



## Lake Lucero



In the heart of New Mexico's Tularosa Basin, wave-like dunes of gypsum sand of White Sands National Monument cover 275 square miles of desert. Sandwiched between the dunes and the San Andres Mountains, lies a vast area known as the Alkali Flat. Lake Lucero lies in the southwest corner of this flat, which is the lowest part, and together they make up the source of the dunes.

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### Formation of the Alkali Flat

During the last ice age, 24,000 to 12,000 years ago, the climate was much wetter. Rain and snowmelt carried gypsum and salt into the basin from the San Andres Mountains to the west and from the Sacramento Mountains to the east.

The gypsum runoff settled in a 1,600

square mile lake we now call Lake Otero. About 12,000 years ago, as the ice age ended, Lake Otero began to evaporate, changing from a lake to a playa, or dry lake bed. Left behind were concentrations of crystallized gypsum called selenite.

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### How the Dunes Began

The selenite crystals formed beneath the clay and silt surface of the flat and waited for the wind, which began to sweep the area at the end of the ice age. Dry air currents carried the clay and silt from the basin and exposed the buried crystals.

Eventually, freezing and thawing broke

the large crystals into progressively smaller chunks, finally turning them into sand. The tiny grains were picked up by the wind and bounced along in a process called saltation. Constantly moving to the northeast, sand grains move a few inches at a time, eventually formed the famous white dunes.

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### Lake Lucero

Today, after heavy rains, water still settles in a ten square mile area, called Lake Lucero, where the process of dune formation continues.

The soil of the Tularosa Basin contains vast amounts of gypsum laden water. Capillary action forces the water upward. Beneath the surface of Lake Lucero, selenite crystals form in the mud, just as they did in the former and larger Lake Otero.

A thin crust of gypsum and other minerals, including table salt and Epsom salt, may also be deposited. Eventually, this crust is swept up by the wind and carried from the basin, exposing more selenite crystals, which break down to form more sand.

The formation of sand at Lake Lucero and Alkali Flat is on a smaller scale than it was when Lake Otero existed, but

Lake Lucero and Alkali Flat remain the primary source of new dunes in the White Sands National Monument.

Today, the trail to Lake Lucero passes steep gullies where selenite crystals have been exposed by erosion of what was once the floor of Lake Otero. As the break down continues, selenite fragments are washed into Lake Lucero. You may see them as transparent crystals. Eventually, they turn white as they collide and scratch each other in the wind. The resulting scratches reflect white light. The sand is also whitened as it is dried by the wind and sun. That's why, immediately after rain storms, the dunes appear to be tan in color, before they again dry out.

## People and the Dunes

As sand formation began at the end of the last ice age, prehistoric people from Asia moved throughout most of North and South America, hunting mammoths, camels, giant bison, and horses. Fossilized footprints of these huge animals can be found today on the Alkali Flat and Lake Lucero.

By 10,000 years ago, ancestors of modern Native Americans were hunting bison in the lush grassland of what is now the Tularosa Basin.

As the climate became more arid, the large animals disappeared, and the hunters were forced to pursue smaller game and to gather plants.

Two thousand years ago, the people were more dependent on agriculture. They abandoned seasonal migrations in favor of permanent villages. By A.D. 700, people were living in canyons around the basin. By A.D. 1100, large villages had been built near permanent water sources including two settlements on the west side of Lake Lucero.

The villages were mysteriously abandoned by the early 1300s. The basin was empty after nearly 10,000 years of occupation.

The Mescalero Apaches had established themselves by the early 1600s in the

area's mountains and Apache resistance delayed European colonization of the basin until the mid 1800s.

In the late 1700s and early 1800s, Spanish expeditions from El Paso entered the area to mine salt on the Alkali Flat. In the 1860s, Hispanic New Mexicans settled in the La Luz and Tularosa Canyons on the east side of the basin.

