

Organ Pipe Cactus

PUERTO BLANCO DRIVE



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- * Driving time 4 hours; length 53 miles (85 km) round trip.
- * Winding, one-way dirt road, not recommended for trailers, or for buses or motorhomes over 25 feet (8 m).
- * Driving or biking off roadway is prohibited.
- * Road subject to flooding; do not cross washes when flooded.
- * Several picnic areas available, one with pit toilet. No campfires allowed.
- * No drinking water available for 53 miles (85 km).
- * All resources are protected; please do not disturb or collect plants, wildlife, rocks, minerals, or artifacts.

1. MIXED SCRUB COMMUNITY

Plants do not "plan" to live here or there; they live where they do because they can.

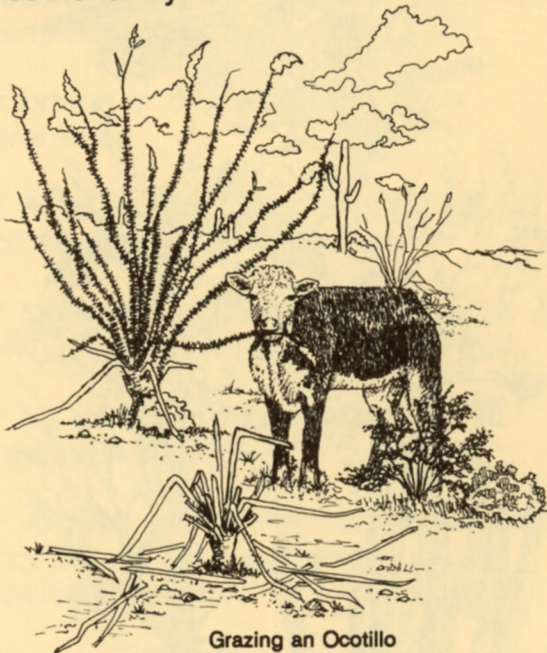
Differences in rainfall, temperature, soil type, and topography create physical environments which in turn support different types of vegetation. A group of plants always associated with a particular physical environment is a plant community.

One of the most striking plant communities in the monument and one of the easiest to recognize is the Mixed Scrub Community. A fine example of it is located to the left (west) on the hillside. It is a diverse mixture of scrubby trees, shrubs, and cacti. The dominant shrub is brittlebush (*Encelia farinosa*), a gray, rounded bush which explodes into a blaze of yellow in the spring. The dominant tree is foothill palo verde (*Cercidium microphyllum*), a small tree with yellowish green bark. Both stand out against the dark volcanic rock outcrops on which they typically grow.



2. DAMAGED OCOTILLO

The plants growing here, with many stems branching like spiked wands from ground level, are ocotillo (*Fouquieria splendens*), members of the ocotillo family.



Grazing an Ocotillo

Ocotillo are "drought deciduous," i.e. they drop their leaves during drought and put out new leaves again when it rains. They may do this several times a year.

These ocotillo have been "grazed" by cattle. During lean years when browse was skimpy, the cattle would reach up and nip the tender tips of the stems or

nibble on the red flowers, breaking the stems in the process.

The Robert L. Gray family started cattle ranching in this country in 1920. Although grazing is generally prohibited in national parks, the Grays were allowed to continue their operation under a special permit after the monument was established in 1937. Their cows are gone now, but the damage they left behind will be around for a long time.

3. PINKLEY PEAK

The massive mountain rising just ahead is Pinkley Peak, 3,145 feet (959 m) above sea level and the highest in the Puerto Blanco Mountains. It was named for Frank "Boss" Pinkley, the able and popular National Park Service superintendent of all the NPS monuments in the Southwest from 1924 until 1939.

The Puerto Blanco Mountains are a mix of lava flows and hardened volcanic ash, both products of volcanic activity that occurred here during Tertiary time (14-22 million years ago). Pinkley Peak is one of the best exposures of these volcanic rocks anywhere in the monument.

