

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 which has its entire world range just in one pond in the park; a small mammal, the kangaroo rat, that

metabolizes 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, and there are, by contrast, coyotes that may turn up anywhere and will eat almost anything. The jackrabbits here have such large ears that they sometimes use them as radiators, transferring body heat to the environment. Motion can be almost imperceptible here, or as fast as the peregrine falcon, clocked at more than 320kph (200 mph) in its dive. Time can be measured . . . or you can leave

it unmeasured. The choice is yours. If you want the reaches of time, you can find them in the Fossil Bone Exhibit or, less apparently, in the deep rock strata of the three Big Bend canyons, Santa Elena, Mariscal, and Boquillas. If you want fleeting glimpses of time, watch the jackrabbit sprint to elude its predators. If you are mildly patient, see how long it takes after the first good spring rainstorm for that "dead" 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.

For purposes of understanding and appreciation, the park can be thought of as having three natural divisions. These are the river, the desert, and the mountains. River and mountains serve as counterpoints to the desert. The river is a linear oasis, and the mountains function, in relation to their arid desert surroundings, much like an island of temperate life.

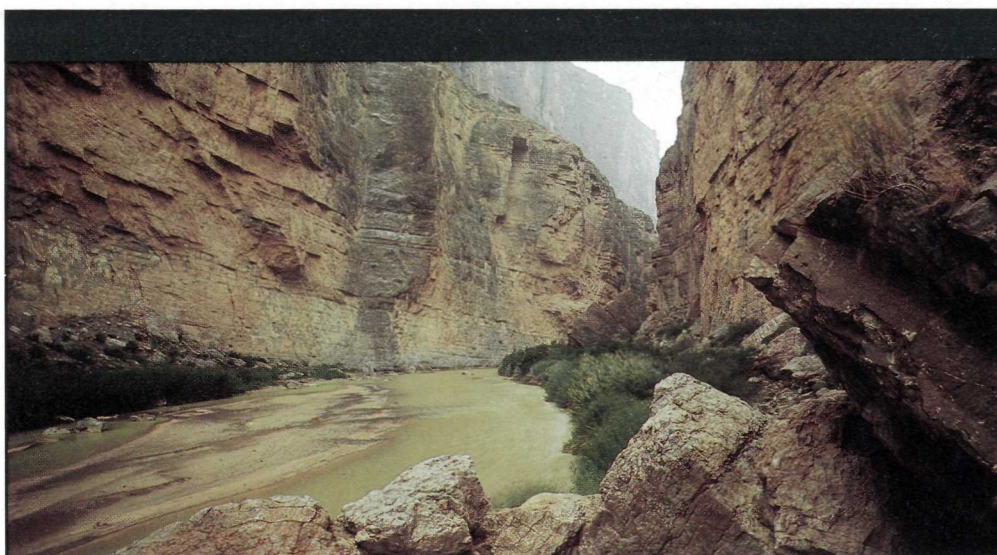
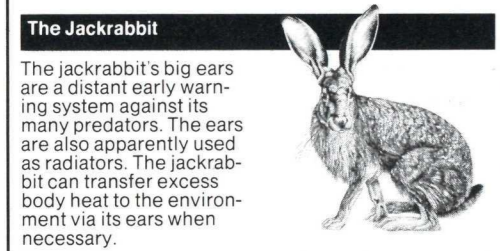


Photo by David Muench

The River

The name Big Bend refers to the great U-turn the Rio Grande makes here in Southwest Texas. The river is an arcing linear oasis, a ribbon of green strung across the dry desert and cutting through, literally, 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, upstream of the park.



The Jackrabbit
The jackrabbit's big ears are a distant early warning system against its many predators. The ears are also apparently used as radiators. The jackrabbit can transfer excess body heat to the environment via its ears when necessary.

and not the Rio Grande. The ancestral river that carved the park's great gorges was probably the Rio Conchos. Today the Rio Grande defines the park's southern boundary for 172 kilometers (107 miles). The garfish and some turtles which swim in the river are living fossils that help describe its former life as a lush savannah and swamp some 50 million years ago. Their ancestors then 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?—just paddle an aluminum canoe down the Rio Grande. The canoe seems 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 millions of years.

