Acoustic Measurements in Arches National Park, Canyonlands National Park, Hovenweep National Monument, and Natural Bridges National Monument, 2001-2007



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Executive Summary

The ability to hear and communicate is essential to the survival of many species of animals. Several species need to hear and produce sounds to establish and defend territories, attract mates, find prey, and avoid predators. Many visitors come to national parks to hear and enjoy natural sounds, including animals but also other natural sounds as well, such as water falls, river rapids, wind through vegetation, and thunder. Visitors also enjoy the quiet and solitude available in parks. Natural sounds are a natural resource that the National Park Service is mandated to protect.

From 2001 to 2007, acoustic measurements were made at 23 locations in Southeast Utah Group (SEUG) parks. The objective of the study was to determine natural (L_{nat}) and existing (L_{50}) ambient sound levels in the primary land cover types in units of SEUG, and to determine the primary sources of sounds (natural and non-natural) in those locations. Park units of SEUG include: Arches National Park (ARCH); Canyonlands National Park (CANY); Hovenweep National Monument (HOVE); and Natural Bridges National Monument (NABR).

The most common land cover types in SEUG units are Colorado Plateau Mixed Bedrock Canyon and Tableland; Colorado Plateau Pinyon-Juniper Shrubland; Colorado Plateau Pinyon-Juniper Woodland; Colorado Plateau Blackbrush-Mormon-tea Shrubland; and Inter-Mountain Basins Big Sagebrush Shrubland. These land cover types cover over 75 percent of SEUG units.

Sound levels (dBA) by season for the primary land cover types were as follows.

Land Cover Group, Season	L_{eq} Log Mean	L_{eq} Median	L_{10} Median	L_{50} Median	L_{90} Median	L_{nat} Median
Pinyon-Juniper, Canyons						
Summer	39.0	28.9	30.8	23.6	19.9	21.4
Winter	33.6	25.5	26.9	19.3	17.9	18.4
Shrubland, Grassland						
Summer	46.0	28.4	30.1	23.1	20.7	21.6
Winter	37.4	26.1	27.4	19.1	18.1	18.3
Riparian						
Summer	46.7	36.2	36.8	27.9	22.6	25.1
Winter	34.4	24.1	25.1	19.1	18.3	18.6

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Summer sound levels (dBA) in Pinyon-Juniper, canyon, shrubland, and grassland land cover types were similar, while summer sound levels in riparian areas were higher by about 4 dBA. Winter sound levels (dBA) in all land cover types (excluding developed areas) were also similar (although very near or below the noise floor of the instruments). It is important to keep in mind that dBA values are the sums of sound levels of many frequencies. Although dBA values were similar in some cases, one-third octave band data often revealed differences in individual spectra, suggesting different sound sources. As a result, acoustic conditions in different land cover types may not be as similar as their dBA values suggest.

In SEUG, wind, birds, and insects were the most common natural sounds. Animal sounds (mostly insects and birds) were much more common in summer. Aircraft and vehicles were the most common non-natural (human-caused) sounds. Common audible sounds in SEUG units and the average percent time audible of each during summer (April-October) and winter (November-March) are shown below.

	Percent Time Audible	
Audible Sound Sources	Summer	Winter
Insect	62	2
Wind	40	25
Aircraft (all types)	27	25
Bird	39	9
Vehicle (and other motor sounds)	17	24
Water (rain, river, etc.)	15	20
Animal (unknown type)	10	2
Natural Other	0	3

Aircraft and vehicles were the most common non-natural sounds in SEUG. Vehicle sounds were limited to 1 km to 10 km from roads, while aircraft sounds were audible in all areas of SEUG. The percent time that aircraft were audible was similar in winter and summer. Vehicles, although less common in winter, were often more audible in winter. Currently, there is no place in any SEUG unit that is free of non-natural sounds for significant periods of time.

Recommendations for future acoustic projects include:

- Initiate Soundscape Management Planning. A soundscape management plan is the single most important document for protecting and restoring park soundscapes. Efforts to develop a soundscape management plan for SEUG should begin as soon as possible.
- Conduct Measurements along Cataract Canyon. During this study, sound levels were measured along the Colorado and Green rivers, but only along flat water

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(non-rapids) sections, above the confluence of the two rivers. Sound levels below the confluence through Cataract Canyon would be different, and would vary with different seasonal water flows. Measurements should be made near rapids in Cataract Canyon during periods of low and high water flow.

- Initiate Long-term Monitoring. A long-term acoustic monitoring program should be initiated in SEUG. This effort should include at least one permanent monitor in CANY and regularly scheduled (every two to three years) monitoring at other locations.
- Conduct Measurements with Low-noise Microphones. Many of the sound levels reported herein are near the noise floor (lower measurement limit) of the sound level meters used in this study (generally 12-18 dBA). This indicates that actual sound levels are below the noise floor and lower than reported here. In one location where a very sensitive, low-noise microphone was used (noise floor 6.5 dBA), sound levels <10 dBA were recorded frequently. This suggests that in some locations in SEUG, absent human-caused noise, very low sound levels are common. Very sensitive, low-noise microphones should be used during measurements in the future to better understand actual sound levels in SEUG.

Natural sounds are considered a natural resource by the National Park Service, a resource the NPS is mandated to protect and, if needed, restore. In order to do successfully, a soundscape management plan, complete with soundscape management standards for different management zones in the park, is essential. All park activities, including resource management, maintenance, ranger activities, interpretation, and new construction should be undertaken with the awareness of the need to minimize impacts to the natural soundscapes in SEUG units.

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Introduction

Natural sounds and natural soundscapes are considered valuable and important natural resources by the National Park Service (NPS 2006). NPS *Management Policies* reflect a strong direction to protect natural soundscapes in parks, stating: "The National Park Service will preserve, to the greatest extent possible, the natural soundscapes of parks" (NPS 2006). Section 8.2.3 of the NPS Management Policies state: "The natural ambient sound level—that is, the environment of sound that exists in the absence of human-caused noise—is the baseline condition, and the standard against which current conditions in a Soundscape will be measured and evaluated" (NPS 2006). In order to understand soundscapes in parks, the amplitude, frequency content, and sources of both natural and non-natural sounds must be determined. Once park soundscape management plans, including specific soundscape standards for each management zone, are developed, acoustic monitoring can determine if those standards are being achieved.

Objectives

The objective of the study was to determine natural and existing ambient sound levels in the primary land cover types in units of SEUG, and to determine the primary sources of sounds (natural and non-natural) in those locations.

Study Area

Arches National Park (ARCH), Canyonlands National Park (CANY), Hovenweep National Monument (HOVE), and Natural Bridges National Monument (NABR) form the Southeast Utah Group. These park units are in southeastern Utah, in the north-central part of the Colorado Plateau (Figure 1). This area is characterized by outstanding geologic features, deep, narrow canyons and high plateaus. The Colorado and Green rivers flow through CANY and come together in the southwest portion of the park. CANY is divided into three principal management districts: Maze, Island in the Sky, and Needles.

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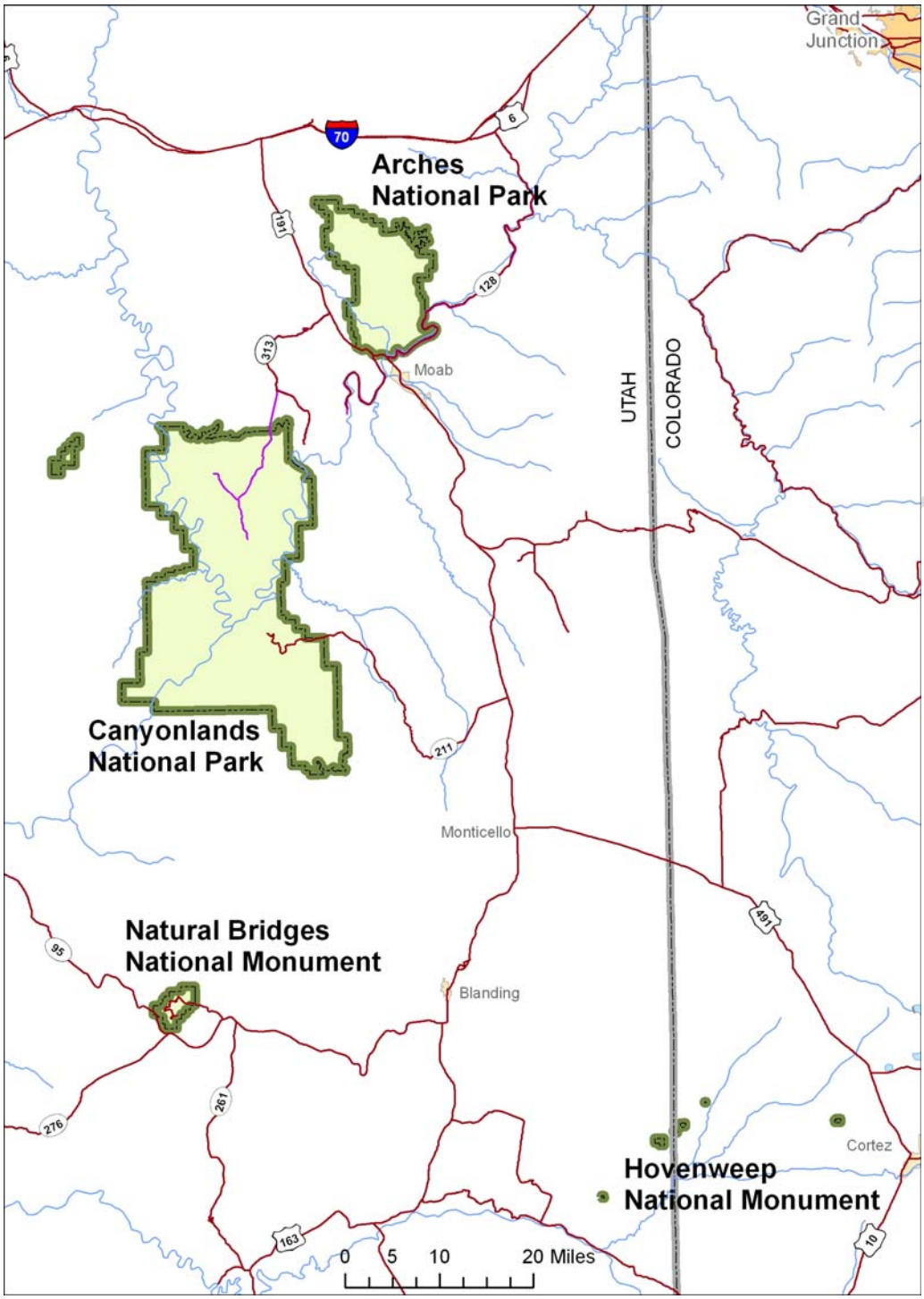


Figure 1. Location of Southeast Utah Group parks, ARCH, CANY, HOVE, and NABR.

Land Cover

Land cover, including vegetation or lack thereof, is a key attribute influencing acoustic conditions of a given study area. Vegetation and climate conditions dictate the types and numbers of animals in a given area. Land cover directly affects how sounds propagate and attenuate from a source to a receiver. Sounds typically propagate with little attenuation over acoustically hard surfaces (e.g., bare rocks or water) as opposed to acoustically soft surfaces (e.g., grassy fields or dense trees).

There is currently no standard land cover/vegetation classification system in the NPS. However, several classification systems, including NatureServe and National Land Cover Database (NLCD), are being reviewed by the NPS for use in grouping NPS park units by common land cover, vegetation, topography, and habitat and associated acoustic zone. With the goal of potentially facilitating future data transferability between parks with similar land cover types and ecological division, all baseline acoustic data collected will be classified in accordance with the NatureServe system being used by The Nature Conservancy and several federal and state agencies and private organizations (Appendix I). The NatureServe classification system complements the National Land Cover Database (NLCD) (Vogelmann et al. 2001). Developed by the U.S. Geological Survey (USGS), the NLCD is the only nationally consistent land cover data set in existence and is comprised of nine class and twenty-one NLCD subclass categories for the entire U.S. (Appendix II).

Climate affects baseline ambient sound levels, as sound propagates differently in cold dry regions as opposed to warm humid regions. Additionally, differences in animal occurrence and activity can also be expected with varying climate. Thus, different climate regions (or ecological domains) of the U.S. have to be considered.

NatureServe, and its Natural Heritage Program members, with funding from The Nature Conservancy, completed the first working classification of terrestrial ecological systems in the United States, southern Alaska, and adjacent portions of Mexico and Canada (Comer et al. 2003). The ecological divisions of North America used in association with NatureServe are shown in Appendix II. With the goal of potentially facilitating future data transferability between parks, all baseline acoustic data collected was organized by ecological division. This project used SEUG land classifications as described in the Southwest Regional Gap Analysis Project (Ramsey 2006), which followed the NatureServe protocols.

The four park units in this study are located in the Inter-Mountain Basin (No. 304) North American Ecological Division. The primary land cover types and percentage of each in ARCH, CANY, HOVE, and NABR are shown in Table 1. A brief description of these primary land cover types in these areas is provided in Appendix III.

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Table 1. Primary land cover types in SEUG park units.

			Percent Land Cover by Park			
NLCD	SCODE	Description	ARCH	CANY	HOVE	NABR
33	S010	Colorado Plateau Mixed Bedrock Canyon and Tableland	22.9	44.2	0.7	26.3
42	S039	Colorado Plateau Pinyon-Juniper Woodland	0.4	6.1	13.8	56.4
42	S052	Colorado Plateau Pinyon-Juniper Shrubland	8.9	11.8	40.8	13.9
51	S054	Inter-Mountain Basins Big Sagebrush Shrubland	0.7	2.6	35.6	2.2
51	S059	Colorado Plateau Blackbrush-Mormon-tea Shrubland	45.8	19.6	0.7	
51	S065	Inter-Mountain Basins Mixed Salt Desert Scrub	7.2	6.6	3.3	
71	S090	Inter-Mountain Basins Semi-Desert Grasslands	1.9	1.3	3.6	
41	S093	Rocky Mountain Lower Montane Riparian Woodland and Shrubland		0.8	1.0	1.0
41	D04	Invasive Southwest Riparian Woodland and Shrubland	2.1	2.2		0.2
71	D08	Invasive Annual Grassland	2.7		0.1	
11	N11	Open Water	0.1	1.6		
		Total:	92.7	96.6	99.5	100.0

Land cover maps and measurement locations for the four SEUG units are shown in Appendix IV.

Methods

Definitions

Definitions of key acoustic terms used in this report follow (from NPS 2005). Additional definitions are provided in Appendix V.

Audibility

Audibility is the ability of animals with normal hearing, including humans, to hear a given sound. Audibility is affected by the hearing ability of the animal, other simultaneous interfering sounds or stimuli, and by the frequency content and amplitude of the sound.

A-Weighting (dBA)

A-weighting is used to account for differences in human hearing sensitivity as a function of frequency. A-weighting de-emphasizes the high (6.3 kHz and above) and low (below 1 kHz) frequencies, and emphasizes the frequencies between 1 kHz and 6.3 kHz, in an effort to simulate the relative response of human hearing.

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Decibel (dB)
A logarithmic measure commonly used in the measurement of sound. The decibel provides the possibility of representing a large span of signal levels in a simple manner as opposed to using the basic pressure unit Pascal. The difference between the sound pressure for silence versus a loud sound is a factor of 1,000,000:1 or more, therefore it is less cumbersome to use a small range of equivalent values: 0 to 130 decibels.

Existing Ambient Sound Level (L_{50})
The sound level of all sounds in a given area, including all natural sounds as well as all mechanical, electrical and other human-caused sounds. The sound level exceeded 50 percent of the time, the L_{50} (median).

Frequency
The number of times per second that the sine wave of sound repeats itself. It can be expressed in cycles per second, or Hertz (Hz). Frequency equals Speed of Sound / Wavelength.

Natural Ambient Sound Level (L_{nat})
The sound level of all natural sounds in a given area, excluding all mechanical, electrical and other human-caused sounds. "Natural ambient" is considered synonymous with the term "natural quiet," although natural ambient is more appropriate because nature is often not quiet. The L_{nat} is the sound level associated with an exceedence value calculated by removing the percent time human-caused sounds are audible.

L_{eq} (Equivalent Sound Level)
The logarithmic average (i.e., on an energy basis) of sound pressure levels over a specific time period. "Energy averaged" sound levels are logarithmic values, and as such are generally much higher than arithmetic averages. L_{eq} values are typically calculated for a specific time period (1-hour and 12-hour time periods are often used). L_{eq} values are computed from all of the 1-second L_{eq} values for the specific time period. L_{eq} must be used carefully in quantifying natural ambient sound levels because occasional loud sound levels may heavily influence (increase) the L_{eq} value, even though sound levels for that period of time are typically lower.

L_{max}
The maximum sound pressure level for a given period.

L_{min}
The minimum sound pressure level for a given period.

L_x (Exceedence Percentile)
This metric is the sound pressure level (L), in decibels, exceeded *x* percent of the time for the specified measurement period. L_{50} is the sound pressure level exceeded 50 percent of the time (L_{50} is the same as the median). L_{90} is the sound pressure level exceeded 90 percent of the time.

Noise Free Interval (NFI)
The length of the continuous period of time during which only natural sounds are audible or there is silence.

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Octave
The interval between two frequencies having a ratio of 2 to 1. The *octave* is an important frequency interval relative to human hearing, and octave band analysis is a standard for acoustic analysis. The frequency resolution in octave band analysis is relatively poor; hence finer frequency resolution is often used in acoustic analysis. Generally, one-third-octave band analysis is used. Three one-third octave bands are in one octave, so the resolution of such a spectrum is three times better than the octave band spectrum.
Sound Level
Generally, *sound level* refers to the *weighted* sound pressure level obtained by frequency weighting, usually A- or C-weighted.
Sound Pressure
Sound pressure is the instantaneous difference between the actual pressure produced by a sound wave and the average barometric pressure at a given point in space. Not all pressure fluctuations detected by a microphone are sound (e.g., wind over the microphone). Sound pressure is measured in Pascals (Pa), Newtons per square meter, which is the metric equivalent of pounds per square inch.
*Sound Pressure Level (SPL***)**
The logarithmic form of sound pressure. Generally, *sound pressure level* refers to *unweighted* sound pressure levels of one-third octave bands.

Measurement Protocols
Acoustic equipment and measurement procedures followed protocols outlined in "Acoustics and Soundscape Studies in National Parks (Draft)" (NPS 2005) and earlier drafts of the document. The basic approach of the study was to place acoustic monitors in the primary land cover types of the park units for a >25 days during summer and >25 days during winter in backcountry areas. Data collection for this length of time will insure that the primary land cover types will be sampled sufficient period of time to provide acoustic data on natural ambient sound levels within a margin of error of ± 3 dB (NPS 2005). Monitors were also placed in developed or frontcountry areas (visitor's centers) for a minimum of 10 days per season. Monitors were checked regularly to ensure system operation, calibration, and data download.

Meteorological Data
Meteorological data (wind speed, wind direction, temperature, and humidity) can improve the utility of acoustic data. Previous studies in National Parks have established a strong correlation between land cover, wind speed, and ambient sound pressure levels (Lee et al. 2005). Sound pressure levels also attenuate differently in cold or hot temperatures. In general, ambient noise levels tend to increase with increasing wind speeds. Depending primarily upon the vegetative characteristics of the measurement site, a substantial change in noise level can occur as wind speeds increase. For example, ambient noise level data measured at a site containing dense foliage will be influenced by wind, primarily due to the wind interacting with leaves. Meteorological data were not collected at all locations during this study due to evolving acoustic monitors (no

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meteorological data during the early measurement years) and also due to security concerns in some locations (large wind gauges with moving parts increased visibility and the possibility of equipment being stolen).

Jakobsen and Andersen (1983) described three types of wind sounds:

1. Natural wind sounds (sounds of turbulence in the air);
2. Vegetation wind sounds (sounds of vegetation being blown by wind): and
3. Microphone sounds (sounds of air flow turbulence against windscreen foam or over the microphone, generally considered "distorted" or "contaminated" sound).

Individuals listening to recordings coded two types of wind sounds, natural and non-natural. The first two types of wind sounds listed above are considered natural; the third type of wind sound is considered non-natural.

Acoustic Monitors

Acoustic measurements in the four SEUG units occurred over several years (2001-2007). Whenever new acoustic monitors or software programs were developed or improved, the new equipment or software was used. As a result, four different types of acoustic monitors were used over the course of the study. Although all equipment and components met or exceeded ANSI Type 1 standards, some improvements included lower inherent system noise which resulted in lower instrument noise floors. As a result, some very low decibel levels may not be directly comparable.

The acoustic monitor most commonly used consisted of a Larson-Davis 824 sound level meter (SLM), Larson-Davis PRM902 preamplifier, GRAS 40AQ microphone, and a Larson-Davis 106.2 windscreen with bird spike. Also included in this monitor was an IBM-compatible notebook computer with sound card to store SPL data and digital recordings, 12-volt batteries to power the system, a solar array to charge the batteries, and a weather-proof container.

A second, similar system consisted of Sound Technology Spectra 132 sound level software (SoundTechnology.com), Sound Technology ST191-DSA external sound card, GRAS 26CA preamplifier, GRAS 40AQ microphone, and a Larson-Davis 106.2 windscreen with bird spike. An IBM-compatible notebook computer was used to run the Spectra 132 software and to store SPL data and digital recordings. A 12-volt battery supply was used to power the system, a solar array to charge the batteries, and a weather-proof container housed the equipment.

A new Larson-Davis 831 SLM was available in 2007, and this system was used in the summer of 2007. The system consisted of a Larson-Davis 831 SLM, Larson-Davis PRM831 preamplifier, PCB 377B20 microphone, and Larson-Davis ESP106-2 Environmental Shrouds (windscreen and bird spike). No computer was needed with this system because the SLM had 2 GB internal memory. A Cowon iAudio X5 MP3 digital

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recorder was used to make and store digital recordings (MP3, 192 kbps). The recorder used the microphone output from the Larson-Davis 831 SLM. A 12-volt battery system was used to power the system, and the equipment was stored in a weather-proof container.

At some locations early in the study, a Larson-Davis 812 sound level meter (with Larson-Davis PRM828 preamplifier and Larson-Davis 2650 microphone) was used. This meter collects dBA but not one-third octave band data, thus for some locations, only dBA data are available.

All sound level meters and systems and components met ANSI Type 1 standards (IEC 804:1985, Integrating-Averaging Sound Level Meters), and were calibrated annually. A B&K 4231 acoustic calibrator that complied with Class 1 accuracy requirements of ANSI S1.40-1984, American National Standard Specification for Acoustical Calibrators (9184), or IEC 942:1988, Sound Calibrators (1988), was used to check calibration in the field.

All instruments (sound level meters, computers, anemometers, and recorders) were time-synchronized with GPS time at deployment, and any time off-sets observed during subsequent visits were recorded.

Monitors were capable of operating remotely for extended periods of time (>30 days) through the use of large data storage ability and solar charging systems. When possible, wind speed and wind direction data were collected. Wind data were collected using two different types of anemometers: Hobo wind speed sensor and data logger (Onset Computer Company) and CV3 ultrasonic anemometer (LCJ Capteurs, France).

All monitors except the LD 812 collected continuous 1-second decibel data (dBA and L_{eq} for 1/3 octave bands, 20-20,000 Hz). Digital audio recordings (.wav files at 16-bit/44100 Hz or MP3 files at 192 kbs) were collected at most sites. Generally, recordings were at regular intervals, a 10-second recording every 2 minutes, throughout the measurement period. In some locations, continuous recordings were collected for short periods.

Observer Logging, Field and Office

Decibel data alone do not allow identification of sources of sounds. When conducting acoustic studies in national parks, it is essential that the source of common sounds, both natural and non-natural, be identified. Further, it is important to determine the percent time that such sounds are audible. This is accomplished by observers logging sound source information in the field and by individuals listening to recordings in the office and identifying sound sources. Listening and logging, either in the field or in the office, is labor intensive, thus logging is only conducted for a sub-sample of the measurement period. Field logging (continuous 1-hour periods) was conducted for all primary measurement sites. Office logging was conducted for seven days per season at each of the primary measurement locations.

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Listening to recordings in an office environment and logging sound sources is not the same as listening and logging sound sources in the field. In general, one hears better in the field. In the field, the listener hears in stereo, two ears hearing in opposite directions. This has the potential to provide some separation in two different sounds that might be overlapping in frequency (and thus might be missed by hearing in mono). The field listener is able to turn his/her head toward the direction of the sound, and this also provides improved hearing ability. The listener in the field can often see the sound source to verify identification. Additionally, listening in the field is in a "free-field" environment, whereas in an office the listener uses headphones, a closed environment.

While several factors of listening and logging in the field are beneficial, listening to recordings in the office also offers some advantages. First, with good recordings, playback equipment, and software, the office listener can increase the playback volume and, in some situations, hear sounds better than the field listener. Second, the office listener is able to "pause" the playback and take frequent breaks. The office listener can also use the "pause" feature during playback to catch up on logging entries when multiple sounds are occurring at one time, something the field logger cannot do. Finally, the office listener is able to re-play any recordings for which a question might exist, as well as ask other individuals for assistance with source identification.

In order to ensure that office listening and logging closely approximates what is heard and logged in the field, adjustments are made to the playback in the office. Two methods can be used to make such adjustments. When continuous recordings are collected during field logging, the office listener can use a human-caused sound event from the log, such as an aircraft sound, and note the time that event was audible to a field observer. If, for example, an aircraft sound was audible for 2 minutes and 40 seconds, the office listener could adjust playback volume such that the time the event was audible to the office listener was also 2 minutes and 40 seconds. The second method, and the method used for this analysis, is to compare an hour of field logging with office logging for the same hour. The logs are compared against each other to make sure that the percent time sounds were audible to the office listener is similar to the percent time that the field observer logged. In most situations, adding 15 dBA during office playback will closely approximate results of logging in the field.

We compared two field logging efforts with matching recordings and logging in the office. At HOVE001 (see Figure 12), Jan. 28, 2003, 1100-1200, field logging recorded aircraft audible 65 percent of the hour. Office logging from a digital recording made for that same hour recorded aircraft audible 63 percent of the hour. At CANY004 (see Figure 11), Jan. 27, 2006, 1300-1400, field logging recorded aircraft audible 25 percent of the hour. Office logging from a digital recording of that same hour recorded aircraft audible 25 percent of the time. Results of field logging and office were very similar. At Grand Canyon National Park (GRCA), a similar comparison was made in a 2005 study (Ambrose 2005). At one location, field observers recorded human-caused sounds 43 percent of the hour, and office loggers recorded human-caused sounds 39 percent of the

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hour. At another location, field observers recorded human-caused sounds 69 percent of the hour, and office loggers recorded human-caused sounds 66 percent of the time. In comparisons at both parks, office logging results were very similar to field logging results.

All field and office listeners/loggers had hearing tests to insure all were within normal ranges. Playback software used was Adobe Audition 1.0. Office listeners used a desktop computer with an external sound card (Sound Devices USBPre or M-Audio MobilePre) and Beyerdynamic DT770 headphones.

Observer Field Logging
At each of the 12 primary (long-term) measurement sites, observers listened and logged each sound heard on a standardized data logging sheet. Sounds were logged in 10-second increments, and were not logged in order of "loudest to quietest" but rather logged for presence or absence. Observers conducted logging near the acoustic monitors (within 25 m), but not so near to influence decibel data and recordings being collected in conjunction with the logging effort.

Observer Office Logging
In addition to field logging, several hours of digital recordings were listened to and sources logged in the office. In office logging, recordings were samples of the entire day, generally using a sample scheme of recording 10 seconds every 2 minutes. This resulted in a 2 hour file for each day. At the 10 long-term backcountry measurement sites, sampled recordings from seven days in summer and seven days in winter were analyzed. At HOVE002 and NABR002, both Visitor Center measurement locations, only two days were sampled (due to almost 100 percent non-natural sounds).

Noise Free Interval
The Noise Free Interval (NFI) metric, which is the continuous length of time during which only natural sounds are audible or there are no sounds audible, was calculated from field observer logging. The NFI metric cannot be calculated from short sample recordings, rather, continuous recordings or continuous field logging are needed. The NFI metric is informative when used with the "Percent Time Audible."

Vehicle Sound Area of Audibility Computations
Vehicles sounds are one of the second-most common audible non-natural sounds in the backcountry of SEUG units (aircraft are the most common). We mapped the approximate area of audibility of vehicle sounds using Volpe's Traffic Noise Model (TNM) look-up tables. TNM provides vehicle sound levels for different vehicle types at different speeds at different distances. These data, in conjunction with field and office source identification efforts and observations of vehicles in each unit, were used to estimate the area of audibility of vehicles.

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We estimated that roughly 75 percent of vehicles were automobiles, and 25 percent were recreational vehicles (RV) and motorcycles. The TNM does not list RV as a vehicle type, so we substituted decibel data for medium-sized trucks for RVs. We computed average vehicle sound levels based on this mix of vehicle types. With the 75/25 percent split for automobile and other vehicle types, average dBA at 50 feet for different speeds are shown in Table 2.

For this exercise, we did not run the TNM model. We computed an average vehicle sound level (based on the 75/25 mix discussed above) at the different speed limits on park roads, and then projected an area of audibility for vehicles using the TNM look-up tables. We tried different baseline sound levels, including L_{nat}, L_{50}, and L_{Aeq} (log mean of hourly values), and compared results with observer field audibility data. Using L_{Aeq} (an energy based average) as the baseline ambient sound level provided the closest match to audibility recorded during field logging. Therefore our area of audibility maps for vehicles was developed using L_{Aeq} as a baseline.

The median L_{Aeq} for the winter in ARCH is 25.2 dBA. Winter is the quietest time of year when vehicles are most audible, averaging 28.2 percent of the time (keep in mind that vehicles can be audible even when those levels are less than ambient due to frequency differences). The TNM look-up tables assume a decrease of about 6 dBA with each doubling of distance (although attenuation of a line source is generally 3 dBA with each doubling of distance, field measurements of vehicle sounds indicate a 6 dBA attenuation is more appropriate). The TNM table does not consider soft versus hard ground or terrain blockage or reflection. All of these factors are common in SEUG units and have a major influence on sound attenuation rates. Attenuation distances to 25.2 dBA for different vehicle speeds using the TNM look-up tables are shown in Table 2. We used these distances for all four SEUG units when preparing vehicle sound audibility maps.

It is important to note that several factors influence vehicle sound attenuation rates. The attenuation distances and maps provided in this report are very, very rough estimates of vehicle sound attenuation rates in SEUG units. Much more detailed information on vehicle numbers, types, use on different roads, and actual sound levels are needed before an in-depth analysis of the area of vehicle audibility can be done.

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Table 2. Sound levels (dBA) of common vehicle mix (75% auto/25% other) at different speeds and approximate distances to attenuate to L_{Aeq} 25.2 dBA.

Speed (MPH)	L_{Aeq} at 15 m (50 ft) (75% Auto/25% Other)	Distance (m) to Attenuate to 25.2 dBA
15	55	500
25	62	1000
35	68	2000
45	72	3200
65	79	7200

Location of Acoustic Monitors

Measurement locations were selected after review of primary land cover types and discussions with SEUG staff. Measurements were made in each of the primary land cover types in each unit. Measurement locations and land cover types of each are shown in Table 3 (see also Figures 2-7 and Appendix IV). Detailed information for each measurement location is provided in Appendix VI.

In CANY, monitors were placed along the Colorado and Green rivers upriver from the confluence of the two rivers. These sections are flat water with no rapids. The Colorado River between Potash and the confluence has considerably more motorized boat traffic than the Green River. Many rafters motor through this section of the Colorado River on their way to run Cataract Canyon. Additionally, a few companies provide a ferry service from the confluence to Potash (using inboard jet boats) to transport boaters that floated the Colorado or Green rivers but were not going through Cataract Canyon. No measurements were made in Cataract Canyon during this study.

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Table 3. Acoustic measurement locations in SEUG, 2001-2007, and land cover types.

Location:	Name:	Latitude		Longitude		Land Cover Code and Description	
ARCH001	Windows	38.68213	N	109.54365	W	S010	Colorado Plateau Mixed Bedrock Canyon and Tableland
ARCH002	Salt Creek Road	38.76112	N	109.60286	W	S059	Colorado Plateau Blackbrush-Mormon-tea Shrubland
ARCH003	ARCH Entrance, VC	38.61740	N	109.61845	W	S010	Colorado Plateau Mixed Bedrock Canyon and Tableland
ARCH004	Salt Valley, 0.7 km S. North Entrance, 0.4 km E. of road.	38.80343	N	109.66429	W	S065	Inter-Mountain Basins Mixed Salt Desert Scrub
ARCH005	Courthouse Wash, Middle	38.64778	N	109.60152	W	D04	Invasive Southwest Riparian Woodland and Shrubland
ARCH006	Klondike Bluff	38.79449	N	109.67930	W	S010	Colorado Plateau Mixed Bedrock Canyon and Tableland
ARCH007	Panorama Point	38.71014	N	109.54893	W	S052	Colorado Plateau Pinyon-Juniper Shrubland
ARCH008	Salt Valley, 3.6 km S. North entrance, 0.4 km W. of road	38.78714	N	109.65349	W	S065	Inter-Mountain Basins Mixed Salt Desert Scrub
ARCH009	Willow Flats Road 1, 10 km	38.69622	N	109.60854	W	S059	Colorado Plateau Blackbrush-Mormon-tea Shrubland
ARCH010	Willow Flats Road 2, junction Tower Arch Road	38.79499	N	109.67829	W	S059	Colorado Plateau Blackbrush-Mormon-tea Shrubland
CANY001	ISKY, E. of Murphy Trailhead	38.35400	N	109.87024	W	S039	Colorado Plateau Pinyon-Juniper Woodland
CANY002	Needles, Salt Creek, Middle	38.10756	N	109.76190	W	S093	Rocky Mountain Lower Montane Riparian Woodland and Shrubland
CANY003	ISKY, S. of Murphy Trailhead	38.35400	N	109.87024	W	S010	Colorado Plateau Mixed Bedrock Canyon and Tableland
CANY004	Needles, Salt Creek, Lower	38.13765	N	109.75185	W	S093	Rocky Mountain Lower Montane Riparian Woodland and Shrubland
CANY005	Maze, Horseshoe Canyon	38.46283	N	110.19186	W	S093	Rocky Mountain Lower Montane Riparian Woodland and Shrubland
CANY006	CO. R., Little Bridge	38.40309	N	109.74768	W	D04	Invasive Southwest Riparian Woodland and Shrubland
CANY007	Green River, Upheaval Dome	38.48458	N	110.00367	W	S093	Rocky Mountain Lower Montane Riparian Woodland and Shrubland
CANY008	Little Bridge Canyon (off-river site; recording cont.)	38.40589	N	109.75890	W	S093	Rocky Mountain Lower Montane Riparian Woodland and Shrubland
CANY009	ISKY, Gray's Pasture	38.41869	N	109.84685	W	S090	Inter-Mountain Basins Semi-Desert Grasslands
HOVE001	Hackberry	37.40956	N	109.02615	W	S052	Colorado Plateau Pinyon-Juniper Shrubland
HOVE002	HOVE VC	37.38524	N	109.07532	W	S054	Inter-Mountain Basins Big Sagebrush Shrubland
NABR001	Owachomo Bridge	37.58471	N	110.01530	W	S010	Colorado Plateau Mixed Bedrock Canyon and Tableland
NABR002	NABR VC	37.60954	N	109.97731	W	S039	Colorado Plateau Pinyon-Juniper Woodland

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Measurement period
Sound levels can be extremely variable, and measurement periods limited to just a few days can lead to erroneous results. The goal of acoustic measurements in National Parks is to ensure that results from the sample measurement period are not more than 3 dB different than results had the entire season been sampled (NPS 2005). A 25 day minimum measurement period for backcountry locations was used based on review of several year-long data sets in other parks (see NPS 2005 for detailed discussion). For frontcountry locations, a 10 day minimum measurement period was used (assuming less day-to-day variability at typical frontcountry locations).