4. TIPPED TUFF AND LAVAS

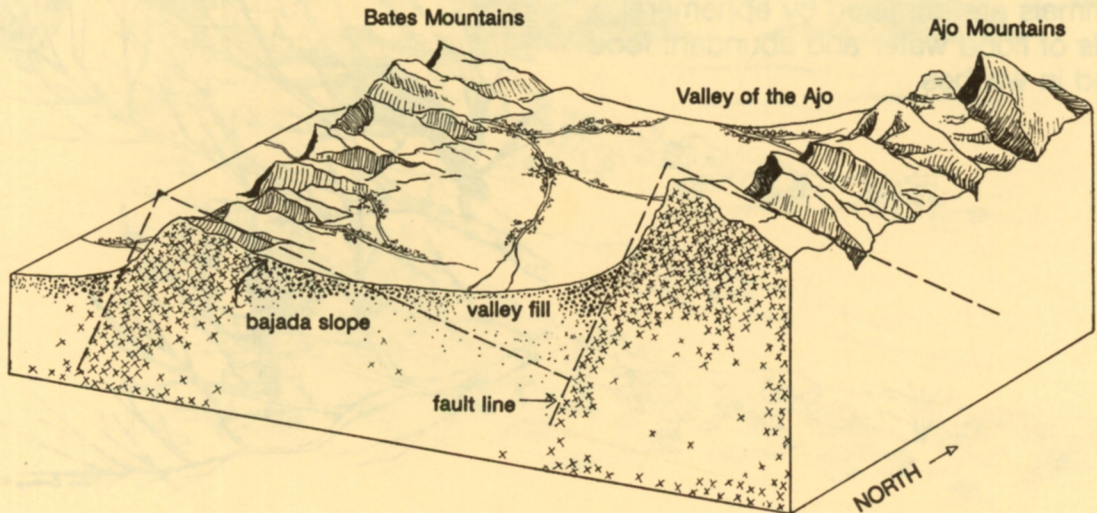
The yellowish patches of rock on Pinkley Peak to the left are layers of "tuff," compressed volcanic ash. Around the tuff are darker rocks that were once in the molten form of lava, oozing over the beds of ash or over other lava flows. After the ash and lava cooled and hardened, they were twisted, tipped, and broken through faulting and uplifting and then further broken down by erosion.

The rocky ledges and slopes created by these volcanic rocks are where the plants of the Mixed Scrub Community grow best.

5. VALLEY OF THE AJO

The broad plain directly ahead to the north is the Valley of the Ajo, which is bordered on the west by the Bates Mountains and on the east by the Ajo Mountains. The Ajo range is the highest in the monument, with Mount Ajo reaching 4,808 feet (1466 m) above sea level.

These mountain ranges were formed by block faulting, in which large blocks of earth were uplifted along fault lines, creating valleys out of the level plains in between. Through erosion, the mountains are being worn down and the valleys are filling up. Eventually the mountains will be buried in their own debris.



6. WASH ENVIRONMENT

The road is about to cross a desert wash, a watercourse typical of desert regions which flows only during floods. When a desert wash becomes deeply entrenched, it is called an *arroyo*.

With regular watering from flooding, the banks of a wash can support a lush thicket of large trees and verdant shrubs, many of which are members of the legume (pea) family. A few of these plants are identified here.

An arroyo or wash thicket provides ideal habitat for a variety of desert creatures, offering moist, shaded areas and a plentiful food supply. Birds such as the ash-throated flycatcher, verdin, and ruby-crowned kinglet are typical of the arroyo environment. Many desert mammals are attracted by ephemeral pools of flood water and abundant food found in washes.