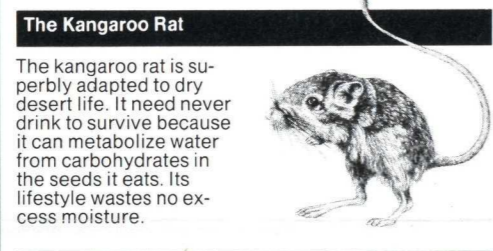
Among the most startling sights in this desert country may be the toothmarks of beaver on cottonwood or willow trees along the river. But don't look for beaver lodges. The beaver in the Big Bend live in bank burrows. The river is an oasis for species not adapted to the aridity of desert life, and so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

The river floodplain provides good areas for bird-watching. 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 you can observe 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.

Extensive exploration of the Rio Grande in the Big Bend country 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. They did not attempt floating the river, as far as we know. The Comanche Indians also crossed the river during the 19th century, to and from Mexico with their raiding parties. Exploration of the river itself came only in 1852, with a boundary survey conducted by U.S. Army Major Wil-



The Kangaroo Rat
The kangaroo rat is superbly adapted to dry desert life. It need never drink to survive because it can metabolize water from carbohydrates in the seeds it eats. Its lifestyle wastes no excess moisture.

liam 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 floated the river from Presidio to Langtry, 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.

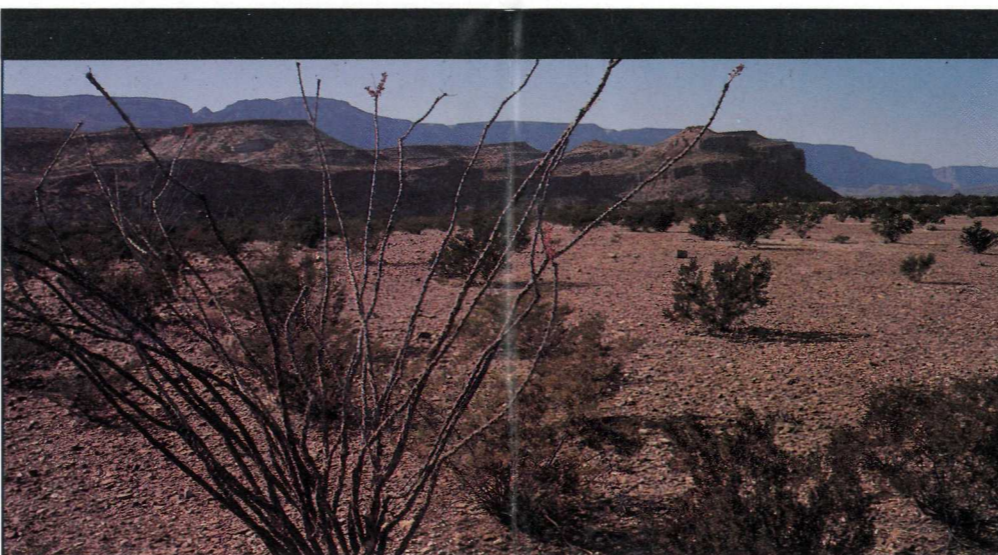
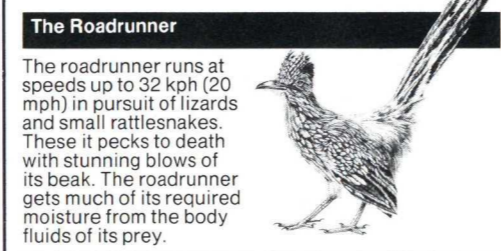


Photo by Jim Bones

The Desert

North America has four warm deserts: the Great Basin, the Mojave, the Sonoran, and the Chihuahuan Desert, which extends deep into Mexico. Big Bend National Park is 97 percent Chihuahuan Desert. This desert is bordered on three sides by mountains that block the rains, and the fourth side abuts vast semiarid plains. The Chihuahuan Desert is young, perhaps not more than 8,000 years old. It is also a green, even



The Roadrunner
The roadrunner runs at speeds up to 32 kph (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.

lush, desert, receiving most of its rainfall 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 simply adapted here to minimize expending its energy, and to maximize getting, even hoarding water, as the kangaroo rat illustrates.

Heat and spring winds contribute to the aridity. At mid-day in the summer, the ground temperature may reach 82°C (180°F), and it can be freezing cold in winter when a northern storm sweeps through. The good news is that it is often a luxurious 27°C (80°F) here while the Rocky Mountains are locked in deep snow.

