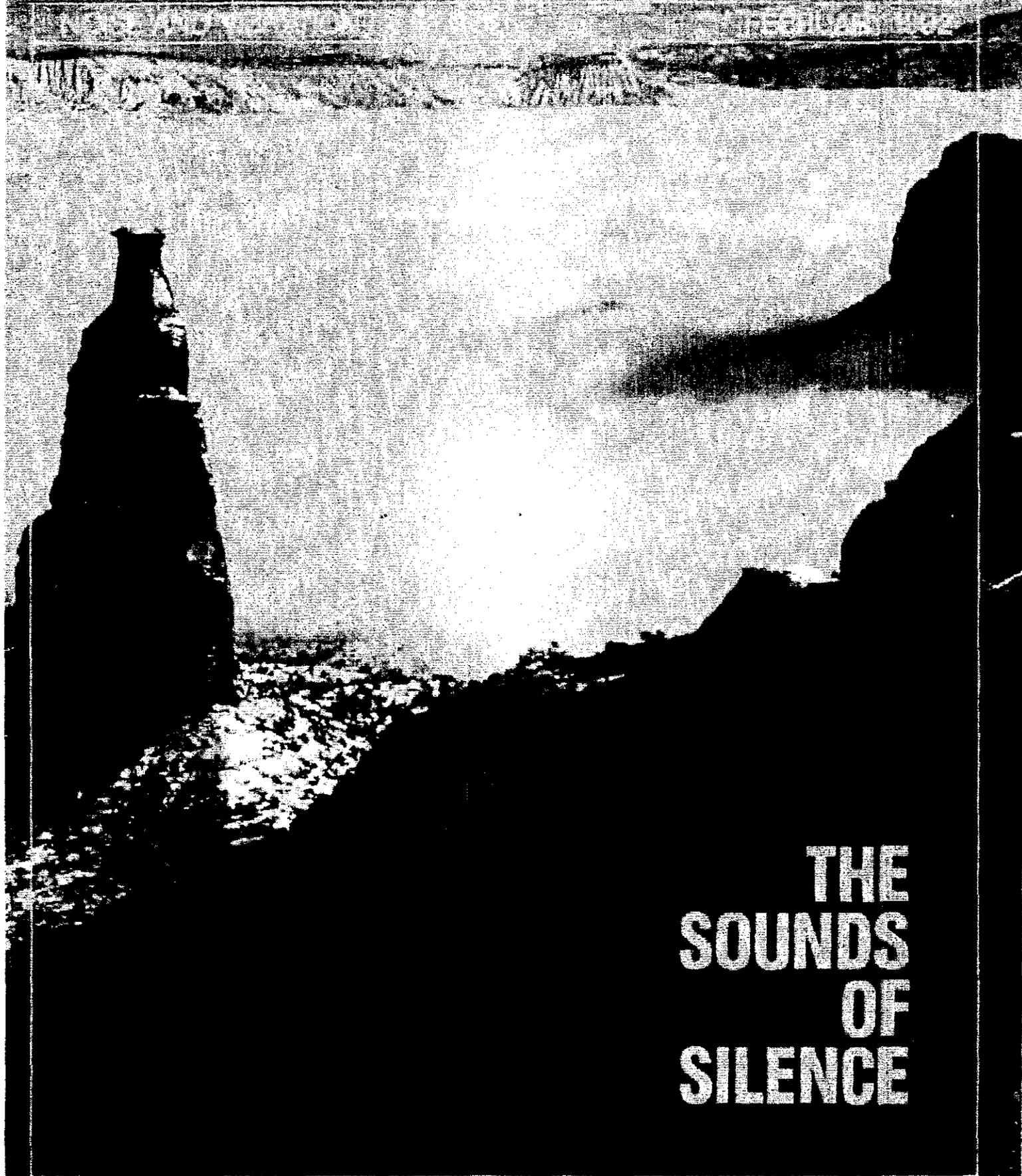


# SOUND LIBERATION



**THE  
SOUNDS  
OF  
SILENCE**

# The Sounds of Silence

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Representative sound levels in a number of National Parks and sound level data collection procedures are reviewed. Some thoughts on the value of quiet to park visitors are expressed.

After working in the city all winter, it's finally time for that hard-earned vacation. Having packed up the car with all of the necessary backpacking supplies you and a friend head for a hiking mecca which up until now you have only read about - Coyote Canyon in the Escalante District of Glen Canyon National Recreation Area.