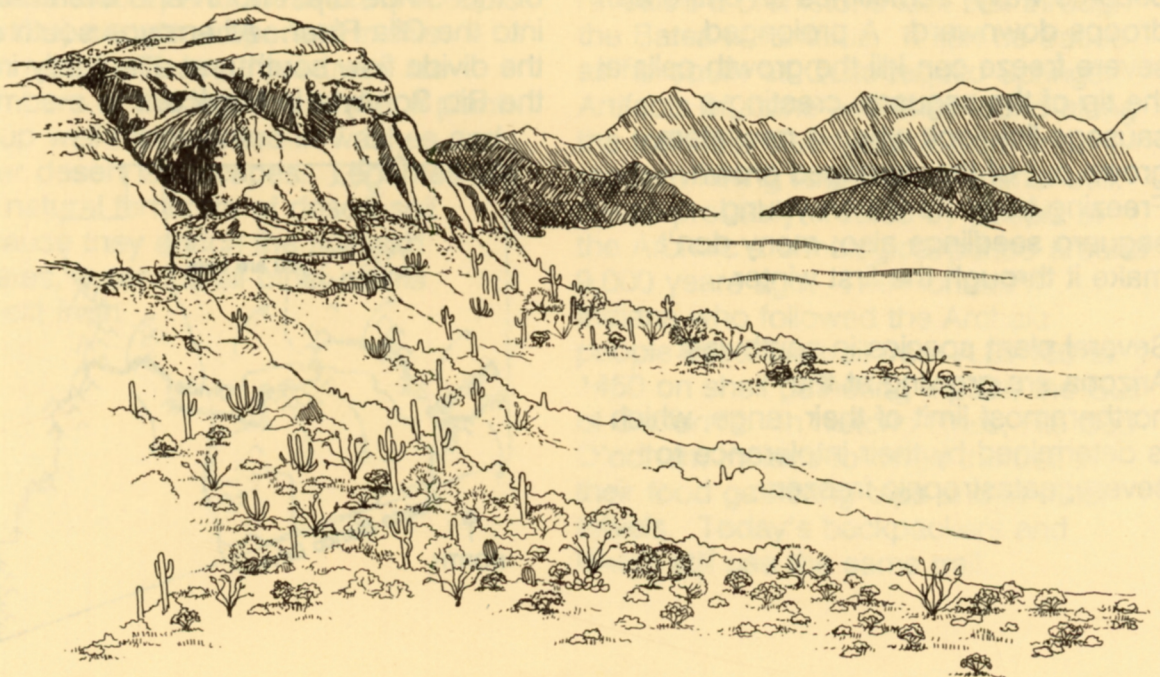


7. THE BAJADA SLOPE

As mountains wear down through erosion, eroded debris is deposited at the mouth of each canyon, spreading out as alluvial fans. Here, the road is cutting across a *bajada*, an area of merged alluvial fans which slopes from the base of the mountains to the valley floor. The size of the particles in the bajada soil is largest at the top of the slope and gets smaller toward the bottom. More soil moisture is available for plants where the particles are larger, so the abundance and diversity of vegetation increases as one ascends the bajada. Because animals are

dependent on plants for nesting sites, roosting places, and food, there is also an increase in the number and types of birds and mammals.

Annual spring wildflowers grow particularly well on bajada slopes, especially north-facing slopes where less sun and cooler temperatures translate into increased soil moisture and higher seed germination. In those favorable years when conditions are just right for the desert annuals to burst into bloom, this section of the drive has one of the showiest flower displays in the monument.



Bajada Slope

8. SIGNS OF HARD WINTERS

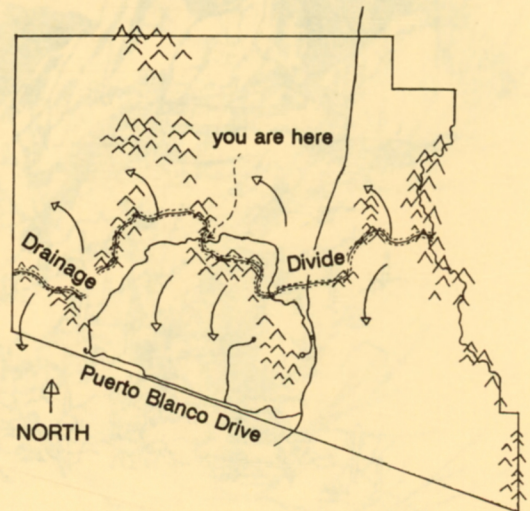
Summer heat in southwest Arizona is intense, with high temperatures often near 110°F (43°C), but the freezing temperatures during the winter are far more damaging to many plants than the heat.

For example, saguaros (*Carnegiea gigantea*), the tall, giant columnar cacti abundant here, can be severely damaged by a heavy frost. Freezing damages their tissue and the resulting tissue rot causes the plant to lose its rigidity and to shrink. Following a freeze, the stems may shrivel and become wavy; sometimes an entire arm droops downward. A prolonged, severe freeze can kill the growth cells at the tip of the saguaro, creating a sausage-link look when a new stem grows out of the damaged crown. Freezing takes its toll on young saguaro seedlings also; many don't make it through the first winter.

Several plant species in southwest Arizona are growing at the northernmost limit of their range, which is determined by their intolerance to severe, catastrophic freezes.