Prehistoric Indians 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 6,000 B.C. These people were not farmers, but hunters and gatherers, taking only what this country offered on its own.

More than 200 plant and animal foodstuffs were here for the taking, but the vastness of the desert necessitated that people be semi-nomadic to take advantage of them. Their diet included walnuts, persimmons, the

fruit and blossoms of yucca, the fruit and young pads of pricklypear, and mesquite beans. 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. We know that some of Big Bend's desert springs have been flowing for thousands of years, because Archaic Culture sites are commonly concentrated around today's springs. These sites may include rock shelters and hearths, or fire rings. By A.D. 800, another culture appeared that was more slanted toward hunting than gathering. By 1200, the La Junta Culture, a Puebloan people, dominated. They were desert farmers. In the 1500s, the Spaniards enslaved the Indians 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 let go their tenuous hold on this area. In the 19th century, the Comanches were themselves driven into the Big Bend by Anglo-American pressure to the north. The Comanches supplemented their desert-derived lifestyle by annually raiding Mexican and later Anglo-American settlements and wagon trains. The gold discoveries in California in the mid-1800s hastened the Comanches' decline. Military forts were built along the route that passed through here to California gold fields.

We should not be amazed that Big Bend animals are so curiously and so well adapted to desert life, because such adaptations are what life is all about. Nevertheless, the antics prove interesting. There are fairy 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 within minutes. Another simple way to beat this heat is to climb above it. Many summer travelers pass through the desert quickly, headed for the higher and cooler Chisos Mountains. Those are people, but some insects use the same principle. They merely fly straight up in the air a short distance, where it is significantly cooler. There is a beetle that seems to walk around and raise itself up on stilts periodically. It, too, is just achieving a critical distance from the desert floor's killing heat.

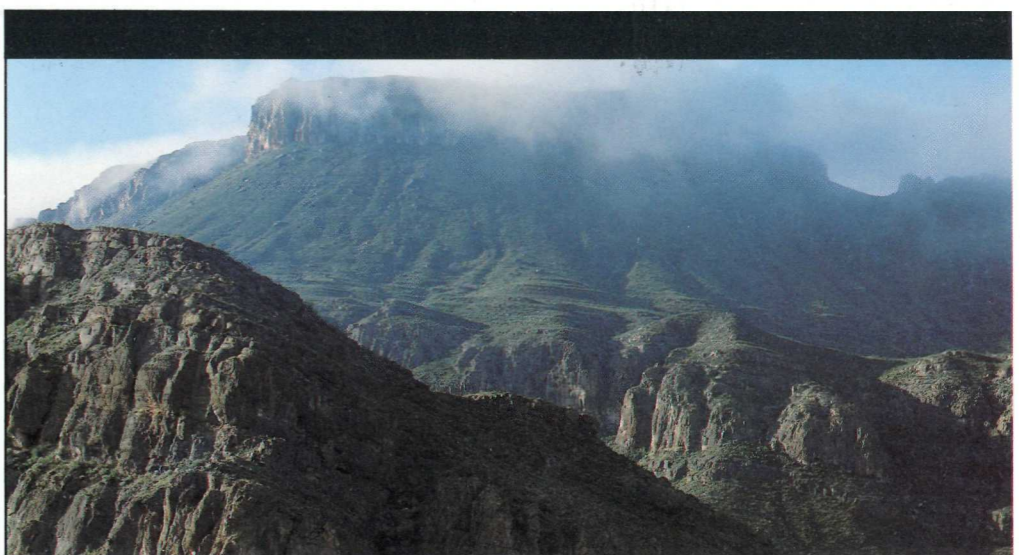


Photo by Jim Bones

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. The mountains bring creatures, as does the river, you would not expect 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 and the colder, moister climates



The Golden Eagle
The golden eagle's wing-spread may be 2 to 2.4 meters (6 to 8 feet). Its golden nape is visible only at close range. This regal bird feeds mostly on rabbits and large rodents. Its nest is found in large trees or on high rocky ledges.

retreated northward. Many plants and animals became stranded in the Chisos Mountains by the ever-increasing aridity of the surrounding lowlands.