As you head down the 2-lane Utah highways on your way to your destination, you marvel at the beautiful scenery as it speeds by. You and your partner chatter the entire way while the wind whistles in the car windows and the car stereo blasts your favorite tunes. You reach the town of Escalante, Utah, stop off at the ranger station and obtain your back country hiking permit. "The weather has been great!" the ranger tells you. This adds to the excitement about the start of your hike which is now only a couple of hours away. You get back into the car and drive through town. Driving through Escalante, you can't help but think about what a nice, relaxing, quiet place it would be to live. "Maybe when I retire" you say to yourself, and drive on.

You finally turn onto Hole in the Rock road. Only about 35 more miles until you reach the trail head and unpack the car. Knowing you won't be hearing any music for the next four or five days, you've decided to play one more tape while you drive down the gravel road. The road isn't too bad as gravel roads go: a little bumpy and you can almost hear the rocks bouncing off the bottom of your car over the music on the car stereo. You finally reach the Red Well trail head. That last little drop-off on the two-track road to the trail head took its toll on the bottom of your car, but hey, at least you are finally here. The car is unpacked, locked up, and you sign the hikers' register indicating your date and time out and your expected return date.

Time to start hiking. The weight of your backpack isn't too bad. You wish you didn't have to carry quite so much water, but in this part of the country you know it is the smart thing to do. You start out at a fairly good pace so that you can get some trail behind you before finding a place to set up camp. Not much chance of seeing anyone else for awhile since you had the only car in the parking area. The sun is a little more intense than you thought it would be so you put on your hat and keep on going. You think to yourself, this place is *BEAUTIFUL*. You glance at your watch and discover that you have already been walking for over two hours. No wonder you're getting tired. This is a little more strenuous than that desk job in the city. Time to stop for a little rest, a snack, and drink of water. Might as well sit on a rock. There are plenty to choose from out here.

Over the past two hours you have started to "acclimate" to the area. Your eyes don't seem so irritated by the bright sun anymore. The heat is bearable, and the sounds of the road, wind, and car stereo have already faded from your ears. As a matter of fact, now that the two of you have stopped walking, you can't hear anything! Wait a minute, what is that steady bump, bump, bump, you hear? Has some moxon got a radio out here? Is your hiking partner tapping his foot on the rock? You hear the thumping again. The beat in your ears is very regular: on a whim you feel your pulse. What do you know? They match! "Holy cow!" you exclaim to your hiking partner, "this place is so quiet I can hear my own heart beating!" You sit as quietly as

you can for a few more minutes and both of you discover this phenomenon.

There is only one explanation for something like this happening. You are in an area with almost a total absence of human-made noise. The surrounding or ambient sound levels in this area are near or below the threshold of human hearing.

## Measuring the Quiet

Monitoring data document the possibility that the national parks along the Colorado Plateau could very well be some of the quietest places on earth. Whether the average visitor consciously dwells on the quietness of the park or just takes it for granted, it is one of the premier resources that draws visitors to our parks. The natural quiet is part of the "naturalness" that people expect when they come to a park. Visitors experience degrees of quiet throughout the park - the noisiest areas are usually around the headquarters or visitor centers, hiking trails are quieter, and the backcountry areas often quietest of all. The scenery, the crisp air, the feeling of being all alone, and the quietness all come together to create an experience that seems to renew the soul and allow us to reassemble our thoughts and make sense of our seemingly out-of-control lives. But how do you quantify ambient sound? Is natural quiet important?

We know instinctively that the natural quiet is important and has an intrinsic value as do clean air and water. But to protect the parks from anthropogenic noise sources, we need to have hard data. Data that allow us to quantitatively define ambient levels.

The National Park Service is slowly, systematically, collecting ambient sound data at a number of parks in the system. Various internal and external activities have spurred data collection efforts in the parks. For example, the controversy surrounding a proposed airstrip at Grand Teton National Park spurred ambient sound monitoring in that area in the late 1970s.<sup>1</sup> Ambient sound monitoring was performed at Bryce Canyon National Park in the early 1980s in response to the proposed Altou coal mine adjacent to the park.<sup>2</sup> The Department of Energy sponsored extensive ambient monitoring in and near Canyonlands National Park as part of its studies to evaluate an area adjacent to the park as a potential site for a nuclear waste repository in the mid-1980s.<sup>3</sup> Also in the mid-1980s, the U.S. Environmental Protection Agency together with the U.S. Forest Service and the National Park Service jointly analyzed potential impacts of oil and gas exploration and development activities adjacent to Glacier National Park.<sup>4</sup> Recent legislation (1987) mandates that the National Park Service monitor noise impacts associated with aircraft overflights. Finally in 1989, the NPS began a concerted effort to perform continuous ambient sound monitoring along the Colorado Plateau, including monitoring at Dinosaur National Monument, Glen Canyon National Recreation Area, and Colorado National Monument as part of planning efforts to better define existing park resources.<sup>5</sup>

## How Quiet is Quiet?

Without exception the studies consistently show ambient sound levels that are so low as to surprise both veteran NPS employees and technical experts. In many cases, the ambient sound levels in parks defy measurement - they are below the noise floor of the monitoring equipment.

