

Prehistoric Trackways National Monument



Welcome to Trackways



Prehistoric Trackways National Monument (Trackways) was established by Congress in 2009. It was designated to conserve, protect, and enhance the unique and nationally important paleontological, scientific, educational, scenic, and recreational resources and values in the Robledo Mountains of southern New Mexico. It encompasses approximately 5,280 acres and is administered by the Bureau of Land Management (BLM), Las Cruces District Office.

Trackway's paleontological resources contain footprints of numerous amphibian-like early tetrapods, lizard-like reptiles, stem-mammals, and invertebrates (insects, arachnids, and worms), as well as leaves, petrified wood, and marine invertebrate shells. Collectively, these fossils provide new opportunities to understand animal behaviors and environments from a time predating the dinosaurs. Trackways contains one of the most scientifically significant early Permian Period track sites in the world. Please note that all paleontological resources in Trackways require a BLM permit to collect.

KNOW BEFORE YOU GO

The summer at Trackways is often dry and very hot. Severe thunderstorms, called monsoons, can cause flash flooding from June to September. Expect freezing temperatures from late fall to early spring. Any outing in Trackways should include daypacks with water, snacks, a first aid kit, and sunscreen. Cell phone service is unreliable in many places.

Always let someone know where you are going and when you plan to return.



WATER. Drink at least one gallon per day if you are hiking. There is no water available at this site.



DOGS ON A LEASH. Pets are permitted in the monument but must be kept on a leash.



WATCH FOR WILDLIFE. Rattlesnakes, mountain lions, scorpions, and coyotes live in this area. Be cautious of your surroundings and be respectful of wildlife.



DRIVE AND BIKE ON DESIGNATED ROUTES. Vehicles and bicycles are only allowed on designated routes throughout the monument. If parking a vehicle, stay within 25 feet of road edges.



SUN PROTECTION. There is little shade at Trackways. Wear sunscreen, a hat, and sunglasses. Limit your exposure in the summer months.



LOOSE ROCKS AND ROUGH TERRAIN. Wear shoes that are comfortable, have traction, provide ankle stability, and protect against cactus spines and rough rocky terrain.



STORM SAFETY. Keep an eye on the sky and be aware that monsoon thunderstorms bring lightning and can cause unexpected flash floods. Stay alert to your surroundings.



PROTECT FOSSILS. This site contains many significant fossils. Please respect the area by leaving fossils undisturbed. Any collection of paleontological resources requires a BLM permit.

Plan Your Adventure

There are many opportunities to explore Trackways on foot or with an off-highway vehicle (OHV). Opportunities include birdwatching, hiking, biking, horseback riding, and OHV riding. There are two hiking trails: the Ridgeline Trail and the Discovery Arroyo Trail. The Ridgeline Trail begins at the parking lot and connects as a loop about one-mile westward while the Discovery Trail splits off from Ridgeline about 0.7 miles from the parking lot. The loop is 2.8 miles and offers views of the Rio Grande Valley, the Organ Mountains, and the Dona Aña Mountains.