Summer and Winter Seasons
Summer and winter periods were based on average temperatures. For this report, summer was defined as April-October, and winter was defined as November-March. Acoustic data collected in spring (March-April) and fall (September-October) occasionally overlapped both summer and winter periods, but overall summer months were louder than winter months.

Acoustic Data
The data collected and resulting metric computations are shown in Table 4.

Table 4. Acoustic data and associated metric collected and computed.

Data Collected:	Metric Computed:
Sound Pressure Level Data (1-second L_{eq} for 1/3 octave bands, 20-20,000 Hz; dBA)	• L_{eq}, L_{10}, L_{50}, L_{90}, L_x, L_{min}, and L_{max} for each hour, day, month, season, and entire measurement period • L_{nat} and $L_{Existing}$ ambient sound levels
Observer Logging and Digital Recordings	• Time Audible • Identification of sources of sound • Distribution of sources of sounds • Noise-free interval

Acoustic metrics are often confusing and not always easily understood. Additional definitions of acoustic terms and examples of metrics are provided in the NPS "Draft Manual for Conducting Acoustics and Soundscape Studies in National Parks" available on the web at http://www.nature.nps.gov/naturalsounds/publications. A short summary follows.

Sound can be defined as a pressure variation in air or other media that is within the hearing range of a given species. This pressure variation has two components: amplitude (sound pressure level) and frequency content. Sound pressure is a measure of the fluctuations in air pressure caused by the presence of sound waves. Sound pressure is the instantaneous difference between the actual pressure produced by a sound wave and the

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average barometric pressure at a given point in space. Sound pressure is measured in Pascals (Pa), Newtons per square meter, which is the metric equivalent of pounds per square inch. The decibel is a logarithmic value used to describe the amplitude of sound pressure levels. The decibel provides the possibility of representing a large span of signal levels in a simple manner as opposed to using the basic unit Pascal. The difference between the sound pressure for near silence versus a loud sound is a factor of 1:1,000,000 or more, therefore it is less cumbersome to use a small range of equivalent values, for example, 0 dB to 100 dB.

Some metrics are straightforward while others are not. L_{min} and L_{max} are simply the minimum and maximum measured values. L_{eq} is a logarithmic average (i.e., on an energy basis) of sound levels over a specific time period. In park situations, L_{eq} is useful for quantifying intruding sounds because its magnitude depends heavily on the loudest periods of a time-varying sound. L_{eq} of an intruding source by itself, however, is inadequate for fully characterizing the intrusiveness of the source. Research has shown that judgments of the effects of intrusions in park environments depend not only upon the amplitude of the intrusion, but also upon the sound level of the "background," in this case, the sound level of the non-intruding sources, usually the natural ambient sound levels. L_{eq} values are not generally appropriate for quantifying natural ambient sound levels; L_{eq} does not translate time-varying exposures into a biologically equivalent measure.

Exceedence metrics (L_{50} and L_{90}) are sound levels, in decibels, exceeded *x* percent of the time for the specified measurement period. The L_{50} value represents the sound pressure level exceeded 50 percent of the measurement period. L_{50} is the same as the median. The L_{90} value represents the sound pressure level exceeded 90 percent of the time during the measurement period. L_{50} and L_{90} values are commonly used to represent existing ambient and natural ambient sound levels, respectively, in acoustic studies. The L_{50} value is an appropriate metric to represent natural ambient sound levels when no human-caused sounds affect the measurements; however, this is very rare in the United States, even is remote locations in National Parks. Some agencies use the L_{90} metric to represent the "background" sound level.

In acoustic studies, data are often adjusted to match the hearing ability of a given species; different species of animals hear certain frequencies better than others. Most often, this adjustment is "A-Weighting," where data are adjusted for human hearing. As with many species, humans do not hear very well at very low or very high frequencies. Acoustic monitors used early in this study collected only dBA data. As newer monitors were developed, one-third octave band data, generally between 20-20,000 Hz were collected. One-third octave band data are much more informative than dBA data only because dBA levels are a single value, the sum of many dB levels of many different frequencies. The single value dBA can be misleading because one does not know what sound(s) contributed to dBA value. With one-third octave band data, one can assess what frequencies contributed most to the sound levels (and in some cases predict the source of

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the sound). Additionally, models that predict audibility require one-third octave band data. This is because audibility of a given sound is determined not only by the amplitude of that sound, but also the frequency content of the sound relative to the frequency content of ambient conditions.

No single metric or audibility log adequately describes acoustic conditions in a given area. Several metrics, using both decibel data and audibility data, are needed to fully understand acoustic conditions.

Acoustic Data Analysis
Computing sound pressure levels for acoustic conditions in National Park units has not been described thoroughly in the literature. Calculations of acoustic metrics for this analysis are described below and in "Acoustics and Soundscape Studies in National Parks" (NPS 2005).

Acoustic data in rural or park-like settings are rarely normally distributed. In many backcountry areas of parks, sound pressure levels are relatively low (15 dBA to 20 dBA are common and sometimes less than 10 dBA), with occasional loud events such as thunder or aircraft. On a graph of decibel level vs. frequency of values, these types of data are generally skewed towards the infrequent but much louder sounds. As a result of this non-normal distribution, the standard arithmetic mean calculation to characterize the central tendency of the data is generally inappropriate. When calculating central tendencies of hourly data that are not normally distributed, the median is the most appropriate measure, rather than the mean. Likewise, when computing central tendencies for data from many hours (such as 25 days of the 0800 hour), the median should be used (if, as is usually the case, those values are not normally distributed). When computing summary metrics for such values, calculations should be based on hourly summary data, not individual 1-second data of all the hours. This is necessary to ensure that hourly variation is addressed as much as possible.

Existing Ambient
Calculating hourly *existing* ambient sound levels is straightforward: it is the median (L_{50}) of all the data (natural and non-natural) for a given period.

Natural Ambient
Calculating hourly *natural* ambient sound levels is not straightforward. All National Park units have both natural and human-caused sounds; hence calculation of natural ambient sound levels (sound levels without the influence of human-caused sounds) is difficult. The most appropriate calculation of natural ambient sound levels is the median of data without the influence of any human-caused sounds. It is not currently economically feasible to physically remove all acoustic data with human-caused sounds from long-term data sets in order to make such a calculation. Therefore, calculation of natural ambient sound levels was made using the percent exceedence concept. L_x refers to the sound level (L), in decibels, exceeded *x* percent of the time.

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Historically, either the L_{50} or the L_{90} has been used when assessing potential impacts of aircraft sounds on parks (Dunholter et al. 1989). If the dataset contains only natural sounds, L_{50} is the appropriate metric to characterize the natural sound levels. However, even in remote areas of national parks, non-natural, mechanical, electrical, and other human-caused sounds are audible; hence the L_{50} may over-estimate natural ambient sound levels. The L_{90} value represents the sound level exceeded 90% of the measurement period. In most remote areas of national parks, distant from frontcountry, developed areas, human-caused sounds are audible, but generally less than 50 percent of the time (although in some areas high altitude aircraft may be audible more than 50 percent of the time for some hours). In such situations, the L_{90} may under-estimate natural ambient sound levels. Therefore, calculating the appropriate L_x from a sub-sample of the data set (based on audibility of human-caused sounds at each measurement site), and applying that L_x to the entire data set, provides a more accurate estimate of natural ambient sound levels than either the L_{50} or L_{90}.

For this analysis, natural ambient sound levels were computed using the percent exceedence method. This method involves sub-sampling the measurement period to determine the percent time human-caused sounds are audible (via field and office logging). Since these human-caused sounds are audible over natural sounds, these sounds are generally (but not always) the loudest sounds. In order to approximate a data set without human-caused sounds, the decibel data were ranked from quietest to loudest, and the loudest percentage (determined via the sub-sample) of the ranked data were removed. The median of the remainder of the dataset, and its associated L_x, is an approximation of the natural ambient sound level of the sub-sample. To calculate the natural ambient sound level for the entire measurement period, this L_x is applied to dBA and one-third octave band data of the entire data set.

The above computation can be mathematically expressed as follows:

$$x = \frac{100 - P}{2} + P$$

Where P is the percent of time human-caused sounds are audible

For example, if non-natural sounds are audible for 40% of the time, L_0 to L_{40} corresponds to the loudest (generally non-natural) sounds, and L_{40} to L_{100} corresponds to quietest (generally natural) sounds. The median of L_{40} to L_{100} data is L_{70}. Therefore, the decibel value at L_{70}, the sound level exceeded 70 percent of the time, would be used for the entire dataset to characterize the natural ambient sound level.

$$x = \frac{100 - P}{2} + P; \qquad x = \frac{100 - 40}{2} + 40 = 70$$

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A legitimate concern with this approach is that some loud natural sounds, such as thunder, could be removed from the data before calculating natural ambient sound levels, and the resulting calculated natural ambient sound levels could be an under-estimate of natural ambient sound levels. Although this is a valid concern, such events are rare relative to the entire measurement period (>25 days). Therefore, removing these data would not likely have a significant impact on calculations of natural ambient sound levels.

Whenever human-caused sounds are audible a large percentage of the time, such as >75%, it is not feasible to compute L_{nat} because so much of the data has to be deleted. Therefore, when human-caused sounds were audible >75 percent of the time, L_{nat} was not computed. This situation occurs mainly at developed, frontcountry areas.

L_{eq} Computations

In previous acoustic studies in national parks, different L_{eq} computations have been used, including the logarithmic mean of 1-second dB data, the arithmetic mean of hourly data, and the median of hourly data. In order to allow general comparisons, all three L_{eq} computations are presented in this report. Generally, L_{eq} is computed as the logarithmic mean of 1-second dB data for a specific time period, such as 1 hour or 12 hours. However, the L_{eq} logarithmic mean computations included in this report are based on the logarithmic mean of several 1-hour periods (due to database limitations). Such computations can result in small differences from L_{eq} computations based on 1-second data for the same period, generally less than 1 dB.

Acoustic Data Analysis Software

Acoustic data were analyzed using software developed by the Natural Sounds Program, National Park Service, Fort Collins, CO. Three programs were used:

NVFormat. Converts decibel data from the sound level meter format to a data format developed jointly by the NPS Natural Sounds Program and the Department of Transportation Volpe Center.

DayAudibility. A spreadsheet program used to code sound sources from observer field and office logs, and provides summary output statistics.

HourlyMetrics. Analyzes decibel data to provide summary 1-hour statistics such as L_{min}, L_{max}, L_{eq}, L_{10}, L_{50}, L_{90}, and L_{nat}.

Data Management and Storage

Acoustic monitors were visited on average once every two weeks and data were downloaded to portable hard drives. All data were converted to a standard NPS/Volpe acoustic data format and stored on very large hard drives. Data were backed up on additional hard drives or DVDs.

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Schedule
Acoustic data collection began in ARCH in 2001 and continued intermittently through 2007. Data collection in CANY, HOVE, and NABR began in 2006 and continued through 2007.

Results

Acoustic monitors were deployed at 23 measurement locations in SEUG from 2001 to 2007. Twelve of these were long-term measurements (>10 days) in both summer and winter, and 11 were short-term measurement locations (3-4 days), generally in summer. Over 36,205 hours of acoustic data were collected during this study (Table 5).

Summary acoustic and audibility metrics for all measurement locations are presented in this section (Tables 6-10). Detailed acoustic and audibility metrics for each of the twelve long-term measurement locations are presented in the Appendices VII and VIII. For each of the long-term measurement locations, the following metrics are presented:

- Hourly dBA
- dBA and 1/3 octave band data for all hours
- Identification of sources of sounds and percent time audible
- Noise free interval

It is important to note that many of the acoustic metrics reported here are very near the noise floor of the sound level meters used in this study (the lower limit of measurement capability, about 12-18 dBA depending on system). When reported sound levels are near the noise floor of the instrument, actual sound levels are below the noise floor of the instruments. Sound levels within 10 dB of the noise floor are influenced by system noise only slightly, but the closer reported sound levels are to the noise floor, the greater the influence on the reported values. For example, if the noise floor of an instrument was 15.0 dBA, and the reported sound level was 25.0 dBA, the actual sound level would be approximately 24.5 dBA. The influence of the noise floor is only 0.5 dBA. However, if the noise floor was 15.0 dBA and the reported sound level was 15.5 dBA, the actual sound levels would be approximately 5.9 dBA. The influence of the noise floor in this example is about 10 dBA. Since many of the metrics and L_{min} values recorded were very near the noise floor of the instruments, actual sound levels in many of the SEUG units are very, very low, often lower than reported in this report.

A total of 36,205 hours of acoustic data were collected during the summer and winter seasons from 2001 to 2007 at 23 locations in SEUG (ten in ARCH, nine in CANY, two in HOVE, and two in NABR). The number of hours of acoustic data collected at each measurement site is shown in Table 5.

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Acoustic Metrics

Summary dBA metrics for the long-term backcountry locations are presented in Table 6. Metrics for long-term backcountry locations grouped by land cover type are presented in Tables 7 and 8. Metrics for frontcountry locations are presented in Table 9. Metrics for short-term measurement locations (dBA only and generally <10 days) are presented in Table 10.

Sound Source Identification

Identification of audible sounds by season and the percent time each sound was audible for the primary measurement locations are presented in Tables 11 and 12. A summary of the most common audible sounds by season is presented in Table 13.

Thunder was the loudest sound source in SEUG. Sounds of thunder were present in 0.3 percent of the recording samples. A summary of the sources of loud events (>80 dBA) and the maximum for that source is presented in Table 14. All events >80 dBA, with location, date, hour, L_{max}, and source is presented in Table 15.

Noise-Free Interval

The maximum and average Noise-Free Interval (NFI), that period when only natural sounds are audible, are presented in Table 16. NFI data for ARCH sites are not available because field logging methods during the early years of this study did not collect such data. NFI data were collected for 25 hours between 0800 and 2000 hours at nine different locations. The average NFI for long-term backcountry measurement locations was 2.6 minutes. The maximum NFI was 18.2 minutes, and the minimum NFI was 0.8 minutes.

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Table 5. Decibel data collected in SEUG park units, 2001-2007.

Site	Hours	Note
ARCH001	11669	
ARCH002	7233	
ARCH003	85	Short-term; Frontcountry site
ARCH004	34	Short-term, dBA only
ARCH005	87	Short-term, dBA only
ARCH006	378	Short-term, dBA only
ARCH007	34	Short-term, dBA only
ARCH008	78	Short-term
ARCH009	114	Short-term, dBA only
ARCH010	117	Short-term, dBA only
CANY001	1425	
CANY002	2997	dBA only
CANY003	998	Summer season only
CANY004	2018	
CANY005	840	
CANY006	901	
CANY007	1440	
CANY008	79	Short-term, continuous recording
CANY009	1795	
HOVE001	1347	
HOVE002	294	Frontcountry site
NABR001	1551	
NABR002	691	Frontcountry site
Total	36205	

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Table 6. Acoustic metrics (dBA) for backcountry measurement locations in SEUG, 2001-2007.

Location/Season	L_{min}	L_{max}	L_{eq} L. Mean*	L_{eq} Median	L_{10} Median	L_{50} Median	L_{90} Median	L_{nat} Median
ARCH001 Summer	19.4	97.4	40.7	28.2	29.8	23.8	22.4	23.0
ARCH001 Winter	19.4	93.4	34.8	26.7	27.9	22.3	21.7	21.8
ARCH002 Summer	21.0	103.7	44.7	28.9	30.1	24.1	22.8	23.5
ARCH002 Winter	16.7	81.6	30.4	25.9	26.4	18.5	17.5	17.6
CANY001 Summer	16.1	88.4	37.2	28.9	30.7	24.4	19.3	22.2
CANY001 Winter	17.5	70.0	34.0	25.3	26.4	19.2	18.2	18.7
CANY004 Summer	12.9	88.0	44.7	32.2	33.5	24.9	20.0	23.2
CANY004 Winter	16.6	90.0	34.8	22.1	22.0	17.9	17.4	17.8
CANY005 Summer	12.7	67.7	34.7	28.1	29.8	21.5	18.5	19.8
CANY005 Winter	7.2	73.3	31.4	25.5	26.2	16.2	15.8	16.1
CANY006 Summer	12.5	87.2	44.7	35.9	37.4	28.7	22.5	24.5
CANY006 Winter	19.4	72.4	33.0	24.7	25.9	20.5	19.9	20.3
CANY007 Summer	12.9	87.7	50.6	40.5	39.4	30.1	25.2	27.7
CANY007 Winter	16.4	79.0	35.3	25.5	27.4	19.0	17.5	17.8
CANY009 Summer	14.8	89.2	47.2	27.9	30.0	22.1	18.5	19.6
CANY009 Winter	16.7	87.4	44.3	26.3	28.4	19.7	18.7	19.0
HOVE001 Summer	15.8	85.5	39.4	27.8	29.4	21.0	17.3	18.5
HOVE001 Winter	14.6	71.8	29.9	23.0	23.8	16.9	15.8	16.5
NABR001 Summer	16.7	83.8	38.8	30.7	33.3	25.0	20.4	21.7
NABR001 Winter	14.6	80.1	35.6	27.0	29.6	18.9	15.9	16.4

*L_{eq} logarithmic mean and L_{eq} median computed from many 1-hour L_{eq} data, not from 1-second L_{eq} data.

Measurements at CANY005 in winter used a very sensitive, low-noise microphone, hence the very low L_{min} value. Other measurement locations might have had equally low values had such equipment been used in all locations.

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Table 7. Acoustic metrics (dBA) for backcountry measurement locations in SEUG, 2001-2007, grouped by land cover type.

Land Cover Group Location	L_{eq} L. Mean	L_{eq} Median	L_{10} Median	L_{50} Median	L_{90} Median	L_{nat} Median
Pinyon-Juniper, Canyons						
ARCH001 Summer	40.7	28.2	29.8	23.8	22.4	23.0
ARCH001 Winter	34.8	26.7	27.9	22.3	21.7	21.8
CANY001 Summer	37.2	28.9	30.7	24.4	19.3	22.2
CANY001 Winter	34.0	25.3	26.4	19.2	18.2	18.7
HOVE001 Summer	39.4	27.8	29.4	21.0	17.3	18.5
HOVE001 Winter	29.9	23.0	23.8	16.9	15.8	16.5
NABR001 Summer	38.8	30.7	33.3	25.0	20.4	21.7
NABR001 Winter	35.6	27.0	29.6	18.9	15.9	16.4
Shrubland, Grassland						
ARCH002 Summer	44.7	28.9	30.1	24.1	22.8	23.5
ARCH002 Winter	30.4	25.9	26.4	18.5	17.5	17.6
CANY009 Summer	47.2	27.9	30.0	22.1	18.5	19.6
CANY009 Winter	44.3	26.3	28.4	19.7	18.7	19.0
Riparian						
CANY004 Summer	44.7	32.2	33.5	24.9	20.0	23.2
CANY004 Winter	34.8	22.1	22.0	17.9	17.4	17.8
CANY006 Summer	44.7	35.9	37.4	28.7	22.5	24.5
CANY006 Winter	33.0	24.7	25.9	20.5	19.9	20.3
CANY007 Summer	50.6	40.5	39.4	30.1	25.2	27.7
CANY007 Winter	35.3	25.5	27.4	19.0	17.5	17.8

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Table 8. Mean sound levels (dBA) of land cover types by season.

Land Cover Group, Season	L_{eq} L. Mean	L_{eq} Median	L_{10} Median	L_{50} Median	L_{90} Median	L_{nat} Median
Pinyon-Juniper, Canyons						
Summer	39.0	28.9	30.8	23.6	19.9	21.4
Winter	33.6	25.5	26.9	19.3	17.9	18.4
Shrubland, Grassland						
Summer	46.0	28.4	30.1	23.1	20.7	21.6
Winter	37.4	26.1	27.4	19.1	18.1	18.3
Riparian						
Summer	46.7	36.2	36.8	27.9	22.6	25.1
Winter	34.4	24.1	25.1	19.1	18.3	18.6

Table 9. Acoustic metrics (dBA) for frontcountry measurement locations in SEUG, 2001-2007 (L_{nat} not computed).

Location/Season	L_{min}	L_{max}	L_{eq} L. Mean	L_{eq} Median	L_{10} Median	L_{50} Median	L_{90} Median
ARCH003 Winter	20.7	80.3	50.4	45.4	49.1	42.1	35.8
HOVE002 Summer	16.8	81.6	41.2	31.7	33.7	27.5	22.7
HOVE002 Winter	16.0	79.5	35.5	26.4	26.4	20.4	18.2
NABR002 Summer	13.2	95.2	46.3	30.9	33.3	25.3	20.0
NABR002 Winter	16.6	70.6	41.4	31.9	33.2	26.4	20.7

Large, high-use Visitor Center Area	50.4	45.4	49.1	42.1	35.8
Small and low-use Visitor Center Area	41.1	30.2	31.7	24.9	20.4

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Table 10. Acoustic metrics (dBA) for ARCH short-term measurement locations (only dBA collected, generally <25 days; L_{nat} not computed).

Site	Date	L_{min}	L_{max}	L_{eq} L. Mean	L_{eq} Median	L_{10} Median	L_{50} Median	L_{90} Median
ARCH004	May-02	21.5	49.2	44.9	31.6	31.5	24.4	22.0
ARCH005	March-03	18.0	75.3	38.6	31.6	33.6	27.5	21.5
ARCH006	Jan-June-00	18.2	95.9	46.2	37.1	38.4	29.2	23.6
ARCH007	February-02	21.9	41.8	31.0	25.9	26.7	22.5	22.0
ARCH008*	August-07	15.6	62.5	29.2	24.4	25.5	18.5	16.9
ARCH009	May-02	21.5	51.1	38.1	33.5	35.5	26.1	22.3
ARCH010	May-02	21.6	51.5	38.3	32.7	35.1	26.6	22.5
CANY002	May-June-02	17.3	79.4	40.2	33.3	34.4	28.5	21.9

*ARCH008 measurements were made in 2007 and used new equipment with lower noise floor.

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Table 11. Audible sounds and percent time audible during summer for backcountry sites, SEUG, 2001-2007.

Audible Sound Sources	ARCH001	ARCH002	CANY001	CANY004	CANY005	CANY006	CANY007	CANY009	HOVE001	NABR001	Mean
No Sound Audible	7.2	9.1	0.3	0.0	0.0	0.0	0.0	1.2	1.4	0.3	1.9
Aircraft (unknown type)	0.0	0.0	0.0	0.0	0.1	0.1	0.2	0.0	0.1	0.1	0.1
Aircraft, Jet	16.6	16.2	21.8	16.7	25.3	30.3	21.9	21.5	29.2	32.5	23.2
Aircraft, Propeller	3.1	4.7	3.6	3.5	2.7	4.9	3.4	3.4	4.8	1.6	3.6
Aircraft, Helicopter	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Vehicle	5.0	2.6	4.6	0.3	0.0	0.0	1.0	15.7	6.6	18.1	5.4
Watercraft	0.0	0.0	0.0	0.0	0.0	4.0	0.2	0.0	0.0	0.0	0.4
Motor Sounds	5.5	1.5	1.9	0.6	0.4	1.1	5.3	0.9	0.0	1.6	1.9
People	0.0	0.0	0.0	0.1	0.2	1.8	0.2	0.0	0.4	1.3	0.4
Domestic Animal	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Non-natural Other	0.0	0.0	0.0	1.1	0.1	0.0	0.0	0.0	3.8	0.0	0.5
Non-natural Unknown	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Wind	52.9	50.0	57.4	34.2	14.2	35.2	14.5	49.5	49.8	43.9	40.1
Water (rain, river, etc.)	0.1	0.2	5.2	13.2	64.5	48.7	10.6	2.2	2.0	3.0	15.0
Thunder	0.4	0.3	1.2	0.3	0.0	0.6	0.7	1.2	1.0	1.0	0.7
Mammal	0.0	0.0	1.0	0.8	7.1	4.1	0.0	0.6	1.3	1.2	1.6
Bird	7.0	0.7	41.5	47.2	53.2	48.5	54.9	46.7	47.6	43.1	39.1
Amphibian	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.1	1.2	0.4
Insect	39.8	35.0	67.1	80.6	61.6	95.5	93.1	52.5	51.0	42.8	61.9
Animal (unknown type)	0.3	0.1	6.0	38.7	34.7	4.6	5.4	5.4	2.6	0.7	9.9
Natural Other	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Natural Unknown	0.0	0.0	0.0	0.0	0.4	0.8	0.9	1.5	0.0	0.3	0.4
Unknown	0.0	0.0	0.6	0.6	0.0	0.0	0.7	0.1	4.2	0.0	0.6
Total Aircraft	20.0	20.9	25.3	20.2	28.1	35.3	25.5	24.8	33.6	34.1	26.8
Total Road Vehicles	5.0	2.6	4.6	0.3	0.0	0.0	1.0	15.7	6.6	18.1	5.4
Total Watercraft	0.0	0.0	0.0	0.0	0.0	4.0	0.2	0.0	0.0	0.0	0.4
Total Non-natural	30.5	25.0	30.8	22.1	28.8	41.2	32.0	39.5	42.8	51.8	34.4
Total Natural	79.6	76.0	98.6	99.9	99.9	99.8	98.1	96.5	95.8	96.2	94.0

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Table 12. Audible sounds and percent time audible during winter for backcountry sites, SEUG, 2001-2007.

Audible Sound Sources	ARCH001	ARCH002	CANY001	CANY004	CANY005	CANY006	CANY007	CANY009	HOVE001	NABR001	Mean
No Sound Audible	26.0	20.8	26.4	25.1	0.0	0.2	31.5	17.2	56.1	23.8	22.7
Aircraft (unknown type)	0.0	0.0	0.5	1.2	0.9	0.4	0.6	0.3	0.0	0.0	0.4
Aircraft, Jet	19.1	20.1	20.1	10.8	27.8	20.4	30.2	20.5	14.0	35.5	21.9
Aircraft, Propeller	4.1	6.0	0.9	0.0	0.1	2.5	2.8	3.1	1.0	0.9	2.1
Aircraft, Helicopter	0.0	0.0	0.3	0.1	0.2	0.2	0.5	0.1	0.0	0.0	0.1
Vehicle	23.9	32.7	1.3	0.0	0.0	0.0	1.9	17.3	1.3	18.1	9.7
Watercraft	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Motor Sounds	15.0	7.0	0.9	4.1	0.3	0.0	7.3	0.0	3.5	1.6	4.0
People	0.0	0.0	0.0	0.0	0.6	0.0	0.2	0.0	0.1	1.8	0.3
Domestic Animal	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0
Non-natural Other	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.0
Non-natural Unknown	0.0	0.0	0.0	0.0	0.1	0.0	0.1	0.0	0.0	0.1	0.0
Wind	15.5	23.3	52.8	13.6	13.8	23.6	6.7	46.0	23.3	34.8	25.3
Water (rain, river, etc.)	0.0	0.0	0.2	1.4	96.8	78.7	10.0	1.8	0.1	6.5	19.5
Thunder	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Mammal	0.0	0.0	0.0	0.1	0.3	0.0	0.0	1.1	0.1	0.4	0.2
Bird	1.1	1.3	9.5	9.0	15.7	20.3	15.3	8.3	7.3	5.9	9.4
Amphibian	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Insect	0.0	0.1	0.2	3.7	0.0	1.5	8.7	0.2	0.0	0.2	1.5
Animal (unknown type)	0.0	0.0	0.5	3.1	0.8	2.8	7.1	0.5	0.8	0.2	1.6
Natural Other	0.0	0.0	0.6	19.3	4.8	0.0	0.0	0.0	0.0	0.0	2.5
Natural Unknown	0.0	0.0	0.0	0.0	4.9	0.3	3.7	1.3	0.0	0.2	1.0
Unknown	0.0	0.0	1.9	1.6	1.4	0.0	0.5	1.2	0.0	0.0	0.7
Total Aircraft	23.3	25.9	21.7	12.0	29.0	23.5	33.9	23.9	15.1	36.3	24.5
Total Road Vehicles	23.9	32.7	1.3	0.0	0.0	0.0	1.9	17.3	1.3	18.1	9.7
Total Watercraft	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Non-natural	61.9	64.8	23.7	16.1	29.8	23.5	42.9	42.5	20.1	51.7	37.7
Total Natural	16.5	24.7	58.2	38.7	99.8	96.7	45.7	54.0	29.3	41.0	50.5

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Table 13. Summary of common audible sounds SEUG, 2001-2007.

Audible Sound Sources	Percent Time Audible		
	Mean All Seasons	Mean Summer	Mean Winter
Insect	34.0	61.9	1.5
Wind	32.7	40.1	25.3
Aircraft (all types)	25.5	26.8	24.0
Bird	24.9	39.1	9.4
Vehicle (and other motor sounds)	18.5	16.8	23.5
Water (rain, river, etc.)	15.6	15.0	19.5
Animal (unknown type)	6.4	9.9	1.6
Natural Other	1.5	0.0	2.5

Table 14. Summary of sources of sounds >80 dBA.

Source	Num. Events	Lmax (dBA)
Thunder	50	103.7
Wind	21	99.8
Rain	3	87.6
Jet	3	87.2
Aircraft, Propeller	2	81.6
Truck	1	80.6

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Table 15. Sound sources >80 dBA with location, date, and hour of day (Note: a question mark "?" in the source identification column indicates no recording was made of the event and thus the source cannot be determined positively).

Location	Date	Hour	L_{max} dBA	Source ID
ARCH002	10/2/2002	21	103.7	Thunder
ARCH002	6/14/2002	13	99.8	Wind
ARCH002	7/20/2002	17	97.6	Wind
ARCH001	7/19/2003	4	97.4	Thunder
ARCH002	9/29/2002	9	97.3	Thunder
ARCH001	6/6/2002	13	97.1	Wind
ARCH001	5/18/2003	14	96.3	Thunder
ARCH002	8/29/2002	5	96.2	Thunder
ARCH006	6/19/2000	15	95.9	Thunder
CANY007	7/10/2006	17	95.2	Thunder
NABR002	8/21/2006	15	95.2	Thunder
NABR002	8/21/2006	14	93.6	Thunder
ARCH001	10/1/2002	22	93.4	Thunder
ARCH001	2/2/2003	12	93.4	Thunder
ARCH001	8/10/2003	19	91.2	Thunder
ARCH001	8/29/2002	7	91.0	Thunder
ARCH001	5/3/2003	22	90.1	Wind
ARCH001	7/24/2003	20	89.9	Thunder
CANY009	9/15/2006	3	89.2	Thunder
CANY009	8/7/2006	18	88.7	Thunder
ARCH001	9/7/2002	16	88.6	Thunder
CANY001	7/10/2006	18	88.4	Thunder
ARCH002	9/29/2002	15	88.0	Thunder
CANY007	7/11/2006	17	87.7	Thunder
ARCH001	7/27/2002	16	87.6	Rain
ARCH002	9/18/2002	3	87.3	Thunder
ARCH002	10/1/2002	22	87.2	Thunder
CANY006	6/23/2006	10	87.2	Jet
ARCH001	5/30/2003	19	87.0	Thunder
CANY009	9/20/2006	14	86.9	Thunder
ARCH001	6/12/2003	15	86.3	Wind
ARCH002	9/7/2002	17	86.1	Rain

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Table 15. Sound sources >80 dBA with location, date, and hour of day (cont.).

Location	Date	Hour	L_{max} dBA	Source ID
CANY009	9/8/2006	21	86.1	Thunder
CANY003	6/11/2005	17	86.0	Thunder
CANY009	11/24/2006	17	86.0	Jet
HOVE001	8/6/2006	19	85.5	Thunder
CANY004	5/11/2006	8	85.4	Thunder
ARCH002	9/7/2002	16	84.7	Thunder
CANY004	4/19/2006	22	84.3	Thunder
CANY004	4/18/2006	8	84.1	Wind
ARCH001	9/29/2002	14	84.0	Wind
CANY001	7/18/2006	22	83.9	Thunder
NABR001	7/30/2006	15	83.8	Thunder
ARCH002	9/29/2002	14	83.7	Thunder
ARCH002	7/25/2002	22	83.6	Wind
CANY007	7/28/2007	11	83.6	Wind
ARCH001	8/29/2002	6	83.5	Thunder
CANY004	4/18/2006	6	83.3	Wind
CANY004	4/29/2006	8	83.2	?
ARCH001	7/25/2002	22	83.0	Thunder
ARCH001	8/8/2002	11	82.9	Jet
ARCH001	9/16/2002	22	82.8	Thunder
ARCH002	9/3/2002	17	82.8	Wind
ARCH002	8/29/2002	6	82.7	Thunder
ARCH002	6/3/2002	15	82.5	Thunder
HOVE001	8/4/2006	12	82.5	Rain
ARCH001	9/6/2003	18	82.4	Thunder
CANY004	5/1/2006	7	82.3	?
ARCH001	8/29/2002	9	82.2	?
ARCH002	6/3/2002	16	82.1	Thunder
CANY004	4/14/2006	8	82.1	Wind
NABR002	8/15/2006	19	82.1	?
ARCH006	5/10/2000	17	82.0	Wind
CANY004	4/25/2006	0	81.8	Instrument

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Table 15. Sound sources >80 dBA with location, date, and hour of day (cont.).

Location	Date	Hour	L_{max} dBA	Source ID
CANY007	7/17/2006	17	81.8	?
ARCH002	12/24/2002	11	81.6	Aircraft, propeller
HOVE002	8/15/2006	21	81.6	?
CANY007	7/22/2006	16	81.5	?
CANY009	9/8/2006	20	81.4	Thunder
CANY009	11/24/2006	13	81.4	?
ARCH002	6/21/2002	19	81.3	Aircraft, propeller
CANY004	4/21/2006	8	81.3	Thunder
CANY004	4/26/2006	8	81.3	Thunder
CANY004	5/1/2006	8	81.3	Wind
ARCH001	9/7/2002	17	81.2	Thunder
CANY004	4/26/2006	2	81.2	Wind
CANY004	4/30/2006	7	80.9	Wind
ARCH002	9/16/2002	23	80.8	Thunder
ARCH001	6/17/2002	17	80.7	?
ARCH001	8/29/2002	17	80.7	Thunder
ARCH001	2/2/2003	14	80.7	Thunder
ARCH002	9/16/2002	22	80.7	Thunder
CANY004	4/20/2006	22	80.6	?
CANY004	5/6/2006	7	80.6	Wind
NABR001	8/5/2006	19	80.5	Wind
CANY004	4/19/2006	8	80.4	Wind
ARCH002	8/19/2002	12	80.3	?
ARCH003	3/25/2003	14	80.3	Truck (engine break)
ARCH006	5/11/2000	9	80.2	Wind
CANY007	7/23/2006	19	80.2	?
ARCH001	5/21/2002	12	80.1	Thunder
CANY004	4/25/2006	8	80.1	Wind
CANY004	4/27/2006	8	80.1	?
NABR001	1/4/2006	18	80.1	?
ARCH002	6/13/2002	7	80.0	?
ARCH002	9/18/2002	4	80.0	?
CANY001	7/20/2006	17	80.0	Thunder

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Table 16. Noise free interval, maximum and average, for measurement locations in SEUG.