Samples of data collected at various parks are presented in Tables 1 and 2. The data are taken from two types of monitoring programs: (1) those associated with a specific project which usually involve short duration grab sampling techniques; and (2) those associated with the ambient monitoring program

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along the Colorado Plateau which involved continuous 24-hour monitoring for a one-year period. The data presented in these tables are summarized from a number of technical reports (see References), and in some cases the ranges of data were reduced to an "average" number for ease of presentation. For additional information on these projects, please consult the original technical reports.

Most of the NPS sound level data are very basic. Much of the work to date has been collected using Digital Acoustics monitors which provide dBA levels, but which do not provide the more sophisticated octave band data. Financial and manpower constraints generally dictate a "keep it simple" approach to sound monitoring in the parks. The remoteness of the monitoring sites in parks, and the temperature variations experienced at the sites, necessitate making choices between sophisticated equipment that needs to be attended, and more basic equipment that can run unattended for extended periods. Likewise, we have had to make choices between grab sample monitoring and continuous monitoring, both of which have advantages and disadvantages.

Regardless of the technical approach utilized, the data presented in Tables 1 and 2 demonstrate that very low ambient sound levels are consistently found in parks in the western United States. The data verify that there are areas along the Colorado Plateau where the silence is as low as that of a high quality sound studio. There are places where you can hear your heart beat. The NPS mission is to protect the sound resources of the parks, to ensure that they remain unimpaired for the enjoyment of future generations. Baseline data are a critical first step to being able to protect the natural quiet found in the parks.

#### Are There Acceptable Noises?

It has long been argued that protecting the sound resources in sensitive areas is not possible because the presence of visitors results in increased human-caused noises. Dr. James Foch, Jr. and Geoff S. Oliver in their Technical Report, *Sound Levels in Bryce Canyon National Park and the Noise Impact of the Proposed Alton Coal Mine* (October 1980), explain that there are important distinctions that need to be made between existing man-made sources in parks and the introduction of new man-made sources.<sup>2</sup> These distinctions are: characteristics of the noises; area of land affected by noise sources; the expectation of the receiver; and the degree to which the existing

sources serve the functions of the public and the National Park Service."

The U. S. Forest Service Publication, *Predicting Impact of Noise on Recreationists* (April 1980), also addresses this issue and says, "In considering what constitutes appropriate or inappropriate impact, it is helpful to distinguish between the magnitude of the impact and its importance. Magnitude refers to the objective measurement of the phenomenon under study: its frequency, extent, and other quantitative dimensions. Magnitude can be reliably measured by independent observers; typically, there will be little disagreement about these measurements. Importance, on the other hand, reflects the value one assigns to some phenomenon . . . it varies among individuals and over time and space. For example, two individuals observing the same impact having a predetermined magnitude can differ greatly in the importance they assign to that impact - a difference reflecting their personal value system and expectations."

Visitors expect and even enjoy natural sounds such as loud waterfalls, chirping crickets and the sound of the wind. Generally speaking, noises associated with visitor use of the park such as surface vehicular traffic, have low to moderate noise levels with relatively short duration and range. Vehicle noises are confined to the vicinity of roads and parking lots. Further, visitors tend to react differently to noises they might anticipate in a park (for instance, vehicles and buses) than they do to unfamiliar or unexpected noises, such as blasting noises from adjacent mineral development operations. Nevertheless, park managers are increasingly aware of the need to analyze and mitigate noise impacts of proposed operations inside the parks, as well as the need to work with agencies who have authority to control noise emanating outside of park boundaries but which impact visitors and resources within the park.

David Hales, former Assistant Secretary for Fish and Wildlife and Parks, addressed the conflict between visitor use of the park and protecting the natural quiet when he said, "Since one of the basic purposes of having parks is for people's enjoyment, some allowance should be made if it [the noise source] appreciably increases the individual's enjoyment of the resource without harming it. Allowances cannot be made, however, if the convenience of some significantly impairs the enjoyment of others, or if the very resources which one seeks to enjoy are harmed or endangered. In addition, we have the responsibility to maintain a few places where convenience is

Table 1. Representative  $L_{90}$  sound levels in dBA measured in parks during project-specific studies.

