

Acoustic Environment and Soundscapes Resource Summary Assateague Island National Seashore

National Park Service
U.S. Department of the Interior

Natural Resource Stewardship and Science
Natural Sounds and Night Skies Division



The Natural Sounds and Night Skies Division (NSNSD) provides the following information to assist park staff in considering the acoustic environment and soundscape in discussions of the park's foundation document. The acoustic environment in the national parks is managed under several policies and regulations. These include: NPS Organic Act of 1916, NPS Director's Order #47: Soundscape Preservation and Noise Management, National Parks Air Tour Management Act of 2000 and several sections of the Code of Federal Regulations regarding audio noise levels, snowmobiles, boats, and other motorized equipment. In addition, soundscapes are mentioned throughout NPS Management Policies including Soundscape Management (4.9), Cultural Soundscapes (5.3.1.7), Recreational Activities (8.2.2), Use of Motorized Equipment (8.2.3), and Wilderness Protection and Management (6.3.4.3). Together, these provide guidance to NPS parks and programs for protecting and restoring the natural soundscapes to the greatest extent possible and in celebrating and conserving the cultural soundscapes at cultural and historic sites.



The quality of the acoustic environment is relevant to nearly every unit in the NPS System. The acoustic environment can be important as a natural resource, a cultural resource, or both. Natural sounds are important to component of wilderness character and play an important role in wildlife communication, behavior, and other ecological processes. In addition, results from multiple surveys indicate that hearing the sounds of nature is an important reason for visiting national parks. Therefore, the importance of acoustic environments and soundscapes is related to an array of park resources and values and has broad implications for park management.

When developing the Foundation Document, park staff should consider the acoustic environment as a resource with inherent value that may be recognized when appropriate in the Fundamental Resource and Value, Other Important Resource and Value, or another section of the document. In addition, parks should consider soundscapes and acoustic resources as important factors that can have a profound effect on the quality of many other park resources and values such as wildlife, wilderness character, visitor experience, cultural landscapes and historic preservation. Please see Attachment 1 for an example of how Bryce Canyon National Park incorporated night skies into various sections of their foundation document. The following sections discuss the importance of natural sounds and the acoustic environment in relation to park resources and values.

Wildlife and Other Natural Resources

The acoustic environment is a natural resource that is integral to wildlife communication, behavior, and many other ecological processes. Exposure to relatively high noise levels that typically occur close to a source can produce potentially harmful physiological responses in humans and other animals including hearing loss, elevated stress hormone levels and hypertension. Lower levels of noise can interfere with ecological processes in surprising and complex ways. Groups of animals (especially in social species) benefit by producing alarm calls to warn of approaching predators and contact calls to maintain group cohesion. A reduction in communication distance created by noise might decrease the effectiveness of these social networks. Many animals are known to eavesdrop on vocalizations from different species. For example, gray squirrels listen in on the communication calls of blue jays to assess site-specific risks of cache pilfering; and nocturnally migrating songbirds and newts use the richness and complexity of biological sounds produced in local environments to make

habitat decisions. Animals also use accidental sounds produced by potential prey to locate their next meal; other animals use sound to avoid predation. At least one study that has animals can use sound to avoid other natural threats - African reed frogs flee from the sound of fire. It is likely that other ecological sounds are similarly important to animals.

These and other studies show that the acoustic environment is not a collection of private conversations between signaler and receiver but an interconnected landscape of information networks based on intentional and accidental sounds. The importance of the acoustic environment should be considered when developing the Foundation Document both in terms of the intrinsic value of natural sounds and their importance to the protection of wildlife species and ecological integrity.

**Wilderness
Character**

Many parks contain areas that are designated, proposed, or managed as wilderness. Preserving the acoustic environment and natural sounds of such areas are critical to effective wilderness management and can have important effects on wilderness character. Natural soundscapes and the absence of anthropogenic noise are crucial components of the wilderness qualities of solitude, naturalness, untrammelled, and undeveloped character. Noise, often from distant roads, park operations and maintenance activities, or aircraft overflights is one of the most common and pervasive human influence on the primeval character of wilderness. A loud or persistent noise source can be a prominent “imprint of man’s work” that can make a back country user or camper instantly aware that they are not alone. Human caused noise, especially low frequency sound from industrial developments, vehicles, and machinery can travel for miles in certain terrain and addressing park soundscapes is often critical to protecting the quality and character and the wilderness. Wilderness should be essentially unhindered and free from modern human control or manipulation and retain its primeval character and influence. When addressing wilderness resources in the Foundation Document, the importance of natural sounds and potentially adverse effects of noise on wilderness character should be considered.

Cultural Resources

Many culturally-based sounds are tangible symbols of a park’s relevance. From culturally significant music, to sounds associated with notable events, to historic reenactments, relevant cultural sounds should be protected in national parks. Sounds as a cultural resource include both man-made sounds and natural sounds because of the impact that specific sounds can have on visitors’ experience. Examples of meaningful soundscapes in our parks including jazz music in New Orleans, fog horn blasts at Golden Gate, and Civil War reenactments at Gettysburg.