Location	Season	Hour of Day	Max. NFI (min)	Average NFI (min)
CANY001	Summer	1300	3.0	1.0
CANY001	Winter	1400	11.7	3.5
CANY003	Summer	900	9.7	1.0
CANY004	Summer	1300	17.7	10.5
CANY004	Summer	1600	15.7	3.6
CANY004	Winter	1300	18.2	11.3
CANY005	Summer	800	9.8	2.6
CANY005	Summer	800	4.2	0.8
CANY005	Summer	1200	9.8	1.7
CANY005	Summer	2000	11.3	3.6
CANY006	Summer	900	12.8	2.7
CANY006	Summer	1100	8.2	3.0
CANY006	Winter	1300	10.7	3.8
CANY007	Summer	900	7.3	2.6
CANY007	Winter	1100	6.7	1.3
CANY009	Summer	900	0.8	0.3
CANY009	Summer	1100	4.3	1.3
CANY009	Summer	1200	6.3	1.7
CANY009	Winter	1300	4.5	1.6
HOVE001	Summer	800	3.3	0.9
HOVE001	Summer	1000	3.8	1.2
HOVE001	Winter	1100	4.8	1.8
NABR001	Summer	1100	5.7	1.5
NABR001	Winter	1000	3.2	1.1
NABR001	Winter	1600	4.0	1.0

Mean Summer			7.9	2.4
Mean Winter			8.0	3.2

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Sound Levels by Land Cover Groups and Management Area

We reviewed acoustic data for different land cover types in order to assess the possibility of lumping land cover types with similar acoustic characteristics for the purposes of developing ambient acoustic maps for the four SEUG units. This review revealed three different land cover groupings with similar acoustic characteristics. These three groups were acoustically similar only in backcountry areas; frontcountry areas and travel corridors were influenced primarily by non-natural sound sources and less by land cover type. The five areas with distinctive acoustic characteristics and dBA values for summer and winter are shown in Table 17. Although riparian areas do not make up a large portion of the study area, these areas were acoustically different in summer than the other land cover types and thus were included as a separate zone. A fourth acoustic zone is developed or frontcountry areas where human-caused sounds dominated. The fifth acoustic zone is the area around travel corridors, roads where vehicle sounds are common and often mask natural sounds (the degree of masking and attenuation distances depend on vehicle speed).

In developing ambient acoustic maps, we assumed an area of influence around low-density developed areas (small visitor centers such as CANY, HOVE, and NABR, NPS maintenance and housing areas, and campgrounds) to be 250 m. For high-medium developed areas (ARCH Visitor Center), we assumed an area of influence to be 500 m. We did not attempt to map sound levels around travel corridors because many variables influence these levels (speed limit, number and type of vehicles, and sound levels of vehicle types), and current information on these variables was not available.

Table 17. Acoustic zones in SEUG units with summer and winter dBA levels.

Zone Number	Land Cover Types and Management Area	dBA Summer	dBA Winter
1	Colorado Plateau Pinyon-Juniper Woodland Colorado Plateau Pinyon-Juniper Shrubland Colorado Plateau Mixed Canyons and Tableland	21.4	18.4
2	Colorado Plateau Blackbrush-Mormon-tea Shrubland Inter-Mountain Basins Big Sagebrush Shrubland Inter-Mountain Basin Mixed Salt Desert Scrub Inter-Mountain Basins Semi-Desert Grasslands	21.6	18.3
3	Rocky Mountain Lower Montane Riparian Woodland and Shrubland Invasive Southwest Riparian Woodland and Shrubland	25.1	18.6
4	Frontcountry		
	Developed Area (small Visitor Center; NPS maint./housing areas; campgrounds	24.9	24.9
	Developed Area, Medium and High Density	42.1	42.1
5	Travel Corridors (speed limit and use number dependent)	NA	NA

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Summer sound levels (dBA) were greater than winter sound levels by about 3 dBA in most backcountry land cover types (Tables 8 and 17). Riparian areas were louder than other backcountry land cover types by about 4 dBA, but only during summer. In winter, sound levels in riparian areas were similar to other backcountry land cover types (18.6 dBA for riparian versus 18.4 dBA for other land cover types).

In frontcountry areas, human-caused sounds dominated the soundscape. In high-use frontcountry areas (ARCH Visitor Center and nearby Highway 191), the median ambient sound level was almost 20 dBA greater than for smaller and less busy visitor centers such as HOVE and NABR (42.1 dBA versus 24.9 dBA respectively). Other small visitor centers (Island-in-the-Sky and Maze districts) are also relatively small; however, existing acoustic conditions are largely dictated by the number of visitors and associated vehicles, and these numbers vary between units.

It is important to keep in mind that dBA values are the sums of sound levels of many frequencies. Although dBA values are similar in some cases, one-third octave band data often reveal differences in individual spectra. As a result, acoustic conditions in different land cover types may not be as similar as they appear based on dBA values. In backcountry areas with relatively few non-natural sounds, similar land cover types tended to have similar dBA and one-third octave band spectra values. Two groups, Pinyon-Juniper/Canyons and Shrubland/Grassland, had very similar dBA values in summer and winter (less than 1 dBA difference, within the margin of error of the instruments). The one-third octave band levels were also similar, but for some one-third octave bands, the difference was greater than 1 dB (see Figures 2 and 3).

Using the land cover groupings listed above (Table 17), sound levels (dBA and one-third octave bands) for summer and winter seasons for each SEUG unit were computed for four of the five primary acoustic areas common to all units (travel corridors not included in these maps or tables). Acoustic zones, land cover types with similar acoustic characteristics, for each SEUG unit are shown in Figures 2-7. L_{nat} values for one-third octave bands (20-20,000 Hz) for summer and winter for four of the five acoustic zones are presented in Tables 18-19 and Figures 8-9.

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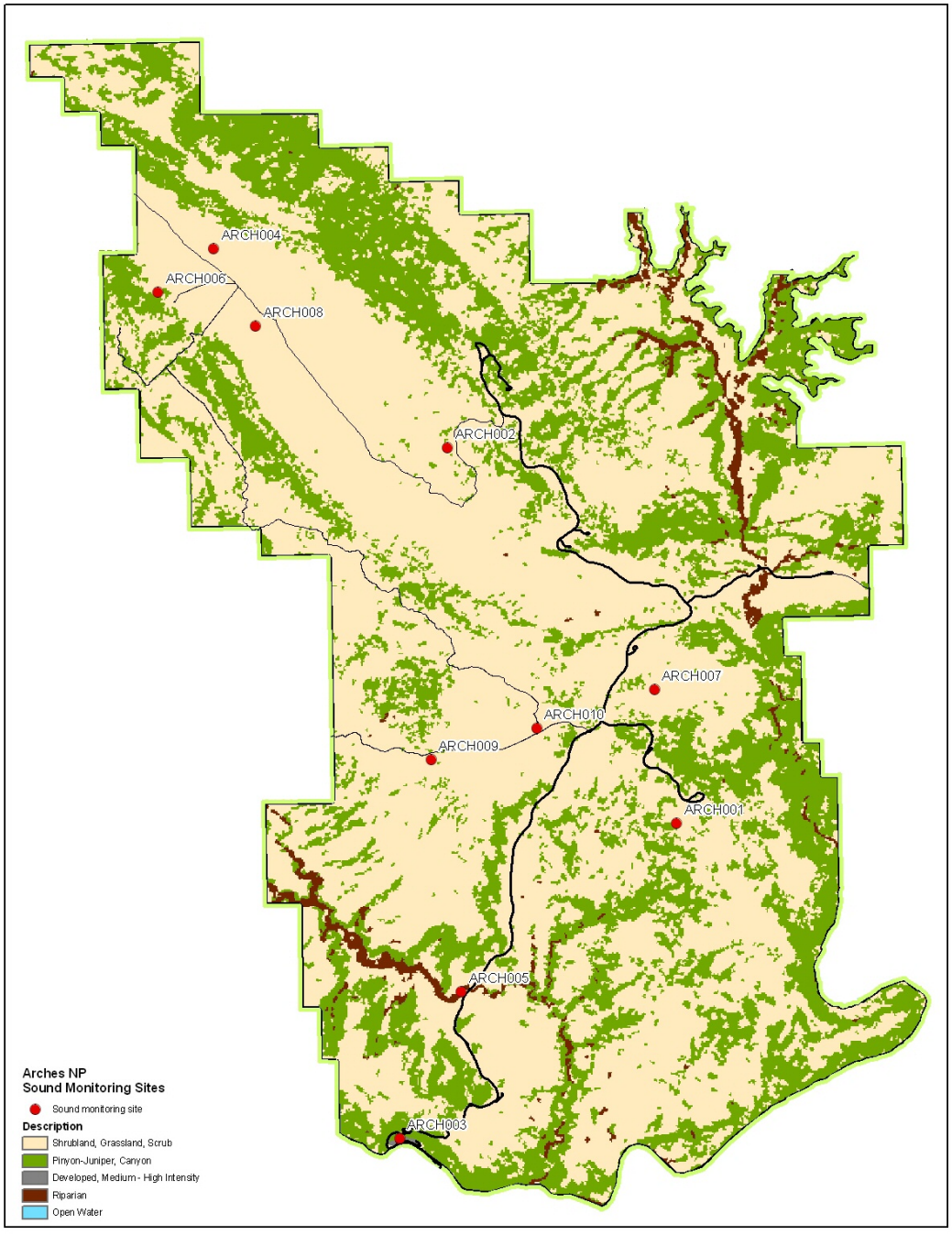


Figure 2. ARCH land cover types grouped according to similar acoustic characteristics.

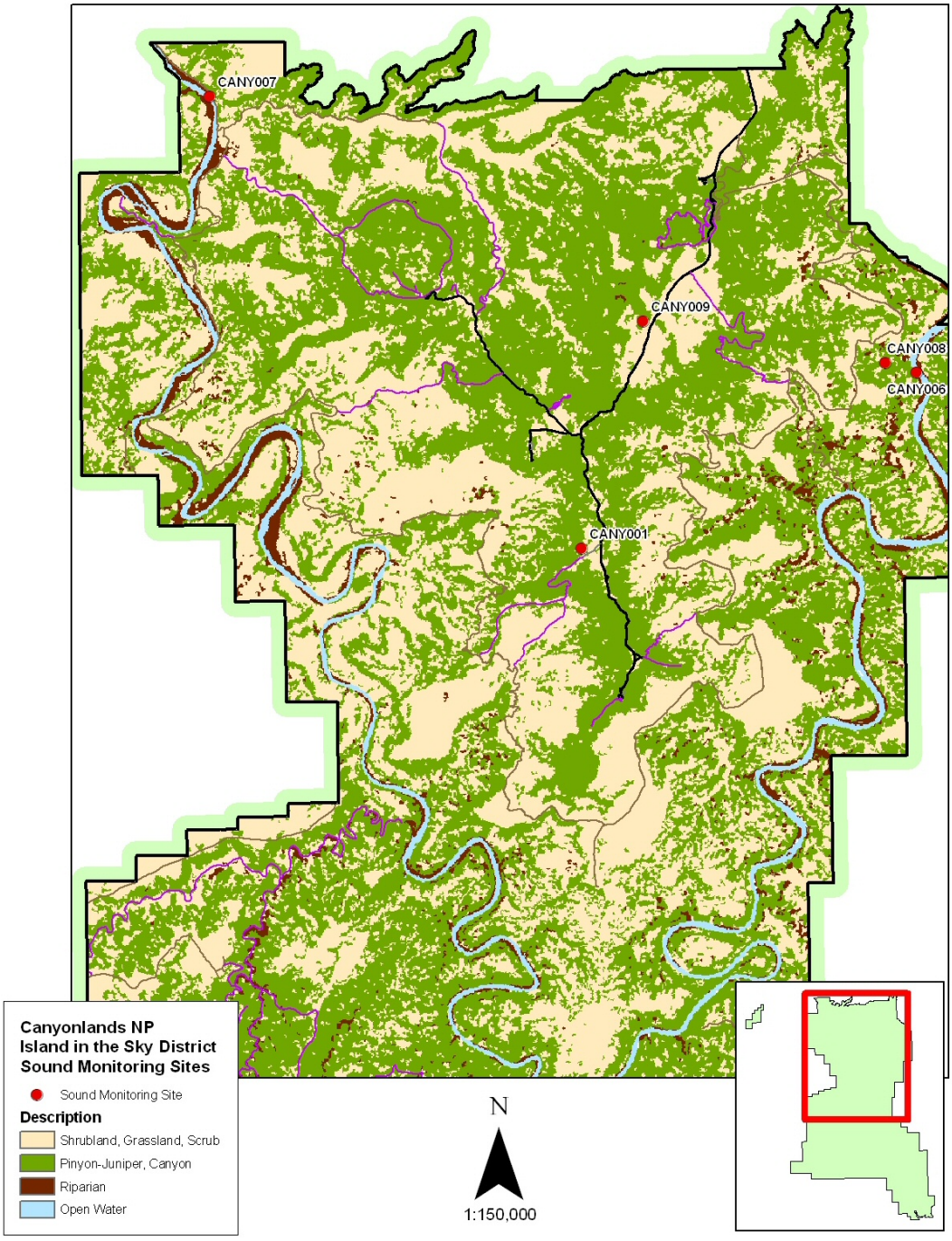


Figure 3. CANY, Island-in-the-Sky, land cover types grouped according to similar acoustic characteristics.

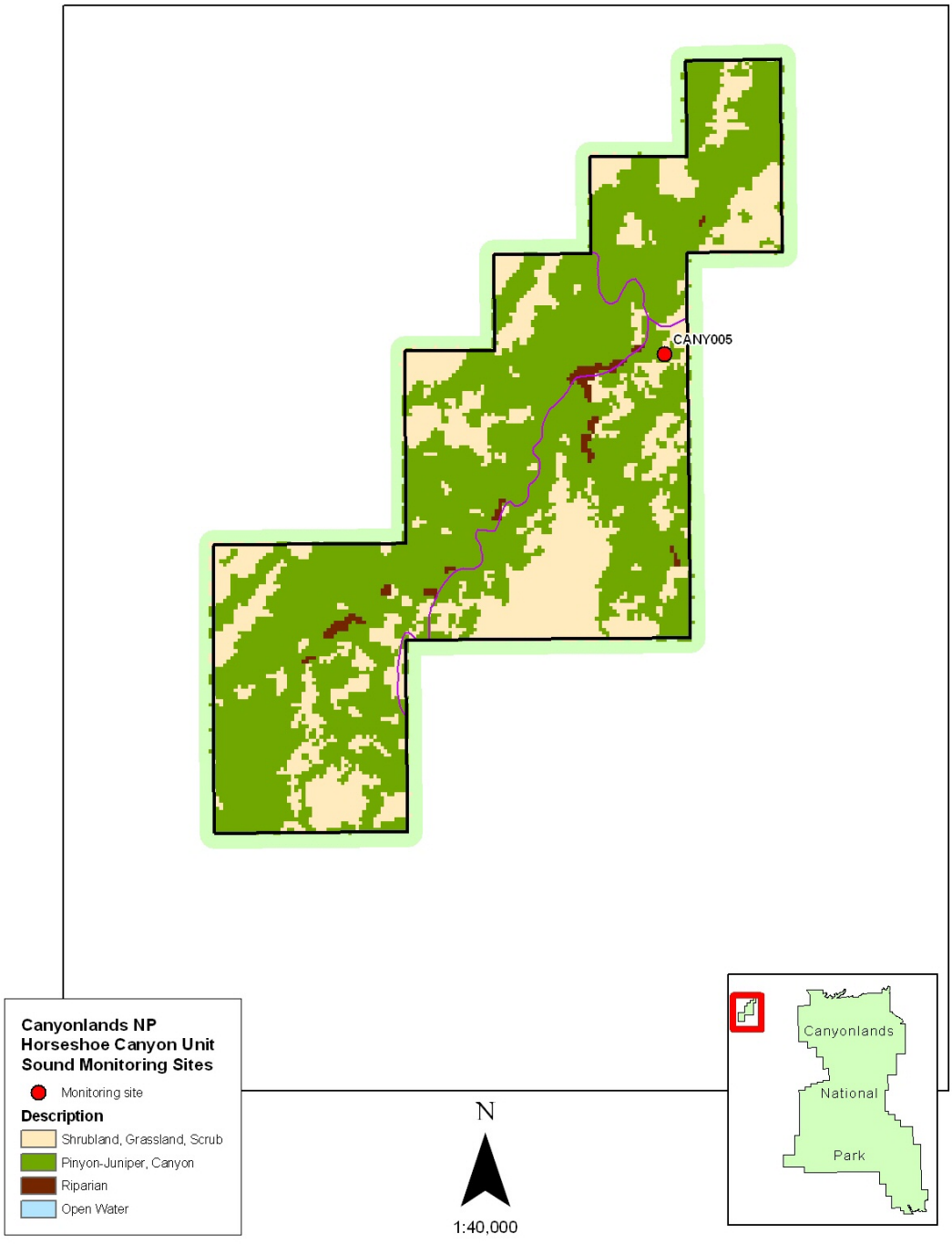


Figure 4. CANY, Horseshoe Canyon area, land cover types grouped according to similar acoustic characteristics.

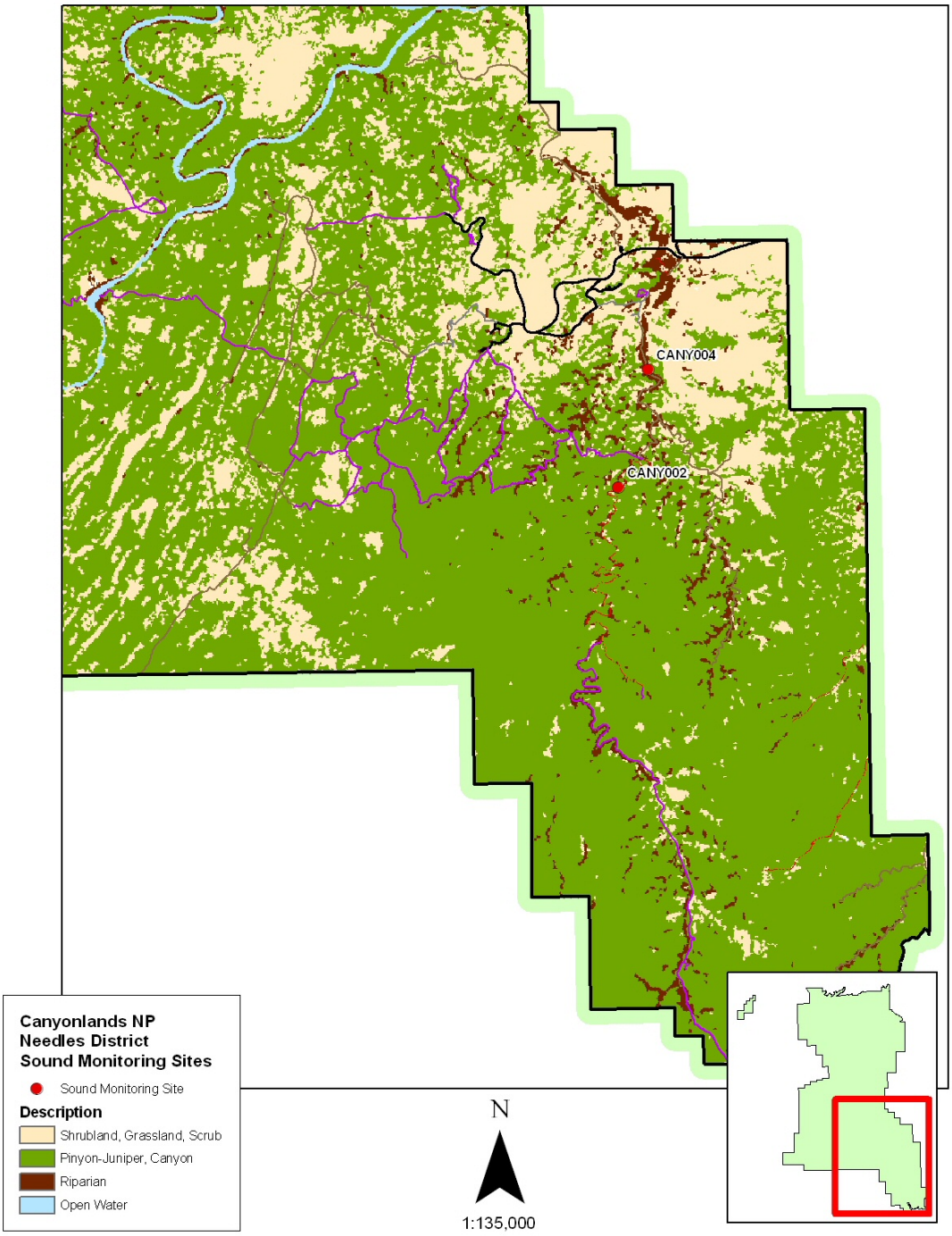


Figure 5. CANY, Needles District, land cover types grouped according to similar acoustic characteristics.

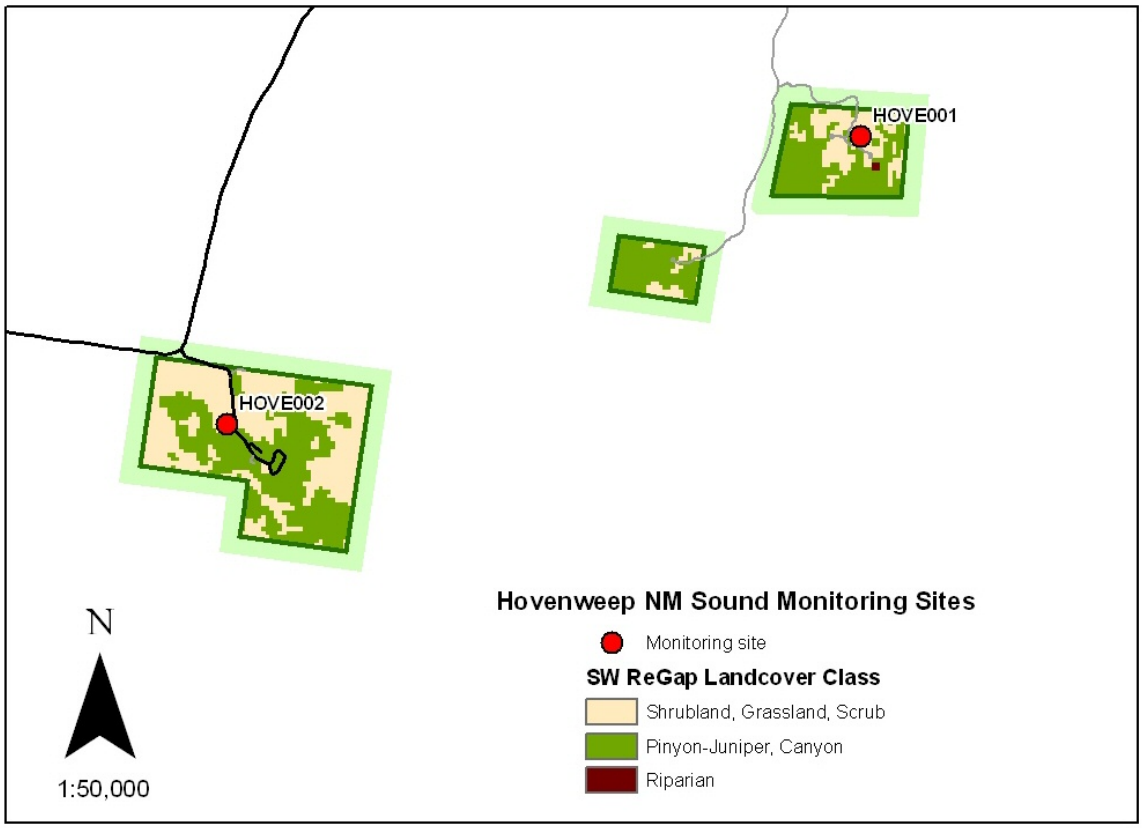


Figure 6. HOVE land cover types grouped according to similar acoustic characteristics.

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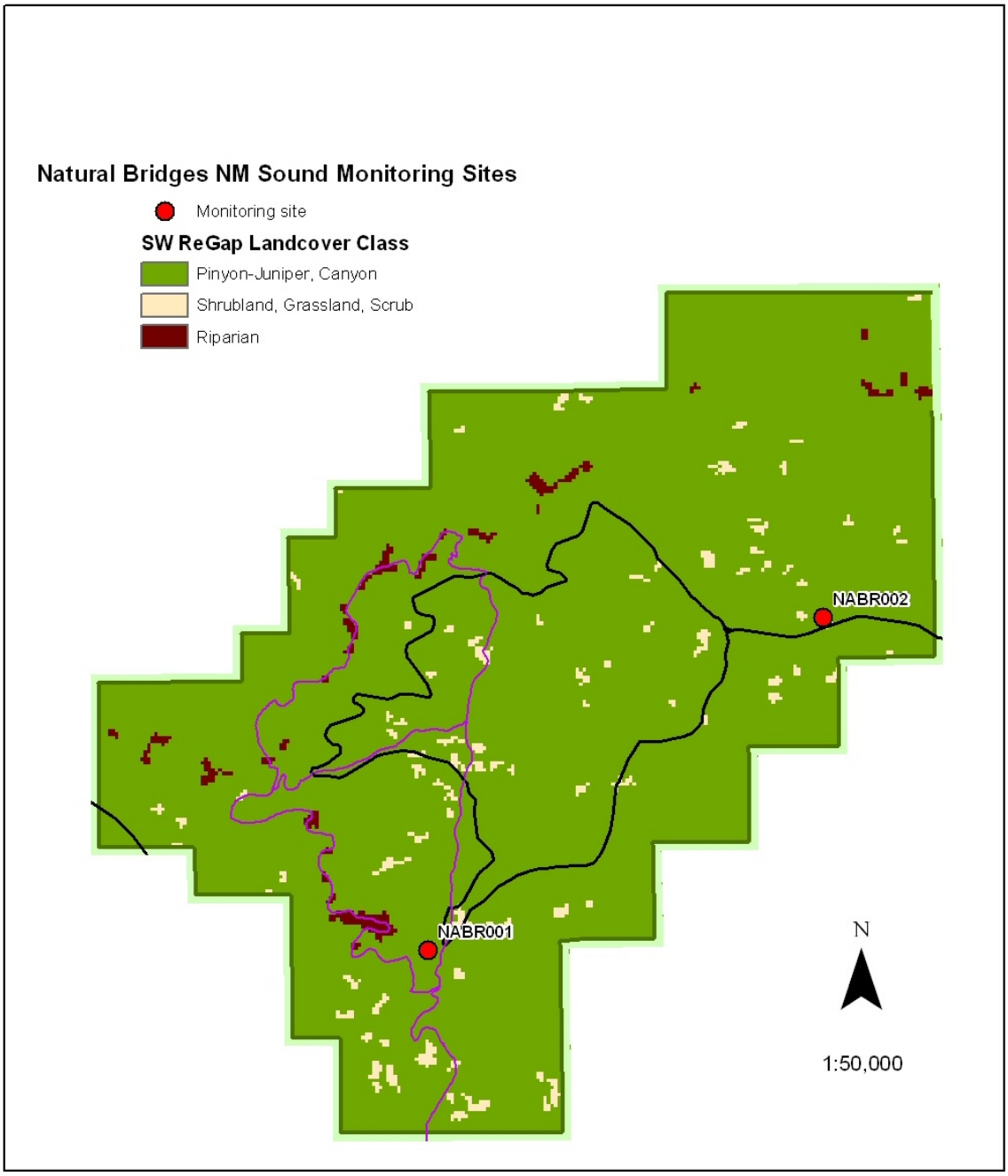


Figure 7. NABR land cover types grouped according to similar acoustic characteristics.

Table 18. L_{nat} for one-third frequency data for SEUG, summer, for four major land cover groups (travel corridors excluded).

Frequency	P-J Group	Shrub Group	Riparian Group	Frontcountry
20	30.1	29.4	22.0	30.3
25	28.3	28.0	20.5	29.7
31.5	26.7	26.8	18.8	29.4
40	24.9	25.2	16.2	29.4
50	23.1	23.6	14.1	31.5
63	21.5	22.3	12.7	30.9
80	19.2	20.5	10.5	26.8
100	16.5	17.5	8.7	25.4
125	13.3	14.4	8.6	27.6
160	10.7	11.7	7.2	21.9
200	8.6	9.9	7.0	20.1
250	6.7	7.6	5.8	18.6
315	5.4	5.4	6.0	14.1
400	4.6	4.4	6.3	14.0
500	3.9	4.1	5.9	12.0
630	3.3	4.0	5.4	12.6
800	3.1	3.9	5.4	9.9
1000	2.6	3.4	5.0	8.0
1250	2.3	3.1	4.7	6.3
1600	2.4	3.5	4.4	5.0
2000	3.0	4.1	4.5	5.5
2500	3.8	4.8	5.1	5.8
3150	4.7	5.6	6.3	4.3
4000	6.3	7.3	9.2	4.4
5000	7.4	8.9	11.6	5.0
6300	7.7	8.7	7.6	5.4
8000	8.7	9.8	8.0	6.1
10000	9.6	10.9	8.1	7.0
12500	10.0	12.0	8.5	7.4
16000	9.9	13.9	8.3	7.1
20000	9.7	14.8	7.1	6.0

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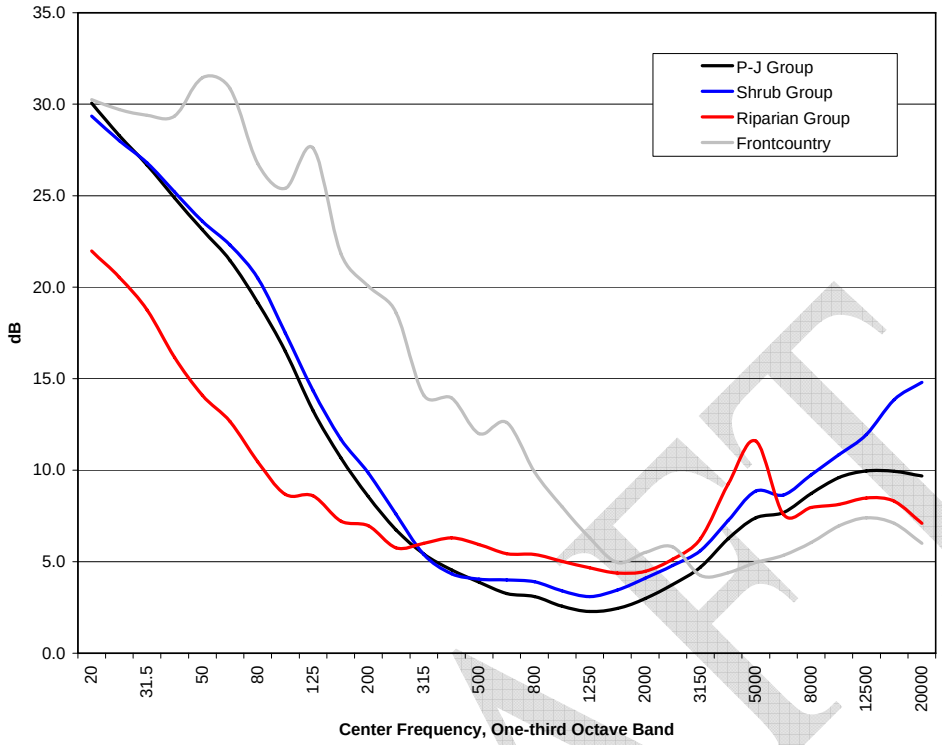


Figure 2. L_{nat} for one-third octave band frequency data for SEUG, summer, for four major land cover groups (travel corridors excluded). L_{50} was used for frontcountry sites since L_{nat} was not computed.

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Table 19. L_{nat} for one-third frequency data for SEUG, winter, for four major land cover groups (travel corridors excluded).

Frequency	P-J Group	Shrub Group	Riparian Group	Frontcountry
20	29.7	30.6	22.6	32.3
25	28.1	28.6	23.7	31.5
31.5	26.3	26.8	21.8	30.8
40	24.6	24.6	19.6	30.0
50	22.8	22.0	17.0	29.4
63	21.3	19.6	14.2	27.9
80	19.2	17.4	11.3	26.7
100	16.2	13.0	8.3	23.7
125	13.1	8.4	6.1	25.1
160	9.6	5.5	4.7	18.0
200	6.8	3.8	3.1	15.7
250	4.8	2.6	2.2	14.6
315	3.4	1.5	1.6	11.2
400	2.1	0.8	1.5	11.4
500	1.1	0.4	1.8	11.2
630	0.4	0.1	2.5	10.3
800	0.2	0.4	2.7	9.0
1000	0.5	1.0	2.8	6.8
1250	1.1	1.7	2.5	6.7
1600	1.9	2.5	2.7	5.7
2000	2.7	3.2	3.1	4.7
2500	3.6	4.0	3.8	4.5
3150	4.4	5.0	4.6	5.4
4000	5.4	6.0	5.5	6.2
5000	6.3	7.0	6.5	7.2
6300	7.2	7.8	7.4	7.9
8000	8.1	8.6	8.2	8.7
10000	9.0	9.2	8.9	9.6
12500	9.5	9.5	9.4	9.9
16000	9.3	10.1	9.5	9.8
20000	8.9	10.2	8.9	9.9

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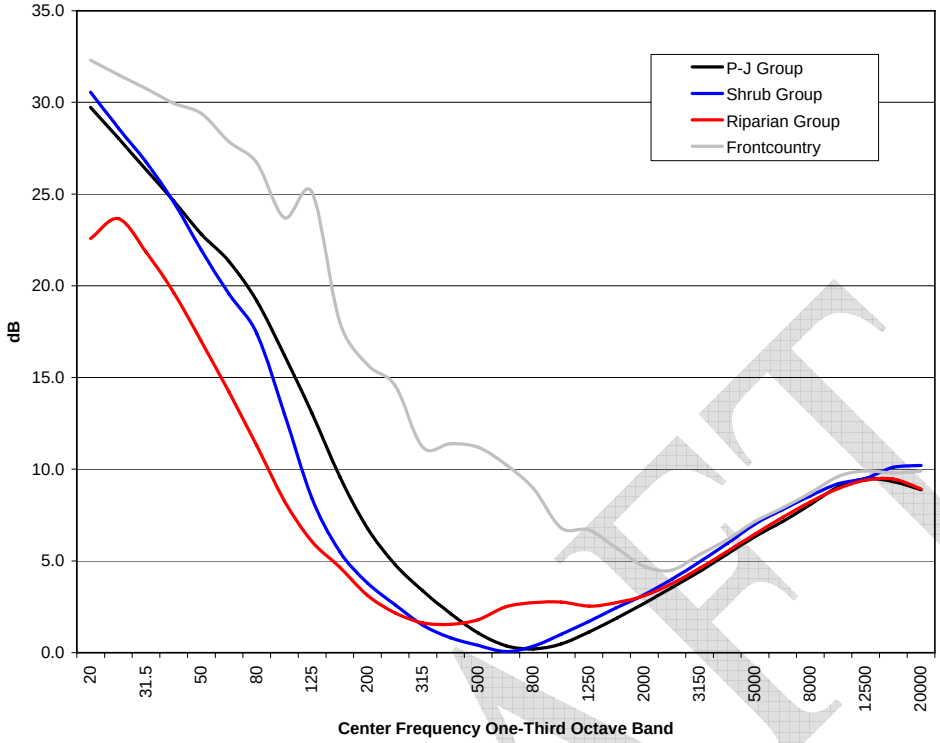


Figure 3. L_{nat} for one-third octave frequency data for SEUG, winter, for four major land cover groups (travel corridors excluded). L_{50} was used for frontcountry sites since L_{nat} was not computed.

