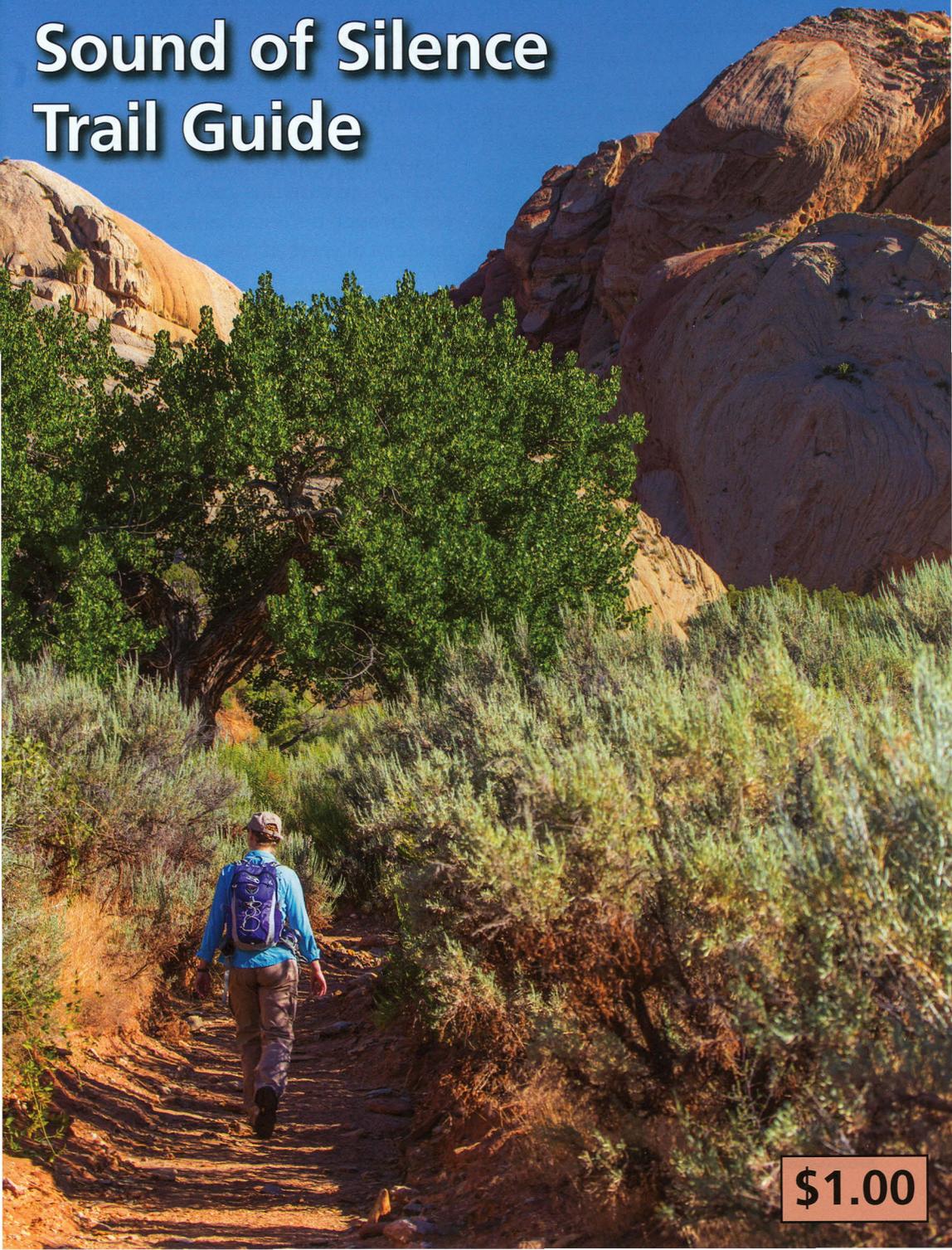


National Park Service  
U.S. Department of the Interior

Dinosaur National Monument  
Utah, Colorado



# Sound of Silence Trail Guide



**\$1.00**

## Trail Facts

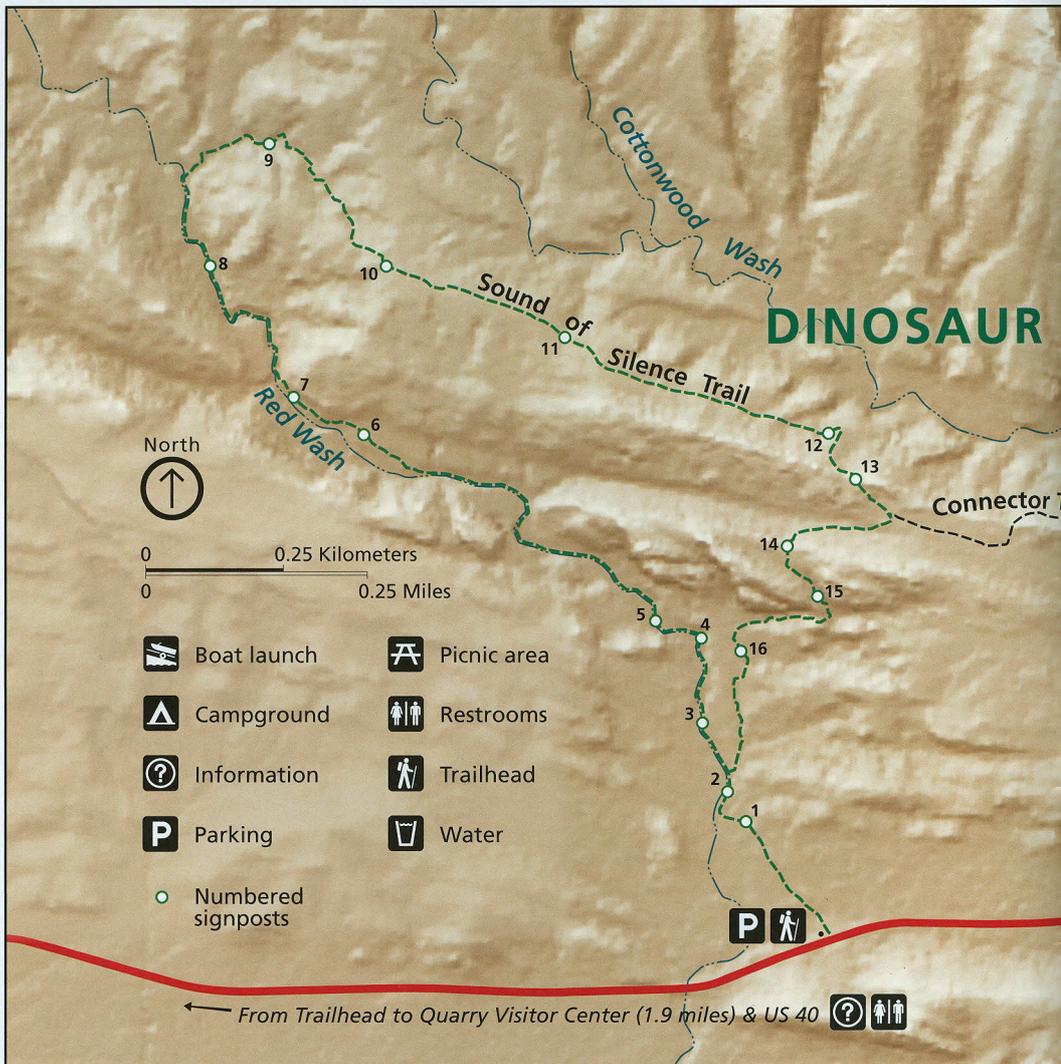
3.2 miles (5.1 kilometers) loop.  
Allow 2 to 3 hours for the hike.

## Hike Safely

- Wear comfortable, sturdy shoes.
- Carry water (at least ½ gallon per person) and snacks.
- Wear protection from the sun.
- Seek shelter immediately if thunder is heard or lightning is visible.
- Steep drops. Watch children!
- Rock scrambling is required.

Welcome to the Sound of Silence Trail. While you hike through one of the quietest places in the West, natural sounds will prevail, including the call of birds and the rustle of wind through the plants. Though we may associate this place with quiet, the landscape can speak to us — if we are ready to listen.

Numbered signposts along the trail correspond with this guide, taking you through different habitats and millions of years of time.



