



Sunrise on the Sierra Quemada, the "burned mountains." Photo by Jim Bones

The Indians said that after making the Earth, the Great Spirit simply dumped all the leftover rocks on the Big Bend. Spanish explorers, less intimate with the landscape, merely dubbed this "the uninhabited land." To come to know this land of desert and mountains cut through by the Rio Grande, the big river, is but to grasp a larger appreciation of the unknown. Here you will find, believe it or not, a desert amphibian,

Couch's spadefoot toad; a mosquito fish whose entire world range is one pond in the park; a small mammal, the kangaroo rat, that makes metabolic water; and a good-sized bird, the roadrunner, that would rather run than fly. There are winged insects that live their entire lives in, on, and off one species of plant. By contrast, coyotes may turn up anywhere and will eat almost anything. Jackrabbits have such large ears that they use them as radiators, transferring body heat to the environment. Motion can be almost imperceptible—or as fast as the diving peregrine falcon

clocked at more than 200 mph. Time can be measured . . . or you can leave it unmeasured. If you want the reaches of time, find them in the Fossil Bone Exhibit or the deep rock strata of Santa Elena, Mariscal, and Boquillas canyons. For a fleeting glimpse of time, watch the jackrabbit sprint to elude a predator. If you are mildly patient, see how long it takes after the first good rainstorm for seemingly lifeless desert to come alive with brightly colored flowers. The truth is, Big Bend is more mood than place. Sometimes you must wait for it to capture you.

Big Bend National Park can be thought of as having three natural divisions: the river, the desert, and the mountains. River and mountains serve as counterpoints to the desert. The river is a linear oasis. The mountains function—in relation to their arid surroundings—much like an island of temperate life.

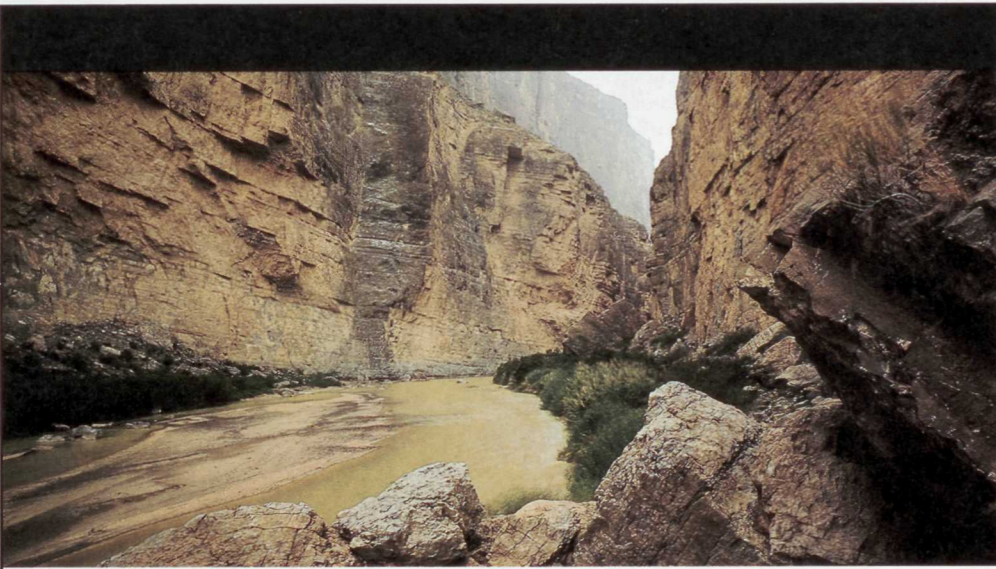


Photo by David Muench

## The River

The name Big Bend refers to the great U-turn the Rio Grande makes here in Southwest Texas. The Rio Grande is an arcing linear oasis, a ribbon of green strung across the dry desert and cutting through its mountains. As do all rivers that survive desert passages, the Rio Grande has its headwaters outside this desert. Today, much of the water flowing through the park is supplied by the Rio Conchos, flowing out of Mexico, and not by the Rio Grande. Much of the flow of the Rio Grande is

### The Jackrabbit

The jackrabbit's big ears are its distant early warning system against predators. The ears also are used as radiators to transfer excess body heat to the environment as necessary.



diverted for irrigation or lost to evaporation before reaching the park's western boundary. The Rio Grande defines the park's southern boundary for 118 miles. The garfish and some turtles in the river are living fossils that help describe its former life as a lush savannah and swamp 50 million years ago. Their ancestors swam in company with crocodiles and hippopotamus-like creatures.