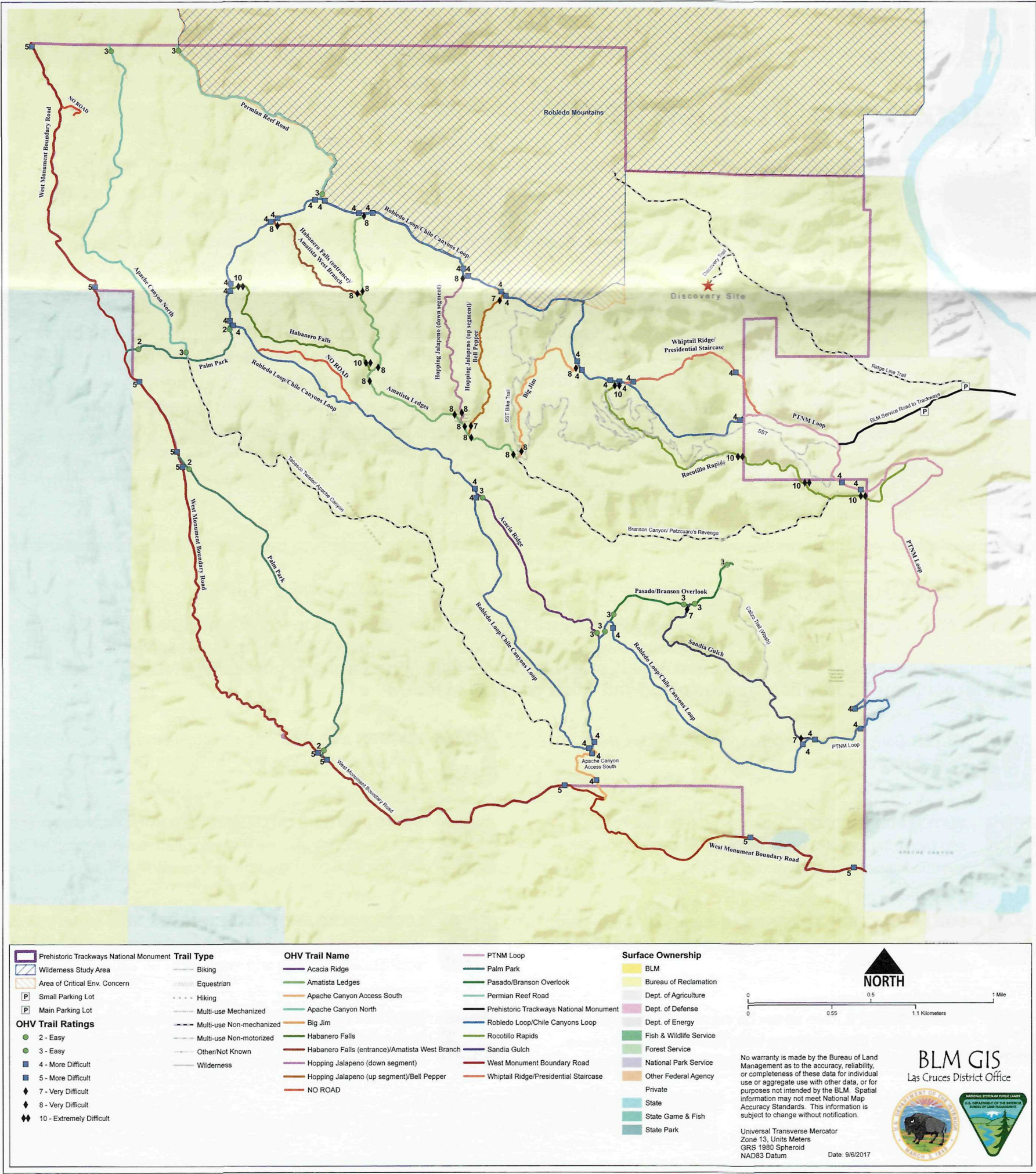
Please note that fossils on the trail may be difficult to identify. Go with a BLM specialist or local paleontologist for this type of opportunity.

How to Get There

North of Las Cruces, NM: from I-25, take Exit 19 toward Radium Springs onto Fort Seldon Rd. Turn left onto NM-185/N Valley Drive and after 8.5 miles, turn right onto Shalem County Trail. Cross the Rio Grande and turn right onto the only dirt road, Permian Track Rd., leading to the west. After about a mile, this road is for high-clearance, 4-wheel drive vehicles only.

OHV Trails

There are several trails within Trackways for OHV riders. The map below shows OHV trails as well as ratings for levels of difficulty. Please follow Leave No Trace and Tread Lightly ethics while exploring the monument.



Traces of a Permian Seacoast

The land that is now Trackways was once part of a coastal floodplain on the edge of an inland sea with various forms of aquatic, plant, and insect life as well as many vertebrates. Today, Trackways is home to more than 150 fossil localities from the early Permian Period, 298 to 289 million years ago (Mya). One of the biggest misconceptions about Trackways is that there are dinosaur fossils in the area. Trackways is a fascinating place for exploration and paleontological discovery because the footprints and fossils in the area are older than the dinosaurs! The fossils found here tell us a story from an ancient time when southern New Mexico was home to a variety of early life.



The Early Permian Period

In the early Permian Period, the continents formed together as the supercontinent, Pangea. In the Late Paleozoic Ice Age, the south pole of Pangea was covered in huge ice sheets that waxed and waned, causing global sea levels to rise and fall. Trackways was located in the arid equatorial region of western Pangea where the land was partially flooded by the sea. There were only two seasons at this time: one very wet and the other very dry.

Primitive amphibians and reptiles roamed the hot and seasonally arid landscape, while clam-like **brachiopods**, sea urchins, and **crinoids** (sea lillies) covered the warm, shallow seafloors of the Hueco Seaway.