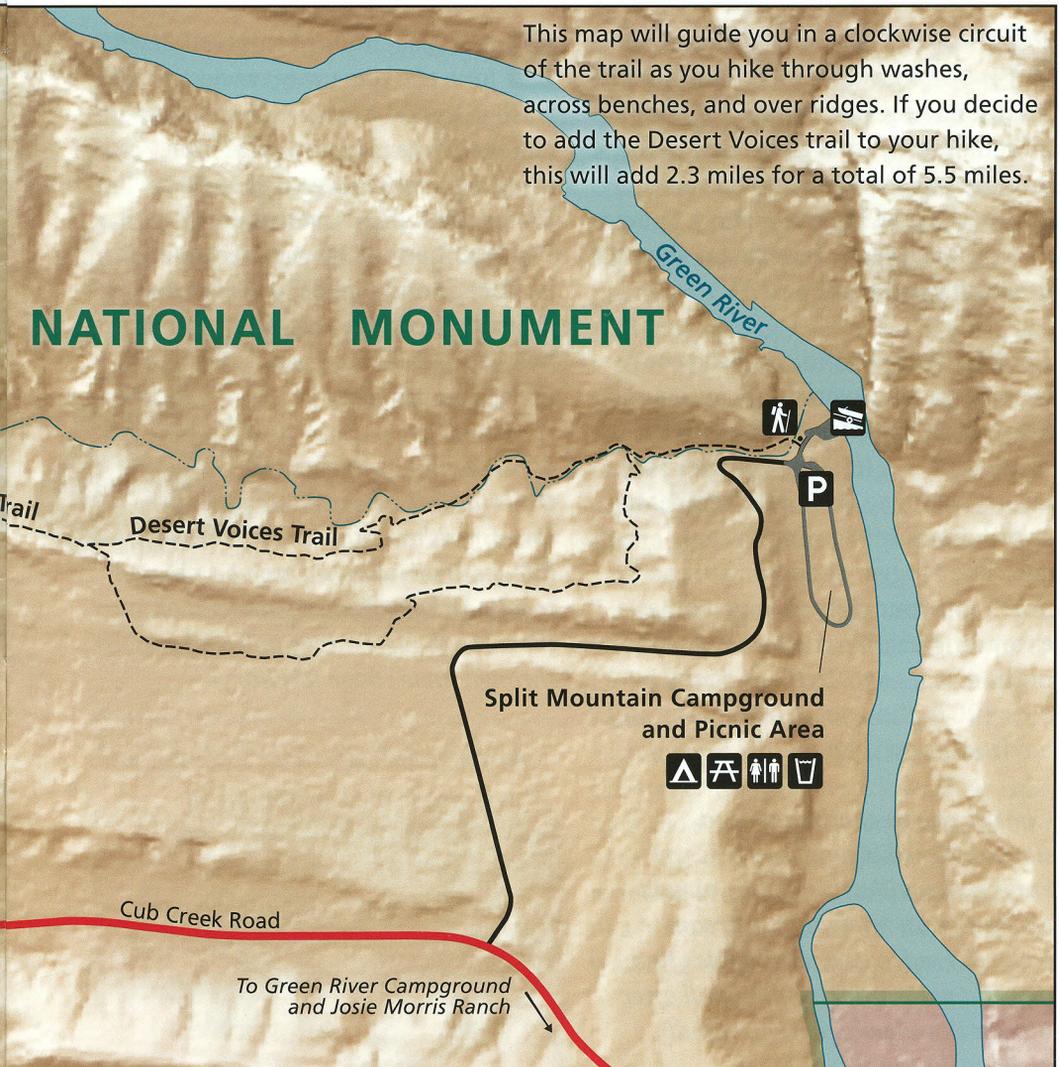
## Trail Description

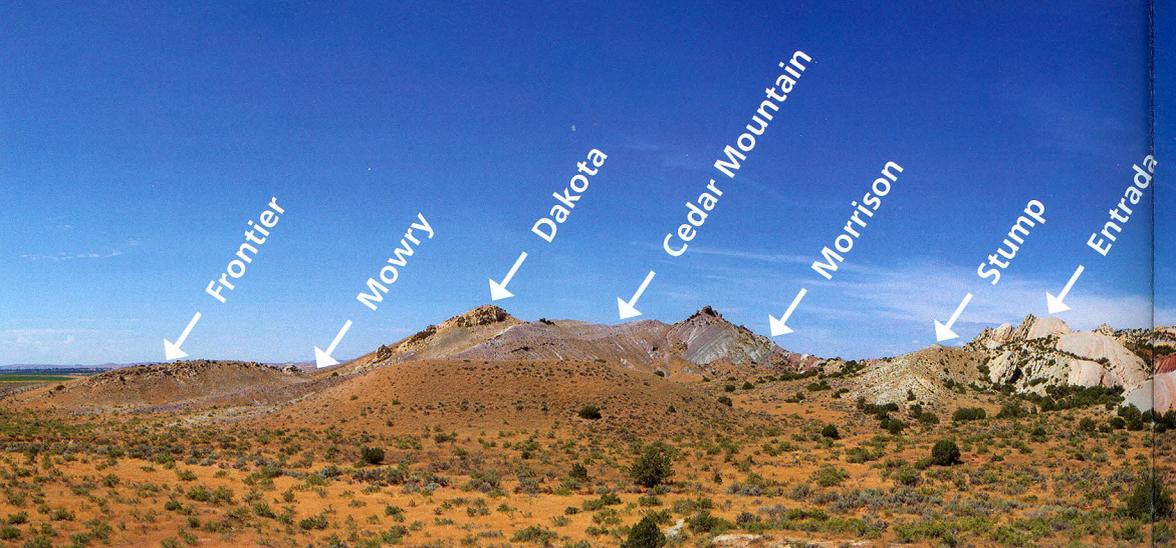
The trail is easy at first, but it gets more difficult the further you hike and includes a short rock scramble near the end. Trail conditions vary depending on weather. The lack of shade can be potentially dangerous during the summer heat. It is best to hike in the early morning when temperatures are cooler. Recent rain may make sections of the trail muddy and slick.

## Leave No Trace

Please stay on the trail unless you are on solid rock or sand. Desert soils are delicate and may be destroyed by walking on them—you will read more about these biological soil crusts later. Pets and bikes are not permitted.

Remember that all plants, animals, flowers, artifacts, fossils, and rocks are protected. Please leave everything where you find it. Take only pictures and memories.