9. LITTLE CONTINENTAL DIVIDE

This point on the drive is where the road crosses a miniature "continental divide" created by two major drainage systems. In order to picture this, imagine the view of this country from an airplane. You would see a vast plain dotted with mountain ranges sitting like girls with full skirts flared out on a level surface. Draining the mountains and slicing through the bajada skirts are thin ribbons of green. This greenery flanks hundreds of arroyos that lead from the mountains into the valleys, where they join bigger arroyos, which ultimately flow into major rivers. All arroyos north of this divide drain north and eventually into the Gila River. All arroyos south of the divide flow south and eventually into the Rio Sonoyta in Mexico.



10. MIXED CACTUS/PALO VERDE COMMUNITY

You are now driving through the Mixed Cactus/Palo Verde Community of plants, which covers almost 50 percent of the monument. It might be better called the "bajada community," as it is found mainly on the bajada slopes.

In addition to cacti, this community supports a wide variety of plants. Saguaro, organ pipe, and cholla cacti are all common here. The dominant tree is the foothill palo verde (*Cercidium microphyllum*), also a key player in the Mixed Scrub Community. Ironwood (*Olneya tesota*) and mesquite (*Prosopis velutina*) are also important in this community. These three trees are members of the legume family, a plant group well represented in washes and other desert landscapes. Legumes are the natural fertilizers of desert soil because they enrich the soil with nitrates, a service all other plants benefit from.

11. LANDFORMS, GEOLOGY, AND HISTORY

To the right (north) in the distance are the jagged Bates Mountains. Kino Peak, the prominent butte in the Bates, is named for Padre Eusebio Francisco Kino, the intrepid Jesuit missionary who brought Christianity and cattle to the area in the late 1600s.

The Bates Mountains are composed of Tertiary age (14-22 million-year-old) volcanic lava with newer basaltic caps on top.

Recent archeological surveys have revealed a prehistoric foot trail through the Bates Mountains. It can be traced as far south as Quitobaquito Springs. Artifacts of stone and shell found along the trail help distinguish it from a modern hiking route or an animal trail. It was probably created by people of the Archaic archeological period around 9,000 years ago. The Hohokam Indians who followed the Archaic people used the trail from A.D. 150 to 1450 on shell gathering trips to the Gulf of California. In historic times, Hia Ced O'odham Indians followed the trail in their food gathering trips and in other travels. Today's backpackers and hikers still use the same trail.

12. ORGAN PIPE CACTUS

When Organ Pipe Cactus National Monument was established in 1937, the boundaries were drawn to enclose and protect most of the organ pipe cacti (*Stenocereus thurberi*) that grow in the United States. These frost-sensitive cacti are common to the south in Mexico, but the monument is near the northern limit of their range. Organ pipes are even more vulnerable to cold snaps than saguaros because their stem diameters are smaller and they lose heat more rapidly. Freeze-damaged organ pipes typically have very wavy or "sausage-link" stems.

Those organ pipes that survive the relatively hard winters in the "north country" of Organ Pipe Cactus National Monument are most often found on south-facing, rocky hillsides, where temperatures are warm enough in the winter to promote seedling survival and to minimize frost damage to adults.

A short trail to the right (west) leads to a middle-aged specimen of this cactus.

13. GOLDEN BELL MINE

These mine shafts are the diggings of Charlie Bell, a local prospector who set up a small mining operation here in the 1930s. He found a little gold and silver, but certainly did not make a fortune here. His ore assayed $\frac{1}{2}$ ounce for every ton mined (about 14 g for every 907 kg). He probably chose this spot because of the vein of pinkish-white quartz, usually a good field indicator of gold or silver.

Other prospectors explored the mineralized portions of the Organ Pipe country for gold, silver, and copper in the late 1800s and into the 1930s, although no extensive or profitable deposits were ever found. The most productive was Victoria Mine, which produced only about \$120,000 in forty years of operation.

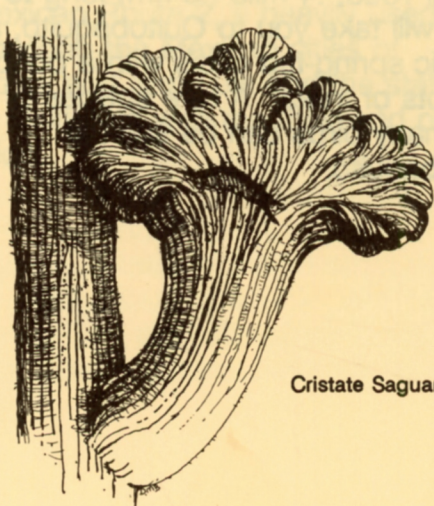
When the monument was established in 1937, mining was prohibited (as it is in most national parks), but it was permitted again in 1941 under a special wartime legislation. In 1976 the 1941 legislation was repealed. Then, in 1978 the land within the monument was closed once and for all to mining when it was designated as a wilderness area.