If you wonder about the river's carving power—did it really cut such colossal canyons?—paddle an aluminum canoe down the Rio Grande. The canoe will seem to hiss as thousands of abrasive particles bounce off its hull. The river is like a relentless, gravity-powered belt sander that has been running for millions of years.

Among the most startling sights in this desert country may be the tooth marks of beaver on cottonwood or willow trees along the river. But don't look for beaver lodges. The beaver in the Big Bend live in bank burrows. The river is an oasis for species not adapted to the aridity of desert life, and so it adds to the park's biological diversity.

The river floodplain provides good areas for birdwatchers. Some birders maintain that the birds in the floodplain are more colorful than elsewhere. Here you find summer tanagers, painted buntings, vermilion flycatchers, and cardinals serving as accent colors to the background greens of floodplain foliage. This ribbon-like floodplain verdancy, seen from a distance,

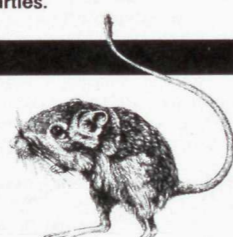
appears as a green belt in the desert. It is a phenomenon seen elsewhere in the park along arroyos, or washes. Undoubtedly you will find birds and other animals making ample use of this interruption of more arid desert vegetation.

On the river's gravel and sandbars and on its cliffbanks are other creatures you would not expect to find in the Chihuahuan Desert. The sandpiper and killdeer bob and sprint on the sandbars, and the cliff swallow flies up to its adobe nest fashioned of river mud.

While the floodplain had been inhabited by native people for centuries, extensive exploration of the Rio Grande dates back only about 130 years. However, Spanish explorers crossed the Rio Grande in the 16th and 17th centuries in their search for gold and silver and fertile lands. The Presidio del Paso de San Vicente was established in 1774 at a major crossing on the Rio Grande. People did not attempt floating the river, as far as we know. The Comanche Indians also crossed the river during the 19th century, traveling to and from Mexico with their raiding parties.

### The Kangaroo Rat

The kangaroo rat is superbly adapted to desert life. It need never drink to survive. It can metabolize water from carbohydrates in the seeds, and it wastes no excess moisture.



Exploration of the river itself came only in 1852, with a boundary survey conducted by U.S. Army Major William H. Emory. The Emory party examined all three canyons but elected to float only Mariscal. In 1861, a survey party led by a Texas Ranger floated Santa Elena Canyon. The leader actually led his party by horse from the canyon rim. In 1889, a U.S. Geological Survey expedition became the first group to run Boquillas Canyon. Some farming had been done on the river's floodplain starting with Mexican settlers on both banks around 1900. Anglo-Americans joined in the farming after 1920, when the Mexican-American boundary unrest ended. Cotton and food crops were grown around Castolon and what is now Rio Grande Village even after the park was established in 1944.



Photo by Jim Bones

## The Desert

North America has four warm deserts: Great Basin, Mojave, Sonoran, and Chihuahuan. The Chihuahuan extends deep into Mexico. Big Bend National Park lies in the northern third of the Chihuahuan Desert. This desert is bordered on three sides by mountains that block the rains. The fourth side abuts vast semi-arid plains. The Chihuahuan Desert is young, perhaps not more than 8,000 years old. It is also a green and somewhat lush desert that receives most of its rainfall and

### The Roadrunner

The roadrunner runs at speeds up to 20 mph in pursuit of lizards and small rattlesnakes. These it pecks to death with stunning blows of its beak. The roadrunner gets much of its required moisture from the body fluids of its prey.



during the summer months when it is needed most. The chief indicator plant of the Chihuahuan Desert is lechuguilla, appearing as a clump of dagger blades protruding from the desert floor. The coarse, strong fibers of the lechuguilla are used in matting, ropes, bags, and household items, which are, in a way, products of the Chihuahuan Desert. The lechuguilla illustrates an often misunderstood fact about the desert: the desert is a life zone. Life has adapted here to minimize expending its energy and to maximize getting or even hoarding water, as the kangaroo rat illustrates.

Heat and seasonal winds contribute to the aridity. At mid-day in summer, ground temperatures may reach 180°F, or it can be freezing cold in winter when northern storms sweep through. The good news is that it is often a luxurious 80°F here while the Rocky Mountains are locked in deep snow.

Prehistoric Native Americans made their homes here at least 10,000 years ago and perhaps earlier, but little evidence of human occupation appears until the Archaic or Desert Culture of 6000 BC. These people were not farmers but hunters and gatherers who took only what this country offered on its own.

