

GUIDE TO THE DRIVE

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# White Sands

NATIONAL  
MONUMENT

NEW MEXICO

A black and white photograph of a cholla cactus (Cylindropuntia) with a tall, spiky flower stalk in a desert landscape. The cactus is in the foreground, and the background shows rolling sand dunes under a clear sky. The text "White Sands" is at the top, "NATIONAL MONUMENT" is in the middle, and "NEW MEXICO" is at the bottom.

# White Sands

## NATIONAL MONUMENT

*Rippled dunes of snowlike gypsum, with plants and animals adapted to a strange environment, in one of the world's most unusual deserts.*

The most spectacular part of the world's largest gypsum desert is included in White Sands National Monument, in the Tularosa Basin of south-central New Mexico. The glistening sea of sand has been drifted by the wind into huge wavelike dunes that are almost bare of vegetation except along the fringes. A few species of plants, remarkably adapted to their peculiar surroundings, have been able to resist burial under the constantly shifting dunes. Several species of animals have developed a protective bleached coloration, making them inconspicuous in their pale environment and thus enabling them to avoid their enemies.

This area is unique in the United States not only because of the immense surface concentration of pure gypsum, which illustrates a combination of natural factors, but also because of the outstanding beauty of the flowing contours of these dazzling white dunes and their intriguing patterns of light and shadow. These patterns are especially impressive and photogenic during late afternoon when the sun is low. And perhaps equally moving is the effect of moonlight upon the undulate dunes.

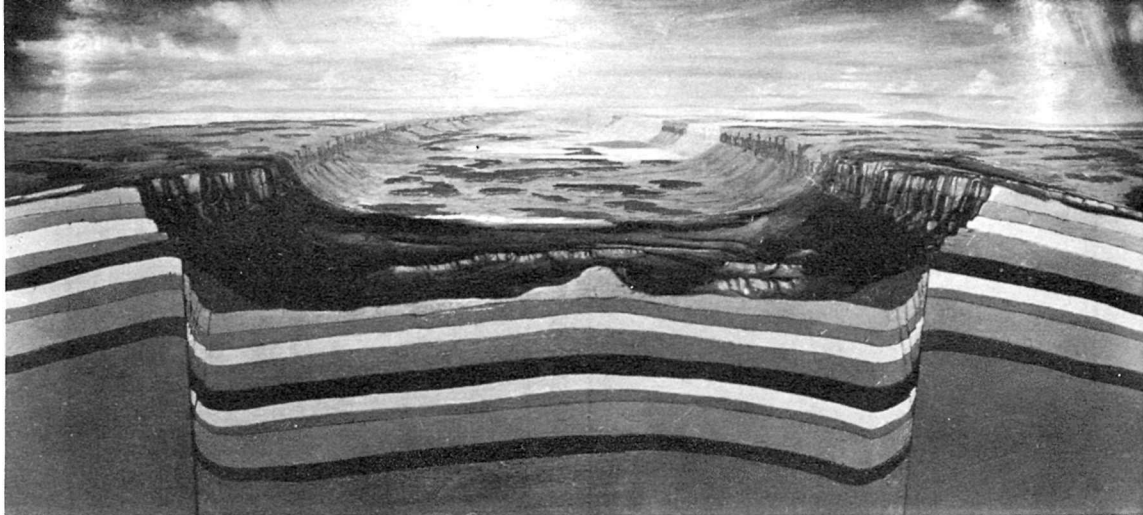
*The National Park System, of which this area is a unit, is dedicated to conserving the scenic, scientific, and historic heritage of the United States for the benefit and enjoyment of its people.*

*Before entering the dune area, you follow the entrance road for about 5 miles. There are many interesting features to be seen along the way, and the self-guide section at the end of this folder will acquaint you with some of them.*

### Geology of the Gypsum Duneland

The Tularosa Valley stretches for more than 100 miles between 2 north-south mountain ranges. All sides of the valley slope gently inward to form a basin, with Lake Lucero, its lowest point, at the southwest extremity of the monument. This valley was formed hundreds of centuries ago, when a great section of the earth's crust settled to form the type of basin known as graben. This phenomenon is effectively illustrated by an exhibit in the monument museum.

