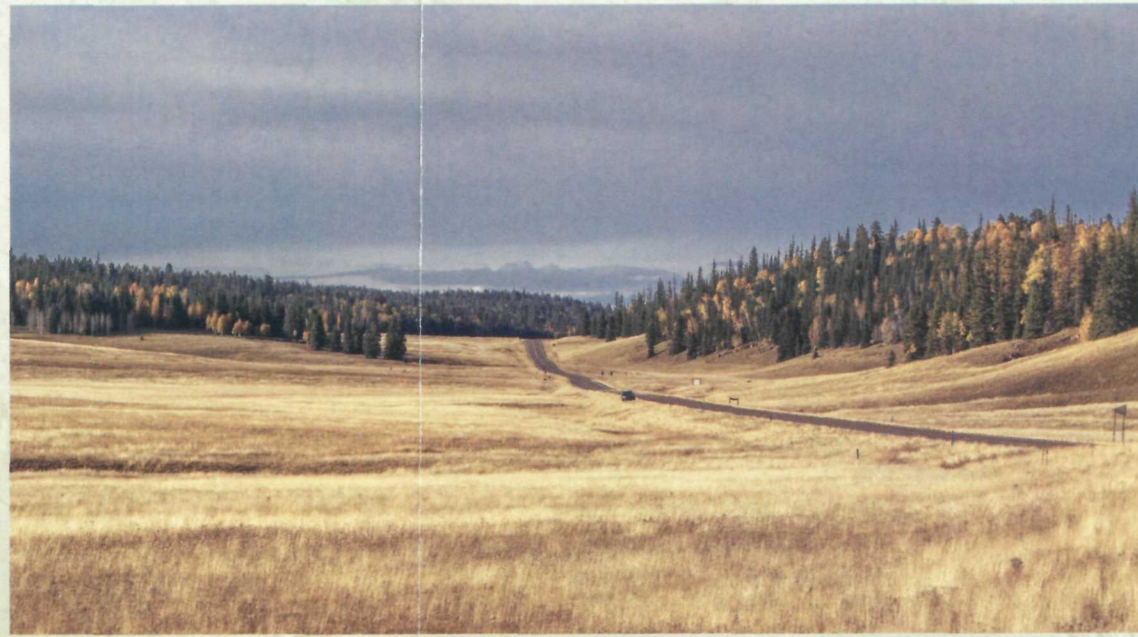


From Rim to River

Before you are waves of stair-stepped ledges, cliffs, and buttes painted ochre, green, and gray. Within moments the colors deepen, then brighten as clouds drift past. You marvel at the slender, shimmering ribbon of river that, along with erosion, carved through rock layers to create this natural wonder. Side canyons branch in all directions from the river.

Behind you—at the South Rim—are roads, signs, sidewalks and trails, hotels, visitor centers, museums, campgrounds, offices, concessioners, a rail depot, buses, cars, and bicycles. At the North Rim you'll find fewer human-made distractions. Use the free pocket maps to locate visitor services and see how to get around both rims.

Development has changed many parts of the Colorado plateau, which surrounds Grand Canyon. To help you imagine this vast plateau with less human impact, see the map below. Its colors (green for cooler, wetter areas, brown for warmer, drier areas) and mixed shaded relief (for cliffs, talus slopes, and ledges) suggest the wide range of terrain that determines the region's water supply, ecosystems, and species.



The Kaibab Plateau, underpinned by limestone, is topped by mixed conifer forest.

North Rim

With a higher elevation (8,000 feet, or 2,438 meters) and more precipitation than the South Rim, temperatures are cooler and forests thicker. The southward tilt of the land directs water to side canyons where sharp, narrow land forms result from the increased erosion.

On your approach through the Kaibab Plateau, you'll pass through some fire-blackened, wooded areas. After people began to suppress fires in the 1900s, dense undergrowth accumulated and became added fuel. Although native ponderosa pines and other species are adapted to withstand lower-temperature fires, many trees succumbed when fires began to burn hotter and longer.

Now the forest composition is changing as more aspen and subalpine trees, like Engelmann spruce, fill in former areas of mixed conifers.

From the visitor center, take a short walk to Bright Angel Point for views of Bright Angel Canyon and Roaring Springs, the main source for drinking water in Grand Canyon. Drive north to Point Imperial where you can see the Vermilion Cliffs and Marble Canyon to the east. From here, drive south to Cape Royal for a panoramic view of the Unkar Delta, farmed by ancestral Puebloans, and the Colorado River.



Where the River Exits the Park

Near the park's western edge the Colorado River flows through the Grand Wash Cliffs. Here the Hoover Dam (completed 1935) impounds the river to create Lake Mead. Water from the lake is used for recreation and is also sent to major cities, small communities, and agricultural areas throughout California, Nevada, and Arizona. As human use of water grows throughout the Southwest, can one river meet the increased demand?