**1** Dinosaur National Monument is best known for its dinosaur fossils, but it protects much more. 23 geologic layers are exposed in the monument, spanning more than one billion years of Earth's history. Sparse vegetation reveals these layers that tell us about the distant past.

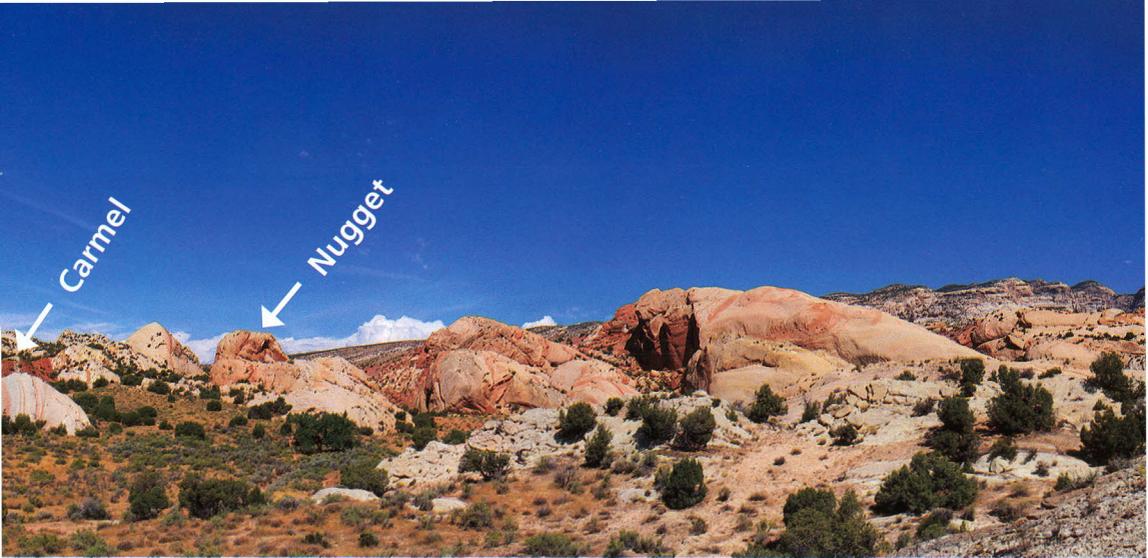
Look to the west and compare your view to the photo above. Frontier Formation and Mowry Shale to the south (on your left) are younger rock layers, dating to the Late Cretaceous, approximately 98 million years ago. The Nugget Sandstone to the north (on your right) is much older, extending back to the Triassic, 200 million years ago. In front of you is over 100 million years of climatic and environmental change.