High above the basin floor, beds of gypsum are found in the mountain ranges flanking the valley. Similar gypsum beds lie beneath the floor of the basin. This is evidence that the basin was once a part of the high plateau, a great blocklike section which slowly sank to form the basin at its present level.



Museum exhibit, showing the faulting and displacement that created the graben—the Tularosa Basin. The bands of white represent gypsum rock.

Percolating water from seasonal rains and melting snow carries tons of gypsum, in solution, from the mountains into Lake Lucero. During much of the year, cloudless skies and warm dry winds evaporate Lake Lucero and it shrinks to a crystal-encrusted marsh. Capillarity draws the gypsum-laden underground water to the surface; and it, too, evaporates, depositing its burden of gypsum throughout the extensive "alkali flats." The persistent southwest wind picks up the particles of gypsum and whirls them away, adding them to the snow-white dunes—the accumulation of centuries. Thus the dunes are ever-growing, ever-changing.

The dunes are also ever-moving. Like active sand dunes everywhere, these of gypsum are literally marching across the countryside. Prevailing winds blow the grains of gypsum, often in a visible cloud, up the gentle windward slopes. Upon reaching the dune crest, these grains fall onto the steep leeward side, adding to it at the expense of the windward side. Thus the dune continues sporadically to inch forward in a northeasterly direction. The ripples that decorate the flatter dune surfaces are miniature examples of the same process.

The whiteness of the dunes is due, of course, to the fact that the sand is composed of small particles of gypsum (hydrous calcium sulphate), whereas most sand dunes in other parts of the world are composed of minute particles of rock, usually gray, tan, or buff in color.

### Plants and Animals of the Duneland

Because of the almost constant wind and resulting gradual movement of the dunes, such plants as are able to establish themselves in the open flats between the dunes eventually become buried. Of the many species of plants which can grow in the gypsum-impregnated soil, only a few are able to survive the irresistible march of the sand. Through rapid growth and elongation of the stems, the struggling crowns keep on top of the rising crests of the dunes. Plants with stems more than 40 feet long have been found. As the dunes continue onward under the pressure of the wind, they gradually recede, leaving the plants elevated on columns of compacted gypsum bound by their roots.

Animals, too, have been affected by their

unusual surroundings. Small creatures—lizards, mice, and others—are picked off easily by such predators as foxes, coyotes, and hawks when they are conspicuous by their color. Thus, through the centuries, only the lighter colored individuals have survived and, through many generations, have developed races of pale and elusive creatures that blend inconspicuously with their white surroundings here in the monument.

Pocket mice are a good example of this process of evolution. White pocket mice are found among the dunes; in the nearby red hills the pocket mice are a rusty color; and on the beds of black lava a few miles north of the sands another race with very dark fur is found.

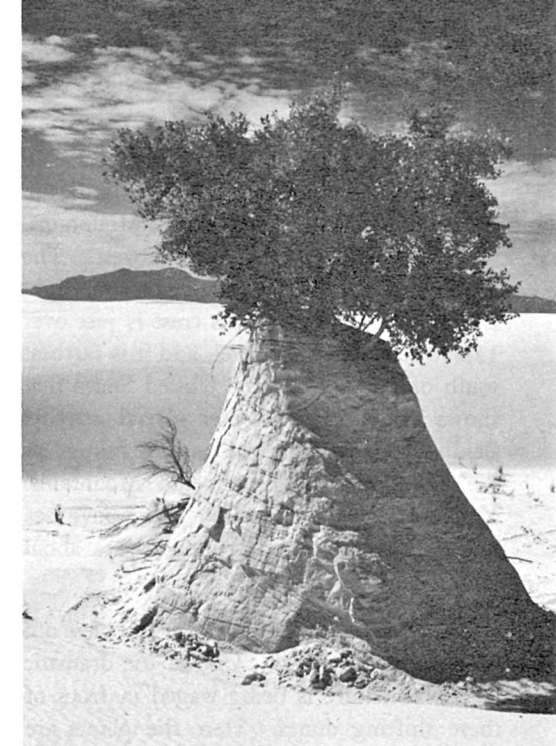
### A Region Rich in Early American Lore

