National Park Service
U.S. Department of the Interior

Natural Sounds Program

Voice of the Desert

Featured Interpretive Program

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Natural Sounds Program
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The Natural Sounds Program works to protect, maintain, or restore acoustical environments throughout the National Park System. We fulfill this mission by working in partnership with parks and others to increase scientific and public understanding of the value and character of soundscapes and to eliminate or minimize noise intrusions.

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Original cover photo by Neal Herbert, NPS

EXPERIENCE YOUR AMERICA™

Integrating Soundscape Topics into Interpretive Programs

The following example demonstrates how soundscapes and acoustic resources can be integrated into interpretive programs. Miriam Graham, park ranger at Canyonlands National Park, developed this campfire program to reveal unique opportunities to hear the sounds of Canyonlands.

Because the National Park Service works to protect and enhance both park resources and visitor experiences, the Natural Sounds Program differentiates between the physical sound sources and human perceptions of those sounds. The physical sound resources, regardless of audibility, at a particular location comprise what is known as the acoustical environment, while the human perception of that acoustical environment is defined as the soundscape. Examples of acoustic resources include sound sources such as wildlife, waterfalls, wind, rain, and historic and cultural sounds, and the quiet background in which to hear them.

Chesler Park. NPS photo by Neal Herbert

Mesa Arch. NPS photo by Neal Herbert

Voices of the Desert By Miriam Graham

"Almost every week, someone in my audience expresses wonder at the extraordinary quiet in Canyonlands…"

This evening campfire program script was written by park interpreter Miriam Graham for visitors to the Needles District of Canyonlands National Park (now at Arches National Park with Canyon Country Outdoor Education).

You can use this script as an example of how to add sound effects to your interpretive programs and share the importance of natural sound environments with your audiences. To prepare for your presentation, start by exploring the symphony of sound in your park and record sounds unique to your area. Following this script are some suggestions for basic outdoor recording provided by Miriam Graham and reviewed by National Public Radio.

Theme
The extreme quiet of the desert in Canyonlands gives us a unique opportunity to hear a variety of natural—and unnatural—sounds.

Goals
For visitors to spend more time on the trails and in camp listening to natural sounds, to notice human-made sounds, and to desire the preservation of quiet in the parks.

Objective
Visitors will be able to identify two natural sounds that are new to them.

Introduction

Good evening and welcome to the Needles District of Canyonlands National Park. [Announcements, safety concerns, etc.]

If you're interested in becoming a volunteer for the park, please talk to me after the program, because we always need volunteers!

I work at the visitor center front desk a lot. People often ask me, “Where can I go to get a great view?” But I’m still waiting for someone to ask, “Where can I go to hear a really good sound?”

Sounds are a part of our environment, and they affect us whether or not we’re aware of them. Perhaps they affect us even more than scenery. It seems that we humans are so visually oriented that we tend to ignore sound. In cities, people tune out unpleasant sounds, such as the sound of traffic, or machinery, or a busy office, especially if those sounds interfere with work or sleep.

There are studies showing how loud noise can raise blood pressure and cause stress to our systems. Other studies show that certain kinds of sound can have a calming, or even healing effect on us.

Have you heard of the Mozart Effect? Students who listen to a half-hour of Mozart before taking a test scored an average of eight points higher than students who did not!

What are some of your favorite sounds?

I forgot to tell you that when I’m not working in the park, I’m a piano tuner. So, sound has always been very important to me and I listen to sound a lot—probably more than the average person does. Tonight, I’m going to share some of my favorite Canyonlands sound with you.

[Note: Before each section of the program I play a sound. Visitors usually like to guess what the sound is.]

Water

One of the most delightful sounds in Canyonlands is one that we usually don’t associate with the desert. I didn’t record this sound in my bathroom! I recorded this sound in Squaw Canyon today, but it may be gone tomorrow. There is only one perennial stream in the Needles, Salt Creek. The rest dry up during part of the year.

How many inches of rain do you get a year where you live? Here, we get only about nine inches. Water (or the lack of it) is the bottom line in the desert. Is sustains and limits all plant and animal life.