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Area of Audibility of Vehicle Sounds in SEUG Units

Maps showing the approximate area of audibility of road noise in each SEUG are provided below (Figures 10-13). These maps are based on vehicle speed and attenuation distances shown in Table 2. These areas of audibility are very rough estimates based on field observations and data in Volpe's TNM. Detailed data on vehicle type, numbers, seasonal use patterns, and actual sound levels of different vehicle type are needed before a more thorough analysis can be conducted.

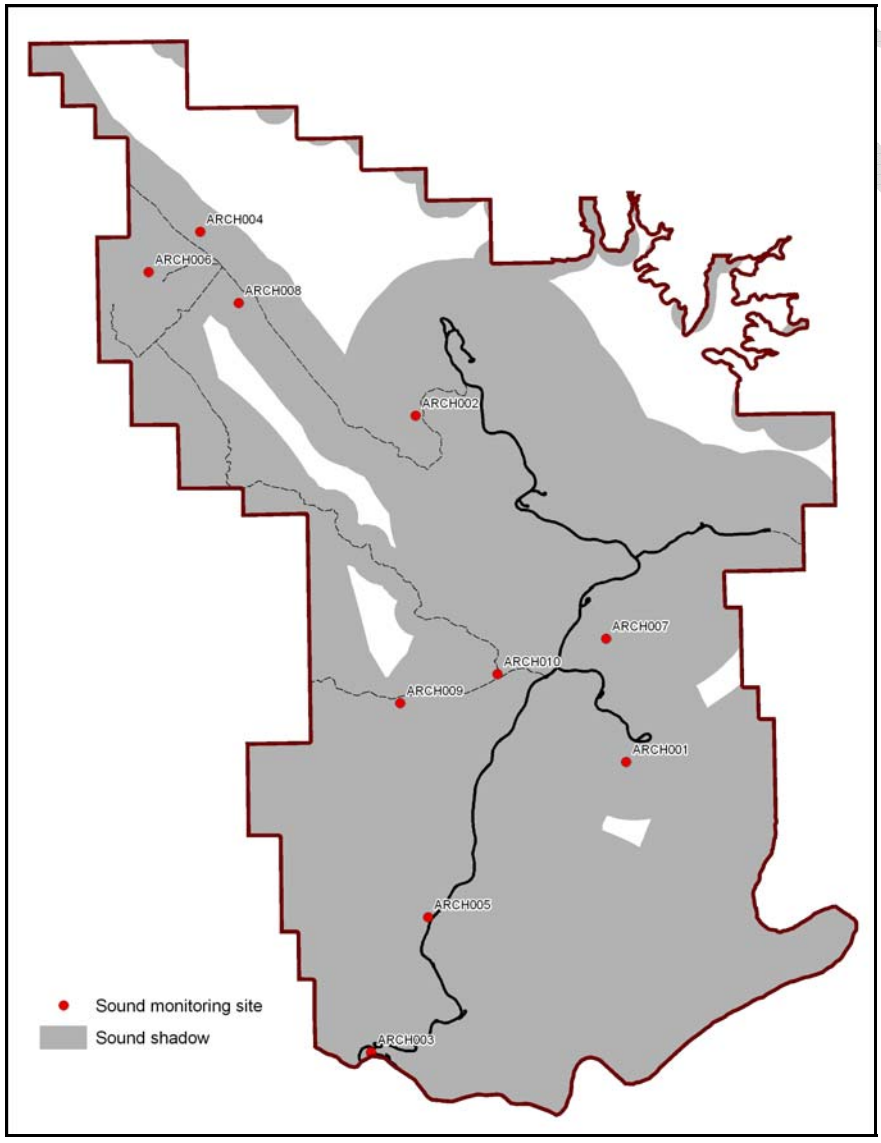


Figure 10. Area of vehicle audibility in ARCH.

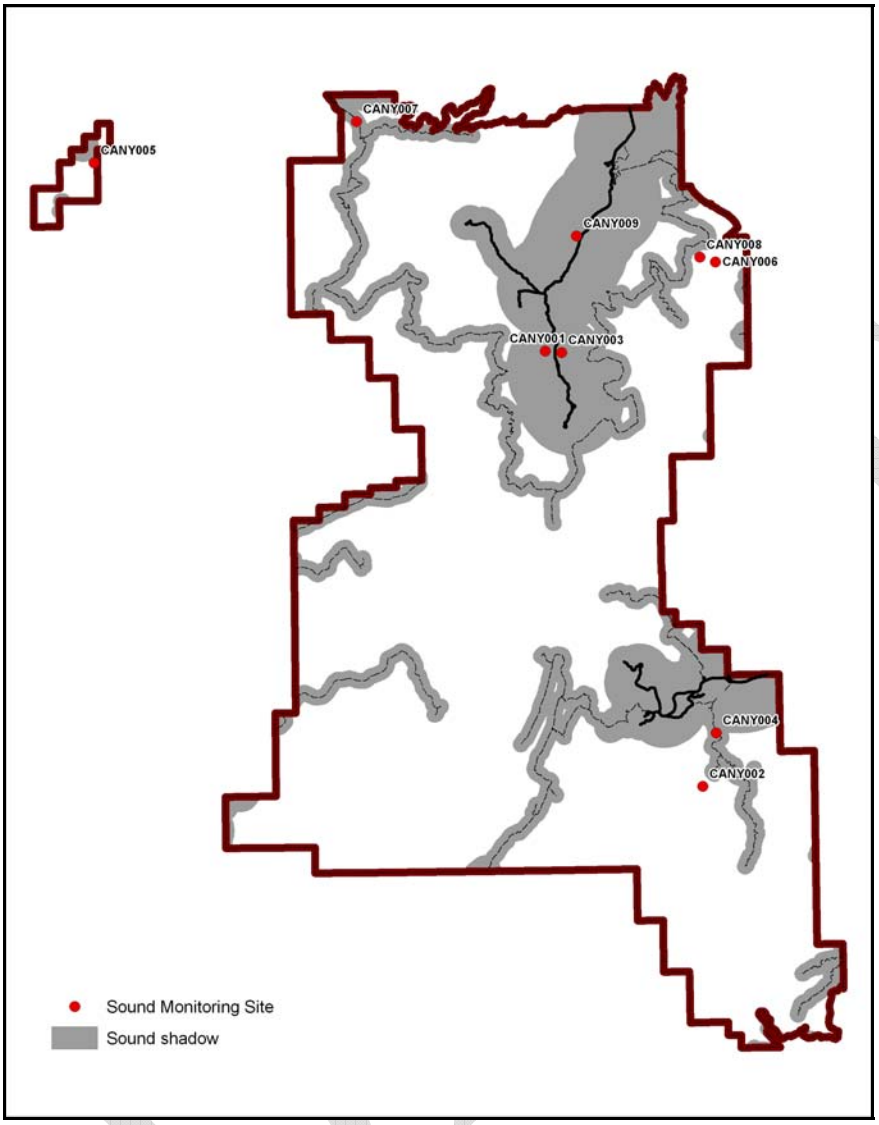


Figure 11. Area of vehicle audibility in CANY.

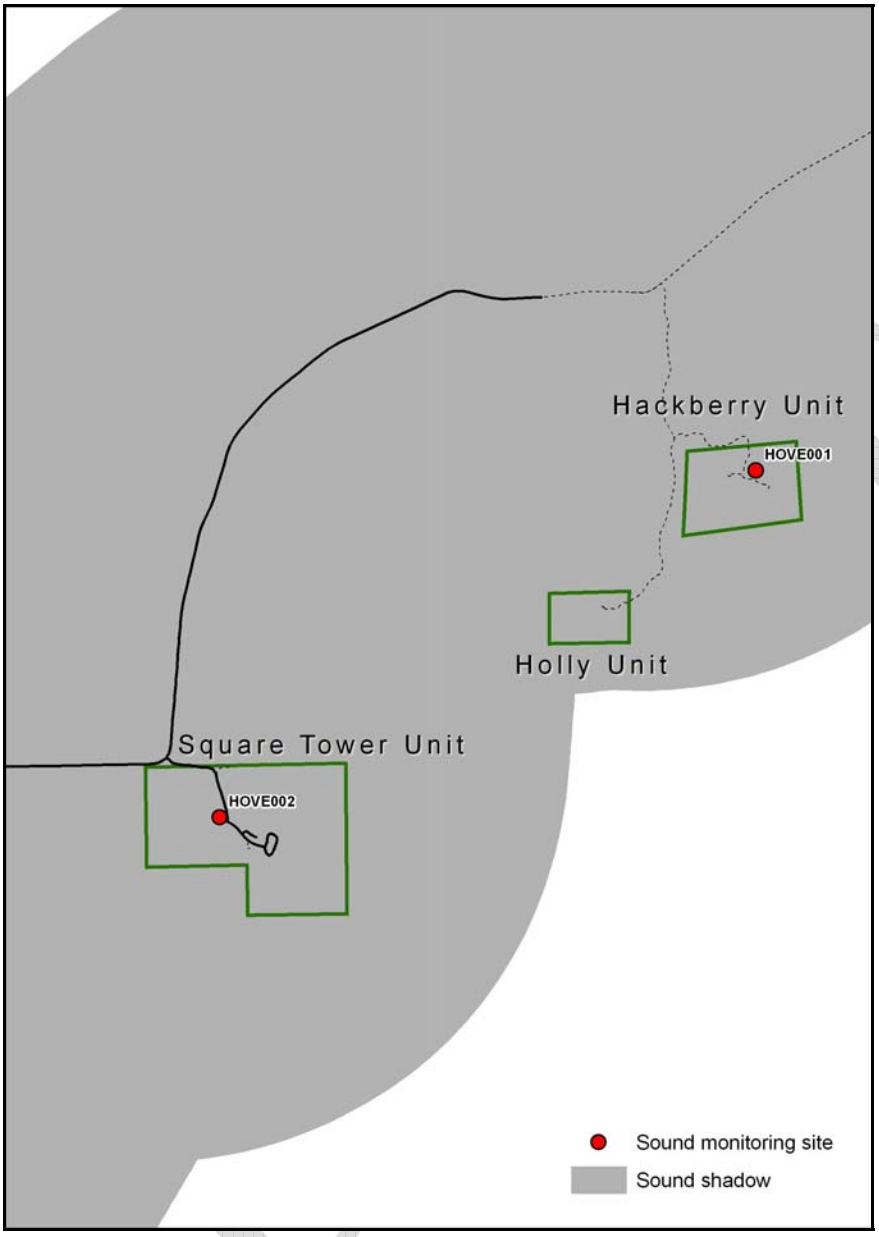


Figure 12. Area of vehicle audibility in HOVE.

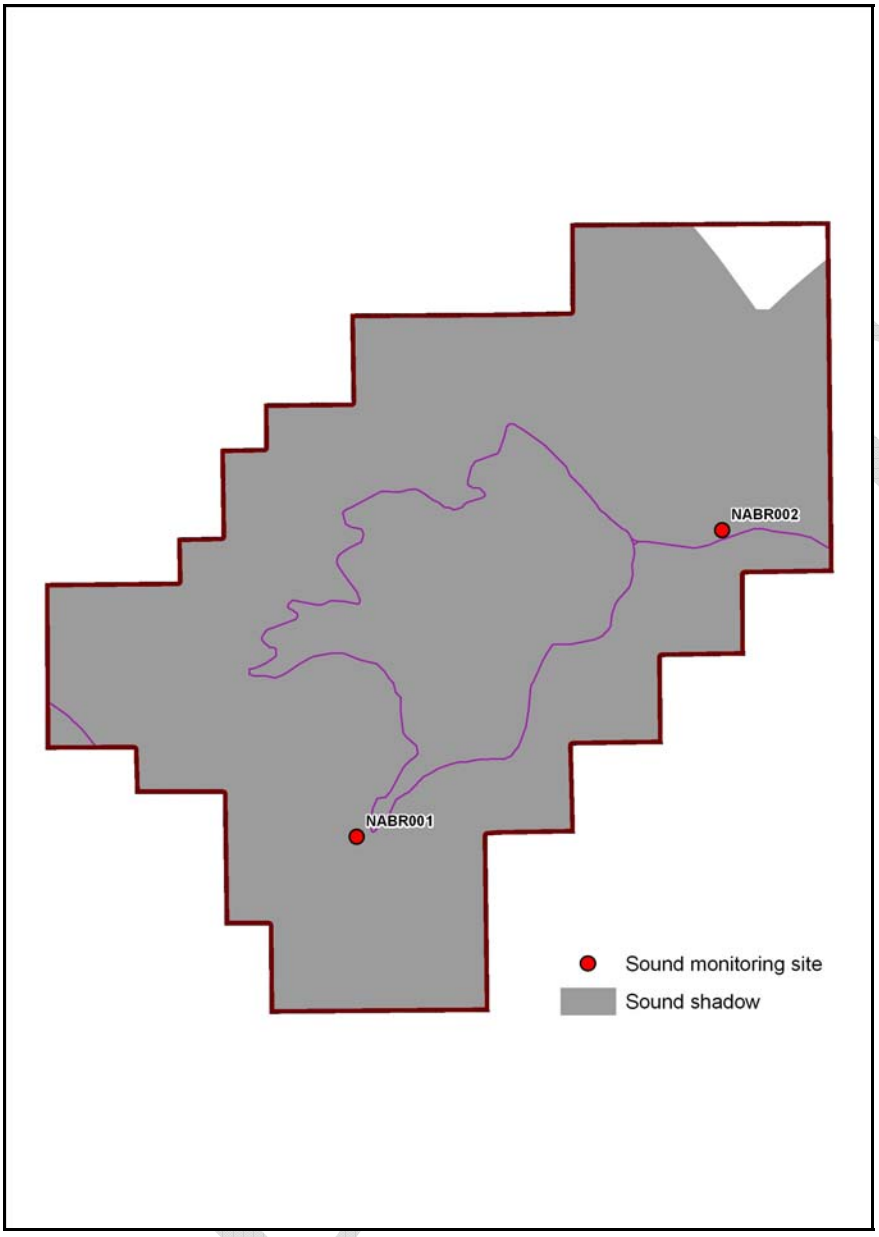


Figure 13. Area of vehicle audibility in NABR.

Discussion

Sound Levels

Sound levels in the backcountry areas of SEUG units were generally very low, often less than 20 dBA. Absent non-natural sounds, sound levels were often near or below the lower limit measurement capability (noise floor) of the sound level meters. Much of the sound levels reported in this report are near the noise floor of the instruments, indicating that actual sound levels were actually lower than reported. With an understanding of the relationship of instrument system noise (the noise floor) and reported sound levels, we can be certain that when reported sound levels are near the noise floor of the instrument, actual sound levels are less than reported by the instrument.

At one location (CANY005), we used a special low-noise microphone capable of measuring down to 6.0 dBA. Recorded sound levels at this location were as low as 7.2 dBA. However, given that this low-noise microphone had a noise floor of 6.0 dBA, actual sound levels in this instance were less than 7.2 dBA. One can compute an estimate of the actual sound level using logarithmic addition functions by subtracting the system sound level from the recorded sound level. In this case, the estimated actual sound level would be 1.0 dBA. Such an estimate can only be made when the instrument system noise (the noise floor) is well known, and even in such situations, the sound level data are not considered to meet ANSI Type 1 standards. Regardless of the standards met or not met, computing and estimating actual sound levels following this approach can provide more accurate sound level data than simply reporting sound level data at or near the noise floor of the instrument.

Sound Levels by Land Cover Type

Sound levels in the primary land cover types in SEUG are similar to sound levels measured in similar land cover types in Grand Canyon National Park. Natural ambient sound level (L_{nat}) in Pinyon-Juniper land cover in SEUG units was 21.4 dBA in summer; in GRCA, L_{nat} in Pinyon-Juniper was 20.7 dBA (0700-1900) in summer (L_{nat} for 0000-2400 for these GRCA sites was not computed). In similar shrubland land cover, L_{nat} in SEUG was 21.6 dBA, and in GRCA L_{nat} was 18.5 dBA (0700-1900). It is important to keep in mind that since these levels are near the lower limit of the measurement capability (noise floor) of the sound level meters, actual levels are lower, and differences might be greater than appear.

Sound Levels in Riparian Areas along the Colorado and Green Rivers

Acoustic monitors were deployed along both the Colorado and Green rivers (CANY006 and CANY007, respectively). Both of the measurement locations were in flat water areas (no rapids), upriver from the confluence of the two rivers. These riparian areas had an abundance of birds, and sound levels in summer at both locations were higher than in other land cover types in SEUG. Sound levels along the Green River were higher than along the Colorado (Tables VII-24 and VII-28), most likely due to a greater abundance of birds. Birds were more abundant at the Green River site probably because of habitat

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differences and a greater abundance of riparian habitats. At the Green River site, several different plant types occurred, including willow, cottonwood, tamarisk, and grassland, and the river valley was broader than at the Colorado River site. At the Colorado River site, tamarisk was the primary species and the river valley was narrow with cliffs immediately behind the site. There was more motorized boat traffic along the Colorado River, but the total time watercraft were audible was only 4 percent. The Green River site was near (50 m) the White Rim Trail (with vehicle traffic), but vehicles were audible only 1 percent of the time.

Common Sounds in SEUG

The most common natural sounds were wind-associated sounds (primarily wind through vegetation), birds, and insects. Birds and insects were common in summer but less so in winter; birds were common in winter but insects were seldom heard.

Aircraft and vehicles were the most common non-natural sounds in SEUG. Aircraft, particularly high altitude commercial jets, were the most common non-natural sound throughout the parks. Of the aircraft sounds, the vast majority (88 percent) were high-altitude commercial jet aircraft (propeller aircraft accounted for 11 percent of the audible aircraft and helicopters accounted for less than 1 percent). Aircraft sounds occur in all areas of the parks, while vehicle sounds are limited to travel corridors. Although vehicle sounds are associated with roads, those sounds can be audible at great distances under certain conditions. For example, vehicle sounds from Highway 191 (east of ARCH) were occasionally audible in ARCH 10 km from the highway when ambient sound levels were very low. Aircraft and vehicle sounds are audible a significant proportion of time in most areas of SEUG, often over 50 percent in daytime hours. On average, aircraft were audible about 26 percent of the time, and vehicles were audible about 19 percent of the time at the measurement locations in SEUG. The percent time that jet aircraft were audible was very similar in summer and winter. At most locations, the percent time these sounds were audible was considerably greater during daylight hours.

Thunder was the loudest recorded sound in SEUG during this study, with several events >80 dBA. The loudest thunder event was 103.7 dBA. Although thunder was the loudest sound, such events were relatively rare, occurring in less than 0.3 percent of the sample recordings (by comparison, aircraft were in over 25 percent of the sample recordings). Other sources of loud events included wind, rain, jet aircraft and propeller aircraft. Aircraft that were >80 dBA were likely flying at a fairly low altitude, probably less than 2,000 feet above ground level.

Other Uses of Acoustic Data

At one measurement location along Salt Creek in the Needles District of CANY (CANY002), recordings collected by the acoustic monitor were used to assess avian species presence in conjunction with standard avian point counts. At this location, CANY staff were conducting standardize avian point counts (10 points along a 1 km line, counting for eight minutes at each point, generally three times a season). At the point

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with the acoustic monitor, field surveys detected 11 species, while 45 species were detected using digital recording (Daw and Ambrose 2003). Field surveys in this area included three transect lines 1 km each with a total of 30 points. Field counts detected 55 species at these 30 points. Thus, species presence data from the recordings at a single point nearly equaled data from the 30 points used in field surveys. The potential for using recordings to supplement field surveys is great.

Noise-Free Interval

As unlikely as it may seem, in some of the most remote areas in the contiguous United States, the average time period when only natural sounds were audible was 2.4 minutes in summer and 3.2 minutes in winter (Table 16). By far the most common non-natural sound was aircraft. All SEUG units are under or near major east-west airline routes and aircraft sounds generally carry many kilometers. The sounds of aircraft are very, very common in SEUG units, especially during daylight hours.

Influence of Aircraft on NFI and SPL Data

In order to assess the influence of aircraft sounds on noise free interval and sound pressure level, we removed all seconds with audible aircraft sounds from two data sets and compared NFI and SPL with and without aircraft. We use two hours for which we had 1-hour field logs and removed all seconds with audible aircraft sounds. The two sites and dates were HOVE001, January 28, 2006, 1100-1200, and CANY001, July 10, 2006, 1300-1400. Differences in NFI and SPL data are shown in Table 20 and Figures 14-15.

Aircraft sounds have a significant influence on both NFI and SPL metrics in SEUG units. In very remote areas, aircraft are the primary or only non-natural sound, and thus the influence on NFI metrics is great. Without aircraft sounds, the NFI averages are much longer. Sound pressure levels with aircraft sounds are about twice that for the same period without aircraft sounds (a 6 dB difference represents a doubling of SPL). The influence of aircraft sounds is greater in quiet ambient conditions which is common in most areas in SEUG. The sound shadow of a high altitude jet is very large, often covering all or the majority of a small park. An example of a Boeing 737-700 flying over ARCH at 30,000 feet is shown in Figure 16.

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Table 20. NFI and SPL data with and without aircraft sounds, HOVE001, January 26, 1100-1200, and CANY001, July 10, 2006, 1300-1400.

HOVE001 20060128 1100-1200

	With Aircraft	Without Aircraft
L_{min} dBA	15.4	15.4
L_{max} dBA	46.6	39.0
L_{50} dBA	18.9	16.7
Adjusted L_{50} dBA	16.9	12.5
Percent Time Aircraft Audible	65%	0%
NFI Average	1.8 Minutes	29.6 Minutes
NFI Maximum	4.8 Minutes	48.5 Minutes
Hourly L_{50} dBA Difference		4.4
Percent Increase Sound Pressure Level		73%
Percent Increase Perceived Loudness		44%

CANY001 20060710 1300-1400

	With Aircraft	Without Aircraft
L_{min} dBA	16.7	16.7
L_{max} dBA	58.4	32.7
L_{50} dBA	23.3	19.3
Adjusted L_{50} dBA	22.2	15.8
Percent Time Aircraft Audible	74%	0%
NFI Average	1.0 Minutes	4.3 Minutes
NFI Maximum	3.0 Minutes	10.7 Minutes
Hourly L_{50} dBA Difference		6.4
Percent Increase Sound Pressure Level		107%
Percent Increase Perceived Loudness		64%

When aircraft were removed, vehicle sounds were the only non-natural sounds. HOVE001 was about1.5 km from a seldom used road. CANY001 was about 0.6 km from a frequently used road.

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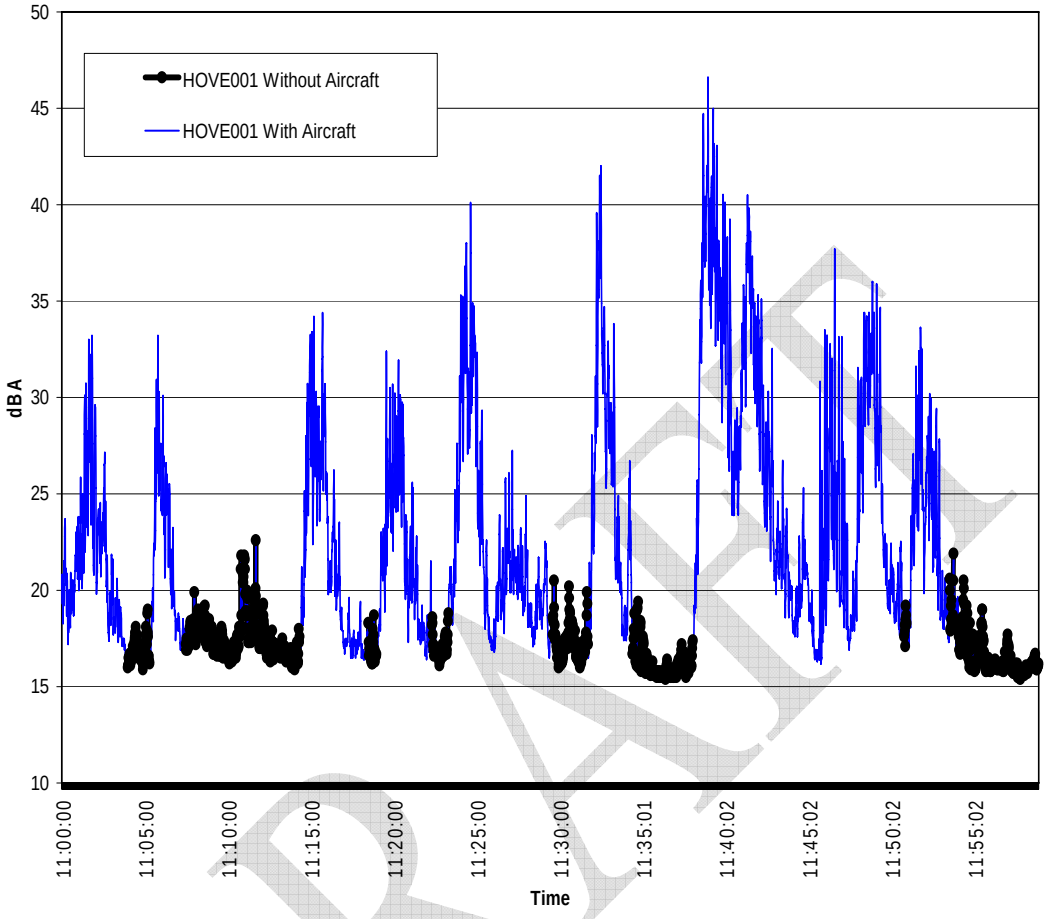


Figure 14. HOVE001, January 28, 2006, 1100-1200, dBA with and without aircraft.

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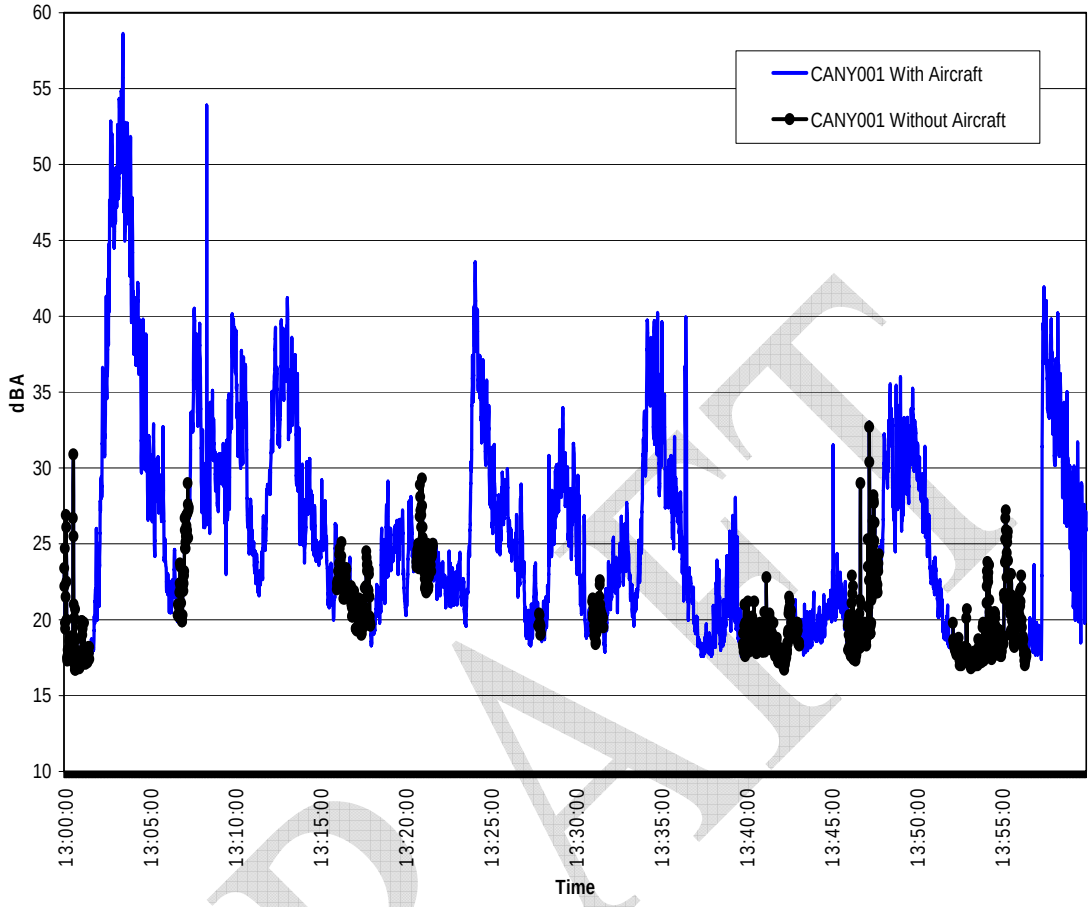


Figure 15. CANY001, July 10, 2006, 1300-1400, dBA with and without aircraft.

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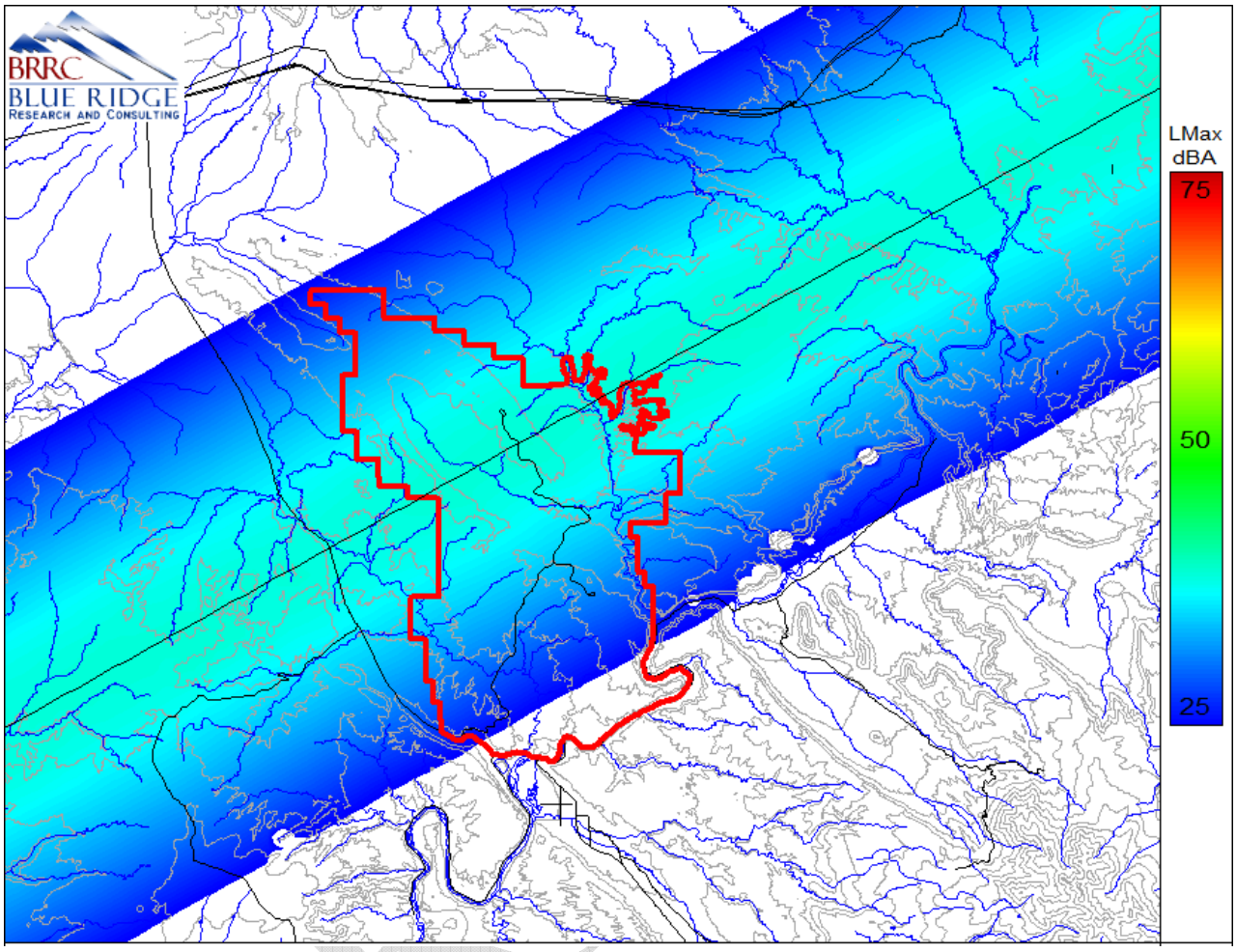


Figure 16. Maximum A-weighted sound levels (dBA L_{Amax}) for a 737-700 flying over ARCH at 30,000 feet at 450 knots with a power setting of 75% of maximum thrust. Note: Several factors influence sound propagation and attenuation rates. This illustration is a rough estimate of the sound levels and sound shadow from this overflight.

DVDs with SEUG acoustic data (decibel data and digital recordings) are included in Appendix IX.

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Recommendations

Recommendations provided below are listed roughly in order of priority. The first two recommendations are those that should be undertaken as soon as possible. The remaining recommendations should be considered as time and funding allow.

Initiate Soundscape Management Planning
A soundscape management plan is the single most important document for protecting and restoring park soundscapes. Efforts to develop a soundscape management plan for SEUG should begin as soon as possible. Establishing soundscape management objectives before sound issues become critical is essential to protecting and restoring park soundscapes.

Conduct Measurements along Cataract Canyon Rapids
During this study, sound levels were measured along the Colorado and Green rivers, but only along flat water sections, above the confluence of the two rivers. Sound levels below the confluence through Cataract Canyon would be different, and would vary with different seasonal water flows. Measurements should be made near rapids in Cataract Canyon during periods of low and high water flow.

Initiate Long-term Monitoring
SEUG purchased acoustic monitoring equipment for this study in 2001. Significant improvements have been made in acoustic equipment since 2001. The principal benefits being much more efficient systems (less power use and fewer batteries and solar panels), and the capability to make continuous digital recordings. Upgrading SEUG equipment to newer models would allow monitoring long-term trends and sound sources in SEUG soundscapes with less effort and would also provide better data that could benefit other disciplines and monitoring efforts (such as avian surveys).

Locations for monitoring and timing should be planned, when possible, to include data collection that would not only monitor soundscapes in SEUG, but also would benefit other monitoring efforts in SEUG, particularly avian monitoring efforts. In CANY, potential locations for this effort are along Salt Creek in the Needles district or along the Colorado or Green rivers where some of the measurements for this project were made, and where established avian surveys are conducted. ARCH is a relatively small park, and HOVE and NABR are very small, with numerous roads; hence vehicle noise is audible in most areas of these units. Monitoring locations in these units could be selected in conjunction with management issues and other monitoring efforts. For the larger park such CANY, a permanent monitoring location should be selected and monitor deployed and operated continuously (all data do not have to be analyzed, but can be stored for future reference). In other areas, monitors could be deployed every two to three years (both summer and winter season). For areas with a specific acoustic data need, monitors could be deployed as needed but generally for a minimum of 25 days. In general, the permanent monitor and cyclic monitors should be done at the same locations used in this study in order to provide comparable data unless there is some compelling reason to use

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different locations. In years when cyclic monitoring is not scheduled, new locations could be monitored.

Conduct Measurements with Low-noise Microphones
Many of the data collected during this project were very near the noise floor of the sound levels meters. Very sensitive, low-noise microphones (that can be used on current or upgraded systems) should be used during measurements in the future to better understand actual sound levels in SEUG.