Cultural sounds help reinforce a sense of pride in place, a connection to heritage and the awareness that humans, too, are integral to soundscape at many national parks. Many anthropogenic sounds have embedded themselves in the American psyche and echo significant movements in the country’s development. The whistle of a train, the heavy rattle of a slave’s chains and the crack of musket fire are all imbued with meaning about the American experience. Culturally-based sounds that are important to the purpose and significance of the park should be considered when developing the Foundation Document.

Visitor Experience

Visitors can be positively or negatively affected by the quality of the acoustic environment. The visitor who experiences the reverberating thud of male bighorn sheep butting heads, the slap of a beaver tail on the water’s surface, or a chorus of bird songs in the evening often cherishes these memories for a lifetime. The sounds are potent reminders of the ancient rituals preserved in our natural spaces and serve as key examples of the richness of park acoustic environments.

Natural sounds can promote understanding of the role of the acoustic environment in the ecosystem. Standing in the midst of the deafening trill of spring peepers, for example, is a

riveting reminder that wetlands are critical habitat for amphibians. A rattlesnake will shake its tail to alert intruders to its presence. Further, the song of the cactus wren characterizes the desert landscape. Such examples help convey the significance of preserving the integrity of the acoustic environment.

Similarly, cultural sounds help form visitor's experiences in our parks. Historic sites can better be revered in quiet solitude. Battle reenactments are more impressive with the explosion of cannons or muskets. Seashores visits are enhanced by the clicking of cabling around sailboat masts or the deep tones of foghorns in the distance. .

Overflights

The noise from overhead aircraft has proven to be a pervasive intrusion to most national parks. The issue is heightened when the aircraft is low flying and local to the park because it is louder and more frequent than flights flying 30,000 above ground. Guided by the National Parks Overflight Act of 1987 (P.L. 100-91) and 2006 Management Policies sect. 8.4, the NPS works to manage overflights. In July, 1995, NPS published Report to Congress on Effects of Aircraft Overflights on the National Park System. For more assistance on the Overflights Program, please contact Vicki McCusker at vicki_mccusker@nps.gov

Interpretive Themes

The significance of the acoustic environment and soundscape on human experience and ecosystem health can be shared with park visitors in a variety of ways. Sounds can be included in displays at visitor centers and interpreted via pamphlets and website content. The content of soundscape themes will vary greatly from park to park. Natural sounds vary by ecosystem and by season. Cultural sounds vary by the purpose and location of each park.

In 2000, Fire Island and Assateague Island National Seashores established a natural sounds interpretive program. Natural sounds were recorded on location and compiled onto a CD produced by Finley--Holiday Films titled "Sounds of the Seashore." Common bird calls and other natural sounds of the Atlantic seashore were included.

For a full discussion of ways to enhance the soundscape for visitors, please reference the NSNSD interpretive handbook, "The Power of Sound."

NSNSD also developed the following pieces for use in parks:

- *Natural Sounds Program: Safeguarding the Sounds of Life* (brochure)
- *Ways to Enjoy Natural Sound* (flier)
- *Acoustic Resources are Essential to Functioning Ecosystems and to the Visitor Experience* (flier).

Quality of the Resource at Fire Island NS

Sound levels in national parks can vary greatly, ranging from among the quietest ever monitored, to extremely loud. While, for example, the din of a typical suburban area fluctuates between 50 and 60 dBA, the crater of Haleakala National Park is intensely quiet, with levels around 10 dBA. Along some remote trails in Grand Canyon National Park, sound levels, at 20 dBA, are softer than a whisper (Bell, Mace, & Benfield, 2009). The noise levels standing near a snowcoach in Yellowstone National Park, however, can be compared to standing three feet from a churning garbage disposal (California Department of Transportation, 1982).

Decibels work on a logarithmic scale; an increase of 10 dB causes a doubling of perceived loudness and represents a ten-fold increase in sound level. Thus 20 dBA would be perceived as twice as loud as 10 dBA, 30 dBA would be perceived as 4 times louder than 10 dBA, 40 dBA would be perceived as 8 times louder than 10 dBA, etc. Below are some examples of sound pressure levels measured in national parks.

dBA	Sound
0	Threshold of human hearing
10	Volcano crater (Haleakala NP)
20	Leaves rustling (Canyonlands NP)
40	Crickets at 5 m (Zion NP)
60	Conversational speech at 5 m (Whitman Mission NHS)
80	Snowcoach at 30 m (Yellowstone NP)
100	Thunder (Arches NP)
120	Military jet at 100m AGL (Yukon-Charley Rivers NP)
126	Cannon fire at 150m (Vicksburg NMP)

**Planning and
Data Needs**

NSNSD staff records, measures and analyzes acoustic information for national parks. Information on sound levels, sounds sources, frequencies, intervals, and variations throughout the day or the year are measured. Acoustic monitoring has not yet taken place at Assateague Island NS. NSNSD works with parks to determine future data needs and monitoring opportunities.

If you would like acoustic monitoring and reporting for your park, please include acoustic environment and/or soundscape in planning documents and request study through a Technical Assistance Request (TAR). The Natural Sounds and Night Skies Division of the NPS is located in at the Washington Area Office in Fort Collins, CO and can be contacted via Frank Turina at frank_turina@nps.gov.