*Change can be continuous and slow or incredibly quick in a desert environment like this. Soon you will encounter an intermittent stream bed (referred to as a wash). It is often dry, but water roaring downhill after intense thunderstorms can rapidly reshape the landscape.*

**2** Many sections of this trail never look the same way twice, and this wash is a good example of constant change. Water is a powerful force that shapes soils as well as rocks. Water can build as well as erode. Plants nourished by water soften the landscape and make it possible for animals, birds, insects, and reptiles to live here. Listen and watch for signs of life as you proceed.

*Signs of animals include the game trails that elk and deer create as they crisscross the washes that the Sound of Silence Trail follows. Don't be tempted to follow these tracks up and out of the wash though— they will lead you through some rough territory!*

You will soon come to an intersection. This is where the trail returns to complete the 3.2 mile hiking loop. This guide is written to follow clockwise travel. Continue walking straight here, in the wash, toward the cottonwood tree ahead.



**3** You might expect a large Fremont cottonwood tree like this to grow near a more obvious source of water. What does its presence here tell us? The surrounding rocks funnel seasonal rainwater to its thirsty roots. This tree, with leaves that sing and whisper in the breeze, provides



habitat for birds and insects, and shade for all. Rabbits, deer, and elk feed on its shoots and stems. Hawks and bats may use cottonwoods as sites to nest or roost. Even in death, tree cavities are refuges and nests for many species of animals.

*Ahead you will find other refuges used by animals to escape the mid-day sun.*



**4** Take a close look at the earthen bank on your right for evidence of flowing water—sometimes swift and other times slow. Erosion continues with each new rainstorm moving more sediment downstream. Faster water can carry larger particles. Can you find a layer that was accompanied by the sound of rushing water? Slower water can only carry fine sediments. Try to find a layer that would have been deposited by a quiet trickle. The surrounding cliffs, slowly eroded by wind and water, add to the diverse, sorted sediment layers.

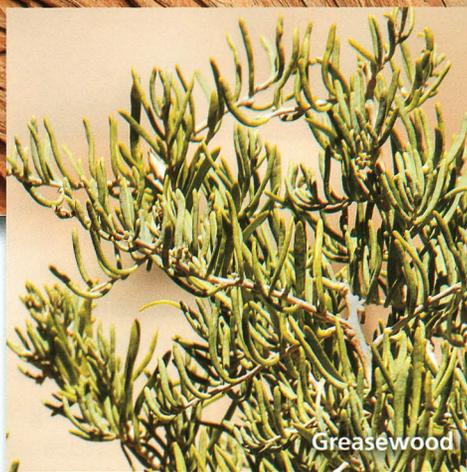
These differences in the sediment layers help natural cavities develop. Holes may be enlarged and used by squirrels and birds as nesting sites. Listen carefully and you may hear the scratchy call of a rock wren or the melodic song of a canyon wren. Look carefully and you may see a golden-mantled ground squirrel peeking out of a hole, its high pitched alarm call warning others of your presence.

**5** The rounded bluffs of Nugget Sandstone towering above are remnants of a vast desert that once covered much of what is today the western United States. Thin diagonal layers called cross-beds formed

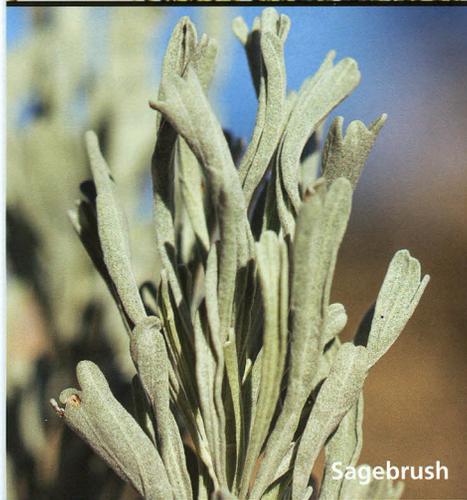
as wind-blown sand dunes moved across the desert 200 million years ago. The steep fronts of these dunes were hundreds of feet high. Trace fossils, like footprints, in the Nugget Sandstone include the tracks of scorpions, spiders, and *Brasilichnium*, an early relative of mammals. Bones from an early Triassic dinosaur have also been found in this rock layer.

Continue in the wash for the next 0.3 miles until you see an arrow marker on your right directing you up and out of the wash. Don't be fooled by the numerous animal trails!

**6** Take a moment to study the plants growing around you. Does the pattern of their placement say anything? The bench of land you are on overlooks a riparian area, filled with Fremont cottonwood trees growing where water is more plentiful and soil is deeper. On the rocky ledges above are Utah junipers, which can survive on very little water. In between, where you are now, are greasewood and sagebrush shrubs.



Greasewood



Sagebrush

Many vegetation patterns occur across Dinosaur National Monument, influenced by elevation, amount of water, minerals in the soils, or sunlight. In turn, these zones provide a variety of habitats for wildlife.

**7** Within this shady rock overhang, can you spot a portion of a packrat debris pile, also known as a midden? It is above your head, in the crevice between the two large rocks that form the overhang. Look for twigs, rocks and fecal pellets, all held together by shiny crystallized urine.