14. BONITA WELL

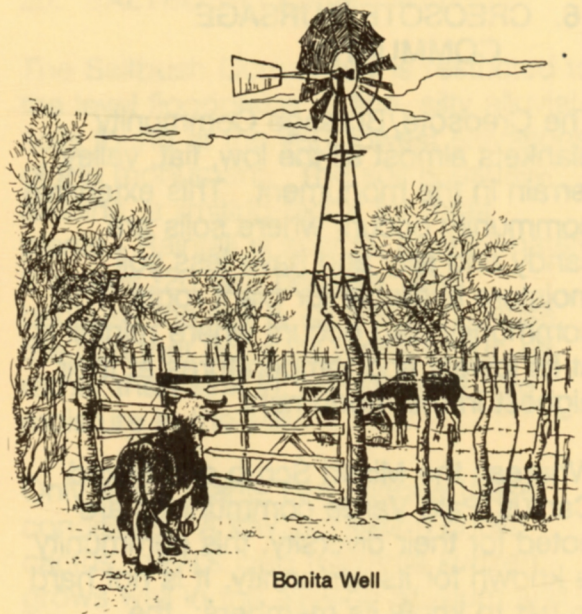
Bonita Well was one of several line camp wells developed in the 1930s by rancher Robert L. Gray and his sons in order to provide water for their stock.

Gray used a unique and clever device to round up his cattle. He would tie the two gates into the corral shut with a piece of stretchy rubber, like an inner tube. A thirsty cow, wanting a drink from the trough inside, would push on the gates until they were spread apart wide enough to get through. Then they would snap shut behind him, trapping the cow inside the corral.

In a region so large that it would take many days and many miles to do a traditional roundup, the trap gate was indispensable.



Cristate Saguaro



Bonita Well

15. CRISTATE SAGUARO

A short trail to the right (west) will lead you to a saguaro cactus (*Carnegiea gigantea*) with an abnormality called a cristate or crested growth, where the normally cylindrical growing tip of a stem spreads out like a fan.

The cause of cristate growth is not fully understood; it may be the result of some kind of injury or frost damage, or may be tied to some genetic mistake. Cristate forms also occasionally occur in organ pipe cacti (*Stenocereus thurberi*), cholla cacti (*Opuntia* spp.), and barrel cacti (*Ferocactus* spp.). It is rare in most other cacti.

16. CREOSOTE/BURSAGE COMMUNITY

The Creosote/Bursage Community blankets almost all the low, flat, valley terrain in the monument. This extensive community occurs where soils are sandy and silty and have less soil moisture available for plant roots. This community also occurs where rainfall is at its lowest and temperatures at their highest in the monument.

Whereas the Mixed Scrub and Mixed Cactus/Palo Verde communities are noted for their diversity, this community is known for its uniformity. It is not hard to get to know its members: the evergreen creosote (*Larrea tridentata*) and gray triangle-leaf bursage (*Ambrosia deltoidea*) make up about 80 percent of the total plant cover. Despite a lack of plant variety, this community is home to many different mammals, reptiles and birds, some of which are not found in other communities.

Traveling west of the monument toward Yuma, one passes through miles and miles of creosote and bursage plains, interrupted only by infrequent green-lined arroyos.

17. BATES WELL/PUERTO BLANCO DRIVE JUNCTION

This is the end of the one-way portion of the drive. To the right, heading north, is an unmaintained four-wheel drive road that passes through the Growler Valley and Bates Well and then leads north out of the monument toward the town of Ajo. To the left, the Puerto Blanco Drive continues for another 27 miles (43 km).

18. QUITOBAQUITO JUNCTION

A spur road, .4 mile (.6 km) long to the right, will take you to Quitobaquito, a historic spring-fed oasis with a pond and lots of trees. A rare species of fish and many birds can be seen at Quitobaquito.

