

Sage branches can be cut, bundled into smudge sticks, and burned to create a pleasant smell. Sand Sage is an indicator of sandy soil. Deer love to browse it.

CL-7. Butterfly location (seasonal) – Which type of butterfly is attracted to what plants?

The wildflowers along the cave trail are perfect places to find butterflies like the white hairstreak, swallowtail, and monarchs. Look for butterflies on the desert marigolds, Indian paintbrush, senecio, and asters. Native grasses like Indian rice grass, blue grama, and sideoats grama are also places to watch. Butterflies are looking for nectar sources and places to lay eggs. Plants where butterflies lay eggs are ones that can be eaten by the caterpillar larva which come from the eggs.

CL-8. Cave – Why is there a black stain on the ceiling?

Notice the smoke stains on the ceiling of the cave. This shows that the cave was used by prehistoric peoples. They may have burned juniper wood, pinon, or manzanita.

CL-9. Cave – Why is it so high off the ground?

Early Native Americans preferred caves that were above ground level because they stayed dry during storms, were more difficult for animals to enter, and provided a view of the surrounding territory in case of enemy attack. Also, there has been erosion at the base of the cave so it is further from the ground than it once was.

Cave opening – How could native peoples use such a small opening?

Early Native American adults were shorter in height than today so the small size of the cave opening and the lower ceiling were not a problem for them.

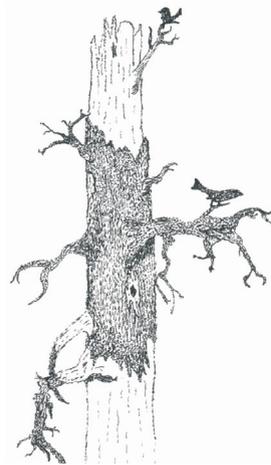
CL-10. Climate zone and vegetation differences – What are the climate and vegetation differences between the canyon area and the cave loop?

The slot canyon trail is generally protected from the hot midday sun and to some extent from wind. It has shade and runoff water. The cave trail includes western and southern

exposures with less shade and water and more exposure to the wind. While most of the plants in the cave loop can also be found in the canyon area, many plants in the canyon area need more water than is available in the cave loop.

CL-11. Cholla on your left and prickly pear on your right – What are cholla and prickly pear and how can they be used?

Cholla is the taller “stick-man” looking cactus with neon pink blooms followed by yellow fruit. Prickly pear, under the juniper, is the smaller ground-level cactus with lots of pads and purple fruit known as tunas. Prickly pear cactus blooms yellow in the spring. Tunas appear after the blooms fade and can be used to make a delicious jelly.



CL-12. Bird in Ponderosa snag – what is a snag and why are they useful?

The dead tree you see is called a snag. Dead trees perform an important function in nature. They are used by birds to scout the area for enemies, to nest in cavities or holes they made or other birds made, and by insects for shelter and food. The insects then attract the birds since insects are a source of food for birds. Woodpeckers, ravens, hawks, and eagles love snags.

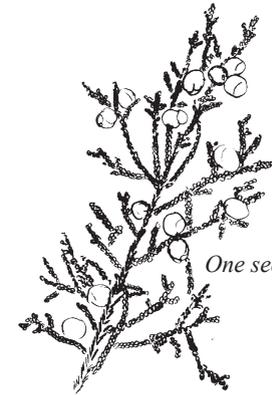
CL-13. The cave loop contains one seed juniper, pinon, chamisa, sand sage, apache plume, and three-leaf sumac – species adapted to drier conditions. It also has many cholla or “stick-man” cactus, prickly pear, and some barrel cactus.