Packrat (bushy-tailed woodrat)

Middens can tell us about past environments. They may exist and be added to for thousands of years. Radiocarbon dating has identified middens up to 50,000 years old. Middens may contain leaves, seeds, fruit, twigs, pollen, bone, shells and scales, leading to identification of past environments. We know from middens that Douglas-fir and ponderosa pine once grew in this area, during a cooler and wetter time. As the climate changed over the last 10,000 years, these species retreated to higher elevations where they are still found.

The trail proceeds on this bench for another 50 yards before it returns to the wash. Watch for signposts.

### An Alien Invader

You may notice some plant stumps with large root structures. Why would monument staff cut down these plants? Look around for the feathery leaves of tamarisk, also known as salt cedar. If it is blooming, it will have small, white to pink flowers. It is a non-native tree that grows in riparian areas throughout the western United States. Brought to North America from Asia in the early 19<sup>th</sup> century for use as an ornamental wind break and to fight erosion, it quickly spread and became invasive, often out-competing native plants.

Its presence on the river banks of the Green and Yampa Rivers, and here in this intermittent stream, changes river hydrology and can make it difficult for deer, elk, and sheep to get to water.



Tamarisk beetle X10

In 2006 and 2007, National Park Service staff introduced 50,000 non-native northern tamarisk beetles to four locations in the monument. The most intensively studied biocontrol agent in North America, the beetle eats only tamarisk. While tamarisk will never be eliminated entirely, the beetles are helping to keep it under control, allowing native vegetation to rebound and natural river functions to return.

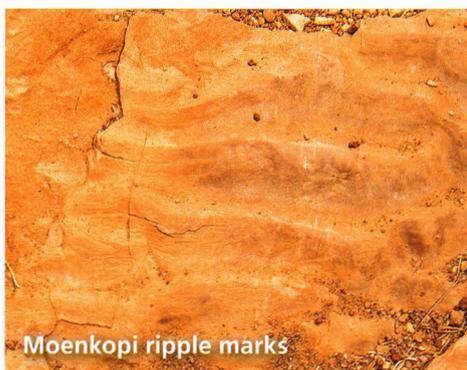
**8** While native plants like the greasewood, rabbitbrush, and sagebrush are important habitat, what about the rock walls themselves? In the past, the large cliff to the south has provided a place for peregrine falcons to nest, called eyeries. Once an endangered species, their numbers have grown and the species is now stable. Thanks to a ban on the pesticide DDT and protected nesting places like this cliff face in Dinosaur National Monument, you may see a peregrine falcon

soaring overhead. Listen carefully for the high-pitched “kak, kak, kak” call.



Continue walking in the wash. Watch for markers ahead with arrows directing you to turn right. You will leave the wide wash and follow a narrow path through weathered hills.

**9** Hidden within these hills are clues of their origin. Look for ripple marks on some of the rocks, and imagine the lapping sound of waves, a message from the past.



Moenkopi ripple marks

You are now walking through the remains of a shallow, watery environment from 250 million years ago called the Moenkopi Formation. Muds and sands were deposited in thin beds on the edges and bottoms of watery areas. Reptiles and amphibians moved stealthily along shorelines and through these shallow waters in a time before the dinosaurs. Invertebrates burrowed in the muds of the floodplains and ammonites (a type of mollusk) swam in the seaways.

Although the weathered soils of the Moenkopi Formation may look inhospitable, flowering plants like desert paintbrush, pale evening primrose and the dramatic prince’s



Desert paintbrush

plume grow here. What are these plants telling us? These soils are high in selenium, which the prince’s plume absorbs so that it is unpalatable and even toxic if consumed.



Prince's plume

## Split Mountain

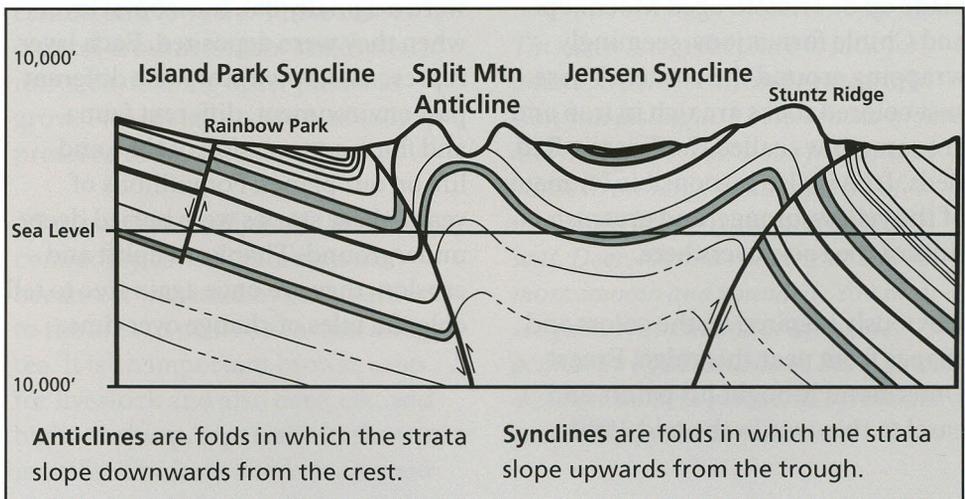


**10** What is happening beneath our feet to result in such a dramatic landscape at the surface?

The noticeable curve of Split Mountain is part of an anticline - an upward fold of rock. While Split Mountain arcs up, other features seem to sag. The sags are called synclines. This underlying roller coaster of

rock formed when formerly flat sedimentary layers were compressed and wrinkled. Forces related to the building of the Rocky and Uinta Mountains 70–40 million years ago caused the uplifting, tilting, faulting and folding of the rock layers. While some layers erode into mounds, others stick out as ridges.