The Hueco Seaway

The Hueco Seaway was a shallow tropical sea that covered much of southern New Mexico during the early Permian. Trackways lies on the northern edge of this seaway



where mud and clay accumulated to form limestone and shale deposits. The warm waters of the seaway were home to a diversity of marine animals, most notably brachiopods, bryozoans, and crinoids. A few clams and snails lived among these animals, and, in places, many **fusulinids** (single-celled shelled organisms) blanketed the sunlit seafloor. Predators in the waters above included **cephalopods** (shelled, squid-like animals) as well as sharks. They indicate a seafloor not unlike the shallow, sunlit sea bottoms of today's Caribbean Sea. Rivers in north and central New Mexico flowed southward to meet the Hueco seashore, forming a vast floodplain teeming with prehistoric life and plants. Conifer forests grew on the river floodplains with *Walchia* being the most common tree. Millions of fossil shells, especially brachiopods, are found in the rock layers of the Robledo Mountains today.

The Robledo Mountains

Trackways is located in the Robledo Mountains which lie along the western side of the Rio Grande Valley just northwest of Las Cruces. Most of the rocks exposed in the Robledo Mountains are from the early Permian Period or older. Younger Cenozoic Era volcanic and sedimentary rocks are also present.

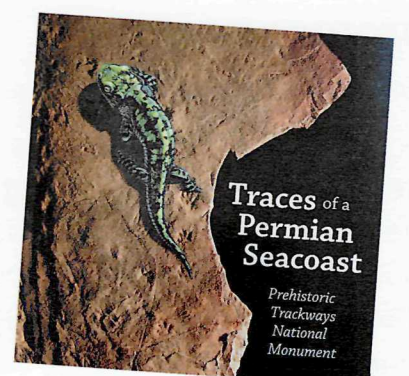
The Permian-age rocks are made of the Hueco Group, which was deposited over a 9 million-year period, starting around 298 Mya. The Hueco Group is over a quarter-mile thick and is comprised of the Shalem Colony, Community Pit, Robledo Mountains, and Apache Dam Formations. These units are mostly grey and yellow marine limestone and shale deposited in the Hueco Seaway, except for the red sandstones and shale deposited on the shore and floodplains. It is in these red rock deposits that most of the plant fossils, and both vertebrate and invertebrate tracks, are found. Over the last 36 million years, complex faulting and igneous intrusions have fractured the Hueco Group strata into many broken blocks of rock that form the rugged canyons and steep ridges that characterize the Robledo Mountains landscape.

The Cenozoic deposits in Trackways include volcanic rocks as well as sediments from the Love Ranch, Palm Park, and Camp Rice Formations. The Camp Rice Formation is made up of river and floodplain deposits from the Ancestral Rio Grande in the late Pliocene to middle Pleistocene Epochs. The Love Ranch Formation is made of conglomerates from when the Robledo Mountains were first uplifted and eroded. The Eocene-age (approximately 48 Mya) Palm Park Formations consists of both gypsum-rich lake deposits and pyroclastic flows from long gone volcanoes.

During the last few million years, younger alluvial sediments have been deposited via the Rio Grande and its tributaries. Throughout the Robledo Mountains, there are no rocks of the Mesozoic Period between 251 Mya and 66 Mya (i.e., the time of the dinosaurs).

Learn More about the Permian Seacoast

The Bureau of Land Management, in partnership with the New Mexico Museum of Natural History and Science published *Traces of a Permian Seacoast* to explore the history of Trackways and the myriad of fossils discovered at the monument. Purchase a copy of this 48-page book to learn more about this area.



Fossil Exploration at Trackways

Paleontologists distinguish two types of fossils: **body fossils** are mineralized remains of the hard tissues of animals or plants - bones, shells, and petrified wood, and **trace fossils** show the work of an organism - how it moved and how it behaved. Trackways includes a major deposit of early Permian trace fossils from amphibian-like early tetrapods, lizard-like reptiles, and stem-mammals, as well as insects and arachnids. Trackways also includes fossil imprints of plant foliage and petrified wood.

These fossils provide opportunities to understand extinct animal behaviors and environments from a time predating the dinosaurs. Fossils at Trackways, like the ones described below, may be hard to find. Go with a BLM specialist or local paleontologist for this type of opportunity.



Illustration of possible *Batrachichnus* trackmaker. The word means 'frog trace.'

Dimetropus

(die-MEET-row-puss)
meaning "Dimetrodon foot."

Dimetropus were up to 4 meters (13 feet) long and the sail-backed Dimetropus was the largest predator known from the early Permian. A ferocious meat eater, it was the "T. rex" of its day. Dimetrodon tracks are about the size of an adult human hand.