The Sierra del Carmen whitetail deer provide a graphic example. The deer live in the United States only in the Chisos Mountains and other nearby ranges. In the entire world, they live only here and across the Rio Grande, similarly isolated in the Sierra del Carmen, and possibly in a few other isolated spots in Mexico. Whitetail deer are not adapted to desert conditions. They may have had a much wider range in this region during the Ice Age, when the climate was cooler in this area. As the climate warmed, cooler conditions prevailed in the Chisos—and Sierra del Carmen—Mountains because of their elevations. Today, the fate of this smaller whitetail deer can be monitored by watching the desert mule deer gradually encroach on the mountain foothills. The mule deer, adapted to desert life, appear to be usurping some whitetail range.

Average rainfall at the Basin (a popular spot in the Chisos Mountains for people and other animals) is twice that at Rio Grande Village, along the river. As you approach the mountains through Green Gulch, you pass grasslands punctuated by century plants and sotol. But soon you begin to notice green, leafy shrubs. Then the bushes get taller, with evergreen sumac, mountain mahogany, Texas madrone, and the common bee-bush. You see both evergreen and deciduous leaves. When you attain an elevation of

1,400 meters (4,500 feet), the first trees begin to appear. Higher up in the drainages you see masses of trees—junipers, small oak trees, and piñon pines. Some tree species found in the Chisos Mountains grow there at the extreme southern limit of their ranges in the United States: ponderosa 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 plant species here are found nowhere else in the world. The Chisos oak grows only in Blue Creek Canyon. The Chisos agave, apparently a hybridized century plant, grows only in these mountains. A number of other plant species, such as the drooping juniper, which appears to need a good watering, grow in the United States only in the Chisos Mountains, but are also found in Mexico and elsewhere.

If you wanted to see all the birds that appear in the United States, eventually you would have to come to

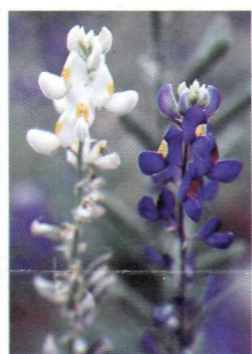


The Coyote
The coyote, an opportunist who eats almost anything, can put on a burst of speed sufficient to run down jackrabbits. Its craftiness, immortalized in Native American myths, is sometimes witnessed by wildlife watchers.

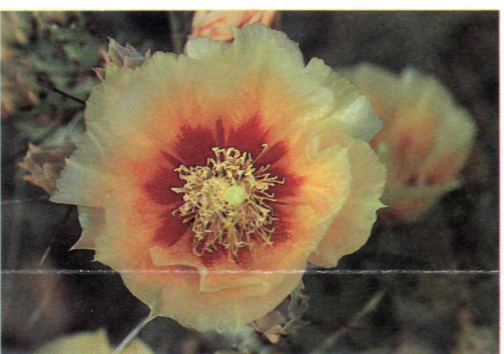
the Chisos, too. To see the Colima Warbler. It nests here after wintering in Mexico. Occurring here also is the mountain lion. This cat, locally called a panther, has given its name to the lion's share of park places, such as Panther Pass and Panther Junction.



1



2



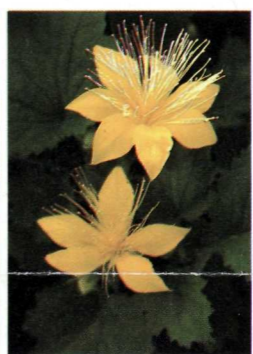
3



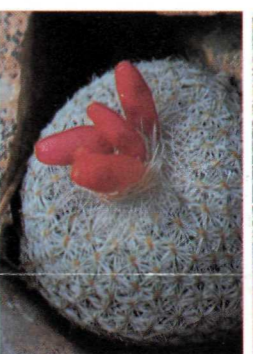
4



5



6



7



8

Amazing Adaptations

The popular image of desert-dwelling plants is the cactus—uncommonly adept at getting water and then miserably about hanging onto it. But there are other strategies or adaptations. One is waiting. Many desert annuals, unlike their counterparts in temperate climates, simply wait out the rains in their seed stage of life. If the rains don't come one year, the seed simply remains dormant. The mechanism is a germination inhibitor. 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 their roots produce toxins that discourage the roots of 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.