*(Continued on next page)*





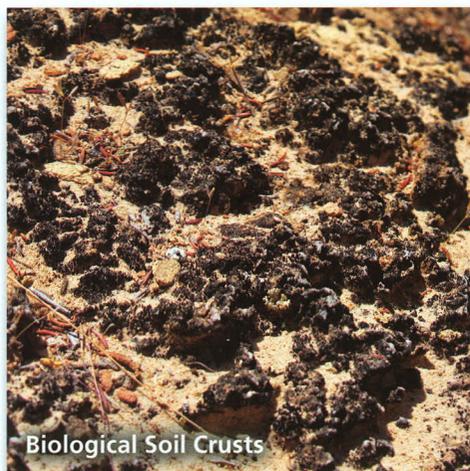
Erosion reveals not only a variety of shapes, but also an array of colors. Look back across the Moenkopi Formation labyrinth you just traversed. In the distance you will see a swath of red rock known as “The Racetrack.” The “lanes” are made up of Triassic-aged Moenkopi and Chinle formations, seemingly wrapping around the corner. These rust colored rocks are rich in iron and are sometimes called the Triassic Red Beds. Iron is also responsible for many of the yellow, orange, and greenish tints of the rock layers here.

Obviously inspired by the colors and shapes from near this ridge, Ernest Untermann brought his paints and easel to this area in the mid-1900s.

A German immigrant, he became known as “The Artist of the Uintas,” and Dinosaur’s dramatic landscapes spoke to him. The painting above is a sample of his work.

The sedimentary rocks around you were originally flat, horizontal layers when they were deposited. Each layer represents its own story of a different past environment, different fauna and flora, a succession of time and life on our planet. For millions of years, these stories were buried deep underground. Thanks to uplift and erosion, they are once again free to tell colorful tales of change over time.

**11** Soils in an arid environment are fragile. Take a minute here to inspect the crusty biological soil. It is mostly cyanobacteria (also called blue-green algae), but also includes lichens, mosses, green algae, microfungi, and bacteria. It takes many years for this soil to form and support life.



While cyanobacteria are mobile and will regenerate if disturbed, lichens and mosses are not and will die if trampled. Blown by wind or moved by other forces, it is estimated that lichens can recolonize an area in 45 years, while it takes mosses an estimated 250 years. These crusts control erosion and fix atmospheric nitrogen, helping other plants to grow. Please stay on the trail to help preserve these unique soils.

All around you is *Ephedra viridis*, commonly called “Mormon tea” because it was used by early settlers to the area to make an invigorating tea. It is an important browse crop for livestock and also deer, elk, and bighorn sheep, especially in the winter months. The large seeds are a good protein source for small mammals

and birds. The drug ephedrine, an antidepressant and decongestant, can be extracted from this and other ephedra species.

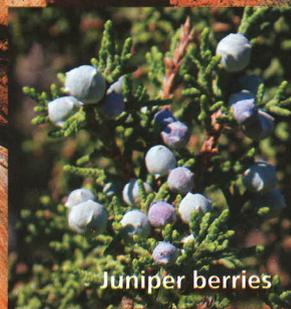


*This area is a great place to look for animal tracks, scat, and game trails. Can you distinguish between carnivore and herbivore scat? Look for fur and bones in the long, slender pieces of mountain lion, coyote, and bobcat scat. Deer, elk and rabbit scat will be more smooth and rounded. You may see game trails in this area, made primarily by elk and deer. See if you can distinguish these game trails from the people trail you are following!*

**12** This spot provides a place to rest, rejuvenate, and cool down before climbing the rocky ridge ahead. Solitude and refuge are two things that national parks and monuments offer. These are places to reflect, learn, and experience nature. Also protected are other qualities such as dark night skies and natural quiet — rare commodities in cities where many of us live.

Growing around you on the slope are Utah junipers. The most common tree species in Utah, it covers one-fifth of the land area of the state. It seems like they can grow nearly anywhere, even out of solid rock. Their roots are the secret. A massive system that makes up  $\frac{2}{3}$  of the tree's total mass, the tap root can be 25 feet deep and lateral roots may extend out 100 feet.

The juniper berry is actually a tiny pinecone, and is eaten by rabbit, fox, coyote, and many species of birds.



Juniper berries

Junipers grow slowly. Older trees, which may be 650-850 years old, have sculptural qualities. Even dead, a juniper may stand silent and strong for several hundred years. Like all of the plants at this 5,000 foot elevation, the juniper must survive on a sparse 10 inches of precipitation a year.

As you hike, check out the sky and you may see a turkey vulture or two, flying on silent wings high above



you. Lightweight for such a wide wingspan, they teeter and totter on the breeze, rarely flapping their wings. An excellent sense of smell leads turkey vultures to carcasses where they feed cooperatively. Think of these silent birds not as purveyors of death, but rather as elegant birds who transform death into life on the wing.

Look carefully at each soaring bird and you may be lucky to see a golden eagle, easily confused with a vulture



at first glance. The golden eagle, at 10 pounds, is a much heavier bird, outweighing the vulture by 6 pounds. Eagles do not teeter and totter, and they hold their wings out flat, while vultures hold their wings in a slight V-shape. Both are dark birds, but the vulture is here only during the summer, while the eagle is a year-round bird.