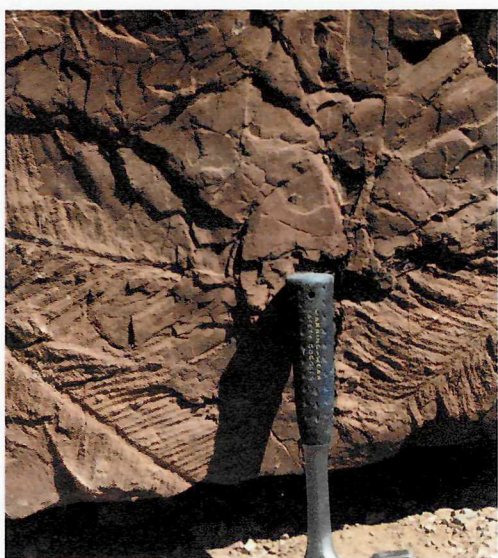


Some of these trackways from the Robledo Mountains record more than 20 footfalls of a single animal and show them walking with a surprisingly upright posture.

Walchia

(WALL-chee-uh) named after naturalist Johann Walch.

In the early Permian, conifer-dominated woodlands bordered the floodplains. *Walchia*, the most common conifer, probably looked similar to a modern Norfolk Island Pine and could grow as tall as 30 meters (100 feet). Near the Hueco seacoast, it grew in expansive forests with extinct seed-bearing ferns with few other kinds of trees. In Trackways, extensive mats of *Walchia* fronds are found on mudflat surfaces, sometimes associated with footprints. Driftwood from these trees is also found in the form of petrified wood today.



Dromopus

(dro-MOE-puss) meaning "running foot."

Dromopus fossils are reptiles whose feet are similar to lizards but that predate the oldest lizard fossils by more than 100 million years. Paleontologists describe the *Dromopus* trackmaker as an araeoscelid, a kind of early reptile with a lizard-like foot.



The trace fossil *Batrachichnus*

Batrachichnus

(baa-track-ICK-nuss) meaning 'frog trace.'

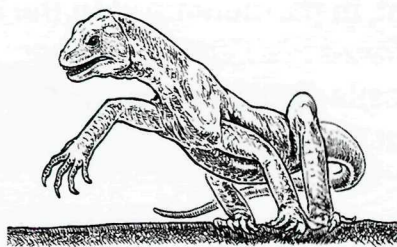
Small salamander-like amphibians left numerous tracks along the coastal floodplain during the early Permian. These tracks are less than 2.5 centimeters (1-inch) long and are the most abundant of the vertebrate tracks in Trackways. *Batrachichnus* were made by many different species of small amphibians who lived along the freshwater rivers and likely could not tolerate salt water.

Brachiopods

Brachiopods are shelled animals that look like clams but have different symmetry. In addition to the differing internal anatomy, in most clams the line of symmetry is parallel to the hinge line, resulting in two halves with the same size and shape. In brachiopods, the line of symmetry is perpendicular to the hinge line, resulting in the two halves being different sizes and shapes, but the left and right are mirror imaged.