NPS Management and FAA Airspace Coordination
The NPS and the FAA should work together to establish areas free of aircraft sounds in selected sound-sensitive areas of parks. Aircraft sounds are by far the most common non-natural sounds in backcountry areas of SEUG units, often audible >50 percent of the time during daylight hours. Since ambient acoustic conditions in SEUG units are generally low, aircraft sounds significantly impact the natural soundscape. Currently, park visitors wishing to experience natural sounds for extended periods cannot do so, and such opportunities should be available. The scope of this recommendation may be beyond SEUG units; however, units in SEUG illustrate the extent of the problem.

Collect High-Quality, Long-term Digital Recordings and Compare with 1995 Data
Long-term digital recordings provide an archival record of acoustic conditions in SEUG. More so than SPL measurement data, recordings provide a wealth of information that can be analyzed and re-analyzed at later dates as analysis techniques become more sophisticated and also more automated. Such recordings also can provide interesting and unique sounds of SEUG for use in visitor education programs and for use in internet-based programs.

In the mid-1990s, SEUG staff and contractors collected 3-4 hour digital recordings at several locations. These recordings have never been analyzed. In order to assess changes in sound sources and percent time each was audible, these recordings should be analyzed and compared with recent recordings made at the same locations at the same time of year.

Assess the Influence of Vehicle Sounds on Park Soundscapes
Vehicles were audible over a considerable area of SEUG units. We attempted to provide a rough estimate of the area of vehicle audibility; however, since vehicle sounds are one the most common non-natural sounds in the parks, a detailed analysis of vehicle audibility would be worthwhile. Much more detailed information on vehicle numbers, type, use of different roads, and actual sound levels of different vehicles are needed before such a study can be undertaken.

Monitor Activities Outside Park Boundaries
Activities outside park boundaries have the potential to significantly influence soundscapes inside parks. Park staff should keep informed of activities that have the potential to impact park soundscapes, and should participate in the planning process to

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minimize impacts. For example, the Canyonlands Fields Airport may consider a new runway that runs east-west in addition to the current north-side runway. An east-west runway would result in landing and take-off routes directly over the north end of ARCH, and this would significantly increase noise levels in the northern parts of ARCH.

Park Management and Maintenance

Normal park management and maintenance operations play a role in park soundscapes. Vehicle access to parks is often an essential part of park management; however, several aspects of roads, speed limits and vehicle types can greatly influence park soundscapes. Speed plays a major role in how far vehicle sounds travel. If some areas of a park are managed for remoteness or solitude values, reduced speed limits could be considered to reduce the area of audibility of vehicles. Some types of warnings to drivers, such as rumble strips, can greatly increase the area of vehicle audibility. When considering road surfaces or re-surfacing projects, special "quiet" road surfaces should be considered to minimize vehicle sounds. Finally, some vehicles have been modified and no longer meet EPA noise regulations. Some modified vehicles, such as straight-pipe motorcycles are often two to four times louder than unmodified motorcycles, and the loud motorcycles result in a significantly larger area of vehicle audibility. Enforcement of EPA noise regulations would help minimize the influence of vehicle sounds on park soundscapes.

Most buildings generate some type of noise, such as heater or air conditioning units, fans, doors opening and closing, drink machines, and other building sounds. Building design and maintenance should consider ways to minimize building sounds.

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Acknowledgements

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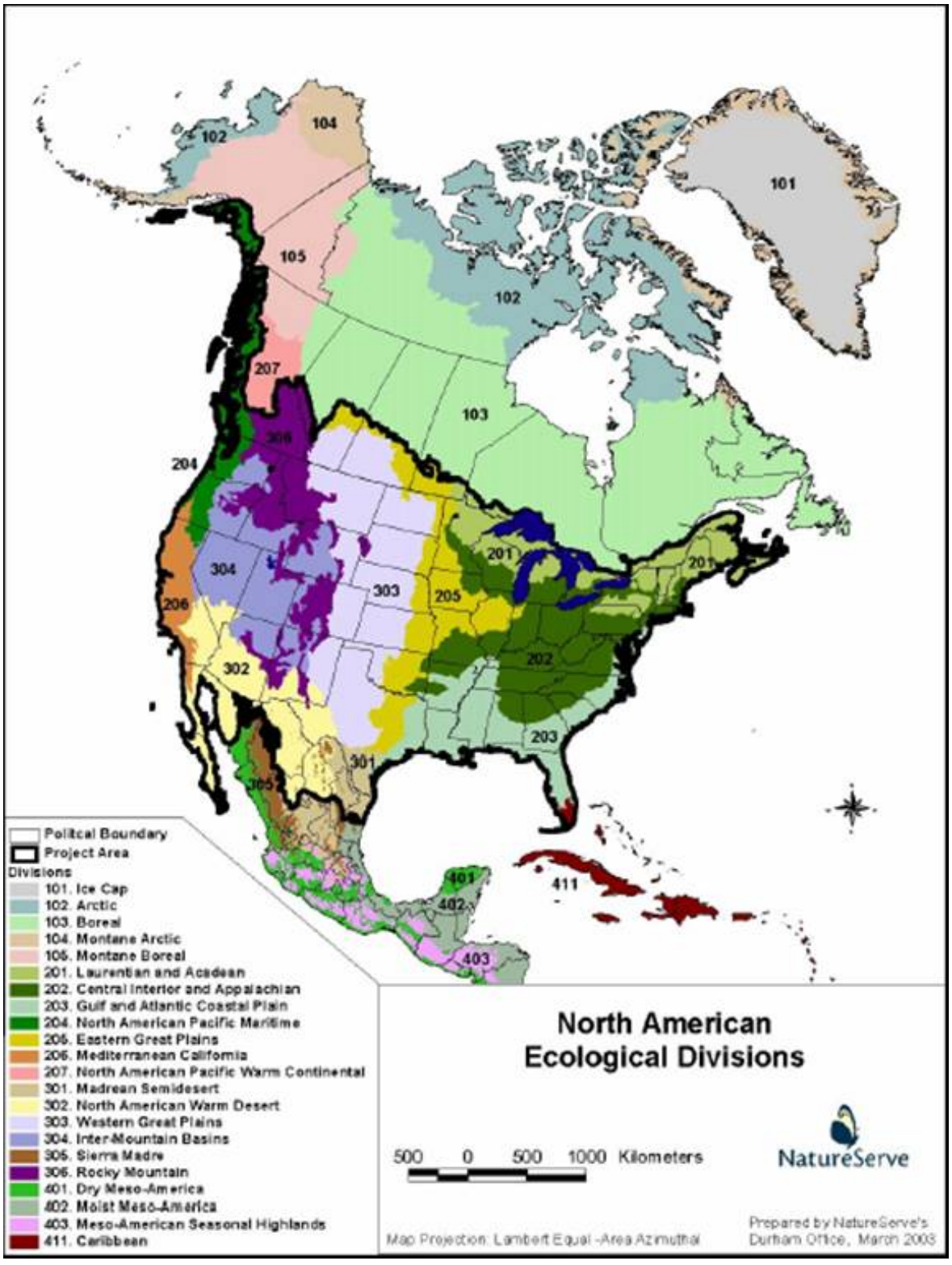
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Appendix I. NatureServe Ecological Divisions of North America.



Appendix II. National Land Cover Database (NLCD) Characterization, Classes, and Subclasses.

Land Cover Class	Land Cover Subclass	Description
Water	11 Open Water	All areas of open water, generally with less than 25% cover of vegetation/land cover.
	12 Perennial Ice/Snow	All areas characterized by year-long surface cover of ice and/or snow.
Developed	21 Low Intensity Residential	All areas with a mixture of constructed materials and vegetation. Constructed materials account for 30-80% of the cover. Vegetation may account for 20 to 70% of the cover. These areas most commonly include single-family housing units. Population densities will be lower than in high intensity residential areas.
	22 High Intensity Residential	Includes highly developed areas where people reside in high numbers. Examples include apartment complexes and row houses. Vegetation accounts for less than 20% of the cover. Constructed materials account for 80 to100% of the cover.
	23 Commercial/Industrial/ Transportation	Includes infrastructure (e.g. roads, railroads, etc.) and all highly developed areas not classified as High Intensity Residential.
Barren	31 Bare Rock/Sand/ Clay	Perennially barren areas of bedrock, desert pavement, scarps, talus, slides, volcanic material, glacial debris, beaches, and other accumulations of earthen material.
	32 Quarries/Strip Mines/Gravel Pits	Areas of extractive mining activities with significant surface expression.
	33 Transitional	Areas of sparse vegetative cover (less than 25% of cover) that are dynamically changing from one land cover to another, often because of land use activities. Examples include forest clearcuts, a transition phase between forest and agricultural land, the temporary clearing of vegetation, and changes due to natural causes (e.g. fire, flood, etc.).
Forested Upland	41 Deciduous Forest	Areas dominated by trees where 75% Or more of the tree species shed foliage simultaneously in response to seasonal change.
	42 Evergreen Forest	Areas dominated by trees where 75% or more of the tree species maintain their leaves all year. Canopy is never without green foliage.
	43 Mixed Forest	Areas dominated by trees where neither deciduous nor evergreen species represent more than 75% of the cover present.

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Appendix II. National Land Cover Database (NLCD) Characterization, Classes, and Subclasses (cont.).

Shrubland	51 Shrubland	Areas dominated by shrubs; shrub canopy accounts for 25-100% of the cover. Shrub cover is generally greater than 25% when tree cover is less than 25%. Shrub cover may be less than 25% in cases when the cover of other life forms (e.g. herbaceous or tree) is less than 25% and shrubs cover exceeds the cover of the other life forms.
Non-Natural Woody	61 Orchards/Vineyards/ Other	Orchards, vineyards, and other areas planted or maintained for the production of fruits, nuts, berries, or ornamentals.
Herbaceous Upland Natural/Semi-natural Vegetation	71 Grasslands/ Herbaceous	Areas dominated by upland grasses and forbs. In rare cases, herbaceous cover is less than 25%, but exceeds the combined cover of the woody species present. These areas are not subject to intensive management, but they are often utilized for grazing.
Herbaceous Planted/Cultivated	81 Pasture/Hay	Areas of grasses, legumes, or grass-legume mixtures planted for livestock grazing or the production of seed or hay crops.
	82 Row Crops	Areas used for the production of crops, such as corn, soybeans, vegetables, tobacco, and cotton.
	83 Small Grains	Areas used for the production of graminoid crops such as wheat, barley, oats, and rice.
	84 Fallow	Areas used for the production of crops that do not exhibit visible vegetation as a result of being tilled in a management practice that incorporates prescribed alternation between cropping and tillage.
	85 Urban/Recreational Grasses	Vegetation (primarily grasses) planted in developed settings for recreation, erosion control, or aesthetic purposes. Examples include parks, lawns, golf courses, airport grasses, and industrial site grasses.
Wetlands	91 Woody Wetlands	Areas where forest or shrubland vegetation accounts for 25-100% of the cover and the soil or substrate is periodically saturated with or covered with water.
	92 Emergent Herbaceous Wetlands	Areas where perennial herbaceous vegetation accounts for 75-100% of the cover and the soil or substrate is periodically saturated with or covered with water.

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Appendix III. Descriptions of Primary Land Cover Types in SEUG (from "Southwest Regional GAP Analysis" Ramsey 2006).

Southwest Regional GAP Analysis Project - Land Cover Descriptions

S010 Colorado Plateau Mixed Bedrock Canyon and Tableland

NLCD Class Barren Lands

Spatial Scale / Pattern Matrix

Concept Summary The distribution of this ecological system is centered on the Colorado Plateau where it is comprised of barren and sparsely vegetated landscapes (generally <10% plant cover) of steep cliff faces, narrow canyons, and open tablelands of predominantly sedimentary rocks, such as sandstone, shale, and limestone. Some eroding shale layers similar to Inter-Mountain Basins Shale Badland (CES304.789) may be interbedded between the harder rocks. The vegetation is characterized by very open tree canopy or scattered trees and shrubs with a sparse herbaceous layer. Common species includes Pinus edulis, Pinus ponderosa, Juniperus spp., Cercocarpus intricatus, and other short-shrub and herbaceous species, utilizing moisture from cracks and pockets where soil accumulates.

Range Colorado Plateau.

Additional Information

Southwest ReGAP Analysis Project Land Cover Datasets:	http://earth.gis.usu.edu/swgap/
NatureServe Explorer (for Ecological System and Alliance information):	http://www.natureserve.org/explorer/
USDA Natural Resources Conservation Service Plants Database:	http://plants.usda.gov/

Field Photos



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S010; Colorado Plateau Mixed Bedrock Canyon and Tableland.

Southwest Regional GAP Analysis Project - Land Cover Descriptions

S039 Colorado Plateau Pinyon-Juniper Woodland

NLCD Class Evergreen Forest

Spatial Scale / Pattern Matrix

Concept Summary This ecological system occurs in dry mountains and foothills of the Colorado Plateau region including the Western Slope of Colorado to the Wasatch Range, south to the Mogollon Rim and east into the northwestern corner of New Mexico. It is typically found at lower elevations ranging from 1500-2440 m. These woodlands occur on warm, dry sites on mountain slopes, mesas, plateaus, and ridges. Severe climatic events occurring during the growing season, such as frosts and drought, are thought to limit the distribution of pinyon-juniper woodlands to relatively narrow altitudinal belts on mountainsides. Soils supporting this system vary in texture ranging from stony, cobbly, gravelly sandy loams to clay loam or clay. Pinus edulis and/or Juniperus osteosperma dominate the tree canopy. In the southern portion of the Colorado Plateau in northern Arizona and northwestern New Mexico, Juniperus monosperma and hybrids of Juniperus spp may dominate or codominate the tree canopy. Juniperus scopulorum may codominate or replace Juniperus osteosperma at higher elevations. Understory layers are variable and may be dominated by shrubs, graminoids, or be absent. Associated species include Arctostaphylos patula, Artemisia tridentata, Cercocarpus intricatus, Cercocarpus montanus, Coleogyne ramosissima, Purshia stansburiana, Purshia tridentata, Quercus gambelii, Bouteloua gracilis, Pleuraphis jamesii, or Poa fendleriana. This system occurs at higher elevations than Great Basin Pinyon-Juniper Woodland (CES304.773) and Colorado Plateau shrubland systems where sympatric.

Range Occurs on dry mountains and foothills of the Colorado Plateau region from the Western Slope of Colorado to the Wasatch Range, south to the Mogollon Rim. It is typically found at lower elevations ranging from 1500-2440 m.

Additional Information

Southwest ReGAP Analysis Project Land Cover Datasets:	http://earth.gis.usu.edu/swgap/
NatureServe Explorer (for Ecological System and Alliance information):	http://www.natureserve.org/explorer/
USDA Natural Resources Conservation Service Plants Database:	http://plants.usda.gov/

Field Photos



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S039; Colorado Plateau Pinyon-Juniper Woodland.

Southwest Regional GAP Analysis Project - Land Cover Descriptions

S052 Colorado Plateau Pinyon-Juniper Shrubland

NLCD Class Scrub/Scrub

Spatial Scale / Pattern Matrix

Concept Summary This ecological system is characteristic of the rocky mesatops and slopes on the Colorado Plateau and western slope of Colorado, but these stunted tree shrublands may extend further upslope along the low-elevation margins of taller pinyon-juniper woodlands. Sites are drier than Colorado Plateau Pinyon-Juniper Woodland (CES304.767). Substrates are shallow/rocky and shaley soils at lower elevations (1200-2000 m). Sparse examples of the system grade into Colorado Plateau Mixed Bedrock Canyon and Tableland (CES304.765). The vegetation is dominated by dwarfed (usually <3 m tall) Pinus edulis and/or Juniperus osteosperma trees forming extensive tall shrublands in the region along low-elevation margins of pinyon-juniper woodlands. Other shrubs, if present, may include Artemisia nova, Artemisia tridentata ssp. wyomingensis, Chrysothamnus viscidiflorus, or Coleogyne ramosissima. Herbaceous layers are sparse to moderately dense and typically composed of xeric graminoids.

Range Rocky mesa tops and slopes on the Colorado Plateau.

Additional Information

Southwest ReGAP Analysis Project Land Cover Datasets:	http://earth.gis.usu.edu/swgap/
NatureServe Explorer (for Ecological System and Alliance information):	http://www.natureserve.org/explorer/
USDA Natural Resources Conservation Service Plants Database:	http://plants.usda.gov/

Field Photos



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S052; Colorado Plateau Pinyon-Juniper Shrubland.

Southwest Regional GAP Analysis Project - Land Cover Descriptions

S059 Colorado Plateau Blackbrush-Mormon-tea Shrubland

NLCD Class Scrub/Scrub

Spatial Scale / Pattern Large patch

Concept Summary This ecological system occurs in the Colorado Plateau on benchlands, colluvial slopes, pediments or bajadas. Elevation ranges from 560-1650 m. Substrates are shallow, typically calcareous, non-saline and gravelly or sandy soils over sandstone or limestone bedrock, caliche or limestone alluvium. It also occurs in deeper soils on sandy plains where it may have invaded desert grasslands. The vegetation is characterized by extensive open shrublands dominated by Coleogyne ramosissima often with Ephedra viridis, Ephedra torreyana, or Grayia spinosa. Sandy portions may include Artemisia filifolia as codominant. The herbaceous layer is sparse and composed of graminoids such as Achnatherum hymenoides, Pleuraphis jamesii, or Sporobolus cryptandrus.

Range Occurs in the Colorado Plateau on benchlands, colluvial slopes, pediments or bajadas. Elevation ranges from 560-1600 m.

Additional Information

Southwest ReGAP Analysis Project Land Cover Datasets:	http://earth.gis.usu.edu/swgap/
NatureServe Explorer (for Ecological System and Alliance information):	http://www.natureserve.org/explorer/
USDA Natural Resources Conservation Service Plants Database:	http://plants.usda.gov/

Field Photos



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PhotoID : UT091402MD07_2.JPG

101

S059; Colorado Plateau Blackbrush-Mormom-tea Shrubland.

Southwest Regional GAP Analysis Project - Land Cover Descriptions

S065 Inter-Mountain Basins Mixed Salt Desert Scrub

NLCD Class Scrub/Scrub

Spatial Scale / Pattern Large patch

Concept Summary This extensive ecological system includes open-canopied shrublands of typically saline basins, alluvial slopes and plains across the Intermountain western U.S. This type also extends in limited distribution into the southern Great Plains. Substrates are often saline and calcareous, medium- to fine-textured, alkaline soils, but include some coarser-textured soils. The vegetation is characterized by a typically open to moderately dense shrubland composed of one or more Atriplex species such as Atriplex confertifolia, Atriplex canescens, Atriplex polycarpa, or Atriplex spinifera. Other shrubs present to codominate may include Artemisia tridentata ssp. wyomingensis, Chrysothamnus viscidiflorus, Ericameria nauseosa, Ephedra nevadensis, Grayia spinosa, Krascheninnikovia lanata, Lycium spp., Picrothamnus desertorum, or Tetradymia spp. Sarcobatus vermiculatus is generally absent, but if present does not codominate. The herbaceous layer varies from sparse to moderately dense and is dominated by perennial graminoids such as Achnatherum hymenoides, Bouteloua gracilis, Elymus lanceolatus ssp. lanceolatus, Pascopyrum smithii, Pleuraphis jamesii, Pleuraphis rigida, Poa secunda, or Sporobolus airoides. Various forbs are also present.

Range Intermountain western U.S., extending in limited distribution into the southern Great Plains.

Additional Information

Southwest ReGAP Analysis Project Land Cover Datasets:	http://earth.gis.usu.edu/swgap/
NatureServe Explorer (for Ecological System and Alliance information):	http://www.natureserve.org/explorer/
USDA Natural Resources Conservation Service Plants Database:	http://plants.usda.gov/

Field Photos



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PhotoID : UT061302JD22_2.JPG

115

S065; Inter-Mountain Basins Mixed Salt Desert Scrub.

Southwest Regional GAP Analysis Project - Land Cover Descriptions

S054 Inter-Mountain Basins Big Sagebrush Shrubland

NLCD Class Scrub/Scrub

Spatial Scale / Pattern Matrix

Concept Summary This ecological system occurs throughout much of the western U.S., typically in broad basins between mountain ranges, plains and foothills between 1500 and 2300 m elevation. Soils are typically deep, well-drained and non-saline. These shrublands are dominated by Artemisia tridentata ssp. tridentata and/or Artemisia tridentata ssp. wyomingensis. Scattered Juniperus spp., Sarcobatus vermiculatus, and Atriplex spp. may be present in some stands. Ericameria nauseosa, Chrysothamnus viscidiflorus, Purshia tridentata, or Symphoricarpos oreophilus may codominate disturbed stands. Perennial herbaceous components typically contribute less than 25% vegetative cover. Common graminoid species include Achnatherum hymenoides, Bouteloua gracilis, Elymus lanceolatus, Festuca idahoensis, Hesperostipa comata, Leymus cinereus, Pleuraphis jamesii, Pascopyrum smithii, Poa secunda, or Pseudoroegneria spicata.

Range Occurs throughout much of the western U.S., typically in broad basins between mountain ranges, plains and foothills between 1500-2300 m elevation.

Additional Information

Southwest ReGAP Analysis Project Land Cover Datasets:	http://earth.gis.usu.edu/swgap/
NatureServe Explorer (for Ecological System and Alliance information):	http://www.natureserve.org/explorer/
USDA Natural Resources Conservation Service Plants Database:	http://plants.usda.gov/

Field Photos



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111

S054; Inter-Mountain Basins Big Sagebrush Shrubland.

Southwest Regional GAP Analysis Project - Land Cover Descriptions

S090 Inter-Mountain Basins Semi-Desert Grassland

NLCD Class Grassland/Herbaceous

Spatial Scale / Pattern Large patch

Concept Summary This widespread ecological system occurs throughout the intermountain western U.S. on dry plains and mesas, at approximately 1450 to 2320 m (4750-7610 feet) elevation. These grasslands occur in lowland and upland areas and may occupy swales, playas, mesatops, plateau parks, alluvial flats, and plains, but sites are typically xeric. Substrates are often well-drained sandy or loamy-textured soils derived from sedimentary parent materials but are quite variable and may include fine-textured soils derived from igneous and metamorphic rocks. When they occur near foothill grasslands they will be at lower elevations. The dominant perennial bunch grasses and shrubs within this system are all very drought-resistant plants. These grasslands are typically dominated or codominated by Achnatherum hymenoides, Aristida spp., Bouteloua gracilis, Hesperostipa comata, Muhlenbergia sp., or Pleuraphis jamesii and may include scattered shrubs and dwarf-shrubs of species of Artemisia, Atriplex, Coleogyne, Ephedra, Gutierrezia, or Krascheninnikovia lanata.

Range Occurs throughout the Intermountain western U.S. on dry plains and mesas, at approximately 1450 to 2320 m (4750-7610 feet) in elevation.

Additional Information

Southwest ReGAP Analysis Project Land Cover Datasets:	http://earth.gis.usu.edu/swgap/
NatureServe Explorer (for Ecological System and Alliance information):	http://www.natureserve.org/explorer/
USDA Natural Resources Conservation Service Plants Database:	http://plants.usda.gov/

Field Photos



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163

S090. Inter-Mountain Basins Semi-Desert Grassland.

Southwest Regional GAP Analysis Project - Land Cover Descriptions

S093 Rocky Mountain Lower Montane Riparian Woodland and Shrubland

NLCD Class Woody Wetland

Spatial Scale / Pattern Linear

Concept Summary This system is found throughout the Rocky Mountain and Colorado Plateau regions within a broad elevation range from approximately 900 to 2800 m. This system often occurs as a mosaic of multiple communities that are tree-dominated with a diverse shrub component. This system is dependent on a natural hydrologic regime, especially annual to episodic flooding. Occurrences are found within the flood zone of rivers, on islands, sand or cobble bars, and immediate streambanks. They can form large, wide occurrences on mid-channel islands in larger rivers or narrow bands on small, rocky canyon tributaries and well-drained benches. It is also typically found in backwater channels and other perennially wet but less scoured sites, such as floodplains swales and irrigation ditches. Dominant trees may include Acer negundo, Populus angustifolia, Populus balsamifera, Populus deltoides, Populus fremontii, Pseudotsuga menziesii, Picea pungens, Salix amygdaloides, or Juniperus scopulorum. Dominant shrubs include Acer glabrum, Alnus incana, Betula occidentalis, Cornus sericea, Crataegus rivularis, Forestiera pubescens, Prunus virginiana, Rhus trilobata, Salix monticola, Salix drummondiana, Salix exigua, Salix irrorata, Salix lucida, Shepherdia argentea, or Symphoricarpos spp. Exotic trees of Elaeagnus angustifolia and Tamarix spp. are common in some stands. Generally, the upland vegetation surrounding this riparian system is different and ranges from grasslands to forests.

Range Found throughout the Rocky Mountain and Colorado Plateau regions within a broad elevation range from approximately 900 to 2800 m.

Additional Information

Southwest ReGAP Analysis Project Land Cover Datasets:	http://earth.gis.usu.edu/swgap/
NatureServe Explorer (for Ecological System and Alliance information):	http://www.natureserve.org/explorer/
USDA Natural Resources Conservation Service Plants Database:	http://plants.usda.gov/

Field Photos



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PhotoID : UT071301LL05_2.JPG

199

S093; Rocky Mountain Lower Montane Riparian Woodland and Shrubland.

Southwest Regional GAP Analysis Project - Land Cover Descriptions

D04 Invasive Southwest Riparian Woodland and Shrubland

NLCD Class Altered or Disturbed

Spatial Scale / Pattern Linear

Concept Summary Areas that are dominated by introduced riparian woody species such as: Tamarix spp. and Elaeagnus angustifolius.

Range Was mapped by SWReGAP in AZ, CO, NM, NV, and UT.

Additional Information

Southwest ReGAP Analysis Project Land Cover Datasets:	http://earth.gis.usu.edu/swgap/
NatureServe Explorer (for Ecological System and Alliance information):	http://www.natureserve.org/explorer/
USDA Natural Resources Conservation Service Plants Database:	http://plants.usda.gov/

Field Photos



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D04; Invasive Southwest Riparian Woodland and Shrubland.

Appendix IV. Land Cover Types and Locations of Acoustic Monitors in SEUG Units.

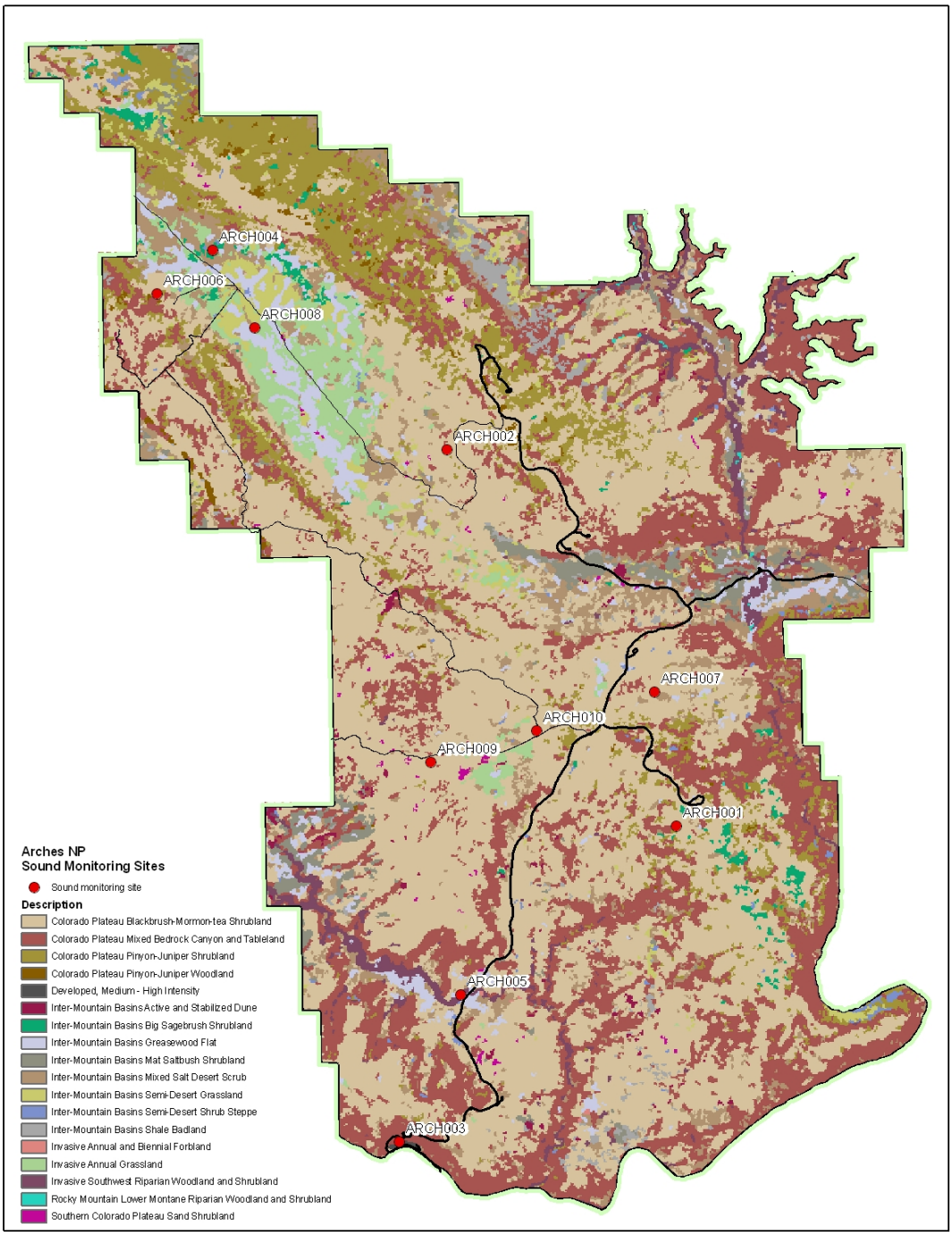


Figure IV-1. Arches National Park.

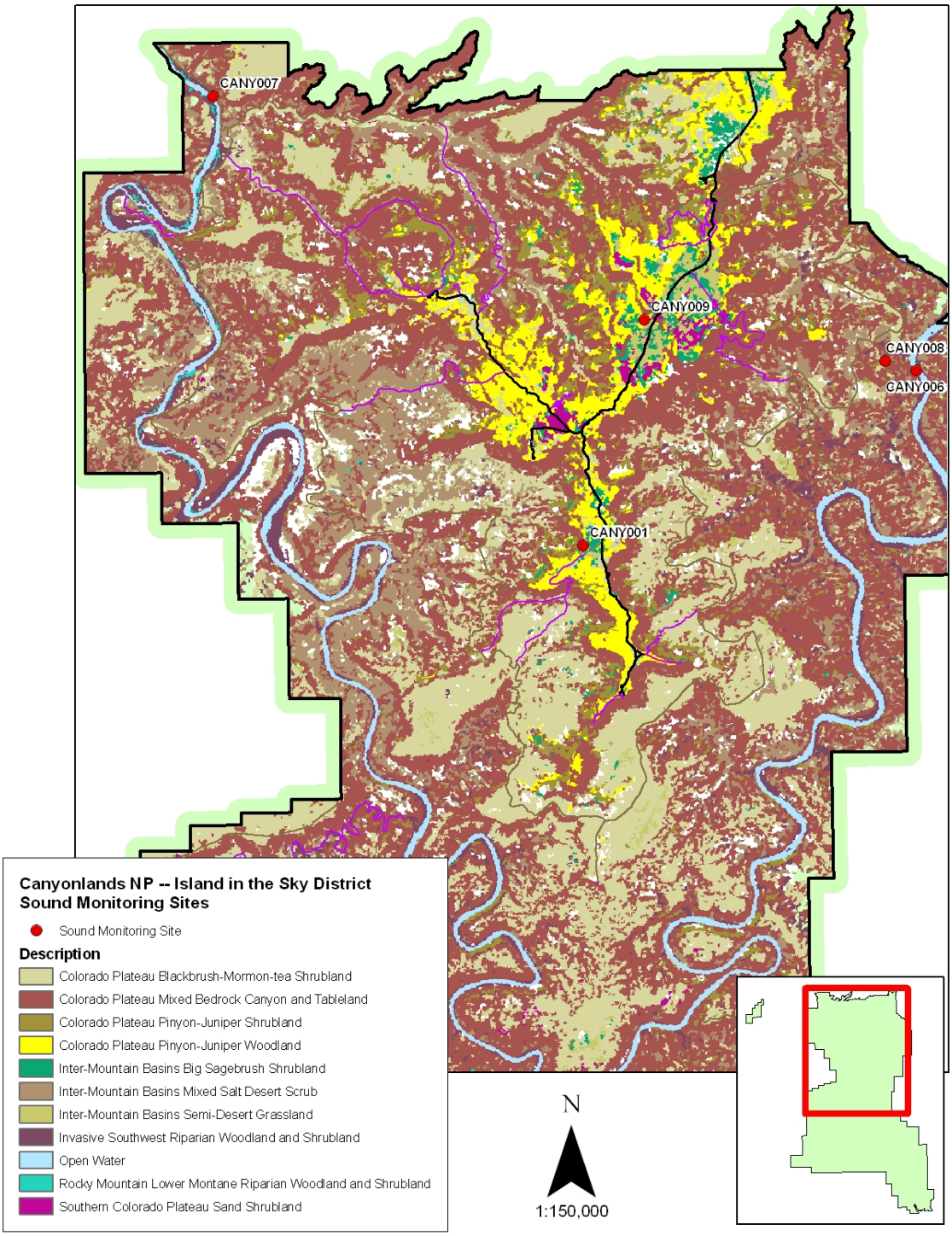


Figure IV-2. Canyonlands National Park, Island-in-the-Sky District

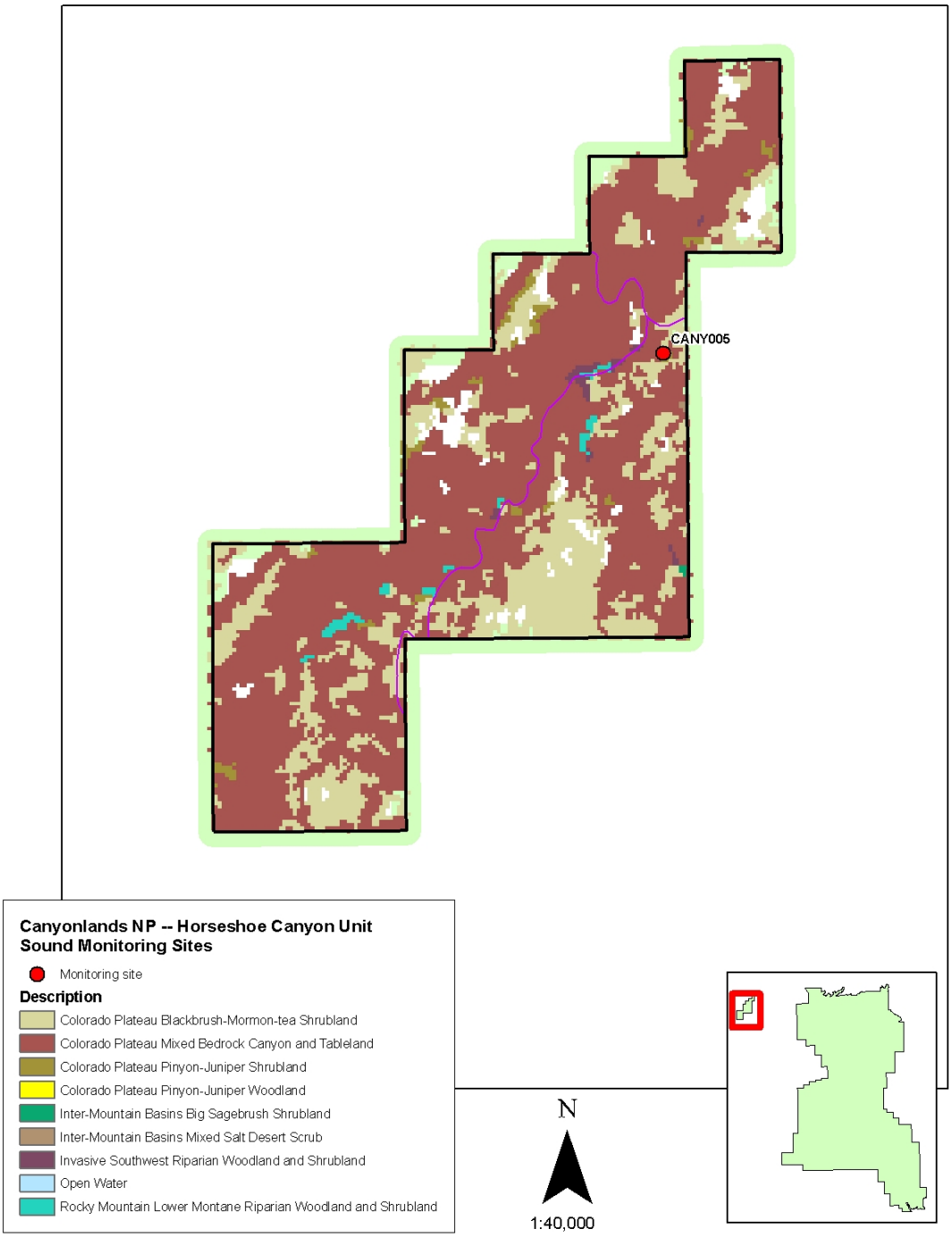


Figure IV-3. Canyonlands National Park, Maze District (Horseshoe Canyon).