Hundreds of Chihuahuan Desert plants were useful to prehistoric people for food or medicine. Their diet included the heart of the sotol and lechuguilla plants; the fruit and blossoms of yucca; the fruit and young pads of pricklypear; mesquite and acacia beans; and

many other native plants. They fashioned baskets and sandals from lechuguilla fiber and yucca leaves. For hunting they used the atlatl, a throwing stick that propelled stone-tipped darts to kill deer, rabbits, and other game. Like us they needed not only food but also pure water and shelter. Desert springs became valuable sources of drinking water, and, today, living sites often include the remnants of rock shelters and hearths or fire rings. In the later part of the Archaic period, trade between the local people and those from the south and west introduced horticultural practices, bringing cultivated corn, beans, and squash to supplement their diets. By 1200, the La Junta people, an agricultural group related to the Puebloan people of the upper Rio Grande, occupied and farmed the river floodplain in areas west of today's national park. In the 1500s, the Spaniards enslaved the Native Americans and substantially changed their culture. Apaches moved in sometime in the 1700s, pushed southward by the Comanches.

The Apaches were capable of resisting the Spaniards, who in the 1700s began to release their tenuous hold on this area. In the 19th century, driven by pressures on hunting territories from encroaching Anglo-American homesteaders, the Comanches were forced southward. Mexican settlers occupied the Big Bend by the early 1800s, and their isolated communities became the targets of raids by nomadic Comanche warriors. The gold discoveries in California in the mid-1800s and the destruction of the bison herds hastened the Comanches' decline. Military forts were built along the route that passed through this area to California goldfields.

We should not be amazed that Big Bend animals are so curiously and so well adapted to desert life. Such adaptations are what life is all about. There are fairly shrimp, fast-growing toads, and those jackrabbit ears. There are more mundane adaptations, too. Many animals beat the heat by coming out only at night. Most snakes do this because summer daytime temperatures on the desert floor would kill them in minutes. Another simple way to beat this heat is to climb above it. Many human travelers pass through the summer desert quickly, headed for the higher and cooler Chisos Mountains. Some insects use the same principle. They merely fly straight up in the air a short distance, where it is significantly cooler. One walking beetle seems to rise up on stilts periodically, again to achieve critical distance from the desert floor's killing heat.



Photo by Jim Bones

## The Mountains

If the Rio Grande interrupts the Big Bend country as a linear oasis, the Chisos Mountains interrupt it as a green island in a desert sea. As does the river, the mountains bring creatures you might not expect to find in desert areas, and several species are quite rare. Isolation provides the key. This situation was set in motion thousands of years ago as the Great Ice Age drew to a close. As the colder, moister climates retreated northward, many plants and animals became stranded

### The Golden Eagle

The golden eagle's wingspan may be 6 to 8 feet. Its golden nape is visible only at close range. It nests in large trees or on high rocky ledges and feeds mostly on rabbits and large rodents.



in the Chisos Mountains by the lowlands' increasing aridity.

Carmen Mountains white-tailed deer provide a graphic example. Within the United States, these deer live only in the Chisos Mountains. They also occupy several of the nearby mountain ranges in Mexico but are not known to occur outside this area that the Rio Grande bisects. White-tailed deer are not adapted to desert conditions. They may have had a much wider range in this region during the Ice Age, when its climate was cooler. As the climate warmed, cooler conditions prevailed in the mountains because of their higher elevations. Today, the fate of this smaller white-tailed deer can be monitored by watching the desert mule deer gradually encroach on mountain foothills. Adapted to desert life, mule deer appear to be usurping some of the white-tailed deer's range.

Average rainfall at the Basin, a Chisos Mountains location popular with people and other animals, is twice that at Rio Grande Village along the river. Approaching the mountains through Green Gulch, you pass grasslands punctuated by century plants and sotol, but soon notice green, leafy shrubs. Then the bushes get taller, with evergreen sumac, mountain mahogany, Texas madrone, and common beebrush. You see both evergreen and deciduous leaves. When you attain an elevation of 4,500 feet, the first tall trees begin to appear. Higher up in the drainages you see masses of trees—junipers, small oak trees, and pinyon pines. Some tree species found in the Chisos Moun-

tains grow there at the extreme southern limit of their ranges in the United States: Arizona pine, Douglas-fir, Arizona cypress, quaking aspen, and bigtooth maple. These are the last lingering remnants of forests once widespread here under the influence of the Ice Age.

Some Big Bend plant species are found nowhere else in the world. The Chisos oak grows only in the Chisos Mountains highcountry. A number of other plant species grow in the United States only in the Chisos Mountains but also are found in Mexico and elsewhere. The drooping juniper that looks like it needs a good watering is such a plant.