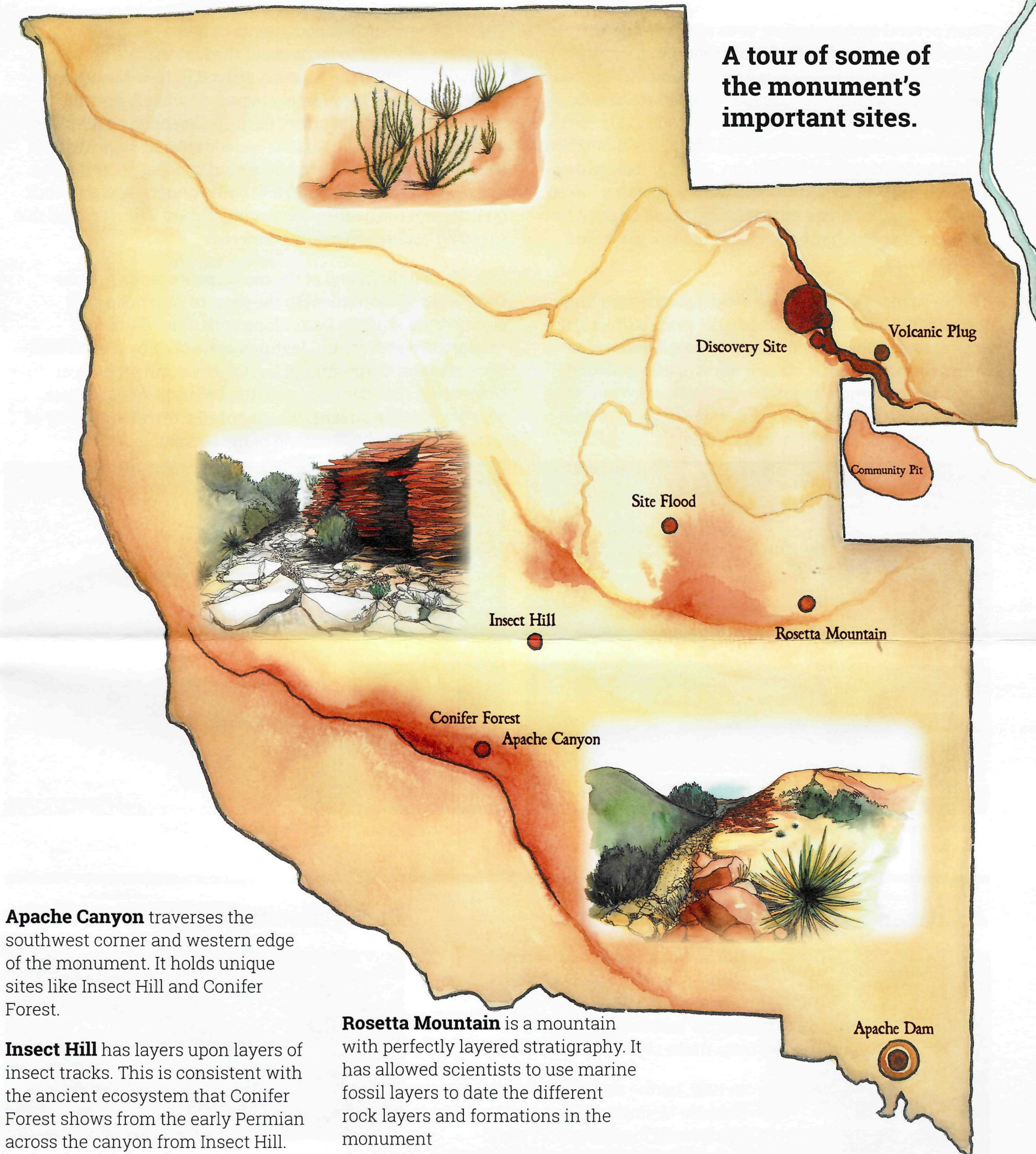
Brachiopods are commonly seen in Trackways and reflect the area's ancestral seafloor.



The track *Dromopus* was made by a lizard-like araeoscelid reptile.

Prehistoric Trackways National Monument

A tour of some of the monument's important sites.



Apache Canyon traverses the southwest corner and western edge of the monument. It holds unique sites like Insect Hill and Conifer Forest.

Insect Hill has layers upon layers of insect tracks. This is consistent with the ancient ecosystem that Conifer Forest shows from the early Permian across the canyon from Insect Hill.

Conifer Forest is a fossil site that contains dense amounts of conifer branch fossil impressions. The fossils show blankets of branches of *Walchia* trees from an ancient forest.

Site Flood is an early Permian site that shows evidence of sea levels rising and falling. This site contains petrified wood, plant fossils, and fossil charcoal from these climatic events. Scientists from all over the world have researched this site for clues to climate change.

Rosetta Mountain is a mountain with perfectly layered stratigraphy. It has allowed scientists to use marine fossil layers to date the different rock layers and formations in the monument.

The **Community Pit** was called fossil hill before the 1980's. It has provided some of the most unique and rare fossils, such as horseshoe crab tracks and jelly fish imprints.

The **Volcanic Plug** is one of several small igneous intrusions within Trackways. Faulting that occurred during the uplift of the Robledo mountains provided conduits for magma to travel to the surface. This plug notably contains naturally occurring basalt columns.

The **Discovery Site** is where Jerry MacDonald excavated trackway fossils that would go on to encompass the Jerry MacDonald Paleozoic Trackways collection at the New Mexico Museum of Natural History and Science.

Apache Dam is a dam that the Civilian Conservation Corps (CCC) built in the 1930's to protect the valley below from flooding.

Cultural Connections

From several archaeological sites identified in the Prehistoric Trackways National Monument, a story can be told of the deep history and ties that Indigenous people have with the landscape. Chipped stone debris (known as debitage) found at sites provide evidence that Indigenous people used local stone from the monument to make tools for their day-to-day tasks and activities. Tools such as bifaces (a stone implement with a flaked edged) served multiple purposes and could be used for tasks such as butchering game animals or preparing animal hides.