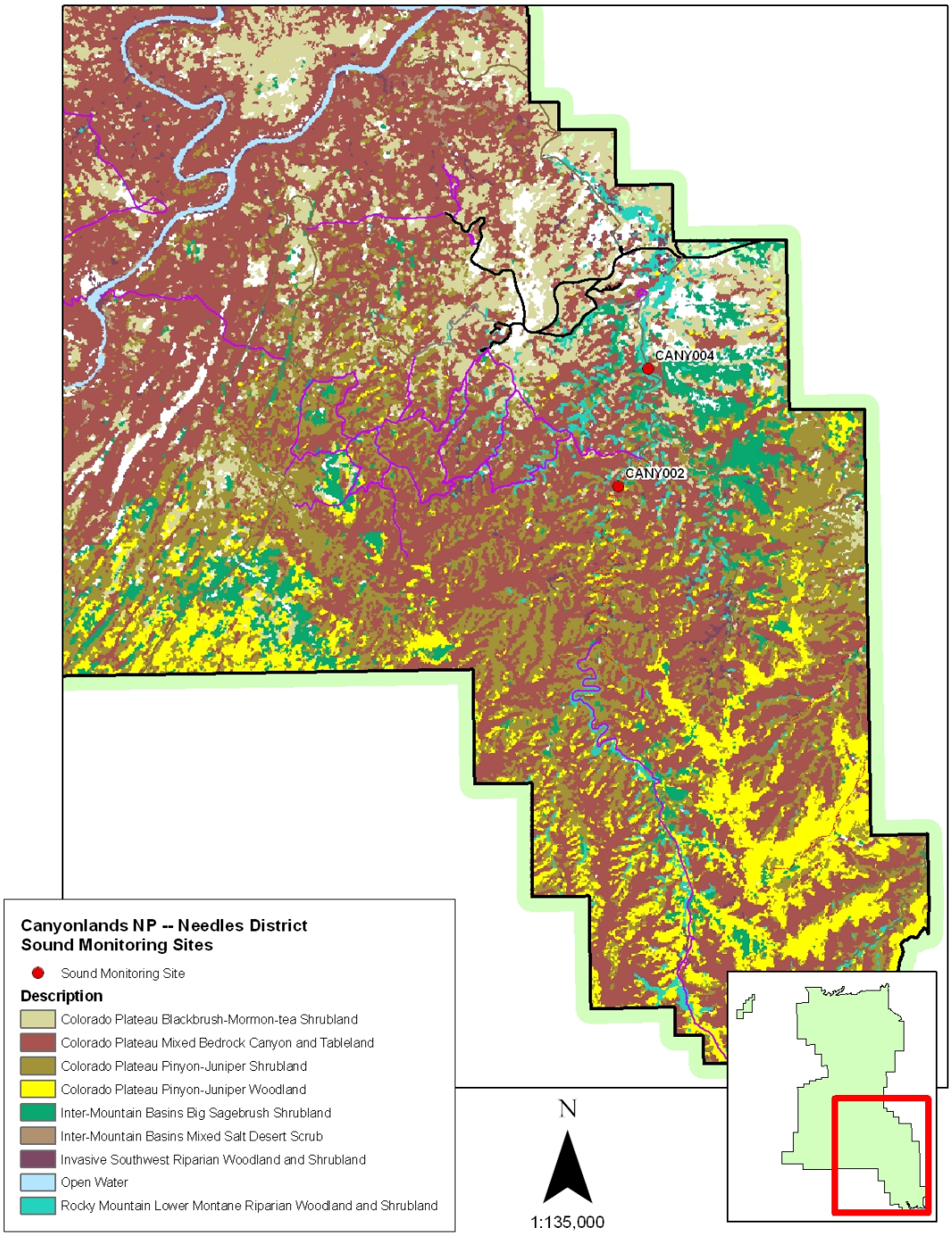


Figure IV-4. Canyonlands National Park, Needles District

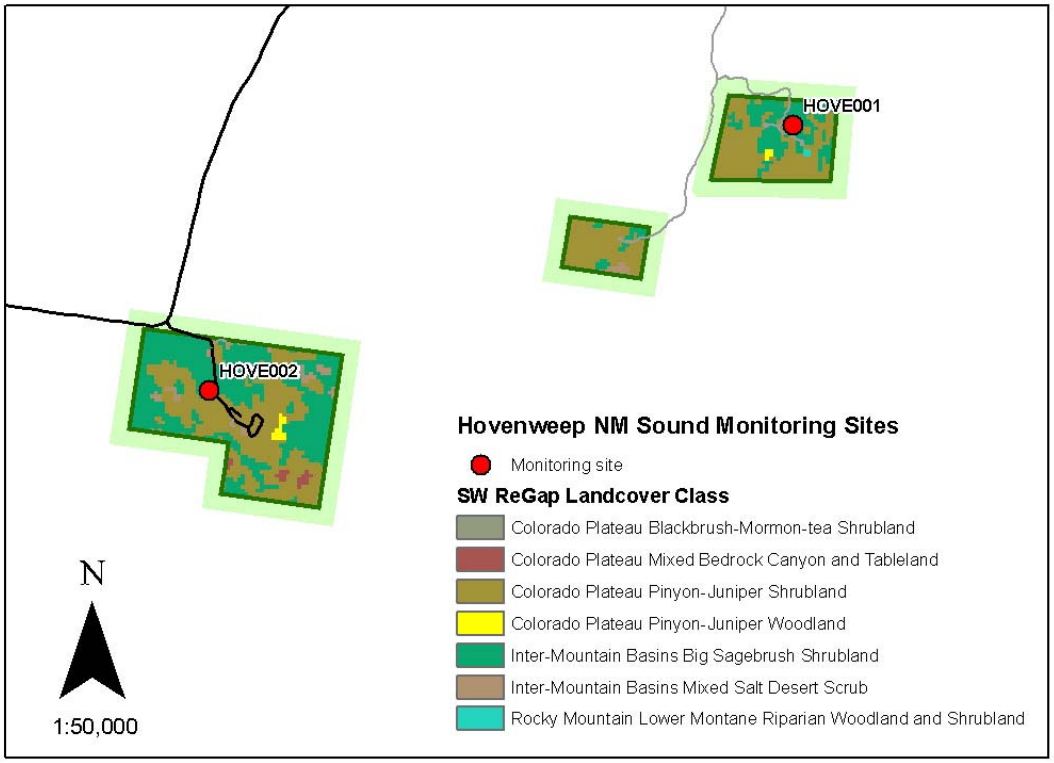


Figure IV-5. Hovenweep National Monument.

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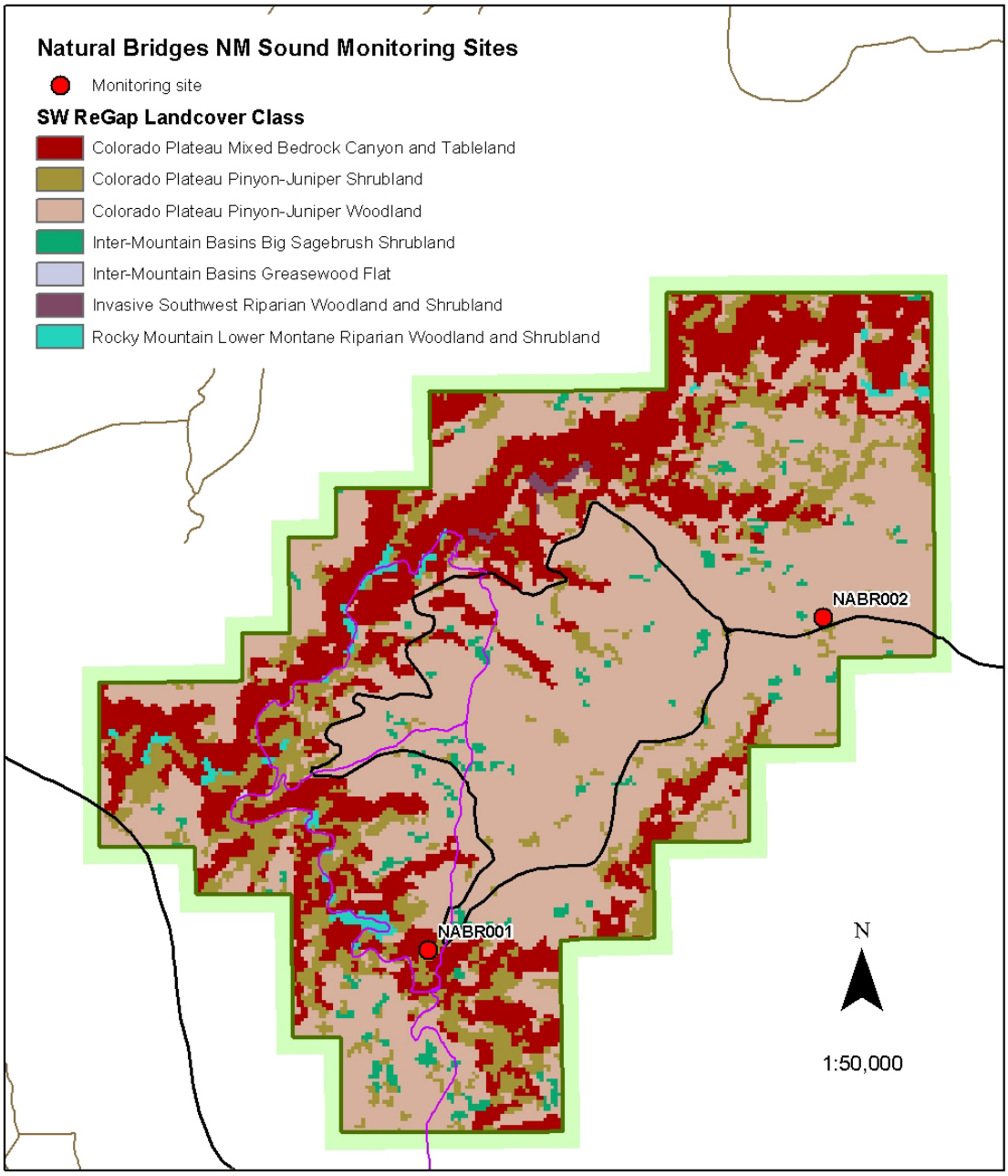


Figure IV-6. Natural Bridges National Monument.

Appendix V. Definition of Acoustic Terms (NPS 2005)

A-Weighting
See "Weighting."

Acoustics. The science of sound.

Acoustic Zones
Areas of similar vegetation, land cover, topography, climate, elevation are often referred to as "acoustic zones," with the assumption that similar animals, physical processes, and other sources of natural sounds occur in similar habitats. As a result, areas with similar attributes will likely have similar natural sound sources, sound levels, and propagation and attentuation properties. While acoustic studies in national parks will focus primarily on natural acoustic zones, some areas in parks, where non-natural sounds are common, may need study as well.

Ambient Sound Conditions
Many different soundscapes occur in national parks. In some areas, natural sounds predominate, while in others, both natural and non-natural sounds occur. In order to understand and management soundscapes, ambient conditions for different soundscapes need to be acoustically described and definitions clearly articulated. Definitions of common ambient sound conditions are provided below.

> **Existing Ambient Sound Level**
> All sounds in a given area (includes all natural sounds as well as all mechanical, electrical and other human-caused sounds).
>
> **Natural Ambient Sound Level**
> All natural sounds in a given area, excluding all non-natural sounds. "Natural ambient" is considered synonymous with the term "natural quiet," although natural ambient is more appropriate because nature is often not quiet.

Amplitude
The instantaneous magnitude of an oscillating quantity such as sound pressure. The peak amplitude is the maximum value.

Attenuation
The reduction of sound intensity by various means (e.g., air, humidity and porous materials).

Area of Audibility
The area within which a specific sound or sounds is audible.

Audibility
Audibility is the ability of animals with normal hearing, including humans, to hear a given sound. Audibility is affected by the hearing ability of the animal, other simultaneous interfering sounds or stimuli, and by the frequency content and amplitude of the sound.

Audiogram
A graph showing hearing acuity as a function of frequency and amplitude.

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Decibel
A logarithmic measure of any measured physical quantity and commonly used in the measurement of sound. The decibel provides the possibility of representing a large span of signal levels in a simple manner as opposed to using the basic unit Pascal. The difference between the sound pressure for silence versus a loud sound is a factor of 1,000,000:1 or more, therefore it is less cumbersome to use a small range of equivalent values: 0 to 130 decibels. A tenfold increase in sound power is equal to +10 dB; a tenfold increase in sound amplitude is equal to +20 dB.

Doubling of Sound Pressure = 6 dB
Doubling of Sound Power = 3 dB
Doubling of Perceived Sound Level = 10 dB (approximately)

Doppler Effect (or Shift)
The apparent upward shift in frequency of a sound as the source approaches the receiver or the apparent downward shift when the source recedes.

Energy Equivalent Sound Level (L_{eq})
The level of a constant sound over a specific time period that has the same sound energy as the actual (unsteady) sound over the same period. In park situations, L_{eq} is useful for quantifying intruding sounds because its magnitude depends heavily on the loudest periods of a time-varying sound. L_{eq} of an intruding source by itself, however, is inadequate for fully characterizing the intrusiveness of the source. Judgments of the effects of intrusions in park environments depend not only upon the amplitude of the intrusion, but also upon the sound level of the "background," in this case, the sound level of the non-intruding sources, usually the natural ambient sound levels. L_{eq} must be used carefully in quantifying natural ambient sound levels because occasional loud sound levels (gusts of wind, birds, insects) may heavily influence (increase) its value, even though the sound levels are typically lower.

Events per Hour
The number of times a non-natural sound source is heard, on average, in one hour (this may be specific to a particular human-caused sound or to all human-caused sounds). If this information is known, presentation and documentation provides another easily comprehended measure of how often the particular intruding sounds are heard. It provides an additional means for communicating the sense of the soundscape.

Frequency
The number of times per second that the sine wave of sound repeats itself. It can be expressed in cycles per second, or Hertz (Hz). Frequency equals Speed of Sound / Wavelength.

Hearing Range (human)
An average healthy young person can hear frequencies from approximately 20 Hz to 20000 Hz, and sound pressure levels from 0 dB to 130 dB or more (threshold of pain). The smallest perceptible change is 1 dB.

Human-caused Sound
Any sound that that is attributable to a human source. This term may be used interchangeably with "non-natural," "human-made," "man-caused," or "man-made" sound.

DRAFT

Infrasound
Frequencies below 20 Hz. Humans perceive frequencies below about 20 Hz as pressure rather than sound.

Intensity
The sound energy flow through a unit area in a unit time.

Loudness
The subjective judgment of intensity of a sound by humans. Loudness depends upon the sound pressure and frequency of the stimulus. Loudness was defined by Fletcher and Munson (1933) as a physiological description of the magnitude of an auditory sensation. The definition of loudness was later refined as a definition of the attribute of auditory sensation corresponding most closely to the physical measurement of sound intensity, but is not always accurate.

Masking
The process by which the threshold of audibility for a sound is raised by the presence of another (masking) sound. A masking sound is one that renders inaudible or unintelligible another sound that is also present.

Noise
Traditionally, noise has been defined as unwanted, undesired, or unpleasant sound. This makes noise a subjective term. Sounds that may be unwanted and undesired by some may be wanted and desirable by others. Sound is sound, as defined in this document: a pressure variation, etc. In order to keep terms used in soundscape management as non-subjective as possible, sounds should be classified as either appropriate or inappropriate, rather than as "noise." or "sound." The appropriateness of any sound in a given area of a park will depend on a variety of factors, including the management objectives of that area.

Noise Floor
The lowest amplitude measurable by sound monitoring equipment. Most commercially available sound level meters and microphones can detect sound levels down to about 15 to 20 dBA; however, there are microphones capable of measuring sound levels below 0 dBA.

Noise-Free Interval
The length of time during which only natural sounds are audible.

Observer Logging
Logging all sounds at a specific location, generally in conjunction with decibel measurements and continuous recording.

Octave
The interval between two frequencies having a ratio of 2 to 1. For acoustic measurements, the octaves start at 1000 Hz center frequency and go up or down from that point, at the 2:1 ratio. From 1000 Hz, the next filter's center frequency is 2000 Hz, the next is 4000 Hz, etc., or 500 Hz, 250 Hz, etc. Octave filtering is usually referred to as the class of octave filters typically 1, 3 or 12, thus creating full octaves, one-third octaves, or one-twelfth octaves.

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Octave Band
The segment of the frequency spectrum centered on an octave center frequency bounded by the midpoint between the next lower and higher octave.

Octave Band, One-Third
A frequency band whose cutoff frequencies have a ratio of 2 to the one-third (approximately 1.26). One-third octave bands reflect reasonably the ability of humans to differentiate tones.

Percent Exceedence (L_x)
These metrics are the sound levels (L), in decibels, exceeded *x* percent of the time. The L_{50} value represents the sound level exceed 50 percent of the measurement period. L_{50} is the same as the median. The L_{90} value represents the sound level exceeded 90 percent of the time during the measurement period. L_{50} and L_{90} are useful measures of the natural sounds because in park situations, away from developed areas, they are less likely to be affected by human-caused sounds. Put another way, human-caused sounds in many park areas are likely to affect the measured sound levels for less than 50% of the time, and almost certainly for less than 90% of the time. L_{50} is used when there is high probability that no human-caused sounds affect the measurements. L_{90} is used when human-produced sounds are present much of the time during measurements. Common sounds that could be present for more than 50% of the time include road traffic sounds and, in some areas, high altitude jet aircraft.

Signal-to-Noise Ratio (SNR)
The ratio between the amplitude of a signal and the amplitude of background noise. Because many signals have a very wide dynamic range, SNRs are often expressed in terms of the logarithmic decibel scale, such as ">60 dB."

Spectrum (Frequency Spectrum)
The amplitude of sound at various frequencies. It is given by a set of numbers that describe the amplitude at each frequency or band of frequencies.

Sound
A wave motion in air, water, or other media. It is the rapid oscillatory compressional changes in a medium that propagate to distant points. It is characterized by changes in density, pressure, motion, and temperature as well as other physical properties. Not all rapid changes in the medium are sound (wind distortion on a microphone diaphragm).

Soundscape
Soundscape refers to the total acoustic environment associated with a given area. In a national park setting, soundscapes can be composed primarily of natural sounds, or it can be composed of both natural and non-natural sounds.

Sound Exposure Level (SEL)
The total sound energy of an actual sound calculated for a specific time period. SEL is usually expressed using a time period of one second. This metric is useful in comparing two sounds that differ is amplitude and duration. A very long, very low level sound may have the same 1-second SEL as a very short, very loud sound.

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Sound Level
Generally, sound level refers to the *weighted* sound pressure level obtained by frequency weighting, usually A- or C-weighted.

Sound Power (W)
The total sound energy radiated by a source per unit time. The unit of measurement is the Watt.

Sound Power Level (L_W)
The acoustic power radiated from a given sound source as related to a reference power level (typically 10^{-12} watts) and expressed as decibels. A sound power level of 1 watt = 120 dB (reference level = 10^{-12} watts).

Sound Pressure
Fluctuations in air pressure caused by the presence of sound waves. Sound pressure is the instantaneous difference between the actual pressure produced by a sound wave and the average barometric pressure at a given point in space. Not all pressure fluctuations detected by a microphone are sound (e.g., wind over the microphone). Sound pressure is measured in Pascals (Pa), Newtons per square meter, which is the metric equivalent of pounds per square inch.

Sound Pressure Level (SPL)
The logarithmic form of sound pressure. In air, 20 times the logarithm (to the base 10) of the ratio of the actual sound pressure to a reference sound pressure (which is 20 micropascals, and by convention has been selected to be equal to the assumed threshold of human hearing). It is also expressed by attachment of the word decibel to the number.

Sound Speed
The speed of sound in air is about 344 m/sec (1,130 ft/sec or 770 mph) at 70^o F at sea level. It substantially varies depending on temperature and type of medium.

Time Above (A-weighted or Unweighted 1/3 OB 20-20,000 Hz)
The amount of time that sound levels from specific sound source(s) are greater than specified sound levels. The A-weighted TA is specific to human hearing; the unweighted TAA is not specific to the hearing ability of a given animal, but rather a measure of when and how long non-natural sound levels exceed natural ambient sound levels.

Time Audible
The amount of time that various sound sources are audible to animals, including humans, with normal hearing (hearing ability varies among animals). This information is essential for measuring and monitoring human-caused sound in national parks. These data can be collected by either a trained observer (attended logging) or by making high-quality digital recordings (for later playback). Percent Time Audible is useful because it is a measure that is understandable without any acoustics knowledge. It is a measure that can be specific to a given animal, and it is a metric that correlates well with park visitor judgments of annoyance and with visitor reports of interference from certain sound sources with the sounds of nature

Time Response
The response speed of the detector in a sound level meter. For Slow response, the response speed is 1 second. Slow time response is frequently used in environmental sound measurements. Fast response time is 1/8 second (0.125). Both Fast and Slow time response have been used in

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previous NPS acoustic studies, and, when compared over long measurement periods (over several days), there is very little difference in results (differences are often less than the accuracy of the meter). Fast and slow time response were developed, in part, to slow needle movement in analog meters so investigators could read and record sound levels. This added a "decay" factor in decibel data. New digital sound level meters, while changing numbers rapidly on the screen, store sound level data in memory for later analysis, thus, the ability to read numbers on the screen is less important. Hence, the most accurate acoustic data are collected without a response speed (fast or slow). For most environmental acoustic studies, data are collected at 1-second intervals (more frequent data may be needed in some studies).

Ultrasound
Sounds of a frequency higher than 20,000 Hz.

Wave
A particular type of disturbance that travels through a medium by virtue of the elastic properties of that medium.

Wavelength
Wavelength is the distance a wave travels in the time it takes to complete one cycle. A wavelength can be measured between successive peaks or between any two corresponding points on the cycle. Wavelength (ft) = Speed of Sound (ft) / Frequency (Hz).

Weighting
Adjustment of sound level data to achieve a desired measurement. A-Weighting is used to account for changes in human hearing sensitivity as a function of frequency. The A-weighting network de-emphasizes the high (6.3 kHz and above) and low (below 1 kHz) frequencies, and emphasizes the frequencies between 1 kHz and 6.3 kHz, in an effort to simulate the relative response of human hearing. C-Weighting is linear over the mid frequency range from 200 Hz to 1.6 kHz, and de-emphasizes the low (below 200 Hz) and high (above 1.6 kHz) frequencies.

Windscreen
A porous device used to cover the microphone of a sound level measurement system. Windscreens are designed to minimize the effects of wind disturbance on the sound levels being measured while minimizing the attenuation (<0.5 dB) of the signal. When using windscreens that attenuate sound levels >0.5 dB, the amount of attenuation for each one-third octave band must be known and corrections applied.

These definitions were derived from several sources, primarily:

Acoustic Alliance. 2001. Glossary of Terms, Acoustic Alliance Products and Services Catalog. Provo, UT.

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Kelso, D. and A. Perez. 1983. Sound Control Terms Made Somewhat Easier. Minnesota Pollution Control Agency, St. Paul, MN.

U. S. Environmental Protection Agency. 1976. About Sound. Environmental Protection Agency, Washington, D. C.

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Appendix VI. Acoustic Measurement Location Information and Photographs for Southeast Utah Group.

ARCH001

Park Code	ARCH
Site Number	ARCH001
Site Name	ARCH, W. of Windows
Site Description	ARCH, approximately 800 m west of Windows arches
Latitude	38.68213
Longitude	109.54365
Datum	WGS 84
Elevation (m)	1555
Slope	10 degrees
Aspect	SW
Ecological Domain (NLCD)	42 Evergreen Forest
Ecological Division (NLCD)	
NatureServe Ecological Division	304 Inter-Mountain Basins
NatureServe Land Cover Class	S039 Colorado Plateau Pinyon-Juniper Woodland
NatureServe Land Cover Subclass	
Vegetation1	Pinyon-Juniper
Vegetation1Percent	35
Vegetation2	Rock
Vegetation2Percent	35
Vegetation3	Desert Shrub
Vegetation3Percent	30
WaterDistance	NA
WaterType	NA
SiteAccess	Road (2 wheel drive), short hike (~800 m).
HumanActivityType1	Road (to Windows)
HumanActivity1Visible	No
HumanActivity1Distance	585 m to road to Windows
HumanActivityType2	Windows parking lot
HumanActivity2Visible	No
HumanActivity3Distance	780 m to Windows parking lot
ParkManagementZone	
PotentialSoundSources	Wind, birds, insects, vehicles, aircraft.
Comment	
Photograph	

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Appendix VI. Measurement Site Information, SEUG, 2001-2007 (cont.).



ARCH001

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Appendix VI. Measurement Site Information, SEUG, 2001-2007 (cont.).

ARCH002

Park Code	ARCH
Site Number	ARCH002
Site Name	ARCH, Salt Valley Road
Site Description	Salt Valley Road, 2.1 km west from main park road
Latitude	38.76112
Longitude	109.60286
Datum	WGS 84
Elevation (m)	1497
Slope	10 degrees
Aspect	NO
Ecological Domain (NLCD)	52 Shrub/Scrub
Ecological Division (NLCD)	
NatureServe Ecological Division	304 Inter-Mountain Basins
NatureServe Land Cover Class	S059 Colorado Plateau Blackbrush-Mormon-tea Shrubland
NatureServe Land Cover Subclass	
Vegetation1	Blackbrush
Vegetation1Percent	60%
Vegetation2	Rock
Vegetation2Percent	25%
Vegetation3	Pinyon-Juniper
Vegetation3Percent	15%
WaterDistance	NA
WaterType	NA
SiteAccess	Road (2 wheel drive), short hike (~150 m).
HumanActivityType1	Road (Salt Valley Road)
HumanActivity1Visible	No
HumanActivity1Distance	
HumanActivityType2	
HumanActivity2Visible	
HumanActivity3Distance	
ParkManagementZone	
PotentialSoundSources	Wind, birds, insects, vehicles, aircraft.
Comment	
Photograph	

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Appendix VI. Measurement Site Information, SEUG, 2001-2007 (cont.).



ARCH002

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Appendix VI. Measurement Site Information, SEUG, 2001-2007 (cont.).

ARCH003

Park Code	ARCH
Site Number	ARCH003
Site Name	ARCH Entrance, Visitor Center
Site Description	ARCH, 150 m SSW from Visitor Center
Latitude	38.61740
Longitude	109.61845
Datum	WGS 84
Elevation (m)	1251
Slope	20
Aspect	WE
Ecological Domain (NLCD)	33 Transitional
Ecological Division (NLCD)	
NatureServe Ecological Division	304 Inter-Mountain Basins
NatureServe Land Cover Class	S010 Colorado Plateau Mixed Bedrock Canyon and Tableland
NatureServe Land Cover Subclass	
Vegetation1	Rock
Vegetation1Percent	60%
Vegetation2	Developed
Vegetation2Percent	20%
Vegetation3	Other (P-J, low shrub, cottonwoods)
Vegetation3Percent	20%
WaterDistance	NA
WaterType	NA
SiteAccess	Road (2 wheel drive), short hike (~100 m).
HumanActivityType1	ARCH Visitor Center
HumanActivity1Visible	Yes
HumanActivity1Distance	150 m
HumanActivityType2	Highway 191 and main entrance road to ARCH
HumanActivity2Visible	Yes
HumanActivity3Distance	150 m
ParkManagementZone	
PotentialSoundSources	Vehicles, road noise, wind, birds, insects
Comment	
Photograph	

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Appendix VI. Measurement Site Information, SEUG, 2001-2007 (cont.).



ARCH003

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Appendix VI. Measurement Site Information, SEUG, 2001-2007 (cont.).

ARCH004

Park Code	ARCH
Site Number	ARCH004
Site Name	Salt Valley Road, near north entrance
Site Description	Salt Valley Road, 0.8 km south of N. Entrance, E. of road.
Latitude	38.80179
Longitude	109.67406
Datum	WGS 84
Elevation	1554
Slope	10 degrees
Aspect	SW
Ecological Domain (NLCD)	52 Shrub/Scrub
Ecological Division (NLCD)	
NatureServe Ecological Division	304 Inter-Mountain Basins
NatureServe Land Cover Class	S065 Inter-Mountain Basins Mixed Salt Desert Scrub
NatureServe Land Cover Subclass	
Vegetation1	Grass
Vegetation1Percent	70%
Vegetation2	Low-shrub
Vegetation2Percent	30%
Vegetation3	
Vegetation3Percent	
WaterDistance	NA
WaterType	NA
SiteAccess	Road (2 wheel drive), short hike (~500 m).
HumanActivityType1	Salt Valley Road
HumanActivity1Visible	Yes
HumanActivity1Distance	0.5 km
HumanActivityType2	
HumanActivity2Visible	
HumanActivity3Distance	
ParkManagementZone	
PotentialSoundSources	Wind, birds, insects, vehicles, aircraft.
Comment	
Photograph	

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Appendix VI. Measurement Site Information, SEUG, 2001-2007 (cont.).



ARCH004

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Appendix VI. Measurement Site Information, SEUG, 2001-2007 (cont.).

ARCH005

Park Code	ARCH
Site Number	ARCH005
Site Name	ARCH, Courthouse Wash, Middle
Site Description	ARCH, Courthouse Wash, 220 m upriver from bridge
Latitude	38.64778
Longitude	109.60152
Datum	WGS 84
Elevation (m)	1242
Slope	0
Aspect	NA
Ecological Domain (NLCD)	90 Woody Wetlands
Ecological Division (NLCD)	
NatureServe Ecological Division	304 Inter-Mountain Basins
NatureServe Land Cover Class	D04 Invasive Southwest Riparian Woodland and Shrubland
NatureServe Land Cover Subclass	
Vegetation1	Tamarisk
Vegetation1Percent	75%
Vegetation2	Cottonwood
Vegetation2Percent	20%
Vegetation3	Creek
Vegetation3Percent	5%
WaterDistance	NA
WaterType	NA
SiteAccess	Road (2 wheel drive), short hike (~200 m).
HumanActivityType1	Road (main park road)
HumanActivity1Visible	No
HumanActivity1Distance	220 m to road
HumanActivityType2	
HumanActivity2Visible	
HumanActivity3Distance	
ParkManagementZone	
PotentialSoundSources	Wind, water, birds, insects, vehicles, aircraft.
Comment	
Photograph	

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Appendix VI. Measurement Site Information, SEUG, 2001-2007 (cont.).



ARCH005

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Appendix VI. Measurement Site Information, SEUG, 2001-2007 (cont.).

ARCH006

Park Code	ARCH
Site Number	ARCH006
Site Name	ARCH, Klondike Bluff
Site Description	Klondike Bluff, 0.4 km NO of parking lot.
Latitude	38.79449
Longitude	109.67930
Datum	WGS 84
Elevation (m)	1577
Slope	5 degrees
Aspect	EA
Ecological Domain (NLCD)	42 Evergreen Forest
Ecological Division (NLCD)	
NatureServe Ecological Division	304 Inter-Mountain Basins
NatureServe Land Cover Class	S052 Colorado Plateau Pinyon-Juniper Shrubland
NatureServe Land Cover Subclass	
Vegetation1	Pinyon-Juniper
Vegetation1Percent	40
Vegetation2	Rock
Vegetation2Percent	40
Vegetation3	Low desert shrub (saltbush, blackbrush)
Vegetation3Percent	20
WaterDistance	NA
WaterType	NA
SiteAccess	Road (2 wheel drive), short hike (~400 m).
HumanActivityType1	Road and parking lot at Klondike Bluff
HumanActivity1Visible	No
HumanActivity1Distance	400 m
HumanActivityType2	
HumanActivity2Visible	
HumanActivity3Distance	
ParkManagementZone	
PotentialSoundSources	Wind, birds, insects, vehicles, aircraft.
Comment	
Photograph	

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Appendix VI. Measurement Site Information, SEUG, 2001-2007 (cont.).



ARCH006

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Appendix VI. Measurement Site Information, SEUG, 2001-2007 (cont.).

ARCH007

Park Code	ARCH
Site Number	ARCH007
Site Name	ARCH, near Panorama Point
Site Description	ARCH, 1.1 km SE of Panaroma Point overlook
Latitude	38.71014
Longitude	109.54893
Datum	WGS 84
Elevation (m)	1461
Slope	10 degrees
Aspect	SW
Ecological Domain (NLCD)	52 Shrub/Scrub
Ecological Division (NLCD)	
NatureServe Ecological Division	304 Inter-Mountain Basins
NatureServe Land Cover Class	S065 Inter-Mountain Basins Mixed Salt Desert Scrub
NatureServe Land Cover Subclass	
Vegetation1	Blackbrush
Vegetation1Percent	60%
Vegetation2	Pinyon-Juniper
Vegetation2Percent	20%
Vegetation3	Rock
Vegetation3Percent	20%
WaterDistance	NA
WaterType	NA
SiteAccess	Road (2 wheel drive), short hike (~1100 m).
HumanActivityType1	Main park road
HumanActivity1Visible	No
HumanActivity1Distance	1000 m
HumanActivityType2	
HumanActivity2Visible	
HumanActivity3Distance	
ParkManagementZone	
PotentialSoundSources	Wind, birds, insects, vehicles, aircraft.
Comment	
Photograph	

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Appendix VI. Measurement Site Information, SEUG, 2001-2007 (cont.).



ARCH007

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Appendix VI. Measurement Site Information, SEUG, 2001-2007 (cont.).