Cholla



Manzanita



One seed juniper



Sand sage

Student Trail Guide

Kasha-Katuwe Tent Rocks NATIONAL MONUMENT

New Mexico • Albuquerque District



An Educational Guide to Biology and Geology

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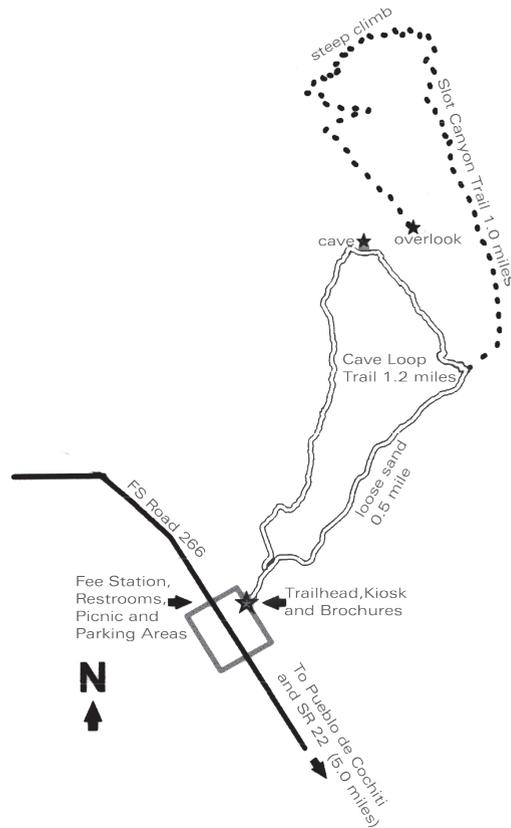


Leave No Trace: Plan ahead and prepare - Travel and camp on durable surfaces - Dispose of waste properly - Leave what you find - Minimize campfire impacts - Respect wildlife - Be considerate of other visitors.

Slot Canyon Trail

Welcome to Kasha-Katuwe Tent Rocks National Monument. We hope you enjoy your hike at the Monument.

In order to conserve costs and resources we ask you to please return this guide to the box.



SC=Slot Canyon Trail
CL=Cave Loop Trail

SC-1. Dead piñons – What caused the trees to die?

There are many dead piñon pines in northern New Mexico. The short answer to why they're dying is the trees are being destroyed by attacks from tiny bark beetles called ips beetles. The longer answer is that several years of drought stressed the trees. When stressed, trees send out a special scent (pheromone signal) that attracts the beetles. In the wetter decade of the 1990's piñons spread beyond their natural range. With the drought of the early 2000's the piñons are retreating and grassland is returning to the area. This is the natural ebb and flow of plant life.

SC-2. One-Seed juniper – What is this plant? How is it adapted to the desert? How can it be used?

One-seed juniper (mono meaning one and sperma meaning seed) is a very large shrub that ranges in size from

6-20' tall with fine-textured waxy, scaly leaves which look somewhat like alligator skin. The waxy, scaly leaves reduce water loss, a benefit for desert plants where water is scarce. The females have blue berries that were used by Native Americans for medicinal purposes and food. The wood was used for bows and arrows, building material, fuel, and prayer sticks. The bark was used for a green dye, fibrous mats, and saddles. One seed junipers have an extensive root system that supports them and reduces soil loss where they grow.

SC-3. Nurture plants (shrub live oak under one seed juniper on left side of trail) and nurture rocks– What is a nurture plant and what do they do?

See the shrub oak under the one seed juniper. The juniper is acting as a nurture plant or mother plant for the smaller oak. It's protecting the plant from nibbling animals and shading it from the hot sun. Rocks often perform a similar function for cactus or other plants, keeping them shaded, protected, and directing water to them when they're young.

SC-4. Manzanita – Why is manzanita so unusual and how is it used?

Manzanita is a beautiful evergreen shrub growing on the hill-sides that's unique to this area. In the spring lovely light pink flowers bloom. The remainder of the year you can see shiny leathery leaves and cinnamon colored bark. Manzanita is difficult to grow so you don't see many of them in landscapes. To germinate, the seeds need fire, cold, and scratching that comes from wind rolling them over the ground. Native Americans used the wood for pipes and tools, the leaves for medicine, and the berries for food.

SC-5. Ponderosa trunk – What does the trunk smell like?

Smell the bark of the ponderosa pine. Does it smell like vanilla?

SC-6. Ponderosa tree roots – How do roots work?

Roots circle the tree. All trees have multiple sizes of roots: large water and nutrient carrying roots closest to the trunk that lead into progressively smaller mats of tiny feeder roots at the farthest edge of the circle. The feeder roots can be found in a circle which is 2 to 5 times the tree canopy. These roots gather water from far away so the tree can survive. Some trees, like pines, also have a deep root below the trunk called a tap root. You are lucky to see all three types of roots on this Ponderosa pine. The tap root is the deep root underneath the trunk. The larger side roots are the ++-nutrient carrying roots. Along the canyon wall look for smaller diameter roots which lead to the tiny feeder roots. Feeder roots capture water and minerals from the soil and provide them to the trunk and leaves (needles for pines).