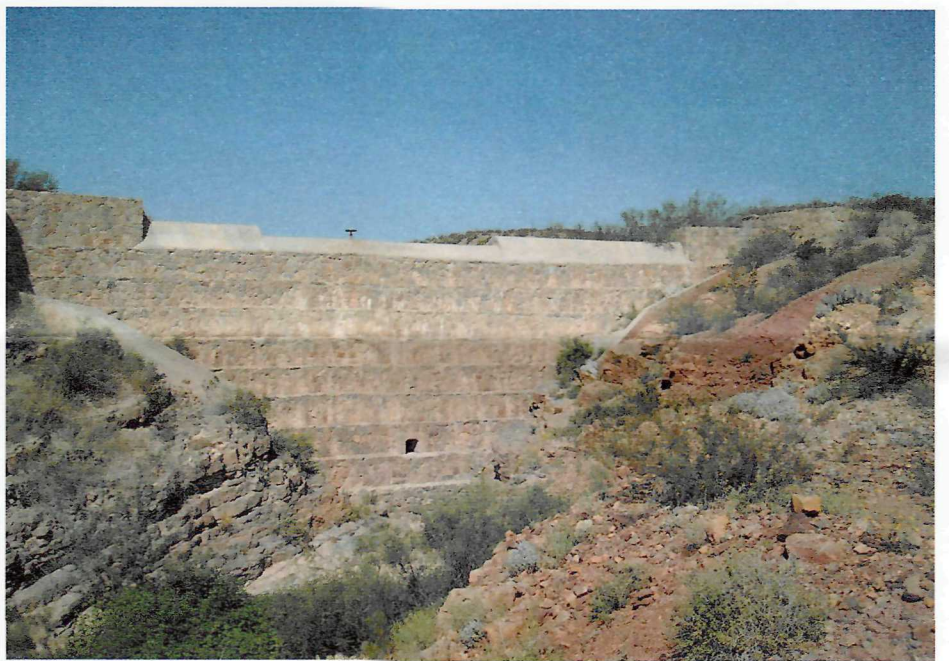
The presence of ground stone tools (tools created through the grinding, pecking, or polishing of stone surfaces) at sites demonstrates that Indigenous people processed local vegetation and/or other natural resources found throughout the monument. For example, a ground stone metate was typically used as a surface to grind certain wild seeds or maize into a flour or meal.



This is an example of a partially complete ground stone metate with a mano on it.

There are few historic documents or archaeological sites that allow us to learn about the historic use of the monument. When the Spanish arrived in New Mexico in the 16th century, they largely bypassed what is now the monument for lands further north. Indigenous peoples such as the Manso and the Apache were known to have lived in the area. The primary use of the land by local people in the last century has been related to cattle grazing and as a rock quarry from the nearby Community Pit No. 1 (now closed due to public health and safety concerns).

Near the southern end of the monument stands Apache Dam, a proud monument to the feats of American civil engineering. Apache Dam, along with other dams and numerous water control features, were built by the Civilian Conservation Corps around Las Cruces during the Great Depression. The dam was constructed in 1936 to mitigate seasonal flooding events which posed a threat to the city of Las Cruces and the farmland of the Mesilla Valley.



Apache Dam, photo circa 2008.

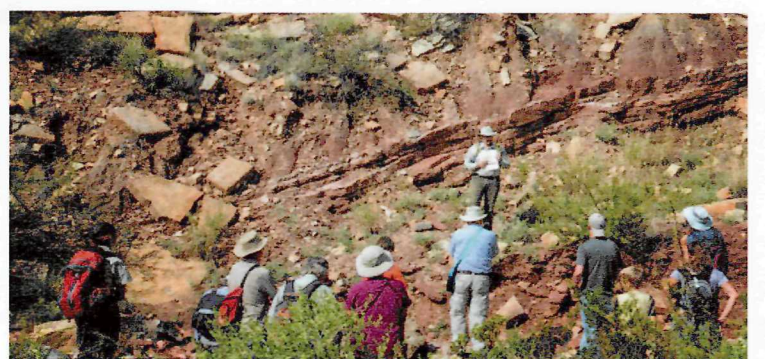
A Citizen Scientist Paleontologist



Not all great fossil discoveries are made by professional scientists. Sometimes, a dedicated, self-taught "amateur" paleontologist can make significant discoveries.