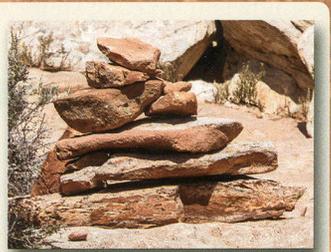


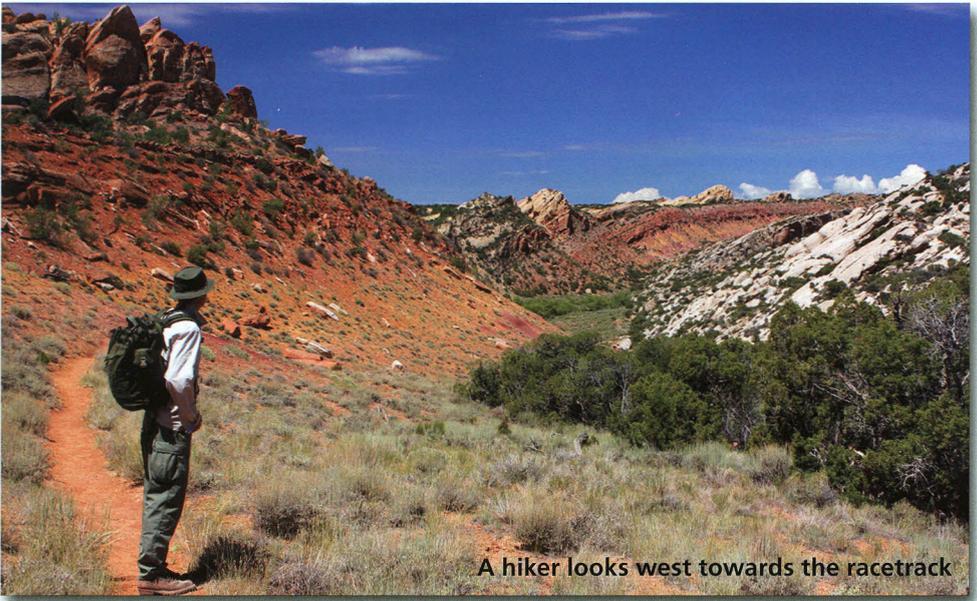
Perhaps a lizard has caught your attention during your hike, lending even more life to the desert. Six species of lizards are found here: common sagebrush, plateau, western whiptail, greater short horned, side-blotched, and tree lizard. Listen for lizards rustling about in the leaf litter, looking for spiders or insects to eat.

**13** In the distance to the south you might be able to see the Green River. This water source attracted not only the Ute and Fremont people, who lived here most recently, but also ancient peoples going back 10,000 years. Rock art and former dwelling sites dot the landscape; voices of the past.

John Wesley Powell boated through here on his way down to the Colorado River around 150 years ago. He made natural history observations, mapped the area, and named many features. The Green River remains a source of adventure and sustenance today.

The trail's descent from this ridge is marked with rock cairns.





A hiker looks west towards the racetrack

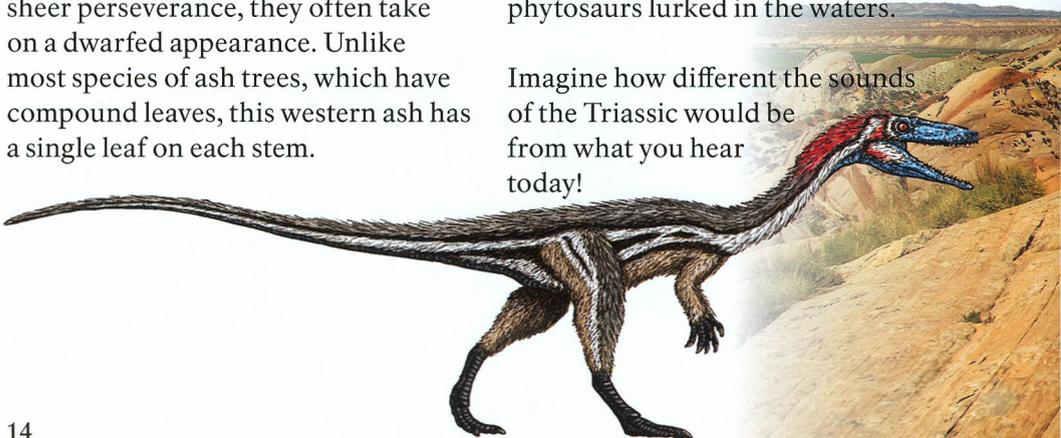
A 0.3 mile connector trail leads from the Sounds of Silence Trail to the Desert Voices Trail. The Desert Voices Trail is a 1.7 mile loop with its trailhead near the Split Mountain Campground and Boat Ramp. If you add these loops together, the total hike will be 5.5 miles.

**14** On this ridge, take a moment to rest in the shade of the small single-leaf ash tree, a species unique to the American Southwest. Surviving by means of deep roots and sheer perseverance, they often take on a dwarfed appearance. Unlike most species of ash trees, which have compound leaves, this western ash has a single leaf on each stem.

The red rock ridge underneath you is the Chinle Formation, formed during a time when rivers, marshes, and small lakes covered the landscape. Plants would not have included a flowering tree like the Singleleaf Ash. Instead, conifers, cycads, ferns, and horsetail plants grew here.

Dinosaurs made their first appearance in this time period, about 225 million years ago. Coelophysis, a three-toed theropod dinosaur about the size of a large dog, roamed the land. Large crocodile-type creatures called phytosaurs lurked in the waters.

Imagine how different the sounds of the Triassic would be from what you hear today!