The River's Course

The Colorado River begins as a trickle of meltwater high in northern Colorado's Never Summer Mountains. Streams and tributary rivers increase its size and volume until it reaches Lake Powell, created by Glen Canyon Dam (completed 1963). The lake traps most sediment carried by the river, so the water released from the dam base is clearer. It is also colder. Grand Canyon's native fish are adapted to more sediment and warmer water. As the result, they cannot thrive today.



Safety and Regulations

Stay on trails and away from cliffs. • Thunderstorms are common in summer. In the event of lightning, seek shelter and stay away from the rim and exposed areas. • It is illegal to launch, land, or operate unmanned aircraft inside Grand Canyon National Park. • Pets must be leashed. Refer to the pocket maps for restrictions and information. • Motor vehicles, including mountain bikes, are restricted to maintained roads. The map above does not show roads. Use pocket maps for road and trail information. • When hiking, carry food and water.

Wear sun protection and appropriate clothing and shoes. Do not try to hike to the river and back in one day; it is dangerous. • It is illegal to feed deer, squirrels, or other park wildlife. • For firearms regulations check the park website.

Accessibility
We strive to make our facilities, services, and programs accessible to all. Call or check our website.

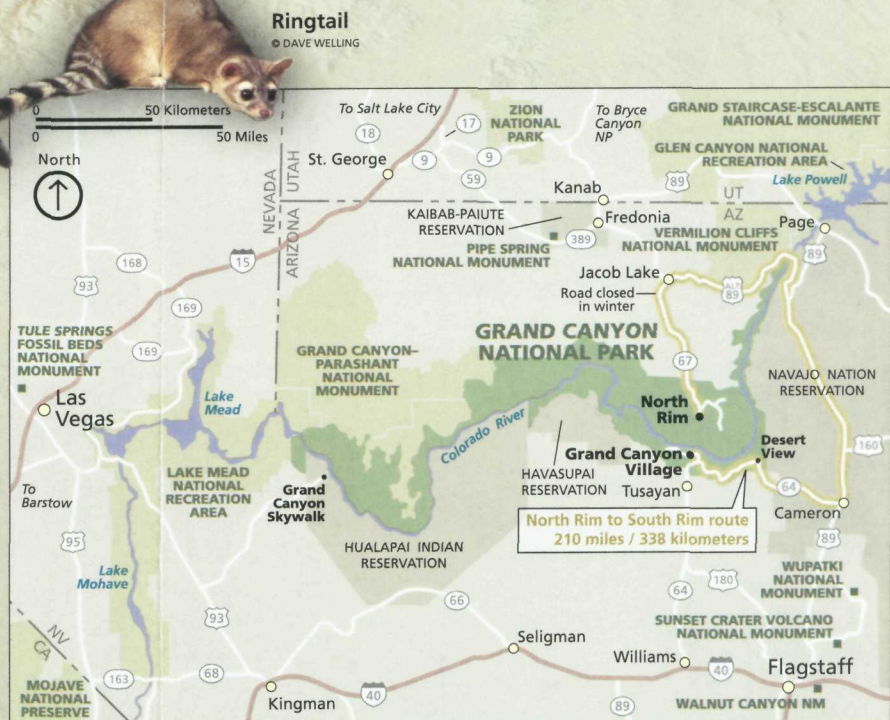
Emergencies call 911

Grand Canyon National Park is one of over 400 parks in the National Park System. To learn more about national parks visit www.nps.gov.

More Information
Grand Canyon National Park
PO Box 129
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www.nps.gov/grca
928-638-7888

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South Rim

Pinyon and juniper trees survive with less than 15 inches (38 centimeters) of rainfall annually at this elevation (7,000 feet, or 2,133 meters). Both trees have tiny leaves to minimize the surface area exposed to the dry air. Yucca's thick, waxy leaves conserve the moisture that their muscular roots pull from the South Rim's dry, rocky soil. Cliffrose and Gambel oak hug the rim. As you move away from the rim the soil's moisture and nutrient levels improve, and ponderosa pines grow in stands.

From Mather Point, gaze across and downward. You'll see tiny patches of bright green in the canyon bottom. The spots of color mark springs at Phantom

Ranch and Bright Angel Campground, stopping points for many who make the rim-to-rim trek.

A rimside walk of less than one mile (1.61 kilometers) will take you from Mather Point to Yavapai Point. On cold or rainy days, study the canyon's rock layers from the geology museum's picture windows.

It's 25 miles (7.62 kilometers) by car from Grand Canyon Village to Desert View. Consider a stop at the Tusayan Museum and Ruin. Pull-outs offer broad views of the Painted Desert and the river.

Cliffrose
© ROBERT RIBOKAS

Desert bighorn sheep
© BYRON HUXE

Hiking the Bright Angel Trail
© DAVID FRENCH



Grand Canyon rattlesnake
© GARY KATZ



Scorpion
© SEIG KOPNITZ



Ringtail
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