ARCH008

Park Code	ARCH
Site Number	ARCH008
Site Name	ARCH, Salt Valley Road near north entrance
Site Description	Salt Valley Road, 4.0 km south of N. Entrance, W. of road
Latitude	38.78146
Longitude	109.64905
Datum	WGS 84
Elevation (m)	1499
Slope	0
Aspect	NA
Ecological Domain (NLCD)	52 Shrub/Scrub
Ecological Division (NLCD)	
NatureServe Ecological Division	304 Inter-Mountain Basins
NatureServe Land Cover Class	D08 Invasive Annual Grassland
NatureServe Land Cover Subclass	
Vegetation1	Grass
Vegetation1Percent	60%
Vegetation2	Blackbrush, Mormon Tea
Vegetation2Percent	40%
Vegetation3	
Vegetation3Percent	
WaterDistance	NA
WaterType	NA
SiteAccess	Road (2 wheel drive), short hike (~500 m).
HumanActivityType1	Road (Salt Valley Road)
HumanActivity1Visible	Yes
HumanActivity1Distance	500 m
HumanActivityType2	
HumanActivity2Visible	
HumanActivity3Distance	
ParkManagementZone	
PotentialSoundSources	Wind, birds, insects, vehicles, aircraft.
Comment	
Photograph	

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Appendix VI. Measurement Site Information, SEUG, 2001-2007 (cont.).



ARCH008

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Appendix VI. Measurement Site Information, SEUG, 2001-2007 (cont.).

ARCH009

Park Code	ARCH
Site Number	ARCH009
Site Name	ARCH, Willow Flats Road, west
Site Description	ARCH, Willow Flats Road, 4.1 km from main park road
Latitude	38.69622
Longitude	109.60854
Datum	WGS 84
Elevation (m)	1476
Slope	0
Aspect	NA
Ecological Domain (NLCD)	52 Shrub/Scrub
Ecological Division (NLCD)	
NatureServe Ecological Division	304 Inter-Mountain Basins
NatureServe Land Cover Class	S059 Colorado Plateau Blackbrush-Mormon-tea Shrubland
NatureServe Land Cover Subclass	
Vegetation1	Blackbrush, Mormon Tea
Vegetation1Percent	85%
Vegetation2	Pinyon-Juniper
Vegetation2Percent	15%
Vegetation3	
Vegetation3Percent	
WaterDistance	NA
WaterType	NA
SiteAccess	Road (2 wheel drive), short hike (~150 m).
HumanActivityType1	Road (Willow Flats Road)
HumanActivity1Visible	Yes
HumanActivity1Distance	150 m
HumanActivityType2	
HumanActivity2Visible	
HumanActivity3Distance	
ParkManagementZone	
PotentialSoundSources	Wind, birds, insects, vehicles, aircraft.
Comment	
Photograph	

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Appendix VI. Measurement Site Information, SEUG, 2001-2007 (cont.).



ARCH009

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Appendix VI. Measurement Site Information, SEUG, 2001-2007 (cont.).

ARCH010

Park Code	ARCH
Site Number	ARCH010
Site Name	ARCH, Willow Flats Road, east end
Site Description	ARCH, Willow Flats Road, 1.2 km from main park road
Latitude	38.70245
Longitude	109.58040
Datum	WGS 84
Elevation (m)	1476
Slope	0
Aspect	NA
Ecological Domain (NLCD)	52 Shrub/Scrub
Ecological Division (NLCD)	
NatureServe Ecological Division	304 Inter-Mountain Basins
NatureServe Land Cover Class	S059 Colorado Plateau Blackbrush-Mormon-tea Shrubland
NatureServe Land Cover Subclass	
Vegetation1	Blackbrush, Mormon Tea
Vegetation1Percent	85%
Vegetation2	Pinyon-Juniper
Vegetation2Percent	15%
Vegetation3	
Vegetation3Percent	
WaterDistance	NA
WaterType	NA
SiteAccess	Road (2 wheel drive), short hike (~100 m).
HumanActivityType1	Road (Willow Flats Road)
HumanActivity1Visible	Yes
HumanActivity1Distance	100 m
HumanActivityType2	
HumanActivity2Visible	
HumanActivity3Distance	
ParkManagementZone	
PotentialSoundSources	Wind, birds, insects, vehicles, aircraft.
Comment	
Photograph	

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Appendix VI. Measurement Site Information, SEUG, 2001-2007 (cont.).



ARCH010

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Appendix VI. Measurement Site Information, SEUG, 2001-2007 (cont.).

CANY001

Park Code	CANY
Site Number	CANY001
Site Name	CANY, ISKY; Murphy Point Trailhead
Site Description	300 m east of Murphy Point Trailhead parkling lot.
Latitude	38.35400
Longitude	109.87024
Datum	WGS 84
Elevation (m)	1882
Slope	5 degrees
Aspect	N
Ecological Domain (NLCD)	42 Evergreen Forest
Ecological Division (NLCD)	
NatureServe Ecological Division	304 Inter-Mountain Basins
NatureServe Land Cover Class	S039 Colorado Plateau Pinyon-Juniper Woodland
NatureServe Land Cover Subclass	
Vegetation1	Pinyon-Juniper
Vegetation1Percent	65
Vegetation2	Low Shrub
Vegetation2Percent	20
Vegetation3	Rock
Vegetation3Percent	15
WaterDistance	NA
WaterType	NA
SiteAccess	Road (2 wheel drive), short hike (~300 m).
HumanActivityType1	Trailhead and parking
HumanActivity1Visible	No
HumanActivity1Distance	300 m
HumanActivityType2	Road to Grand View Point
HumanActivity2Visible	No
HumanActivity3Distance	600 m
ParkManagementZone	
PotentialSoundSources	Wind, birds, insects, vehicles, aircraft.
Comment	
Photograph	

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Appendix VI. Measurement Site Information, SEUG, 2001-2007 (cont.).



CANY001

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Appendix VI. Measurement Site Information, SEUG, 2001-2007 (cont.).

CANY002

Park Code	CANY
Site Number	CANY002
Site Name	CANY, Needles, Salt Creek, middle
Site Description	Needles, Salt Creek, about 1.6 km upriver from Peekaboo Spring
Latitude	38.10756
Longitude	109.76190
Datum	WGS 84
Elevation (m)	1562
Slope	0
Aspect	NA
Ecological Domain (NLCD)	90 Woody Wetlands
Ecological Division (NLCD)	
NatureServe Ecological Division	304 Inter-Mountain Basins
NatureServe Land Cover Class	S093 Rocky Mtn Lower Montane Riparian Woodland -Shrubland
NatureServe Land Cover Subclass	
Vegetation1	Rock
Vegetation1Percent	40%
Vegetation2	Sagebrush
Vegetation2Percent	30%
Vegetation3	Riparian (Cottonwood)
Vegetation3Percent	30%
WaterDistance	35 m
WaterType	Salt Creek
SiteAccess	Needles, to Peekaboo Spring (4 x 4), hike 1.6 km up creek/trail.
HumanActivityType1	Trail
HumanActivity1Visible	No
HumanActivity1Distance	35 m
HumanActivityType2	
HumanActivity2Visible	
HumanActivity3Distance	
ParkManagementZone	
PotentialSoundSources	Wind, birds, insects, water, aircraft.
Comment	
Photograph	

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Appendix VI. Measurement Site Information, SEUG, 2001-2007 (cont.).



CANY002

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Appendix VI. Measurement Site Information, SEUG, 2001-2007 (cont.).

CANY003

Park Code	CANY
Site Number	CANY003
Site Name	CANY, ISKY; South of Murphy Point Trailhead
Site Description	300 m south of Murphy Point Trailhead turn off.
Latitude	38.35400
Longitude	109.87024
Datum	WGS 84
Elevation (m)	1882
Slope	5-10 degrees
Aspect	No
Ecological Domain (NLCD)	42 Evergreen Forest
Ecological Division (NLCD)	
Land Cover Class (NatureServe)	304 Inter-Mountain Basins
Land Cover Subclass (NatureServe)	S039 Colorado Plateau Pinyon-Juniper Woodland
Vegetation1	Pinyon-Juniper
Vegetation1Percent	50
Vegetation2	Low Shrub
Vegetation2Percent	20
Vegetation3	Rock
Vegetation3Percent	30
WaterDistance	NA
WaterType	NA
SiteAccess	Road (2 wheel drive), short hike (~300 m).
HumanActivityType1	Road to Grand View Point
HumanActivity1Visible	No
HumanActivity1Distance	600 m
HumanActivityType2	
HumanActivity2Visible	
HumanActivity3Distance	
ParkManagementZone	
PotentialSoundSources	Wind, birds, insects, vehicles, aircraft.
Comment	
Photograph	

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Appendix VI. Measurement Site Information, SEUG, 2001-2007 (cont.).



CANY003

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Appendix VI. Measurement Site Information, SEUG, 2001-2007 (cont.).

CANY004

Park Code	CANY
Site Number	CANY004
Site Name	CANY, Needles District, Salt Creek
Site Description	East side of Salt Creek, 1.5 km south of gate
Latitude	38.13765
Longitude	109.75185
Datum	WGS 84
Elevation (m)	1648
Slope	5-10 degrees
Aspect	N
Ecological Domain (NLCD)	90 Woody Wetlands
Ecological Division (NLCD)	
Land Cover Class (NatureServe)	304 Inter-Mountain Basins
Land Cover Subclass (NatureServe)	S093 Rocky Mtn Lower Montane Riparian Woodland-Shrubland
Vegetation1	Deciduous trees
Vegetation1Percent	50
Vegetation2	Sagebrush
Vegetation2Percent	30
Vegetation3	Rock
Vegetation3Percent	20
WaterDistance (m)	30
WaterType	Salt Creek, perennial creek
SiteAccess	Road (2 wheel drive), short hike (~300 m).
HumanActivityType1	Trail, hiking and four-wheel drive
HumanActivity1Visible	No
HumanActivity1Distance (m)	30
HumanActivityType2	Trailhead, parking lot
HumanActivity2Visible	No
HumanActivity3Distance (m)	1500
ParkManagementZone	
PotentialSoundSources	Wind, sater, birds, insects, vehicles, aircraft.
Comment	
Photograph	

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Appendix VI. Measurement Site Information, SEUG, 2001-2007 (cont.).



CANY004

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Appendix VI. Measurement Site Information, SEUG, 2001-2007 (cont.).

CANY005

Park Code	CANY
Site Number	CANY005
Site Name	Moonshine Canyon, Horseshoe Canyon
Site Description	
Latitude	38.46283
Longitude	110.19186
Datum	WGS 84
Elevation (m)	1377
Slope	10-15 degrees
Aspect	N
Ecological Domain (NLCD)	90 Woody Wetlands
Ecological Division (NLCD)	
Land Cover Class (NatureServe)	304 Inter-Mountain Basins
Land Cover Subclass (NatureServe)	S093 Rocky Mtn Lower Montane Riparian Woodland-Shrubland
Vegetation1	Rock
Vegetation1Percent	60
Vegetation2	Riparian (Box Elder, Fremont Barberry, Cottonwood)
Vegetation2Percent	30
Vegetation3	Desert Scrub
Vegetation3Percent	10
WaterDistance (m)	20
WaterType	spring, small creek
SiteAccess	Hike from Horseshoe Canyon parking lot.
HumanActivityType1	Trail
HumanActivity1Visible	No
HumanActivity1Distance (m)	250
HumanActivityType2	
HumanActivity2Visible	
HumanActivity3Distance	
ParkManagementZone	
PotentialSoundSources	Wind, water (spring) birds, insects, aircraft.
Comment	
Photograph	

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Appendix VI. Measurement Site Information, SEUG, 2001-2007 (cont.).



CANY005

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Appendix VI. Measurement Site Information, SEUG, 2001-2007 (cont.).

CANY006

Park Code	CANY
Site Number	CANY006
Site Name	Colorado River, junction with Little Bridge Canyon
Site Description	Colorado R., n. side, .8 km downriver Little Bridge Canyon
Latitude	38.40309
Longitude	109.74768
Datum	WGS 84
Elevation (m)	1197
Slope	15
Aspect	SE
Ecological Domain (NLCD)	90 Woody Wetlands
Ecological Division (NLCD)	
Land Cover Class (NatureServe)	304 Inter-Mountain Basins
Land Cover Subclass (NatureServe)	D04 Invasive Southwest Riparian Woodland and Shrubland
Vegetation1	Invasive Riparian (Tamerisk)
Vegetation1Percent	25%
Vegetation2	Water (Colorado River)
Vegetation2Percent	25%
Vegetation3	Rock
Vegetation3Percent	50%
WaterDistance (m)	10
WaterType	Colorado River
SiteAccess	Boat from Potash;
HumanActivityType1	River traffic
HumanActivity1Visible	Yes
HumanActivity1Distance (m)	50
HumanActivityType2	
HumanActivity2Visible	
HumanActivity3Distance	
ParkManagementZone	
PotentialSoundSources	Wind, water (river sounds, boat wake) birds, insects, aircraft.
Comment	
Photograph	

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Appendix VI. Measurement Site Information, SEUG, 2001-2007 (cont.).



CANY006

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Appendix VI. Measurement Site Information, SEUG, 2001-2007 (cont.).

CANY007

Park Code	CANY
Site Number	CANY007
Site Name	Green River near Taylor Canyon
Site Description	Green River, e. side, 1.1 km n. Upheaval Btm., Labyrinth Camp
Latitude	38.48458
Longitude	110.00367
Datum	WGS 84
Elevation (m)	1198
Slope	0
Aspect	NA
Ecological Domain (NLCD)	90 Woody Wetlands
Ecological Division (NLCD)	
Land Cover Class (NatureServe)	304 Inter-Mountain Basins
Land Cover Subclass (NatureServe)	D04 Invasive Southwest Riparian Woodland and Shrubland
Vegetation1	Invasive Riparian (Tamerisk, Napweed) and grass
Vegetation1Percent	40%
Vegetation2	Water (Green River)
Vegetation2Percent	40%
Vegetation3	Rock
Vegetation3Percent	20%
WaterDistance (m)	10
WaterType	Green River
SiteAccess	White Rim Trail, from Mineral bottom, 4 x 4 and short hike
HumanActivityType1	River traffic
HumanActivity1Visible	Yes
HumanActivity1Distance (m)	50
HumanActivityType2	Traffic on White Rim Trail
HumanActivity2Visible	No
HumanActivity3Distance	120
ParkManagementZone	
PotentialSoundSources	Wind, water (river sounds, boat wake) birds, insects, aircraft.
Comment	
Photograph	

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Appendix VI. Measurement Site Information, SEUG, 2001-2007 (cont.).



CANY007

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Appendix VI. Measurement Site Information, SEUG, 2001-2007 (cont.).

CANY008

Park Code	CANY
Site Number	CANY008
Site Name	Little Bridge Canyon
Site Description	1.5 km up East Fork of Little Bridge Canyon
Latitude	38.40589
Longitude	109.75890
Datum	WGS 84
Elevation (m)	1217
Slope	0
Aspect	NA
Ecological Domain (NLCD)	90 Woody Wetlands
Ecological Division (NLCD)	
Land Cover Class (NatureServe)	304 Inter-Mountain Basins
Land Cover Subclass (NatureServe)	S093 Rocky Mtn Lower Montane Riparian Woodland -Shrubland
Vegetation1	Rock
Vegetation1Percent	70%
Vegetation2	Riparian Woodland
Vegetation2Percent	20%
Vegetation3	Grass (Ricegrass)
Vegetation3Percent	10%
WaterDistance (m)	1.5 km
WaterType	Colorado River
SiteAccess	Boat to Little Bridge Canyon, hike right fork Little Bridge Canyon
HumanActivityType1	
HumanActivity1Visible	
HumanActivity1Distance (m)	
HumanActivityType2	
HumanActivity2Visible	
HumanActivity3Distance	
ParkManagementZone	
PotentialSoundSources	Wind, birds, insects, aircraft.
Comment	
Photograph	

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Appendix VI. Measurement Site Information, SEUG, 2001-2007 (cont.).



CANY008

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Appendix VI. Measurement Site Information, SEUG, 2001-2007 (cont.).

CANY009

Park Code	CANY
Site Number	CANY009
Site Name	ISKY Grays Pasture
Site Description	CANY ISKY, 1.6 km w. Lathrop Trailhead, 350 m N. of road
Latitude	38.41869
Longitude	109.84685
Datum	WGS 84
Elevation (m)	1831
Slope	0
Aspect	NA
Ecological Domain (NLCD)	52 Shrub/Scrub
Ecological Division (NLCD)	
Land Cover Class (NatureServe)	304 Inter-Mountain Basins
Land Cover Subclass (NatureServe)	S090 Inter-Mountain Basins Semi-Desert Grasslands
Vegetation1	Grassland (grass, Mormon Tea)
Vegetation1Percent	70%
Vegetation2	Pinyon-Juniper
Vegetation2Percent	20%
Vegetation3	Rock
Vegetation3Percent	10%
WaterDistance (m)	
WaterType	
SiteAccess	Drive to ISKY, 350 m hike
HumanActivityType1	ISKY road
HumanActivity1Visible	No
HumanActivity1Distance (m)	350
HumanActivityType2	
HumanActivity2Visible	
HumanActivity3Distance	
ParkManagementZone	
PotentialSoundSources	Wind, vehicles, birds, insects, aircraft.
Comment	
Photograph	

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Appendix VI. Measurement Site Information, SEUG, 2001-2007 (cont.).



CANY009

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Appendix VI. Measurement Site Information, SEUG, 2001-2007 (cont.).

HOVE001

Park Code	HOVE
Site Number	HOVE001
Site Name	HOVE, Hackberry Unit, upland
Site Description	300 m north of Hackberry Spring
Latitude	37.40956
Longitude	109.02615
Datum	WGS 84
Elevation	2004 m
Slope (degrees)	5
Aspect	S
Ecological Domain (NLCD)	42 Evergreen Forest
Ecological Division (NLCD)	
Land Cover Class (NatureServe)	304 Inter-Mountain Basins
Land Cover Subclass (NatureServe)	S052 Colorado Plateau Pinyon-Juniper Shrubland
Vegetation1	Juniper
Vegetation1Percent	70
Vegetation2	Sagebrush/low shrub
Vegetation2Percent	30
Vegetation3	
Vegetation3Percent	
WaterDistance	300 m
WaterType	Hackberry Spring
SiteAccess	Road (4 wheel drive), short hike
HumanActivityType1	Trai/four-wheel drive road.
HumanActivity1Visible	Yes
HumanActivity1Distance (m)	150
HumanActivityType2	
HumanActivity2Visible	
HumanActivity3Distance	
ParkManagementZone	
PotentialSoundSources	Wind, building, vehicles, aircraft, birds, insects.
Comment	
Photograph	

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Appendix VI. Measurement Site Information, SEUG, 2001-2007 (cont.).



HOVE001

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Appendix VI. Measurement Site Information, SEUG, 2001-2007 (cont.).

HOVE002

Park Code	HOVE
Site Number	HOVE002
Site Name	HOVE Visitor Center
Site Description	25 m SE of HOVE Visitor Center
Latitude	37.38524
Longitude	109.07532
Datum	WGS 84
Elevation (m)	1909
Slope (degrees)	5
Aspect	SE
Ecological Domain (NLCD)	52 Shrub/Scrub
Ecological Division (NLCD)	
Land Cover Class (NatureServe)	304 Inter-Mountain Basins
Land Cover Subclass (NatureServe)	S054 Inter-Mountain Basins Big Sagebrush Shrubland
Vegetation1	Sagebrush, low shrub
Vegetation1Percent	80
Vegetation2	Utah Juniper
Vegetation2Percent	20
Vegetation3	
Vegetation3Percent	
WaterDistance	
WaterType	
SiteAccess	Road (2 wheel drive)
HumanActivityType1	Visitor Center, parking lot
HumanActivity1Visible	Yes
HumanActivity1Distance (m)	30
HumanActivityType2	Road
HumanActivity2Visible	Yes
HumanActivity3Distance	75
ParkManagementZone	
PotentialSoundSources	Wind, building, vehicles, aircraft, birds, insects.
Comment	
Photograph	

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Appendix VI. Measurement Site Information, SEUG, 2001-2007 (cont.).



HOVE002

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Appendix VI. Measurement Site Information, SEUG, 2001-2007 (cont.).

NABR001

Park Code	NABR
Site Number	NABR001
Site Name	NABR, Owachomoa Bridge
Site Description	North of Owachomo Bridge
Latitude	37.58471
Longitude	110.01530
Datum	WGS 84
Elevation (m)	2201
Slope (degrees)	15
Aspect	W
Ecological Domain (NLCD)	42 Evergreen Forest
Ecological Division (NLCD)	
Land Cover Class (NatureServe)	304 Inter-Mountain Basins
Land Cover Subclass (NatureServe)	S010 Colorado Plateau Mixed Bedrock Canyon and Tableland
Vegetation1	Pinyon-Juniper
Vegetation1Percent	40
Vegetation2	Rock
Vegetation2Percent	50
Vegetation3	Low Shrub
Vegetation3Percent	10
WaterDistance	225 m
WaterType	
SiteAccess	Road (2 wheel drive), short hike (~300 m).
HumanActivityType1	NABR loop road
HumanActivity1Visible	No
HumanActivity1Distance	600 m
HumanActivityType2	
HumanActivity2Visible	
HumanActivity3Distance	
ParkManagementZone	
PotentialSoundSources	Wind, birds, insects, vehicles, aircraft.
Comment	
Photograph	

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Appendix VI. Measurement Site Information, SEUG, 2001-2007 (cont.).



NABR001

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Appendix VI. Measurement Site Information, SEUG, 2001-2007 (cont.).

NABR002

Park Code	NABR
Site Number	NABR002
Site Name	NABR Visitor Center
Site Description	25 m N. NABR Visitor Center
Latitude	37.60954
Longitude	109.97731
Datum	WGS 84
Elevation	2363 m
Slope	0
Aspect	NA
Ecological Domain (NLCD)	42 Evergreen Forest
Ecological Division (NLCD)	
Land Cover Class (NatureServe)	304 Inter-Mountain Basins
Land Cover Subclass (NatureServe)	S039 Colorado Plateau Pinyon-Juniper Woodland
Vegetation1	Pinyon-Juniper
Vegetation1Percent	70
Vegetation2	Sagebrush
Vegetation2Percent	30
Vegetation3	
Vegetation3Percent	
WaterDistance	
WaterType	
SiteAccess	Road (2 wheel drive)
HumanActivityType1	Visitor Center, parking lot
HumanActivity1Visible	Yes
HumanActivity1Distance	25 m
HumanActivityType2	Road
HumanActivity2Visible	Yes
HumanActivity3Distance	75 m
ParkManagementZone	
PotentialSoundSources	Wind, building, vehicles, aircraft, birds, insects.
Comment	
Photograph	

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Appendix VI. Measurement Site Information, SEUG, 2001-2007 (cont.).



NABR002

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Appendix VII. Acoustic Metrics for Primary Measurement Locations, Southeast Utah Group, 2001-2007.

Table VII-1. Acoustic metrics (dBA) for Arches National Park, Windows Area (ARCH001), summer 2002-2003 (n=8084).

Hour of Day	Num. Hours	L_{min}	L_{max}	L_{eq} L. Mean	L_{eq} A. Mean	L_{eq} Median	L_{10} Median	L_{50} Median	L_{90} Median	L_{nat} Median
0	338	19.5	74.2	33.4	27.0	25.6	26.3	23.5	22.4	23.1
1	337	19.4	73.7	32.9	26.8	25.3	26.0	23.7	22.4	23.3
2	336	19.5	70.0	32.5	27.0	25.0	25.8	23.4	22.3	23.2
3	337	19.4	73.3	32.4	27.2	25.8	26.5	23.6	22.4	23.6
4	337	19.5	97.4	39.2	26.4	24.6	25.6	23.2	22.2	23.1
5	337	19.6	69.3	32.2	25.7	23.6	24.1	22.4	21.9	22.3
6	337	19.6	83.5	36.5	26.0	23.8	23.6	22.1	21.9	22.0
7	335	19.7	91.0	38.7	27.8	25.9	26.1	22.4	22.0	22.2
8	334	19.4	77.0	38.3	29.5	28.1	28.9	23.0	22.3	22.4
9	334	20.0	82.2	39.4	31.8	30.6	32.3	24.0	22.5	22.8
10	336	20.1	78.0	38.7	32.7	31.9	33.9	24.8	22.7	23.0
11	338	19.6	82.9	40.5	32.1	30.6	32.1	23.9	22.5	22.9
12	337	19.9	80.1	43.4	32.3	30.6	31.8	24.0	22.5	23.0
13	336	20.1	97.1	45.9	32.9	31.4	32.5	24.5	22.5	23.5
14	337	20.1	96.3	43.9	33.5	31.6	33.0	25.1	22.6	24.0
15	337	20.1	86.3	42.4	33.4	31.5	33.1	24.9	22.6	23.9
16	336	20.0	93.5	45.8	33.6	31.4	33.2	24.8	22.5	23.9
17	337	19.9	81.2	42.6	32.5	30.5	32.2	24.4	22.3	23.3
18	338	19.9	82.4	41.5	31.6	29.7	30.9	24.1	22.3	23.0
19	338	19.6	91.2	39.9	30.1	27.9	29.2	23.2	22.2	22.7
20	338	19.7	89.9	40.4	30.6	29.0	30.9	23.9	22.2	22.7
21	338	19.7	70.4	36.3	30.0	28.6	30.2	24.8	22.8	23.8
22	338	19.7	93.4	42.7	29.4	27.6	29.1	24.7	22.8	23.7
23	338	19.5	76.4	34.6	27.6	25.9	27.0	23.7	22.7	23.5

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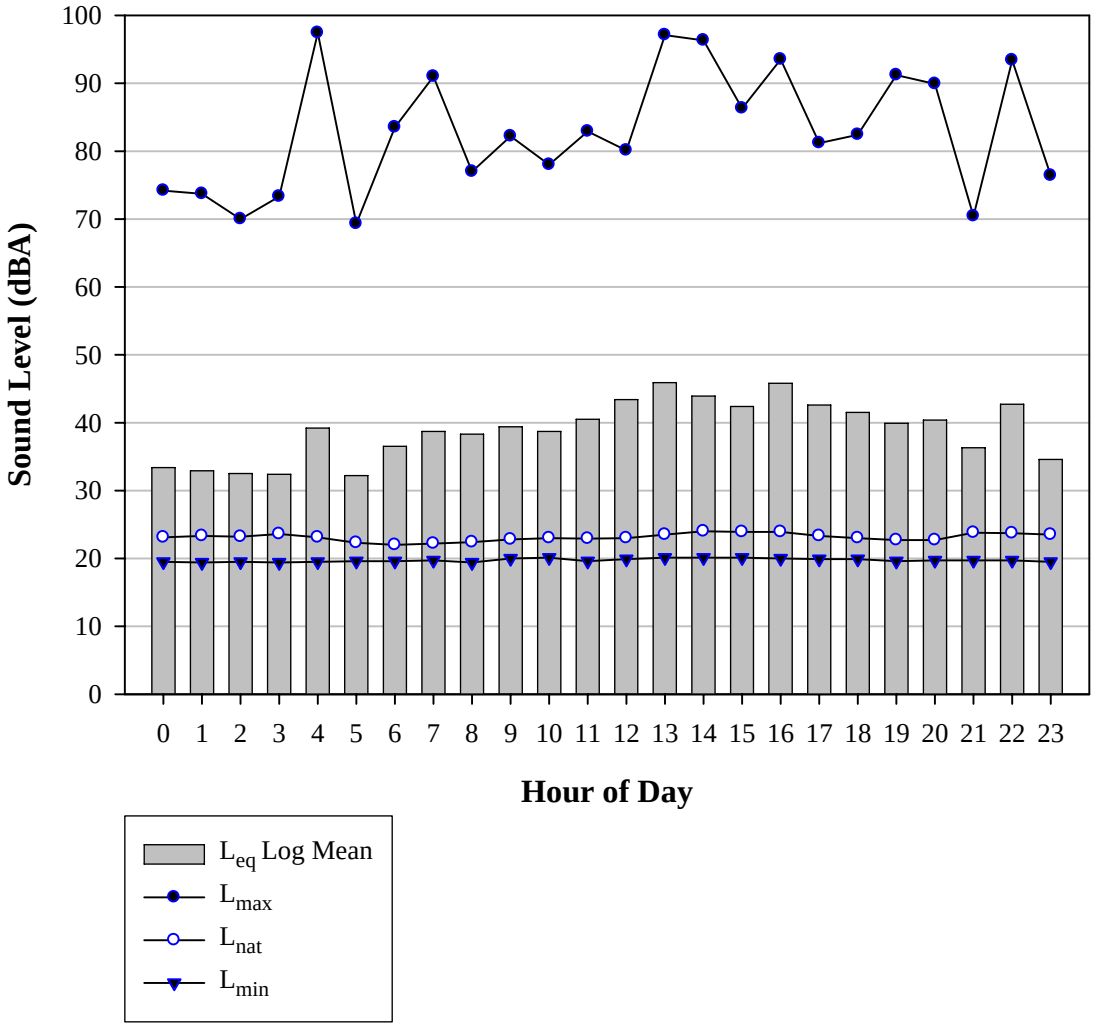


Figure VII-1. Acoustic metrics (dBA) for Arches National Park, Windows Area (ARCH001), summer 2002-2003 (n=8084).

Table VII-2. Acoustic metrics (dBA) for Arches National Park, Windows Area (ARCH001), winter 2002-2003 (n=3585).

Hour of Day	Num. Hours	L_{min}	L_{max}	L_{eq} L. Mean	L_{eq} A. Mean	L_{eq} Median	L_{10} Median	L_{50} Median	L_{90} Median	L_{nat} Median
0	150	19.4	69.7	31.3	24.4	22.8	22.4	21.7	21.6	21.6
1	150	19.5	73.8	31.8	24.1	22.4	22.1	21.7	21.6	21.6
2	150	19.5	72.7	32.6	23.7	22.3	22.0	21.6	21.6	21.6
3	150	19.5	68.2	30.2	24.1	22.6	22.2	21.7	21.6	21.6
4	150	19.6	68.6	29.6	23.2	21.9	22.1	21.7	21.6	21.6
5	150	19.6	70.3	29.6	23.7	22.1	22.2	21.7	21.6	21.6
6	150	19.7	68.8	29.5	24.2	22.5	22.7	21.8	21.6	21.7
7	150	19.8	66.4	31.6	26.4	24.9	25.0	22.3	21.8	21.8
8	150	19.8	69.1	32.0	28.5	27.1	27.4	23.0	22.1	22.1
9	149	20.2	68.6	33.9	30.6	29.9	32.7	23.8	22.3	22.2
10	149	20.3	73.3	36.5	32.1	31.7	33.7	24.4	22.5	22.6
11	146	20.2	75.6	37.0	31.7	31.2	33.0	24.1	22.4	22.4
12	147	20.1	93.4	42.9	31.2	30.7	32.4	23.5	22.1	22.2
13	147	20.0	73.6	36.7	30.7	29.6	31.0	23.2	22.1	22.2
14	149	19.8	80.7	37.8	31.1	30.3	32.2	23.0	21.9	22.1
15	149	19.9	69.3	35.8	31.2	30.9	32.7	23.0	21.9	22.0
16	149	20.1	70.1	35.8	30.9	30.2	31.6	22.8	21.8	21.9
17	150	19.8	72.8	35.5	29.4	27.7	30.1	22.6	21.7	21.8
18	150	19.7	68.1	33.5	29.6	29.2	31.4	22.6	21.8	21.8
19	150	19.7	66.9	32.0	28.0	26.7	27.8	22.0	21.7	21.8
20	150	19.6	67.3	32.5	29.3	28.8	31.0	22.3	21.7	21.7
21	150	19.6	61.8	29.9	27.4	26.7	27.5	22.0	21.7	21.7
22	150	19.9	61.7	29.0	26.7	25.7	27.4	22.0	21.6	21.7
23	150	19.6	66.7	29.2	25.4	24.3	23.9	21.7	21.6	21.7

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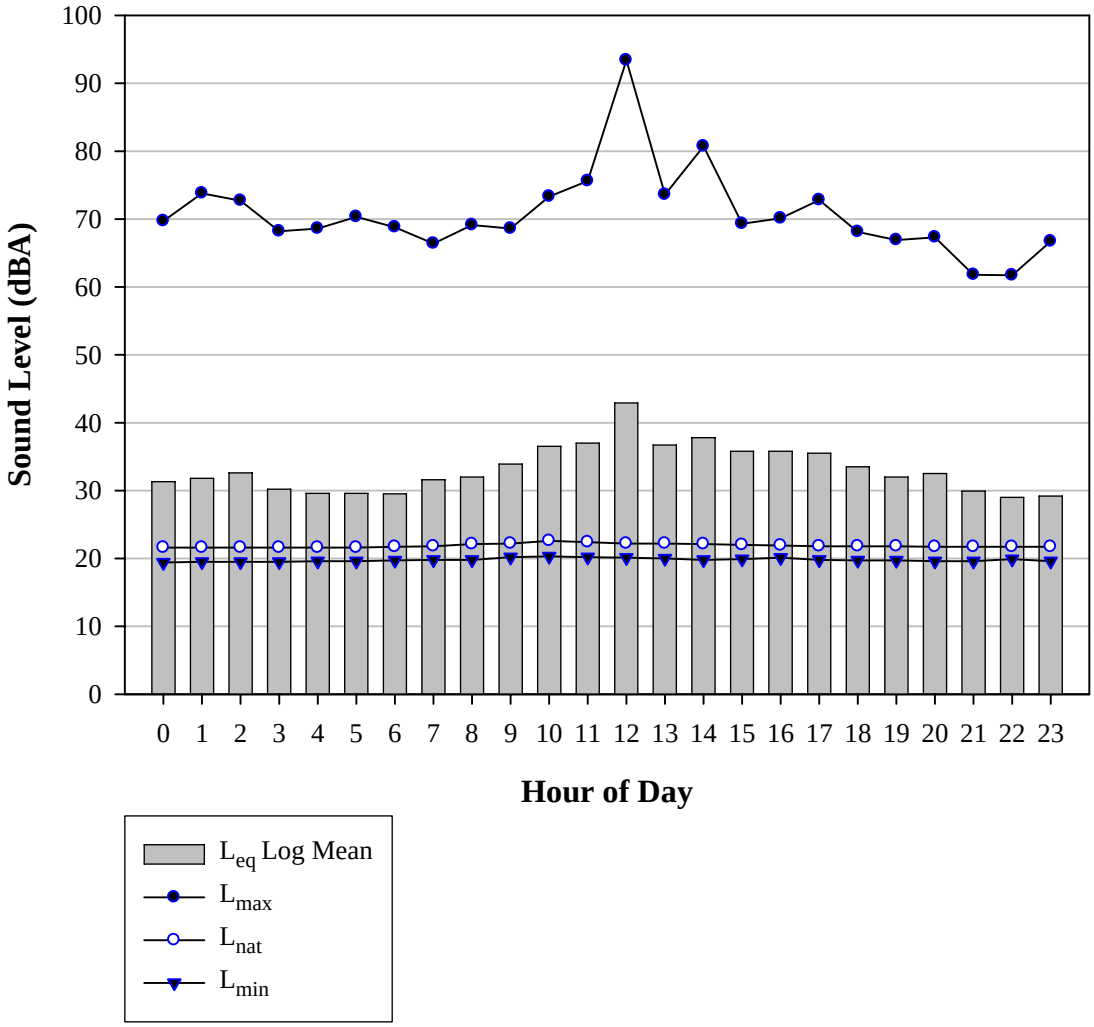


Figure VII-2. Acoustic metrics (dBA) for Arches National Park, Windows Area (ARCH001), winter 2002-2003 (n=3585).