Plants and animals have evolved some extraordinary adaptations to deal with the lack of water. If you look around you at the plant life in Canyonlands, you’ll notice that, except near rivers, we have no big, leafy trees. Leaves are tiny, thick, curled, waxy, hairy, spiny, or light in color; all these qualities cut down on water evaporation from the surface of the leaf. The best adapter to the desert in the plant world is the cactus. Its leaves have been reduced to spines, and its stems (the fleshy part of the cactus) can swell up with water when there is water available, and shrink and shrivel when it is dry. Cacti also send out shallow “rain roots” after a rainfall to take up water very near the ground surface.

Each depression in these rocks where we are sitting contains a whole world dependent upon water. The potholes fill up with water when it rains, providing the drinking source for many animals. Then the eggs of a score of pothole creatures hatch out—eggs that have been waiting weeks, months, and even years for the right conditions. These worms, beetles, tadpoles, and prehistoric crustaceans develop very quickly into adulthood. As the pothole dries up again, the adults die, but the eggs they’ve laid remain, waiting for the next rain to begin the cycle again. Desert animals are also specially adapted to living here. The kangaroo rat, a small, nocturnal rodent with big feet, doesn’t have to drink water at all. It gets all its water from food, and even its urine is dry.

Humans, on the other hand, are not adapted to desert conditions. We need to drink a gallon of water a day, so remember to bring plenty of drinking water when you're hiking or even if you're hanging around camp. If you're feeling irritable, headachy, or confused, it's probably because you haven't been drinking enough—water, that is.

[For late summer programs] A friend of mine told me a story that I'd like to share with you about water. He was camping near a dry wash in Taylor Canyon in the Island in the Sky District of the park. He'd gotten caught in a thunderstorm earlier that afternoon, but as evening came, the weather cleared. He'd just finished cooking supper, so he turned his little backpacking stove off. Suddenly he heard a sound like the stove was still on. [Make the sound.] He turned around just in time to see the proverbial wall of water rushing down the wash—and just in time to move his gear to higher ground!

That was the sound of a flash flood approaching. The sandy, rocky soil here doesn't absorb much water and so, after a downpour, the water collects and starts to flow off the canyons and down the washes towards the Colorado and Green rivers. As it flows, the water takes sand with it. It becomes liquid sandpaper, wearing down the rocks. This process—erosion—started millions of years ago to carve the canyons, and it's still happening today. The moral of this story: Erosion happens. Also: Don't camp in a wash! Flash floods usually occur in the late summer, but they can happen any time after a heavy rain. When you're hiking in a canyon, be aware of possible escape routes.

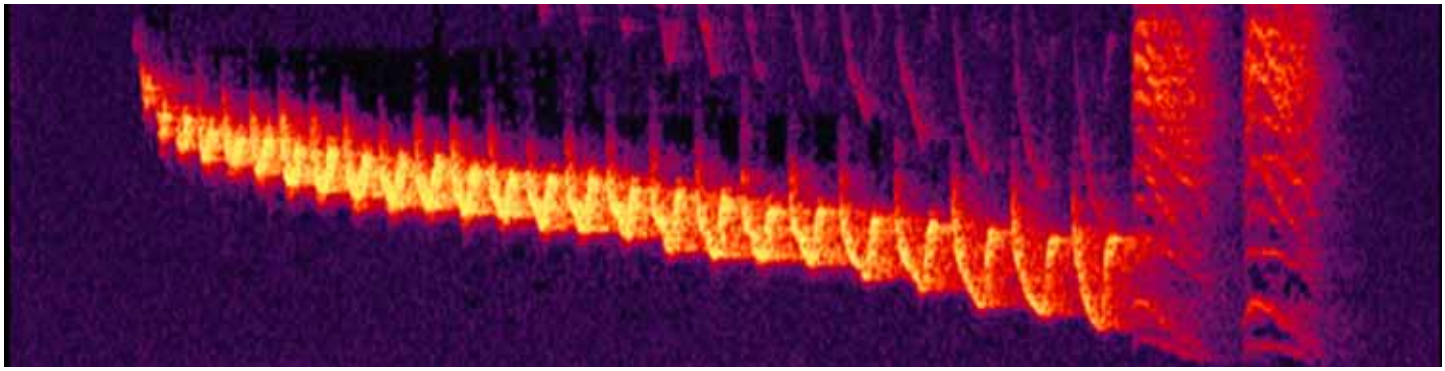
Canyon Wren

One of the most typical sounds of the desert canyons was described by naturalist Robert Ridgeway in the 1860s in terms of water: "a cascade of sweet, liquid notes, like the spray of a waterfall in sunshine." Seldom seen but often heard, canyon wrens inhabit steep-walled canyons, usually with water in the bottoms. The canyon wren is a petite, reddish-brown bird with a white throat and breast, speckled plumage, and a tail sticking up as it nervously pokes with its long bill into every crevice looking for insects and other invertebrates to eat. You can hear these wrens year-round in Canyonlands.