To see all the bird species that occur in the United States, eventually you must come to the Chisos Mountains to see the Colima Warbler. It nests here after wintering in Mexico. Also occurring here is the mountain lion, locally called a panther. This cat has given its name to the lion's share of park places, including Panther Pass and Panther Junction.

### The Coyote

The coyote can put on a burst of speed sufficient to run down jackrabbits. Its craftiness, immortalized in many Native American myths, sometimes is witnessed by wildlife watchers.



Rainbow cactus



Unusual white and common purple Big Bend bluebonnets



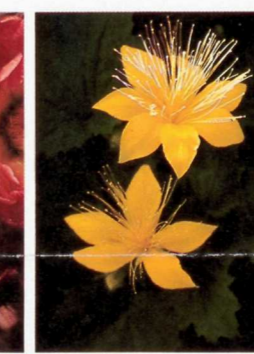
Pricklypear cactus



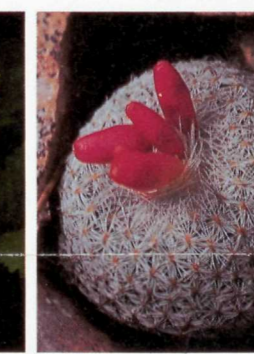
Chisos prickly poppy



Claretcup cactus



Rocknettle



Button cactus



Strawberry pitaya cactus

## Amazing Adaptations

The popular image of desert-dwelling plants is the cactus, uncommonly adept at getting water and then miserly about hanging onto it. There are other strategies or adaptations. One is waiting. Many desert annuals, unlike their counterparts in temperate climes, simply wait out the rains in their seed stage of life. If the rains don't come one year, the seed simply remains dormant. Some seeds are coated with chemicals that inhibit germination. Unless enough rain falls to remove this inhibitor, the seed ignores the wetting. This assures that the developing plant will have enough water to complete its life cycle and develop new seeds before the next dry spell. This chemically patient seed may wait more than a

year to germinate, but once it does, the plant will develop, flower, and fruit much more rapidly than a temperate annual would. Creosotebushes ply another strategy. These regularly spaced shrubs look as though human beings had planted them because they produce a toxin in the leaves that, when shed, discourages other plants from intruding on their growing space. The small creosotebush leaves are coated with a resin so that they lose little moisture to the air. These combined strategies make creosotebush the most prevalent shrub in the park and enable it to prosper in all North American deserts. Creosotebushes that grow along a road tap pavement runoff and may grow twice as tall as those one row

back from the road. Cactuses exemplify water conservation. Instead of water-losing leaves, cactuses have spines. These also protect the plants from being trampled or eaten. (When you're all stem, you can't afford to be nibbled on!) The thick and fleshy stem presents reduced surface area and bears a waxy coating that inhibits evapotranspiration. The shallow root system spreads in a wide pattern to intercept rainwater as soon as it enters the ground. Cactuses store water, serving as their own reservoirs for surviving long droughts. The ocotillo, not a cactus, is in a family by itself. With rain, the ocotillo develops leaves but drops them when dry conditions return. This may happen several times per year. Wax ex-

tracted from the candlelilla, or wax plant, is used in the manufacture of candles, waxes, gum, and phonograph records. In the rainy season, the stem fills up with a thick sap that, in the dry season, coats the stem as a wax and prevents evaporation. The wax seals in moisture and protects the candlelilla from drought. Desert plants display their most profuse flowering in late summer, following the regular rains of July and August. While this is difficult to predict, wildflowers often are most impressive during the hot months. One glimpse of this floral richness may change your image of the desert forever.

themselves out to their true water retentive proportions and to sport colorful blossoms. Dead-looking plants leaf out anew. Wildflowers galore bloom as carpets of glorious color. Carpets not-

ing can revise so thoroughly your concept of the desert as to witness its flowering.

Illustrations by Gene Dieckhofer





1 Backpacking the Chisos. 2 River floaters. 3 On the South Rim. 4 Glenn Spring ruins. 5 Wilson Ranch. 6 The Window Trail.

### Visiting the Park

There is no public transportation to or through the park. Trains and buses provide service to Alpine. Airlines serve Midland-Odessa and El Paso. Distances here are vast, so plan arrivals and departures conveniently for available facilities. See the area map at right for highway approaches. Water and gasoline are available at few and widely separated points in and around the park. Check your water supply and gas gauge before you leave Alpine or Marathon.

**Note:** Carry drinking water in desert country. Hikers require 1 gallon per day per person; start your return trip before half your water is gone. Treat spring water before drinking and don't drink the river water.

Park headquarters is at Panther Junction. Check there for schedules of naturalist programs and activities. Publications sold there include the official Big Bend National Park Handbook, a hiker's guide, a road guide, and topographic maps. Five driving tours are outlined in the handbook and in the road guide.