The moving sands quickly covered the tracks made by early people who passed this way, but the sands preserved their tools and weapons, and so we know that they lived and were here.

Arrowpoints and other artifacts found in the monument show that prehistoric Indians camped near the dunes. The remains of an ancient two-wheeled all-wooden cart, probably a Spanish carreta, hint of tragedy here. As the dunes move slowly before the wind, what long-buried traces of other people will be brought to light?

### The Monument Museum

The story of the white sands, how they originated and their influences on the plants, animals, and people of the vicinity, is told in the monument museum. The photographs, paintings, charts, models, and actual specimens will add to your enjoyment of the monument. They will help you to understand the processes of nature and the events in man's history that occurred here. The museum is located in the visitor center.



Cottonwood tree on a pedestal of encrusted sand.

### Hints for Amateur Photographers

Many beautiful and spectacular photographs, both black-and-white and color, have been taken of the sand dunes. Almost without exception, these have been made during the 2-hour period before sunset, when shadows accent the sand ripples and provide strong contrast between the west- and east-facing slopes of the dunes. Before that time, glare of the sun on the sand and lack of shadows cause conditions unsuitable for scenic photography.

### Frequently Asked Questions

*Where is the site of the explosion of the first atomic bomb?*

The first atomic-bomb test explosion was set off about 55 miles north of the headquarters building. This spot is indicated on the map on the back of this folder.

*Where does the water in the picnic area come from?*

Water in the picnic area is hauled by tank truck from headquarters. Since it may become stagnant in the storage tanks, it is not recommended for drinking.

*How large an area is covered by the sands?*

There are about 275 square miles of duneland. Not all of this, however, is within the monument boundaries.

*May I climb the dunes?*

You certainly may, and it is recommended that you do so in order to enjoy fully this unusual experience. The view from the crest of a high dune is stimulating, and such a vantage point provides a splendid opportunity for photography.

*How far down does the sand go?*

The sand is only on the surface and is continually being moved about by the wind.

Late afternoon shadows.



### The Monument

White Sands National Monument, comprising nearly 230 square miles, is located in south-central New Mexico on U. S. 70.

The monument is a wildlife preserve; all plants and animals are protected and must not be harmed or disturbed. HELP KEEP THE SANDS CLEAN by using the fire-places and refuse containers. Vehicles are restricted to roads and parking areas. *It is dangerous to attempt to drive on the dunes.*

### Visitor use Fees

Fees are collected for each automobile, motorcycle, and housetrailer entering the monument. All fees are deposited as revenue in the U. S. Treasury and offset, in part, appropriations made for operating the monument.

### Facilities

Neither meals nor sleeping accommodations are available; facilities may be found in Las Cruces (54 miles) and Alamogordo (15 miles). A picnic area, with tables



Dunes held in place (stabilized) by plant growth.

and fire grilles, is provided for those who bring lunches. A concession at headquarters sells souvenirs and refreshments. Overnight camping is not permitted within the monument.

#### Administration

White Sands National Monument is administered by the National Park Service, U. S. Department of the Interior. A superintendent, whose address is Box 231, Alamogordo, N. Mex., is in immediate charge.

#### Mission 66

Mission 66 is a program designed to be completed by 1966 which will assure the maximum protection of the scenic, scientific, wilderness, and historic resources of the National Park System in such ways and by such means as will make them available for the use and enjoyment of present and future generations.