Black-Chinned Hummingbird

The canyon wren isn't the only animal in the desert to call up images of water. The hummingbird is the "Rainbird" to the Southwest's native peoples. According to a Pima story, at one time, the wind and the rain spirits left the people. Since they were dying of thirst, they sent out many different animals to bring back wind and rain, but none were successful. Finally, the hummingbird offered to help. The people scoffed at him at first—he was surely too small (a black-chinned hummer weighs as much as one golden eagle primary feather!) and weak! But they were desperate, so they gave in. The hummingbird asked for one thing: some strands of the chief's daughter's beautiful long black hair, which he wove into a rope.

Spectrogram of canyon wren vocalization by NPS Natural Sounds Program.



White-throated Swift. Wikimedia photo by Michael Woodruff.

Now, if you've ever watched hummingbirds, you know that they are incredible flyers. They migrate from Mexico every spring, flying at about 25 to 30 miles an hour, but if they catch a tail wind, they can go twice as fast. The hummer had a white tail feather, which always pointed to the wind. As he flew, he followed the direction of this magic feather, and it brought him to the place where the wind and rain spirits were hiding. In an instant, he tied them up with the hair-rope and told them that if they didn't come back, he would never untie them. And that's how the hummingbird brought rain back to the Pima people.

White-Throated Swift

You may be more likely to hear the "whoosh" of a white-throated swift as its zips over your head if you're standing on the edge of a cliff. They may be the fastest bird in North America—they've been observed escaping the midair attack of a peregrine falcon at about 200-mph!

They're black, swallow-like birds with white on the throat and underside, and long, slender, pointed wings that they hold out stiffly while flying, and a forked tail. White-throated swifts are actually closer cousins to hummingbirds than to swallows.

White-throated swifts spend most of their time in the air. They even mate in the air, free-falling and swooping back up before they hit the ground. In fact, their feet are so weak they have trouble taking off when they do alight on the ground. Their Latin name, Apodidae, means "without feet." They can be seen year-round in Canyonlands, though they seem to hibernate during the coldest weather.

Raven

"Ghastly grim and ancient raven, wandering from the nightly shore, Tell me what thy lordly name is, on the night's Plutonian shore! Quoth the Raven, 'Nevermore'."

The raven, to Poe, was an evil omen. Europeans have also considered ravens a symbol of death, but American Indian tribes have a better opinion of them. According to the Northwest tribal people, the raven's role is similar to the coyote's role in the Southwest, that of a creator and also a trickster.

Maze Overlook. NPS photo by Neal Herbert.

Pothole Point. NPS photo by Neal Herbert

Either way, humans have never been indifferent to ravens, perhaps because they are so big and so black, and always seem to be hovering nearby. Even Jesus talked about ravens. He said, "Consider the ravens, for they neither sow nor reap, which neither have storehouse nor barn, and God feedeth them." And it's true—ravens never seem to lack for food. They are both predator and scavenger, feeding on carrion, killing live game, dining on the eggs of other birds, and even eating plants. They sometimes accompany other predators to feed on their kill: in the days of the great bison herds, ravens would travel along with the herds, taking advantage of a carcass if an animal happened to die.

Pinyon Jay

Unlike ravens, their close cousins the pinyon jays do have storehouses. These nuts are their favorite food, and they may become your favorite food if you try one! [Pass pinyons around.] Pinyon jays collect the ripe nuts of pinyon pines in the fall and cache them on the ground, usually far away from the tree. The jays eat most of the nuts throughout the winter but ones they leave eventually sprout and start new trees. By taking the nuts far away from the parent tree, the jays ensure the genetic variability of the pinyon tree population.