In 1987, hiking alone in the Robledo Mountains, Jerry MacDonald found the now world-famous early Permian tracksites that led to the creation of the monument. Since the late 1980's, Jerry has worked closely with scientists to develop a new understanding of the Permian trackway record based on his discoveries. Jerry's determination to preserve Trackways for future generations was a huge factor in convincing the U. S. Congress to establish the monument to protect the fossils and promote their further study and interpretation.

BLM Paleontologists



Federal paleontologists speak for the fossil resources on public lands. This involves reviewing projects for potential impacts to fossils and prescribing mitigation measures such as surveying and monitoring to protect fossils. Paleontologists also inventory the land to look for new fossils and collect them if needed. They visit known fossil localities to monitor for impacts from natural forces and/or human impacts and they host outreach events for the public to educate people on fossils. To participate in a guided hike, contact the Las Cruces District Office at (575) 525-4300.

Explore More Paleontological Sites in New Mexico



Aden Lava Flow Wilderness

The Aden Lava Flow Wilderness is located in the Organ Mountains-Desert Peaks National Monument and is characterized by basaltic flows, volcanic craters, and coppice sand dunes. The wilderness lava flows includes pressure ridges, lava tubes, and steep-walled depressions up to 100 feet-wide. Grass and shrubs grow on the lava flow with cacti and yucca. Vegetation consists of grasslands and desert shrubs such as mesquite and creosote. Vent tubes, and the many crevices found in the lava, provide cover and den sites for wildlife. Melanistic (dark) forms of mammals and reptiles live on the black lava flows, including the rock pocket mouse and black-tailed rattlesnake. Bats are also numerous, making their homes in the cracks of this broken lava landscape. In 1929, a group of Boy Scouts discovered a complete skeleton of the Shasta ground sloth fossil while exploring a volcanic gas vent in the Aden Lava Flow. Using radiocarbon dating, scientists estimate that the bear-sized sloth fell to its doom around 11,000 years ago. What other fossils may be hidden in the crevices of the Aden Lava Flow?

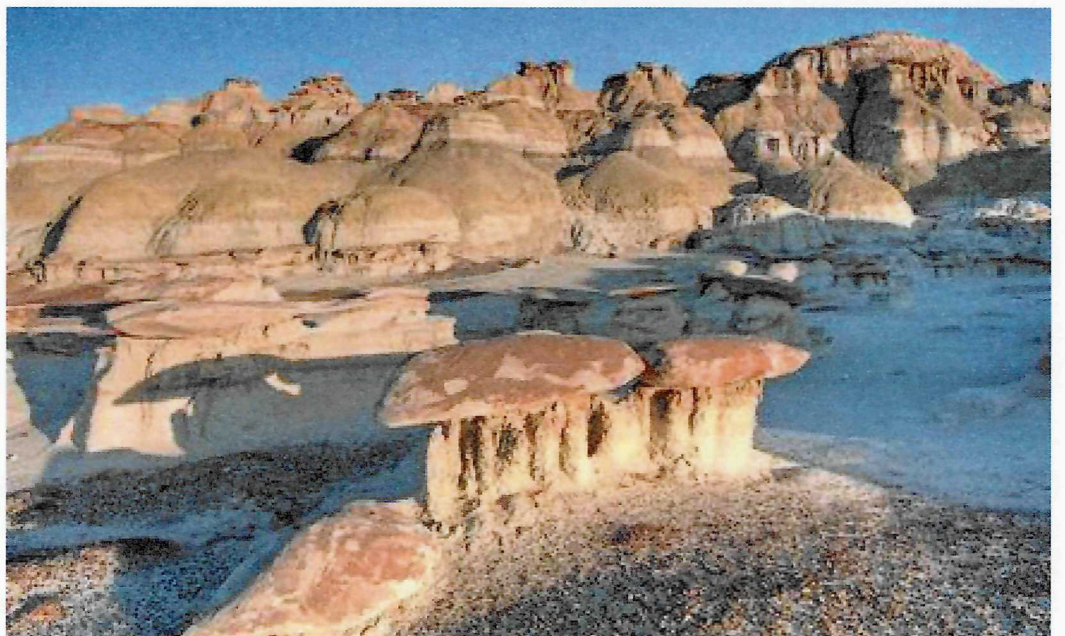
Bisti / De-Na-Zin Wilderness

The Bisti/De-Na-Zin Wilderness is a rolling landscape of badlands that offers some of the most unusual scenery found in the Four Corners Region. Time and natural elements have etched a fantasy world of strange rock formations made of interbedded sandstone, shale, mudstone, coal, and silt. The weathering of the sandstone forms hoodoos - weathered rock - in the form of pinnacles, spires, cap rocks, and other unusual forms. Fossils occur in this sedimentary landform. Translated from the Navajo language, Bisti (Bis-tie) means "a large area of shale hills." De-Na-Zin (Deh-nah-zin) is Navajo for "cranes."