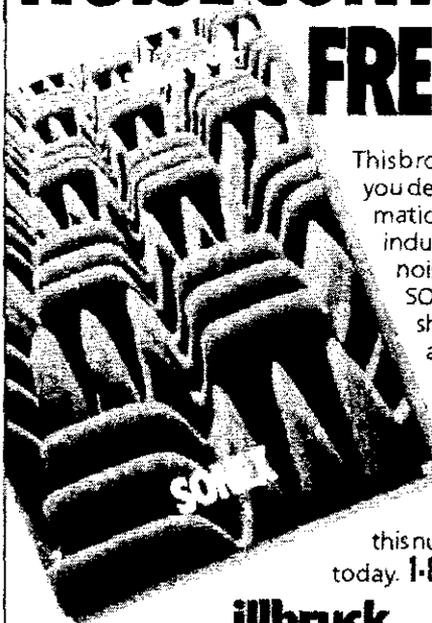
Park	Spring		Summer		Fall		Winter	
	Day	Night	Day	Night	Day	Night	Day	Night
Bryce Canyon NP (Utah)	-	-	35	20	-	-	-	-
Canyonlands NP (Utah)	-	-	-	-	-	-	18*	19*
Glacier NP (Montana)								
Thoma Creek	-	-	20	45	-	-	-	-
Trail Creek	-	-	35	43	-	-	-	-
Hornet Lookout	-	-	20	47	-	-	-	-
Red Meadow Creek (Site 4)	-	-	35	45	-	-	-	-
Red Meadow Creek (Site 5)	-	-	35	43	-	-	-	-
Grand Teton NP (Wyoming)	-	-	-	-	32	-	-	-

\*The Canyonlands study presented  $L_{95}$  values.

Table 2. Representative hourly  $L_{90}$  sound levels in dBA measured in parks during continuous ambient monitoring program for the Colorado plateau region.

Park	Spring		Summer		Fall		Winter	
	Day	Night	Day	Night	Day	Night	Day	Night
Colorado NM (Colorado)								
Kodel's Canyon	29	22	26	22	26	22	25	22
Suction Point	28	22	26	22	25	22	-	-
Black Ridge	38	33	36	33	38	33	33	32
Dinosaur NM (Colorado/Utah)								
Harper's Corner	24	24	23	22	22	22	26	28
West Cactus Flat	29	25	24	23	24	19	28	26
Glen Canyon NRA (Arizona/Utah)								
Rainbow Bridge	40	24	28	21	35	21	-	-
Escalante	30	21	23	21	23	21	26	21

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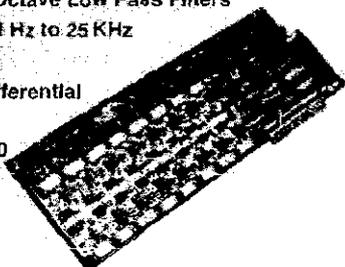


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not a consideration, and where people can address nature face to face, without mechanized buffers."<sup>6</sup>

### Urban Areas vs. Pristine Environments

As you might expect, analyzing impacts of proposed developments in areas with extremely quiet ambient levels is different than analyzing impacts in areas with "normal" urban noises. Audibility becomes an increasingly important factor. Whereas background noises in an urban setting might mask impacts from a proposed drilling project, that same drilling project in a pristine environment would likely be noticeable, and may in fact sound louder because of the absence of other noises.

The National Academy of Sciences addressed the issue of noise impacts on special land uses in its 1977, *Guidelines for Preparing Environmental Impact Statements on Noise*.<sup>7</sup> That report states that, "For outdoor amphitheatres, or other critical land uses requiring special considerations, the hourly average sound level  $L_p$  due to the new intruding noise should not be allowed to be higher than 5 dB below the existing hourly average sound level..." The Committee's report discusses impacts of noise intrusion and says: "The environment may be degraded either because the increased noise affects wildlife or monuments, or because it destroys the tranquility of wilderness areas to which urban dwellers wish to go for an escape from city noise..." In each case, some of the value of our national natural resources is lost; the quality of the environment is lowered."

### Back to Our Hikers

Well, it's been five days of hiking, eating and sleeping in some of the most beautiful country you have ever seen. As you and your hiking partner climb the last steep trail up to the parking area, you can't help feeling saddened. To leave this pristine place where the beauty of the scenery and the stillness of the air makes your senses play tricks on you, and makes you see and hear things that you aren't sure are really there, is a sad thing indeed. It's been an almost "religious" experience. You swear that you could "feel" the spirits of the Anasazi that inhabited the area years ago. Now you know what it means to be truly "in touch" with your feelings.

The car is loaded, you turn the key and your pollution producing, noisy piece of machinery roars to life. For the last time this summer you navigate your vehicle down Hole-in-the-Rock road. Out of sheer habit you slide a tape into the cassette player. Even before the music has started your partner pulls the tape back out and tosses it onto the back seat. Without words you know exactly what he is thinking - why ruin a perfectly quiet week?

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