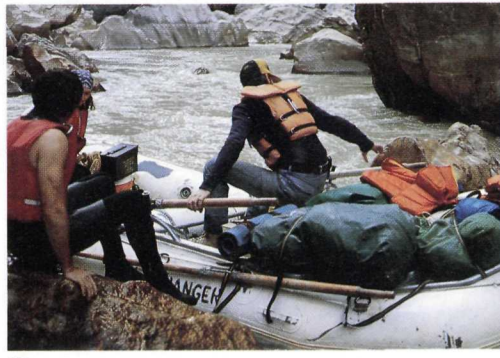
Cactuses exemplify water conservation. Instead of water-losing leaves, cactuses have spines. These also protect the plants from being trampled or eaten. (When you're all stem, you can't afford to be nibbled on!) The thick and fleshy stem presents reduced surface area and bears a waxy coating that inhibits 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 is not a cactus; it's in a family by itself. With rain, the ocotillo develops leaves, but drops them when conditions are dry. This may happen several times per year. Wax extracted from the

candelilla, 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, protecting the plant from drought. Desert plants display their most profuse flowering in springtime, which hits the lowlands in February and slowly ascends to the mountain heights by May. One glimpse of this floral richness and your image of the desert changes forever.

1 Rainbow cactus. 2 Albino and normal Big Bend bluebonnets. 3 Pricklypear cactus. 4 Pink pricklypoppy. 5 Claretcup cactus. 6 Rocknettle. 7 But-ton cactus. 8 Strawberry pitaya cactus.

Illustrations by Gene Dieckhoner

Big Bend



1

2

3

4

5

6

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 serve 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 4 liters (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, Texas 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, Texas 79834.

There are no medical services in the park. The nearest hospital is Alpine, 174 kilometers (108 miles) from park headquarters. A paramedic service is available at Terlingua, 42 kilometers (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, Texas 79834, or telephone (915) 477-2251.

Activities

Big Bend offers superb walking and hiking, horseback riding, river running, birdwatching, flower gazing (see side one), and good river fishing for catfish. *Please read the following sections on regulations and safety before you begin.* **Hiking.** Walks and hikes range from short self-guided nature trails to cross-park treks. To hike off trail, you need proper gear and adequate supplies. Use a topographic map and know your route. A hiker's guide is sold at park headquarters. **River Trips.** The Rio Grande is a Wild and Scenic River for 307.8 kilometers (191.2 miles) along part of the park boundary and extending below. A free river permit is required for floating the river and is available at park headquarters and ranger stations. A river guide is sold at park headquarters. There are no equipment rentals in the park. Call or write the park for a list of river outfitters. Because of local thunderstorms, the river can be high from July through October. **Birding.** The more than 400 species of birds that have been seen in the park make it a birder's paradise. The larger migration through the park is in the spring. Ask a ranger about the best birding spots during your visit. **River Use.** 375 kilometers (234 miles) of the Rio Grande are administered for recreational use by Big Bend National Park. Obtain a free river float permit and current river information at park headquarters or any ranger station. You should be well equipped and well informed before running the river.

Regulations and Safety

Climbing Hazards. The rock throughout the park is unstable. Climbing is not recommended. **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 can be a serious hazard. Wear stout shoes and clothing if you hike off developed trails. You should carry tweezers to remove spines too small to be extracted by hand. Some cactuses have irritating spines barely visible to the naked eye. **Poisonous Reptiles and Insects.** A copperhead and four rattlesnake species live here. They are rarely seen in the daytime. They are protected by law, so do not harm them. If you walk at night, stay on the trails and carry a flashlight. Snakes, scorpions, tarantulas and other park wildlife won't harm you unless you annoy them. Promptly seek attention if you are a victim of any accident or injury. **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 of river runners.

If you have any questions about any activity, please ask a park ranger. Report all accidents, incidents, or injuries at park headquarters or to a ranger.

Driving. Observe posted speed limits. 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 the established roads. Backcountry roads are subject to closure from storm damage. Always check road conditions before driving on unpaved routes. **Trail Use.** Stay on established trails to prevent erosion and slides. Smoking on trails is not allowed. Please carry out all refuse. **Camping and fires.** Camping is allowed in campgrounds and in designated backcountry sites. Building of wood and ground fires is prohibited. **Hiking/Backcountry Camping.** Obtain a backcountry permit for any overnight use. Building a ground fire is prohibited. Fire danger in the Chisos Mountains may be extreme. Pets are prohibited on park trails and in the backcountry. Besides the variety of highcountry trails, there are numerous rewarding hikes in the lower desert region. Ask a ranger about hikes in the lowlands. 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.

© GPO 1983-381-578/242