#### GUIDE TO THE DRIVE

Watch for the Numbered Posts along the Right-Hand Side of the Road.

These posts refer you to the following numbered paragraphs. If one of the people in your car will read aloud the proper para-

graph as you come to each post, your visit to White Sands National Monument will be much more enlightening and enjoyable.

**Post No. 1.** The dunes to your left have become stabilized by the established vegetation. As the plant roots grow downward into the sand, they anchor the grains of gypsum. Only a few species of plants are able to survive on the bare gypsum dunes, but enough of them have become established among these fringe dunes to hold them in place. Please remain on the road; there are many more spectacular dunes ahead, where turn-outs enable you to park your car and climb the dunes.

Notice the line of mesquite (mess-KEET) bushes some distance to your right. These are growing along an old oxcart road. Seeds contained in ox droppings took root, and the resulting bushes now mark the route of the old trail.

**Post No. 2.** The low grayish shrub so abundant here is fourwing saltbush and should not be confused with sagebrush, which is found in the colder, higher Great Basin desert much farther north. Leaves of saltbush have a salty taste and are palatable to wildlife. Saltbush grows in the sands only

among the more stable fringe dunes like those to your left.

**Post No. 3.** The white sands are located in the wide valley known as the Tularosa Basin. Ahead of you are the San Andres Mountains, which border this basin on the west. The high mountain in the distance to your right is Sierra Blanca Peak. Its crest is just over 12,000 feet above sea level, and it is farthest south of any peak in the United States that shows evidences of former glacial activity. Behind you, forming the eastern border of the basin, are the Sacramento Mountains. You are now about 4,000 feet above sea level. The largest nearby dunes are about 30 feet high.

**Post No. 4.** The dunes at your left have not yet become stabilized. One of the dramatic battles of nature is being waged in front of these shifting dunes. Here the plants are struggling to gain a foothold and to keep their crowns from being buried by the sand, which is steadily moving toward the northeast before the prevailing winds, engulfing the vegetation in its irresistible progress.

The dark-green shrub in the area to your right is iodine bush. The name is derived from the color and appearance of the dried sap from crushed stems of the plant.

**Post No. 5.** You are now entering the dune area. Vegetation finds it much more difficult to survive in the moving sands. Among the several species of plants that can get a precarious foothold on the dunes are squawbush, verbena, yucca, shrubby pennyroyal, and rabbitbrush.

**Post No. 6.** The large dune ahead and to your left is quite active and would soon bury

the road if the sand were not frequently cleared away. All of the active dunes are slowly moving toward the northeast, pushed by the prevailing southwest wind. Constant clearing is necessary to keep the road open, but occasionally a dune wins the battle and the road must be rerouted.

To your right are several gypsum pedestals. Plants were once growing on top of a dune, and their roots, penetrating deep into the sand, bound the grains together. The dune, being still active, moved on slowly, leaving behind the columns of gypsum held together by the tangled mass of fibrous roots.