It's a true partnership. While other birds are settling down for a winter routine of survival, pinyon jays actually begin their mating season in November, after they have had a chance to collect a large stash of food. The pinyon tree has a bumper crop of nuts every six to seven years, and on those years, pinyon jays may hatch several clutches of eggs.

The pinyon jay is an all-blue bird. Like the raven, it is a corvid, a family of birds that include ravens, jays, crows, and magpies. Corvids are social birds, and pinyon jays often fly in flocks, calling as they fly.

Peregrine Falcon

This sound was almost gone from the world at one time. In the late 1940s, its numbers suddenly and drastically declined, so that it was extinct in the eastern U.S. and almost extinct in the West.

Scientists found high amounts of the pesticide DDT in the birds that had eaten small birds, which had in turn fed upon insects sprayed with DDT. They found that DDT was causing the eggs of the peregrines to be so thin that they would usually break before hatching. In 1970, the peregrine falcon was placed on the Endangered Species list, and in 1972, DDT was banned in the U.S. from most uses. (Unfortunately, it's still used in some Latin American countries where peregrines migrate.)

Just taking DDT off the market wasn't enough to bring back the peregrine, so an eleventh-hour recovery effort started. In some cases, biologists placed peregrine falcon eggs in foster parents' nest. This was a heroic act, because not only do peregrines live high up on cliffs, they also have very sharp talons and they hate being disturbed!

The recovery efforts have been successful, and today you can see peregrines hunting as often as you might see them cruising the cliffs of Canyonlands. They're as thrilling to watch as to hear as they soar high over their prey, suddenly dropping down and nailing a smaller bird at speeds of up to 200 mph.

Great Horned Owl

The great horned owl is the most common and widespread owl in North America, and probably the bird most often heard in the movies! It is a large owl, brown with black barring and feathery tufts that look like ears but are not. Its actual ears are two asymmetrical openings on its head, and its whole face functions as an outer ear. The shape of the owl's face is like a satellite receiver for sound.

Peregrine falcon. Wikimedia photo by Trisha Shears.

Owls also have excellent eyesight; research shows that some species can see by the light of a single candle that is four football fields away! But they are farsighted, so when their prey is close, they find it with their sense of hearing. An owl can hear the slightest rustling of a mouse or other prey. Its soft feathers have serrated edges that air can pass through, so its flight is practically soundless as it sneaks up on the catches his prey, which it can do even in total darkness.

Bats

A clue: the frequencies of these sounds have been lowered so that we can hear them. I played two different sounds of this animal, the only flying mammal. Can you guess? The first sounds were Mexican freetail bats communicating; the second was a "feeding buzz," the sound of a silver haired bat hunting.

How do bats see in the dark? Humans see by reflected light, but bats "see" by reflected sound. They fly with their mouths open, practically screaming into the darkness—if we could hear them, that is. The sounds they make bounce off objects and return in the form of echoes, similar to our sonar. The bat forms a mental image of the world around it from these echoes. As a bat gets closer to its prey (such as a mosquito), it makes more frequent sounds—this is the buzzing. Echolocation is so sensitive that a bat can "see" something as fine as a human hair in total darkness!

Coyote. Wikimedia photo by Matt Knoth.

Coyote

Though a symbol of the West, coyotes are also the most maligned, hunted, and persecuted animals in the West, mainly because people believe they kill livestock. There is actually very little evidence that coyotes take animals that aren't weak, sick, genetically defective, or already dead. In spite of this persecution, coyotes have survived and even extended their range. Though they originated in the Southwest, they are now found in every state except Delaware!

Coyotes sing to communicate with each other, warn members of the den of danger, or let others know that food is available. A mated pair of coyotes will sing a duet together to let other coyotes know of their bonding. And just as we call our kids after they leave home, coyotes arrange meetings with their young to check up on them and bring them extra food for months after the pups have left the den.

Humans: Cowboys, Indians, and Tourists

Now I'm going to ask you to use your aural imaginations.