SC-7. Cottonwoods, hop trees – How can these trees exist in the desert?

Generally in the desert you don't find very tall trees with large leaves. If you see them at all growing naturally, they'll be in river or stream areas. There's just not enough water to support big trees with large leaves. Because water is funneled into the canyon area and because the tall walls provide more shade from the sun, trees that need more water such as narrow leaf cottonwoods and hop trees are found in the canyon area. The shade reduces the amount of water loss for these trees. Smell the leaves of the hop tree (it has leaflets in threes). That's why they're named after hops, a grain crop used to make beer.

SC-8. Mosses and lichens – Why/when do mosses and lichen appear?

This wall contains moss. Mosses grow on rock where water is available. Notice that most of the mosses are soft, green and on shaded moist walls. Lichens grow on rocks where it's drier and come in various colors: yellow, orange, blue, gray, green, and black. They are made up of two life forms: algae within a fungus framework. Some lichens are thousands of years old and are very fragile. Lichens are pioneer life forms and open the way for more complex life forms to grow.

SC-9. Mountain mahogany seeds – Why are the seeds of mountain mahogany shaped as they are?

In the fall, mountain mahogany puts out seed that look like small curly, white pieces of yarn. Mother Nature designed the seeds to spiral into the ground. Notice the small toothed edges of the leaves.

SC-10. Huge boulders blocks the trail – Where do the boulders come from?

As the layers of volcanic ash erode huge boulders come loose and roll to the canyon floor. Also, boulders are formed from sections of the canyon wall that break free when cracks expand and contract with freezing and thawing water.

SC-11. Bird nesting places high in the cliffs – Which birds use the nesting places high in the cliffs?

At the top of the cliffs are half moon cutouts formed by wind and water. Birds use these protected places for nesting. See if you can see the swifts, which fly in bursts and then sail on the wind. Swallows, kestrels, hawks, ravens, and even eagles use these as nesting places too.

SC-12. Box Elder – Have you seen any other Box Elders in the canyon?

The Box Elder is a tree related to the maple family. This is the only spot in the canyon where you can find one of these trees. This tree is not an evergreen so it does lose its leaves in the fall.



Cave Loop Trail



CL-1. Animals/Reptiles – Which animals/reptiles are found and where?

Watch for coyotes, rabbits, lizards, and rattlesnakes along the trails. Coyotes and rabbits like one-seed juniper and sand sage and inhabit the arroyos. Lizards and rattlesnakes prefer rocky, warm areas, but may seek out shade during the heat of the day. Talking helps warn a rattlesnake that you're coming.

CL-2. Baby tent rocks on wall (look up) – How are tents formed?

Tent looking formations are created when the softer volcanic ash or tuff wears away from the solid rock that forms the cap. If a tent rock loses its cap, the remaining formation will wear away quickly. Notice that tents formed near the top of the cliffs are smaller in height than those formed near the base of the cliffs which may be as much as 90' tall.

CL-3. Teepee garden – How are the teepees different from hoodoos?

Teepees are shorter and wider than hoodoos. Also unlike the tents on the canyon trail there are no boulders at their base or caps on top. The teepees were formed differently. Bursts of hot volcanic steam (fumaroles) escaped from below the ground and pushed through the surface material to form the teepee. You can identify a teepee by the blow hole near the top and the knife edge at the top.

CL-4. Sand dune – How did the sand get here?

Prevailing winds from the northwest blow pumice from cliffs to this location forming the sand dune you see before you.

CL-5. Yucca baccata or banana yucca – How was it used by Native Americans?

Look close! This yucca plant that has wider leaves had many uses by Native Americans such as fibers for making mats, sandals, and baskets, paint brushes for pottery, as a medicine to reduce swelling, as soap or shampoo, and as food.

CL-6. Sand Sage – Where are the trees?

Possibly the inhabitants of the cave used the trees around the cave for fire wood. With the trees gone, sand sage took over. As a shrub, sand sage is about 4' tall and has soft, light evergreen, fine textured leaves with a pleasant dusty aroma. Sand