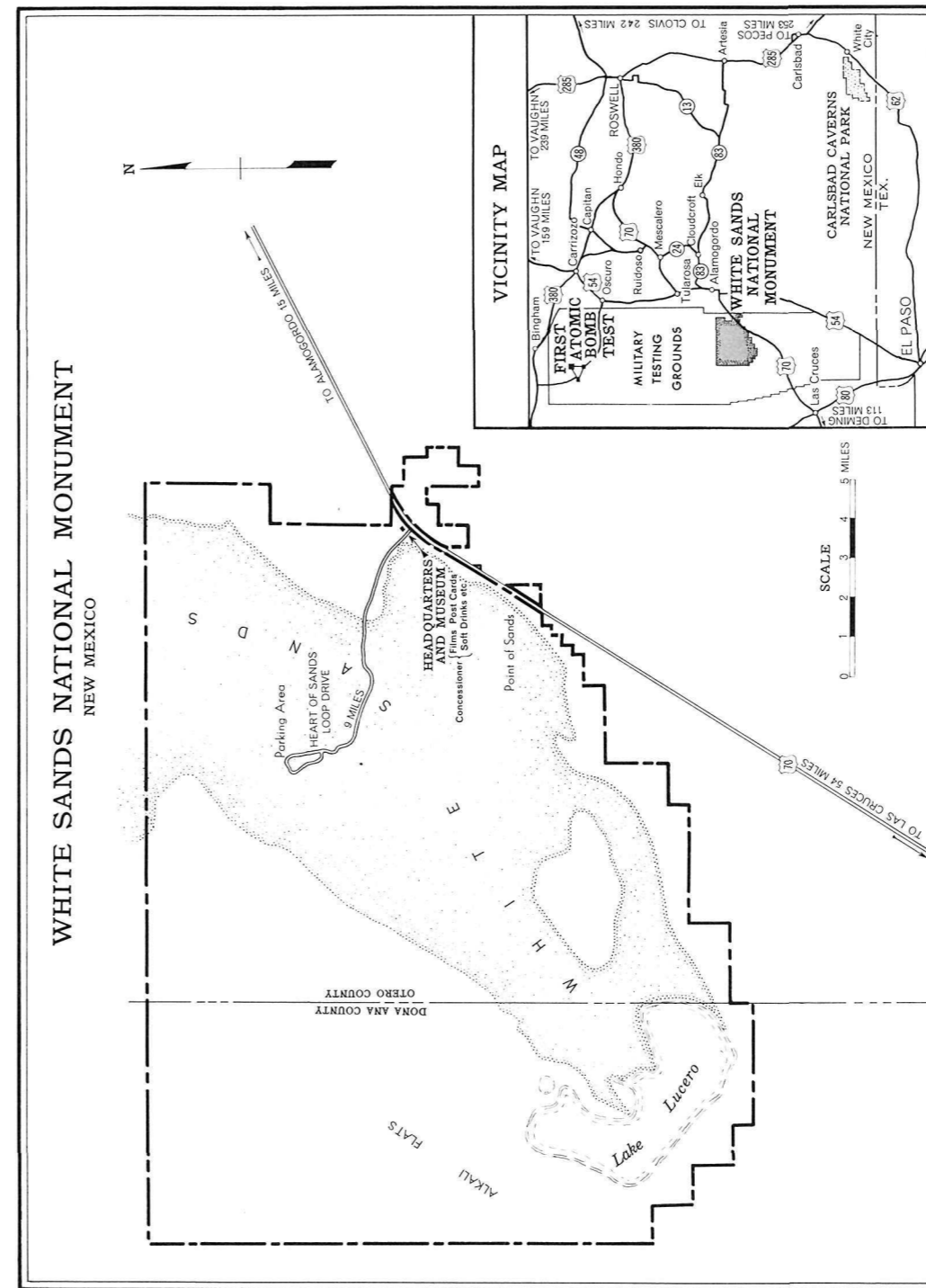
**Post No. 7.** Note the level depressions between the dunes. You may be surprised to learn that the water table is high here and in some of these depressions you may reach water by digging down only a few feet. This water contains a great deal of gypsum in solution, but it provides moisture that many species of plants can use, which explains the growth of vegetation. On your left is a small cottonwood tree, and to your right a number of other cottonwoods are visible.

**Post No. 8.** You are now entering the section of the drive which takes you into the spectacular heart of the dunes. The most scenic part of the drive lies ahead. The road from here on is pure, hard-packed gypsum.

After completing the drive and before you leave the monument, you should stop at the visitor center and examine the exhibits that have been designed to explain the many features of the area. A park ranger is on duty to answer your questions and clear up any matters about the monument that may puzzle you.



UNITED STATES DEPARTMENT OF THE INTERIOR  
Stewart L. Udall, Secretary  
NATIONAL PARK SERVICE, Conrad L. Wirth, Director



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