Find overnight lodging in the park at the Chisos Mountains Lodge in the Basin. Campgrounds are located in the Basin, Rio Grande Village, and Castolon. There is a trailer park with utility hookups at Rio Grande Village. In spring and fall, all lodging and camping facilities may be full. Check before driving to



the park by calling (915) 477-2251. For reservations and information on lodging, call (915) 477-2291 or write National Park Concessions, Inc., Big Bend National Park, TX 79834. There are backcountry roadside campsites along some park dirt roads (free permit required). Many require a high clearance or 4-wheel-drive vehicle.

Groceries, cold drinks, camping supplies, and film are sold at the Basin, Rio Grande Village, Castolon, and

Panther Junction. The Chisos Mountains Lodge has a gift shop. Minor auto repairs can be obtained at Panther Junction. Saddle horses, pack animals, and guides can be arranged for in the Basin with the Chisos Remuda by calling (915) 477-2374 or by writing Chisos Remuda, Basin Rural Station, Big Bend National Park, TX 79834.

There are no medical services in the park. The nearest hospital is at Alpine, 108 miles from park headquarters. A paramedic service is available at Terlingua, 26 miles from park headquarters.

For information about the park and its management, facilities, services, programs, and recreational opportunities write: Superintendent, Big Bend National Park, TX 79834, or telephone (915) 477-2251.

### Activities

Big Bend offers superb walking and hiking, horseback riding, river running, birdwatching, and good river fishing for catfish. *Please read the following sections on regulations and safety before you begin; if you have questions, please ask a park ranger.* Report all accidents, incidents, or injuries at park headquarters or to a ranger. **Hiking.** Walks and hikes range from short, self-guiding nature trails to cross-park treks. Off-trail hiking requires proper gear and adequate supplies. Use a topographic map and know your route. A hiker's guide is sold at park headquarters. **River Use.** Big Bend National Park administers 234 miles of the Rio Grande for recreational use. Obtain a free river float permit (required for all boat use) and current river information at park headquarters or any ranger station. Be well equipped and informed before running the river. A river guide is sold at park headquarters. There are no equipment rentals in the park. Contact the park for a list of river outfitters. Because of local thunderstorms, the river can be high from July through October. The Rio Grande is a Wild and Scenic River for 191.2 miles along part of the park boundary and extending below. **Birding.** More than 400 species of birds have been seen in the park, a birder's paradise. The larger migration occurs here in spring. Ask a ranger about the best birding spots during your visit.

### Regulations and Safety

**Driving.** Observe posted speed limits. The maximum speed limit in Big Bend National Park is 45 mph. If water crossings are flooded by seasonal storms, wait out the high water. A few minutes' wait is better than having your vehicle swept downstream. No vehicles may be driven off established roads. Backcountry roads are subject to closure from storm damage. Check on road conditions before driving unpaved roads. **Night Driving.** Watch for wildlife at night. Animals blinded by your headlights may stay on the road.

**Spines and Thorns.** Spines and thorns of cactuses and other plants are hazardous; wear stout shoes and clothing for off-trail hiking. Carry tweezers to remove small spines.

**Poisonous Reptiles and Insects.** A copperhead and 4 rattlesnake species live here but rarely are seen in daytime. They are protected by law; do not harm them. At night, stay on trails and carry a flashlight. Snakes, scorpions, tarantulas, and other wildlife generally won't harm you unless you annoy them. Get prompt attention in case of accident or injury.

**Trail Use.** Stay on established trails to prevent erosion and slides. Smoking on trails is not allowed. Carry out all refuse. **Camping and Fires.** Camping is allowed in campgrounds and at designated backcountry sites with a permit. Building wood or ground fires is prohibited. **Hiking/Backcountry Camping.** Obtain a backcountry permit for any overnight use. Building ground fires is prohibited. Fire danger in the Chisos Mountains may be extreme. Pets are prohibited on park trails and in the backcountry. Besides highcountry trails, there are numerous rewarding hikes in the lower desert region; ask a ranger about them. Be wary of high water and low spots when camping. Do not camp in arroyos or washes; they may become raging rivers while you sleep. **Fishing.** Fishing licenses are not required within the park. Park rangers can supply fishing information. **Firearms and Pets.** Using or displaying firearms is prohibited. Pets must be leashed at all times and are prohibited on trails, in the backcountry, and in public buildings.

**Swimming and Wading.** The Rio Grande is dangerous because of strong currents, submerged snags, and sudden drop-offs. The Rio Grande claims the lives of more swimmers and waders than river runners.