19. QUITOBAQUITO OASIS

The Quitobaquito oasis is the only example of true wetland/marshland in Organ Pipe Cactus National Monument. Because of the presence of water, Quitobaquito has had a long and rich cultural history, with the park visitor adding the latest chapter. The early people did not come here to birdwatch or see the rare pupfish as we do today, but through all time, people have enjoyed the respite from the desert that Quitobaquito offers.

A short trail starts here and leads to the pond, with a spur trail to the springs that feed it.

The four-strand wire fence here delineates the boundary between the United States and Mexico. The highway on the other side of the fence is Mexican Route 2, a heavily used road connecting the Mexican cities of Sonoyta and San Luis and the state of Baja California with the mainland of Mexico.

20. SALTBUSH COMMUNITY

The Saltbush Community is restricted to the level floodplains of fine, silty alluvial soils found at the very lowest elevations of the monument. The soil is usually alkaline, a limiting factor for most plants. Rainfall is scarce, approximately 8 inches (20 cm) per year, and because the soil is so fine and dense, the rain that does fall tends to run off rather than sink in, leaving very little moisture in the soil.

Only a few plants can tolerate these conditions. A low, sprawling cholla cactus, devil's club (*Opuntia kunzei*), grows well in the alkaline alluvium and an occasional mesquite tree (*Prosopis velutina*) can be found. But the real hero of this community is saltbush (*Atriplex* spp.) the common, pale gray shrub growing here, one of few plants that truly flourishes in this environment.

21. INTERNATIONAL BOUNDARY

The land that is now Organ Pipe Cactus National Monument used to belong to Mexico. In 1853, through a treaty called the Gadsden Purchase, the United States bought from Mexico a 43,535 square mile (112,756 sq km) tract of land which included southern Arizona. The United States paid \$10 million for the land. The exact location of the new international line was not determined until boundary surveys by both countries were completed in 1855 and the white boundary markers similar to the one here were erected.



22. DESERT PAVEMENT

On fairly level ground throughout the Sonoran Desert are areas covered by a mosaic of small stones, closely wedged against each other and of uniform size, called "desert pavement." Sometimes

the stones are darkened on their exposed surfaces by a patina of iron and manganese oxides called "desert varnish," created by weathering.

One theory says that desert pavement is formed by sheets of water flowing over an almost level, rocky plain, with the larger stones being left behind and the smaller materials being carried beyond. After the plain dries out, wind carries away the fine soil between the stones and additional flooding wedges them closer together. In this way the "paved" appearance is maintained.

23. SENITA BASIN

A spur road to the left ends at Senita Basin, a peaceful, pretty valley nestled between the Puerto Blanco Mountains and the Sonoyta Mountains. The spur road is 4½ miles (7 km) long. Some of the best examples in the monument of the rare senita cacti (*Lophocereus schottii*) grow in Senita Basin.

24. ELEPHANT TREE AND ITS COMPANIONS

The conditions here in Senita Basin are just right for several unusual plants. The elephant tree (*Bursera microphylla*) is a subtropical species common along

the central coast of the Gulf of California in Mexico, but rare in the United States. A short trail leads up the slope to the north to an elephant tree.

The large cactus adjacent to the pullout is a senita (*Lophocereus schottii*), another plant whose distribution in the United States is very limited, although it is common in Mexico.

Temperature is the main controlling factor in limiting the range of both these species. Organ Pipe Cactus National Monument is one of the few places in the United States to see either of them growing in the wild.

25. SENITA BASIN GEOLOGY

The rocky hills surrounding Senita Basin are made of pink, crystalline granite. This rock material was once in a molten form, but unlike the lava flows elsewhere in the monument, the molten magma that was to become granite never flowed out on the surface. Instead, it oozed into cracks deep below the earth's surface and then cooled very slowly, 40-60 million years ago. Later in time these rocks were uplifted from their deep home and then weathered into their present crumbly state.

26. DESERT FOREST

One of the striking characteristics of a large portion of the Sonoran Desert is the stature of the plants, many of which grow to be tree-sized, even the cacti. The height of the vegetation plus the relative lushness and abundance of it breaks the bleak stereotype of a "desert." The forest-like quality of much of the Sonoran Desert is the result in part of a bimodal precipitation regime: two rainy seasons instead of just one as in other North American deserts. About half of the annual rainfall of 9 inches (23 cm) falls in the winter and the other half in the summer. In this way the plants get watered twice a year.

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