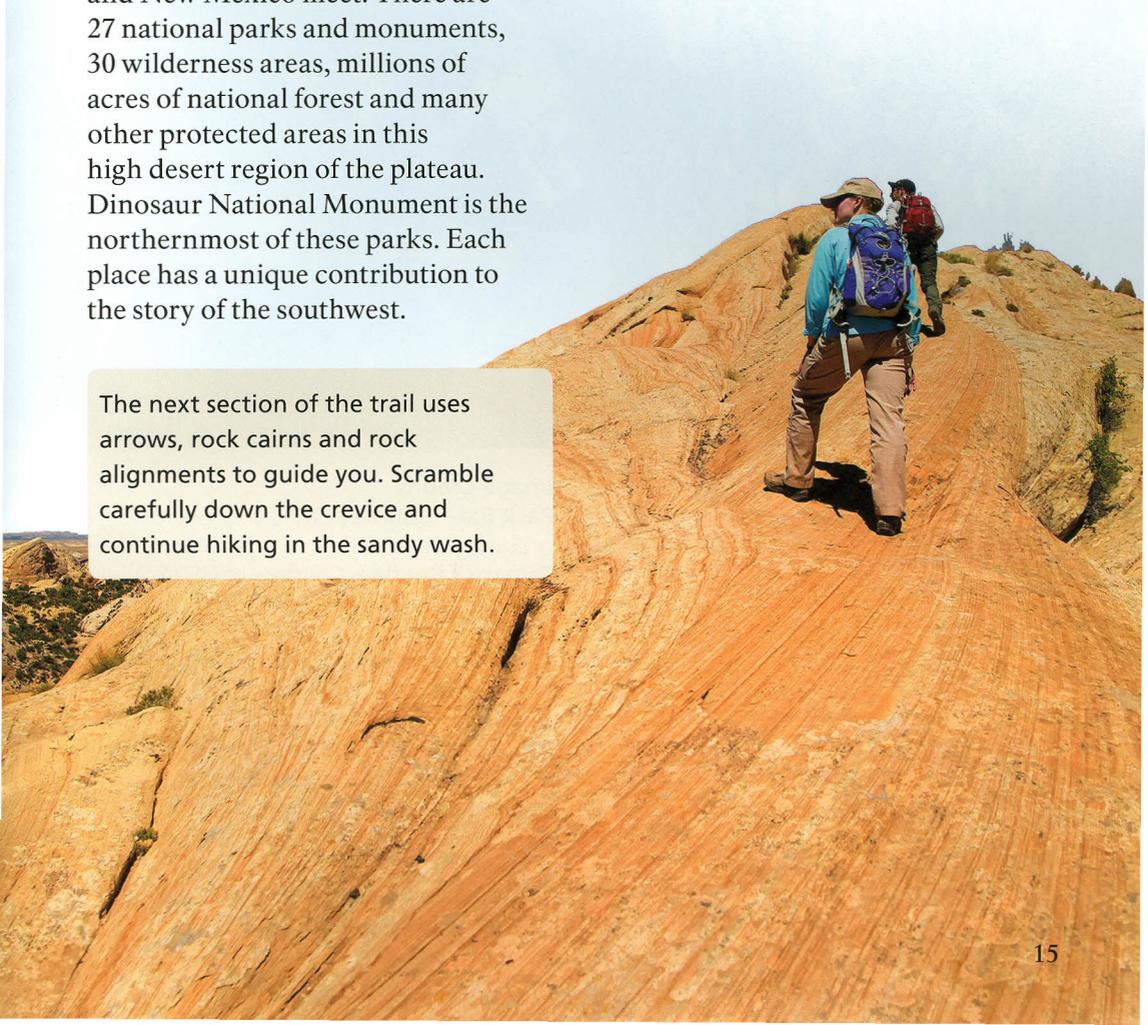


**15** For those feeling fit and adventurous, an optional side trip is available at this spot. Climb the sloping rock stretching to the sky to the west. Step carefully, move slowly, and when you reach the top, you will be rewarded with a 360° panorama.

Alternatively, you can enjoy the view from the shade of the juniper tree beside the trail marker, and contemplate that you are standing at the northern edge of the Colorado Plateau. Encompassing 240,000 square miles, this area is sometimes known as “Red Rock Country” and centers on the Four Corners area where Colorado, Arizona, Utah and New Mexico meet. There are 27 national parks and monuments, 30 wilderness areas, millions of acres of national forest and many other protected areas in this high desert region of the plateau. Dinosaur National Monument is the northernmost of these parks. Each place has a unique contribution to the story of the southwest.

The next section of the trail uses arrows, rock cairns and rock alignments to guide you. Scramble carefully down the crevice and continue hiking in the sandy wash.

**16** For many of us, the simple beauty of the land’s colors and textures may be enough to satisfy, awe, and inspire. These places also allow geologists, paleontologists, biologists, and archeologists to more deeply investigate and study the Earth and our history. On this hike, you have seen the silent reminders of many changes —sometimes occurring over millions of years, or sometimes occurring very quickly. Sediments, rocks, plants, animals, and the other features of the landscape all speak to those who slow down and take the time to hear what they have to say.



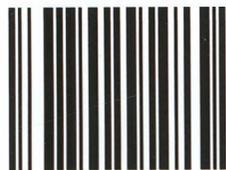


Anise swallowtail butterfly on rabbitbrush

Text and design by Dinosaur National Monument staff

Published in cooperation with the National Park Service, U.S. Department of the Interior.

Sound of Silence Trail Guide



716

**\$1.00**

#### **Image Credits**

**Pack Rat**—Courtesy of the U.S. Geological Survey/Ken Cole

**Tamarisk Beetle**—Courtesy of USDA

**Peregrine Falcon**—Courtesy of US Fish & Wildlife Service

**Split Mountain Diagram**—Courtesy of the U.S. Geological Survey/ Wallace R. Hansen

**All others**—NPS, *Special thanks to Jim and Jan Allen for initial booklet design and many of the images.*

©Copyright 2017

Intermountain Natural History Association  
P.O. Box 155, Jensen, UT 84035