After the Mescalero Reservation was established in 1873, settlers from the eastern states and Texas replowed the fields of the ancient people and introduced sheep, goat, and cattle ranching. In 1897, Jose and Felipe Lucero began ranching on the south shore of the lake that would bear their name. Eventually, they owned 20,000 acres. Visitors to Lake Lucero can see stock pens, a well, watering trough, and a fallen wind pump of the Lucero ranch.

In 1933, White Sands National Monument was established to protect the world's largest gypsum dune field and the unique plants and animals that live in the dunes.

The Luceros and many other ranchers abandoned their cattle operations during World War II when much of the basin became a bombing range.

## 2010 Tour Schedule

Every month, White Sands National Monument offers a ranger-led tour of Lake Lucero to visitors interested in learning more about the formation of the dunes and the origin of the sands.

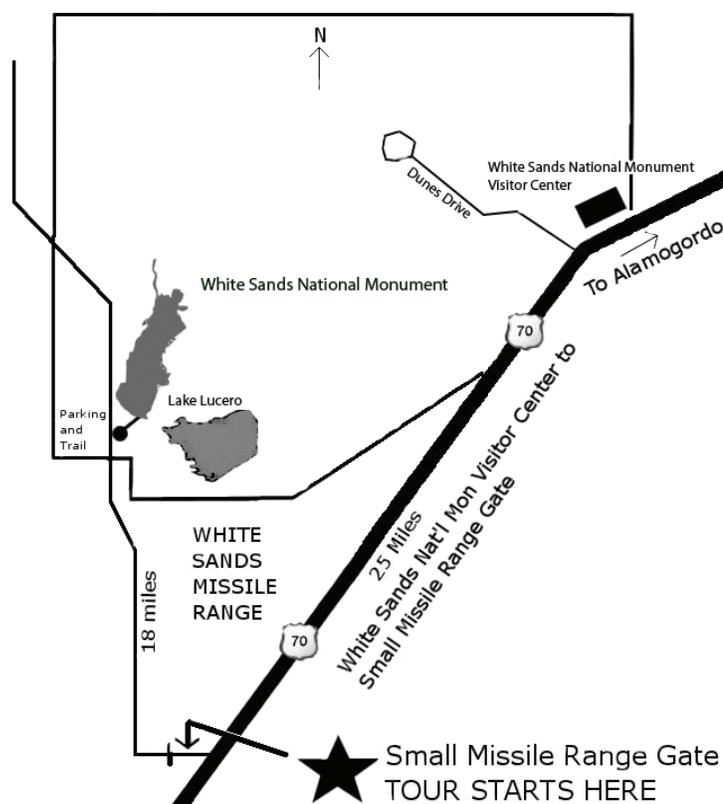
### 2010 Tour Dates

2 pm Saturday, January 30  
2 pm Sunday, February 28  
9 am Saturday, March 27  
9 am Sunday, April 25  
5 pm Saturday, May 29  
5 pm Saturday, June 26  
5 pm Saturday, July 31

Reservations are required and accepted one month in advance of the tour date. Special fees of \$3 per person 16 and older and \$1.50 per person for 15 and younger apply. Call 575-679-2599 ext. 236 to make your reservation.

5 pm Saturday, August 28  
9 am Sunday, September 26  
9 am Saturday, October 30  
10 am Saturday, November 27  
2 pm Saturday, November 27  
10 am Sunday, December 26  
2 pm Sunday, December 26

## Map to Start of Tours



Lake Lucero tours start twenty-three miles south of the monument at the Small Missile Range Gate, located on Hwy 70 W between mile markers 174 and 175. A ranger will check you in and collect the tour fee at the missile range gate. The drive to the trailhead from the gate is 17.5 miles, so make sure to have a full tank of gas. There are no gas stations between Alamogordo and Las Cruces on Hwy 70.

The tour takes approximately three hours, two hours of which are outside. Be sure to bring plenty of water, snacks and sunscreen. Dress accordingly for the weather. The hike from the trailhead to the lake is 3/4 of a mile long over rough desert terrain and washes, so wear good shoes (no open-toed shoes). Dogs are allowed on the tour as long as they are on a leash.