Ah-Shi-Sle-Pah Wilderness

Fossils from the Late Cretaceous Period (dinosaur, crocodilian scutes, and turtle shell) can be found at Ah-Shi-Sle-Pah (meaning "gray salt" in Navajo). This BLM wilderness is located in northwest New Mexico and is a badland area of rolling, water-carved clay hills. There are fossils amidst sparse vegetation of sagebrush, piñon-juniper, Great Basin scrubland, and grassland. A unique landscape of sandstone cap rocks and scenic olive-colored hills contains soft colors rarely seen elsewhere. Water is scarce and there are no marked trails. Be prepared before you visit.



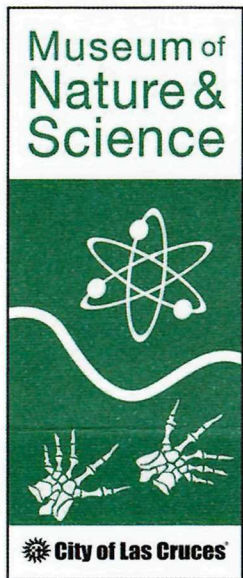
Example of a tree mold. Photo courtesy of USGS.

West El Malpais

In both El Malpais National Monument and El Malpais National Conservation Area near Grants, New Mexico, lava flows cover the landscape. While you won't find dinosaur fossils in the area, plant fossils and tree molds are visible. Tree molds form when lava quickly wraps around an existing tree - the cool and moist tree trunk causes the lava to form a crust and leave behind a cylindrical shape as the lava cools.



Partners



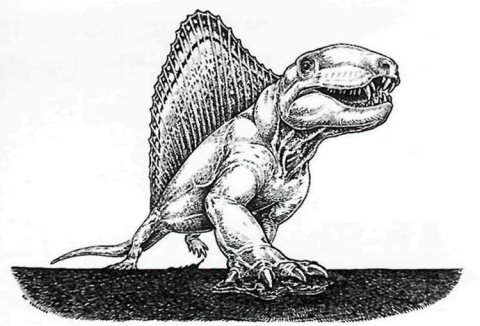
The Las Cruces Museum of Nature & Science exhibits some of the finest trackways specimens from Prehistoric Trackways National Monument. Nearly a dozen species are represented in two of the largest continuous trackways excavated from the site including trace fossils *Dimetropus*, *Dromopus*, *Batrachichnus*, and tracks of invertebrates.

The museum is located in downtown Las Cruces and is open Tuesday – Friday 10:00 am – 4:30 pm and Saturdays 9:00 am – 4:30 pm. Admission to the museum is free.



An Outdoor Classroom

Prehistoric Trackways National Monument offers a way to explore our ancient past, in a time before the dinosaurs. Not only do trace fossils provide opportunities to understand what was here in the early Permian Period but they tell us stories of how plants and animals existed, how they behaved, and how they moved. The monument is a short, twenty-minute drive from downtown Las Cruces and provides students and families a chance to experience what life was like in the area millions and millions of years ago.



LEAVE NO TRACE

Visitors help protect wild areas by making conscientious choices and minimizing their personal impact. By following Leave No Trace principles, you help ensure that public lands remain intact for future generations.

1. Plan ahead and prepare:

Plan ahead and bring the right supplies.

2. Travel and camp on a durable surface:

Stay on the trail and camp on established sites.

3. Dispose of waste properly:

Bring all of your trash out with you, including human waste.

4. Leave what you find:

Leave natural items, fossils, and cultural artifacts where you found them.

5. Minimize campfire impacts:

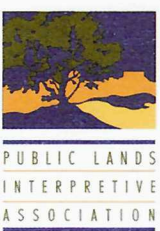
Only burn fires where allowed and make sure to put them out.

6. Respect Wildlife:

Leave wildlife alone and watch it from a distance.

7. Be considerate of other visitors:

Make sure to give other visitors the chance for a natural, peaceful experience.



This publication was developed as a cooperative project between the Bureau of Land Management and Public Lands Interpretive Association, a non-profit organization that inspires and educates the public about the natural and cultural heritage resources of America's public lands.