It's about 1930, a cold night at the end of November. Coyotes are singing in the distance. A cowboy (named Slim, of course), an employee of the Scorup-Somerville Cattle Co., lies awake in his bedroll at the Cave Spring camp, trying to keep warm. The horses and dogs are also in the alcove since the weather's bad. Imagine the sounds: the bark and yip of coyotes, cowboys snoring, horses snorting, a cow lowing somewhere nearby, a fire crackling, and those other sounds that cowboys make after a hearty dinner of beans. Now, at a time like this, a cowboy can get philosophical. Maybe Slim had the following conversation with his partner lying on the ground next to him:

Reincarnation

"What does reincarnation mean?"
A cowboy ast his friend.
His pal replied, "It happens when
Yer life has reached its end.
They comb yer hair, and warsh yer neck,
And clean yer fingernails,
And lay you in a padded box
Away from life's travails.

"The box and you goes in a hole,
That's been dug into the ground.
Reincarnation starts in when
Yore planted 'neath a mound.
Them clods melt down, just like yer box,
And you who is inside,
And then yore just beginnin' on
Yer transformation ride.

"In a while the grass'll grow
Upon yer rendered mound.
Till some day on yer moldered grave
A lonely flower is found.
And say a hoss should wander by
And graze upon this flower
That once wuz you, but now's become
Yer vegetative bower.

The posey that the hoss done ate
Up, with his other feed,
Makes bone, and fat, and muscle
Essential to the steed.
But some is left that he can't use
And so it passes through,
And finally lays upon the ground.
This thing, that once wuz you.

"Then say by chance, I wanders by
And sees this upon the ground,
And I ponders, and I wonders at,
This object that I found.
I thinks of reincarnation,
Of life, and death, and such,
And come away concludin': Slim,
You ain't changed, all that much

That's a cowboy poem by Wallace McCrae. Most of the land in the Needles was used for grazing cattle from the late 1800s until 1974. But long before cowboys, other people lived here.

The Anasazi, or Ancestral Puebloans, truly lived off the land, by hunting, gathering wild plants, and farming corns, beans, and squash. Can you imagine the sounds of these people going about their everyday tasks? They had no horses or wheels, and only the simplest of tools with which they farmed and built small houses, kivas where they performed their religious ceremonies, and granaries to store food. The grinding of corn and wild seeds was surely a common sound. [Demonstrate metate and mano.] Along the Cave Springs trail you'll see three grinding areas worn side by side right into the slickrock. Grinding corn was probably a social activity, with several women talking and laughing as they worked.

So, human beings have been in the Needles for a long time. One could argue that they belong here. Since Canyonlands became a national park in 1964, there have also been the sounds of humans at play. Here's a jeep going over Elephant Hill.

What about machine sounds? Do they interfere too much with natural sounds, the feeling of solitude here in the desert? Can that great horned owl hear a mouse moving if there's an engine running nearby, or will he go hungry? Did you hear that airplane overhead a few minutes ago?

The National Park Service has pledged to protect the natural quiet of our national parks just as it protects our other natural resources—the air, soil, water, and wildlife. Several parks, including Canyonlands, recently measured year round sound levels in different locations. We hope to use this data as a baseline from which to compare future noise levels so we can decide how much is too much noise in the park. Noise from airplane overflights is an issue we are concerned with here in Canyonlands. Right now, we have no real limits on tourist airplanes flying over the park, but FAA and the National Park Service have been working to come up with plans to regulate commercial air tours.

Conclusion

The desert can be a very silent place. Some people find the silence of the desert disconcerting at first. However, after a while, they discover that it can also be contemplative, calming—bordering on mystical. As we've heard tonight, it's that very silence that gives us a unique opportunity to hear sounds: the sound of the wind rustling through the cottonwood trees, a single fly buzzing in the afternoon heat, a raven's cackle, or as the writer Barry Lopez put it, the "grace notes" of a canyon wren.

As you go back to your campsites tonight and continue your visit to Canyonlands, spend a few moments listening to the voices of the desert, and to that uncanny silence. I hope you'll be rewarded with some of the natural sounds we've listened to on tape tonight and to many more as well. Thanks for joining me tonight and have a fine evening.

Props

1. Water resistant CD player (such as Sony Splash-proof) – important for outdoor use
2. CD Native Lands for intro and outro music
3. CD of sounds (in order) taken from CDs and my own recordings
4. Pictures (used only with small groups, sometimes they distract people from listening)
5. Metate and mano, coyote track, pinyon nuts, bandana for cowboy costume, flashlights

Many of us ponder what the cultural landscape may have been like hundreds of year past. Can you imagine the cultural soundscape? NPS photo of the Great Gallery by Neal Herbert.