Table VII-3. Acoustic metrics (dBA and un-weighted one-third octave bands 12.5-20k Hz) for all hours, ARCH, Windows Area (ARCH001), summer 2002-2003.

dBA/Freq	Num. Hours	L_{min}	L_{max}	L_{eq} L. Mean	L_{eq} Median	L_{10} Median	L_{50} Median	L_{90} Median	L_{nat} Median
dBA	8084	19.4	97.4	40.7	28.2	29.8	23.8	22.4	23.0
12.5	8084	1.9	99.0	62.6	49.1	52.0	38.5	30.1	35.1
15.8	8084	2.4	98.8	61.1	46.4	49.0	36.3	28.7	33.3
20	8084	3.2	99.4	59.4	43.6	45.7	34.7	27.5	31.9
25	8084	1.1	93.9	57.6	40.8	43.0	33.2	26.2	30.5
31.5	8084	-0.1	93.8	55.4	38.4	41.1	31.9	24.8	29.1
40	8084	-0.9	94.7	52.9	36.5	39.4	30.3	23.2	27.5
50	8084	-2.6	92.3	50.2	35.2	38.2	29.1	21.8	26.3
63	8084	-1.2	92.3	47.6	34.0	36.9	27.9	21.0	25.2
80	8084	-2.6	93.6	45.3	32.6	35.1	26.1	19.6	23.5
100	8084	-4.8	93.0	43.6	30.5	32.7	22.9	16.4	20.2
125	8084	-5.9	89.5	42.1	29.5	31.2	19.5	12.8	16.7
160	8084	-7.0	90.9	40.7	28.5	29.9	16.3	9.2	13.3
200	8084	-8.9	91.7	39.1	26.3	28.0	14.1	6.5	10.8
250	8084	-7.6	90.9	37.3	24.0	25.4	12.1	4.8	8.7
315	8084	-11.6	92.0	35.8	22.4	23.0	9.9	3.9	7.2
400	8084	-3.9	92.1	34.4	20.4	20.5	8.3	3.4	6.0
500	8084	-3.3	90.8	33.0	17.2	17.2	6.7	2.9	4.9
630	8084	-2.9	90.2	31.5	12.9	13.7	5.2	2.5	4.0
800	8084	-2.1	89.3	30.2	9.6	10.8	4.7	2.7	3.9
1000	8084	-1.4	88.0	28.7	7.4	8.2	4.0	2.7	3.4
1250	8084	-0.5	86.6	27.1	6.3	6.7	3.9	3.1	3.5
1600	8084	0.5	85.3	25.3	5.9	6.1	4.4	3.9	4.2
2000	8084	1.0	82.6	23.6	6.1	6.5	5.3	4.8	5.1
2500	8084	1.3	79.9	21.9	6.7	6.6	5.9	5.5	5.8
3150	8084	1.5	77.8	21.0	7.4	7.3	6.7	6.2	6.5
4000	8084	3.1	75.0	20.8	9.0	8.9	7.7	7.3	7.5
5000	8084	3.7	83.1	22.3	10.0	9.9	8.7	8.4	8.6
6300	8084	4.4	90.1	24.9	10.1	10.1	9.6	9.4	9.5
8000	8084	5.1	91.6	25.6	11.0	11.2	10.9	10.7	10.8
10000	8084	5.9	97.1	30.6	12.3	12.4	12.0	11.8	11.9
12500	8084	6.6	84.2	21.1	13.7	13.7	13.3	13.1	13.3
16000	8084	7.7	82.2	20.6	14.7	14.8	14.5	14.3	14.4
20000	8084	7.6	75.1	19.6	15.9	16.1	15.8	15.6	15.7

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Table VII-4. Acoustic metrics (dBA and un-weighted one-third octave bands 12.5-20k Hz) for all hours, Arches National Park, Windows Area (ARCH001), winter 2002-2003.

dBA/Freq	Num. Hours	L_{min}	L_{max}	L_{eq} L. Mean	L_{eq} Median	L_{10} Median	L_{50} Median	L_{90} Median	L_{nat} Median
dBA	3585	19.4	93.4	34.8	26.7	27.9	22.3	21.7	21.8
12.5	3585	10.6	94.7	57.0	40.2	43.1	36.4	31.0	32.3
15.8	3585	9.9	93.4	55.2	38.8	41.8	35.6	30.8	32.0
20	3585	7.8	92.1	53.3	37.8	40.7	34.9	30.3	31.5
25	3585	7.4	91.5	51.3	36.1	39.3	33.0	28.2	29.4
31.5	3585	6.4	90.3	48.9	34.9	38.2	31.3	26.5	27.7
40	3585	4.8	87.5	46.3	33.9	37.3	29.8	24.6	25.8
50	3585	2.5	86.4	43.8	33.1	36.6	28.4	22.9	24.1
63	3585	1.2	87.5	41.6	32.5	36.1	27.7	21.9	23.2
80	3585	-3.1	88.0	40.0	31.5	34.7	26.6	20.8	22.2
100	3585	-7.1	84.5	38.1	29.6	32.5	22.3	16.3	17.6
125	3585	-4.0	87.1	37.0	29.3	31.3	19.0	13.1	14.4
160	3585	-5.1	85.0	35.9	28.7	30.2	15.4	9.1	10.6
200	3585	-12.9	84.9	34.2	27.0	28.5	13.2	6.9	8.3
250	3585	-5.4	82.9	32.4	24.3	25.3	11.8	5.7	7.0
315	3585	-6.8	83.8	30.8	22.8	22.6	10.0	4.7	5.9
400	3585	-3.7	83.3	29.4	20.4	19.0	7.1	3.1	4.0
500	3585	-3.0	85.5	27.4	16.0	14.4	4.4	1.8	2.3
630	3585	-2.6	85.5	25.3	10.4	9.5	2.7	1.3	1.6
800	3585	-2.1	88.2	24.7	5.7	5.7	2.3	1.5	1.6
1000	3585	-1.2	86.2	23.3	3.7	3.9	2.8	2.2	2.4
1250	3585	-0.3	84.4	21.7	3.8	4.2	3.6	3.1	3.3
1600	3585	0.7	82.8	19.9	4.7	5.4	4.5	3.9	4.1
2000	3585	1.7	80.0	17.6	5.5	6.2	5.3	4.8	4.9
2500	3585	2.5	76.9	15.4	5.9	6.3	5.9	5.5	5.6
3150	3585	3.4	72.4	13.7	6.6	6.9	6.5	6.2	6.3
4000	3585	4.7	67.6	12.7	7.3	7.6	7.3	7.0	7.1
5000	3585	5.8	61.2	11.9	8.2	8.4	8.1	7.9	8.0
6300	3585	6.8	59.6	11.9	9.1	9.3	9.0	8.9	8.9
8000	3585	7.9	65.6	12.7	10.4	10.5	10.4	10.2	10.2
10000	3585	8.9	60.9	12.9	11.6	11.8	11.6	11.5	11.5
12500	3585	9.8	56.0	13.9	13.2	13.4	13.2	13.1	13.1
16000	3585	10.8	59.1	15.1	14.7	14.8	14.7	14.6	14.6
20000	3585	12.5	60.3	16.2	15.9	16.0	15.9	15.8	15.8

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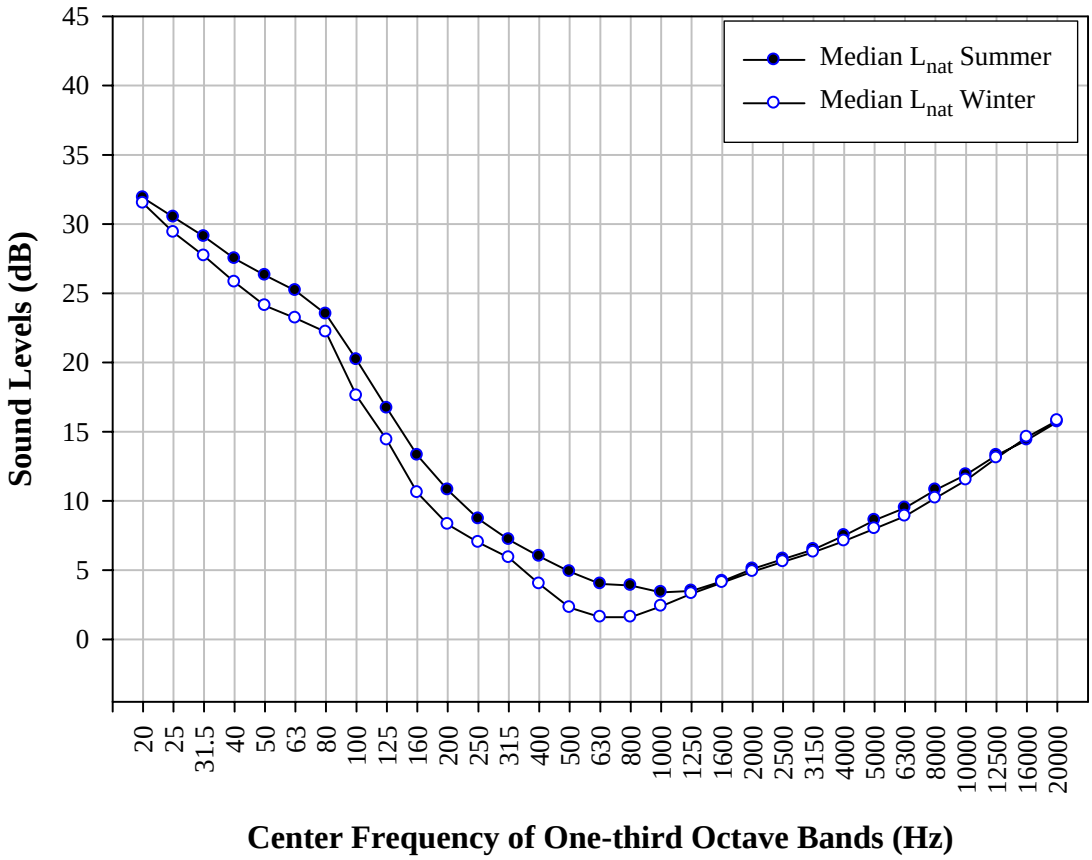


Figure VII-3. L_{nat} for one-third octave bands (20-20k Hz, un-weighted) for all hours, Arches National Park, Windows Area (ARCH001), summer and winter 2002-2003.

Table VII-5. Acoustic metrics (dBA) for Arches National Park, Salt Valley Road (ARCH002), summer 2002 (n=3934).

Hour of Day	Num. Hours	L_{min}	L_{max}	L_{eq} L. Mean	L_{eq} A. Mean	L_{eq} Median	L_{10} Median	L_{50} Median	L_{90} Median	L_{nat} Median
0	165	21.0	66.9	31.8	27.8	26.5	27.7	24.5	22.8	24.2
1	165	21.1	65.6	31.8	27.5	25.6	26.3	23.9	22.7	23.7
2	163	21.8	78.3	33.8	28.0	26.1	27.4	24.0	22.8	23.8
3	164	21.8	87.3	36.3	28.2	26.5	26.4	24.1	22.7	23.8
4	164	21.7	80.0	33.4	26.5	24.6	25.2	23.2	22.6	23.1
5	163	21.8	96.2	45.9	25.4	23.6	24.0	22.8	22.4	22.8
6	163	21.7	82.7	37.3	25.9	23.7	23.6	22.6	22.4	22.5
7	164	21.7	80.0	32.3	28.0	26.8	26.3	23.1	22.6	22.8
8	163	21.8	75.9	36.4	29.7	28.6	29.6	24.1	23.0	23.5
9	162	21.8	97.3	49.1	32.3	30.9	32.3	24.8	23.1	23.7
10	163	21.8	78.1	39.8	32.8	31.5	33.7	25.2	23.1	23.6
11	164	21.8	79.0	41.3	32.0	31.0	31.8	24.1	22.8	23.1
12	164	21.9	80.3	41.3	32.5	31.3	32.3	24.1	22.8	23.3
13	165	21.9	99.8	54.3	33.8	32.2	32.8	24.6	22.8	23.6
14	163	22.0	83.7	43.0	34.4	33.1	34.0	25.3	22.9	24.3
15	163	21.9	88.0	42.4	34.5	33.3	34.7	25.5	22.9	24.7
16	164	21.9	84.7	43.9	34.1	33.0	33.9	25.1	22.9	24.8
17	164	21.2	97.6	46.5	33.3	31.9	32.9	24.8	22.8	24.0
18	164	21.1	75.9	40.7	33.0	31.8	32.7	24.5	22.8	23.4
19	165	21.1	81.3	37.8	30.0	28.0	28.9	23.3	22.6	23.0
20	165	21.1	74.4	38.9	30.0	28.4	29.5	23.1	22.5	22.8
21	165	21.1	103.7	50.2	30.3	28.2	30.0	24.5	22.7	23.5
22	164	21.1	87.2	42.8	30.0	28.0	29.9	25.1	23.1	24.3
23	165	21.1	80.8	34.8	28.5	27.0	28.3	25.1	23.0	24.8

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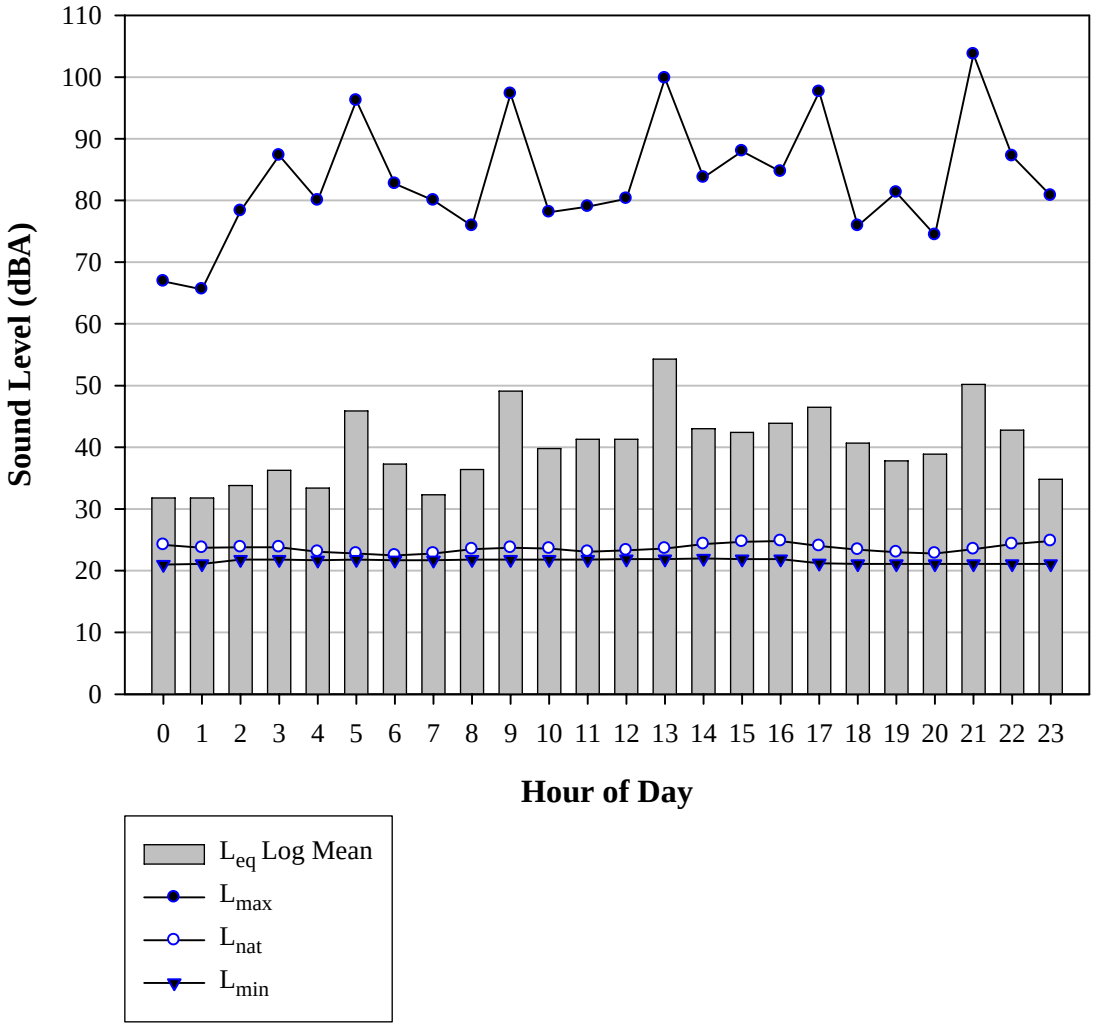


Figure VII-4. Acoustic metrics (dBA) for Arches National Park, Salt Valley Road (ARCH002), summer 2002 (n=3934).

Table VII-6. Acoustic metrics (dBA) for Arches National Park, Salt Valley Road (ARCH002), winter 2002 (n=3298).

Hour of Day	Num. Hours	L_{min}	L_{max}	L_{eq} L. Mean	L_{eq} A. Mean	L_{eq} Median	L_{10} Median	L_{50} Median	L_{90} Median	L_{nat} Median
0	138	16.8	58.0	24.4	20.7	18.9	18.5	17.5	17.2	17.3
1	138	16.8	57.6	23.7	19.9	18.1	18.5	17.4	17.2	17.3
2	136	16.8	57.4	25.0	20.3	18.9	18.1	17.4	17.2	17.2
3	138	16.8	60.0	25.9	21.3	19.8	18.9	17.5	17.2	17.3
4	137	16.8	54.8	22.7	19.5	18.2	18.6	17.6	17.3	17.4
5	138	16.8	57.5	22.3	19.9	18.6	18.9	17.8	17.4	17.5
6	138	16.7	55.8	23.3	20.7	19.4	19.6	18.2	17.5	17.7
7	138	16.7	65.0	27.7	24.5	23.4	22.0	18.6	17.8	17.8
8	138	16.8	61.7	29.1	26.8	26.1	26.6	19.6	18.2	18.2
9	136	16.9	69.9	32.2	30.0	29.7	31.7	21.5	19.2	19.2
10	135	16.9	63.2	33.0	31.3	31.5	33.1	22.3	19.3	19.4
11	137	16.9	81.6	34.2	30.8	30.5	31.6	21.8	18.9	19.2
12	137	16.8	67.9	32.7	29.6	29.1	31.4	20.8	18.3	18.8
13	138	16.8	66.9	33.3	31.4	31.3	31.7	20.3	18.0	18.3
14	138	16.8	69.6	33.0	29.6	29.1	30.6	20.0	17.8	18.2
15	138	16.8	67.2	32.5	29.8	29.8	30.6	20.0	17.7	17.8
16	138	16.7	62.5	32.1	29.6	29.5	30.4	19.1	17.6	17.6
17	137	16.7	63.4	31.8	28.6	28.2	29.5	18.6	17.4	17.5
18	137	16.7	65.1	32.1	29.7	30.1	32.1	19.0	17.4	17.5
19	137	16.8	62.6	31.6	26.7	26.0	25.4	17.9	17.3	17.4
20	137	16.8	62.4	31.5	27.6	27.2	28.9	18.2	17.3	17.4
21	138	16.8	59.6	29.0	25.4	24.9	25.6	17.9	17.3	17.5
22	138	16.8	57.2	27.2	25.0	24.5	24.8	17.9	17.3	17.5
23	138	16.8	54.5	25.9	22.7	22.4	20.5	17.7	17.3	17.4

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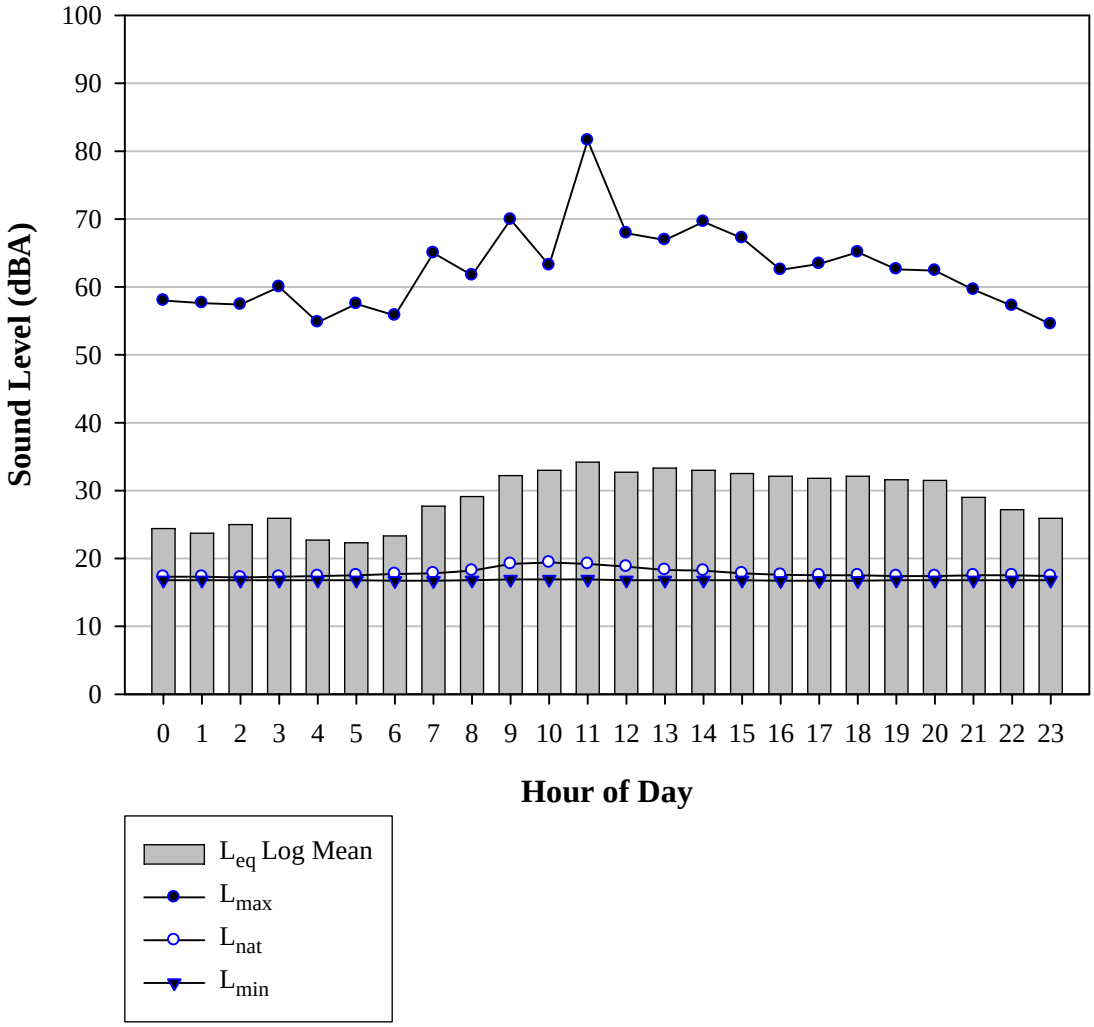


Figure VII-5. Acoustic metrics (dBA) for Arches National Park, Salt Valley Road (ARCH002), winter 2002 (n=3298).

Table VII-7. Acoustic metrics (dBA and un-weighted one-third octave bands 12.5-20k Hz) for all hours, Arches National Park, Salt Valley Road (ARCH002), summer 2002.

dBA/Freq	Num. Hours	L_{min}	L_{max}	L_{eq} L. Mean	L_{eq} Median	L_{10} Median	L_{50} Median	L_{90} Median	L_{nat} Median
dBA	3934	21.0	103.7	44.7	28.9	30.1	24.1	22.8	23.5
12.5	3934	-0.1	98.2	63.6	49.7	51.3	36.4	28.2	33.5
15.8	3934	3.5	94.9	62.0	46.8	47.5	34.2	26.5	31.5
20	3934	2.8	94.7	60.4	43.5	43.9	32.8	25.5	30.3
25	3934	3.3	93.9	58.5	40.2	41.5	31.7	24.1	29.2
31.5	3934	0.5	94.6	56.1	37.8	40.1	30.6	22.8	28.0
40	3934	0.0	93.6	53.4	36.1	38.9	29.3	21.1	26.4
50	3934	-1.3	91.2	50.5	34.8	37.6	27.7	19.6	24.9
63	3934	-1.4	93.5	47.5	33.9	36.2	26.5	18.7	24.1
80	3934	-1.6	91.6	45.0	33.3	34.6	24.7	17.3	22.3
100	3934	-2.6	92.9	43.1	31.3	32.2	21.2	13.7	18.6
125	3934	-5.1	92.0	42.3	30.5	31.0	17.7	10.4	15.1
160	3934	-5.4	94.8	41.5	29.3	29.7	14.5	7.4	11.9
200	3934	-4.8	96.3	40.0	26.5	27.2	12.8	5.9	10.2
250	3934	-4.7	96.0	39.1	24.6	24.4	11.4	4.8	8.6
315	3934	-4.8	96.3	37.8	22.9	22.4	9.6	4.0	7.1
400	3934	-1.8	95.0	36.6	20.5	19.7	8.0	3.6	5.9
500	3934	-0.6	95.7	35.1	17.3	16.8	6.6	3.6	5.2
630	3934	-0.6	96.2	34.2	13.2	14.0	5.6	3.3	4.6
800	3934	0.1	94.9	32.9	10.3	11.5	5.2	3.4	4.5
1000	3934	0.9	95.0	31.8	8.0	9.3	4.9	3.6	4.4
1250	3934	1.8	94.1	30.2	6.7	7.7	4.9	4.0	4.6
1600	3934	2.6	93.3	29.1	6.3	7.1	5.1	4.4	4.9
2000	3934	3.4	92.1	27.6	6.4	7.1	5.6	5.1	5.5
2500	3934	4.1	91.1	26.1	6.8	7.4	6.3	5.8	6.1
3150	3934	5.1	88.3	24.1	7.5	7.9	7.0	6.6	6.9
4000	3934	6.0	86.4	24.3	8.9	9.5	8.2	7.8	8.1
5000	3934	7.0	84.1	28.0	9.8	10.2	9.3	8.8	9.1
6300	3934	8.1	90.7	32.1	10.0	10.3	9.8	9.5	9.7
8000	3934	9.6	94.1	34.8	11.3	11.6	11.1	10.8	11.0
10000	3934	10.9	99.2	39.9	12.7	12.9	12.5	12.3	12.4
12500	3934	12.3	95.7	36.2	14.2	14.4	14.0	13.8	13.9
16000	3934	14.1	88.9	30.2	15.9	16.1	15.7	15.5	15.6
20000	3934	15.2	86.6	29.4	17.1	17.3	16.9	16.7	16.9

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Table VII-8. Acoustic metrics (dBA and un-weighted one-third octave bands 12.5-20k Hz) for all hours, Arches National Park, Salt Valley Road (ARCH002), winter 2002.

dBA/Freq	Num. Hours	L_{min}	L_{max}	L_{eq} L. Mean	L_{eq} Median	L_{10} Median	L_{50} Median	L_{90} Median	L_{nat} Median
dBA	3298	16.7	81.6	30.4	25.9	26.4	18.5	17.5	17.6
12.5	3298	7.5	92.7	53.7	37.5	39.8	34.1	29.4	30.6
15.8	3298	8.9	91.7	51.4	36.5	39.0	33.8	29.5	30.6
20	3298	6.9	87.5	48.9	35.7	38.4	33.1	28.8	29.9
25	3298	4.2	87.2	46.1	34.6	37.6	31.5	27.0	28.1
31.5	3298	-11.6	83.9	43.1	33.9	37.2	30.3	25.7	26.7
40	3298	0.9	82.7	40.0	33.3	36.7	29.1	24.4	25.4
50	3298	2.4	79.6	37.3	32.2	35.7	27.2	22.1	23.2
63	3298	0.6	82.5	35.8	31.2	34.7	25.9	20.6	21.7
80	3298	-4.6	83.6	35.5	30.5	33.7	25.5	19.9	21.2
100	3298	-14.4	81.6	34.5	28.7	31.2	20.6	14.8	16.0
125	3298	-7.4	84.6	34.4	29.1	29.8	16.1	10.3	11.5
160	3298	-6.3	79.9	32.7	28.9	28.7	13.0	7.0	8.1
200	3298	-22.9	84.6	30.7	26.6	26.9	12.3	6.6	7.7
250	3298	-8.0	77.3	29.1	24.6	24.1	11.0	5.4	6.6
315	3298	-4.0	80.8	27.7	23.3	21.4	8.4	3.4	4.5
400	3298	-3.1	75.5	26.2	20.4	18.0	6.2	2.2	2.9
500	3298	-2.6	79.4	23.1	16.4	13.8	4.3	1.5	2.0
630	3298	-2.1	75.3	19.9	11.0	8.9	2.5	1.1	1.4
800	3298	-1.8	71.2	18.0	6.2	5.2	2.3	1.4	1.7
1000	3298	0.1	68.9	17.0	4.1	4.4	3.0	2.1	2.3
1250	3298	0.3	64.6	15.7	4.1	4.7	3.6	2.8	3.0
1600	3298	1.3	60.4	14.2	4.1	4.7	3.9	3.3	3.4
2000	3298	2.1	56.9	12.2	4.3	4.8	4.2	3.7	3.8
2500	3298	2.6	55.4	10.3	4.7	5.1	4.6	4.2	4.3
3150	3298	3.4	62.4	10.5	5.2	5.5	5.1	4.8	4.9
4000	3298	4.6	56.2	8.6	5.6	5.9	5.6	5.3	5.4
5000	3298	5.1	45.2	7.5	6.1	6.3	6.0	5.8	5.8
6300	3298	5.4	48.8	7.2	6.3	6.5	6.3	6.1	6.1
8000	3298	5.7	55.4	7.4	6.7	6.8	6.6	6.4	6.5
10000	3298	5.9	49.7	7.3	6.8	6.9	6.8	6.6	6.6
12500	3298	5.7	44.1	6.7	6.3	6.5	6.3	6.2	6.2
16000	3298	6.0	45.1	6.9	6.6	6.8	6.6	6.4	6.5
20000	3298	6.1	49.8	7.1	6.9	7.0	6.9	6.8	6.8

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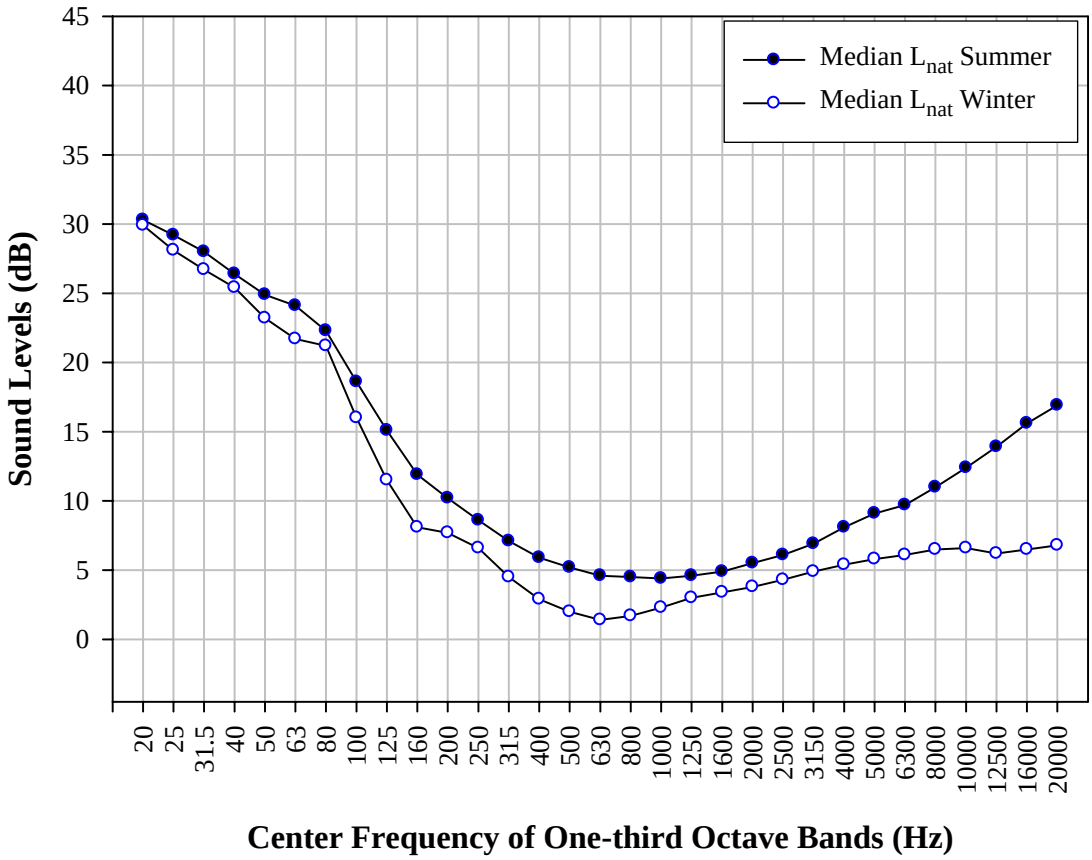


Figure VII-6. L_{nat} for one-third octave bands (20-20k Hz, un-weighted) for all hours, Arches National Park, Salt Valley Road (ARCH002), summer and winter 2002.

Table VII-9. Acoustic metrics (dBA) for Arches National Park, Entrance Station Area (ARCH003), March 2003 (n=85).

Hour of Day	Num. Hours	L_{min}	L_{max}	L_{eq} L. Mean	L_{eq} A. Mean	L_{eq} Median	L_{10} Median	L_{50} Median	L_{90} Median
0	3	21.2	59.1	42.5	41.0	43.5	48.2	32.1	25.1
1	3	21.0	59.5	41.2	39.8	42.5	46.3	31.7	25.6
2	3	21.1	59.8	39.3	38.2	38.4	42.2	29.1	25.7
3	3	21.4	59.2	39.0	38.1	39.9	43.4	27.8	25.9
4	3	21.0	58.1	39.4	37.7	38.1	41.7	29.1	25.6
5	3	21.2	60.6	41.7	40.1	39.8	43.6	33.4	27.8
6	3	21.2	60.5	42.0	40.2	40.2	44.6	33.6	25.2
7	3	21.9	59.5	44.6	42.8	43.4	46.6	41.7	36.0
8	3	23.9	65.2	45.9	44.1	45.6	48.7	43.6	38.6
9	3	26.0	65.9	47.8	45.5	45.8	49.0	43.9	39.4
10	4	25.2	63.6	49.7	47.6	48.9	52.4	46.3	41.2
11	4	25.8	68.0	51.1	48.3	49.3	52.7	46.9	42.0
12	4	26.2	70.0	51.5	49.1	50.5	53.7	47.8	42.7
13	4	30.6	71.6	52.4	50.6	51.4	55.0	48.7	43.3
14	4	31.1	80.3	54.1	51.5	50.8	54.5	48.2	43.1
15	4	34.2	73.6	54.1	52.2	52.0	55.6	50.0	44.6
16	4	31.1	75.5	54.3	52.3	52.1	55.8	49.9	44.7
17	4	31.4	75.1	53.1	51.1	50.8	54.2	48.2	43.4
18	4	25.4	71.2	51.6	49.4	49.3	53.0	46.2	40.3
19	4	24.7	72.8	53.0	48.6	47.7	51.7	44.6	37.3
20	4	24.3	72.6	53.7	47.2	45.0	49.4	40.8	30.8
21	4	21.3	65.9	47.4	44.3	43.7	48.3	38.7	28.4
22	4	20.7	64.2	43.4	41.5	41.6	46.0	35.8	26.8
23	3	21.4	69.9	43.3	42.1	44.4	48.1	34.2	26.2

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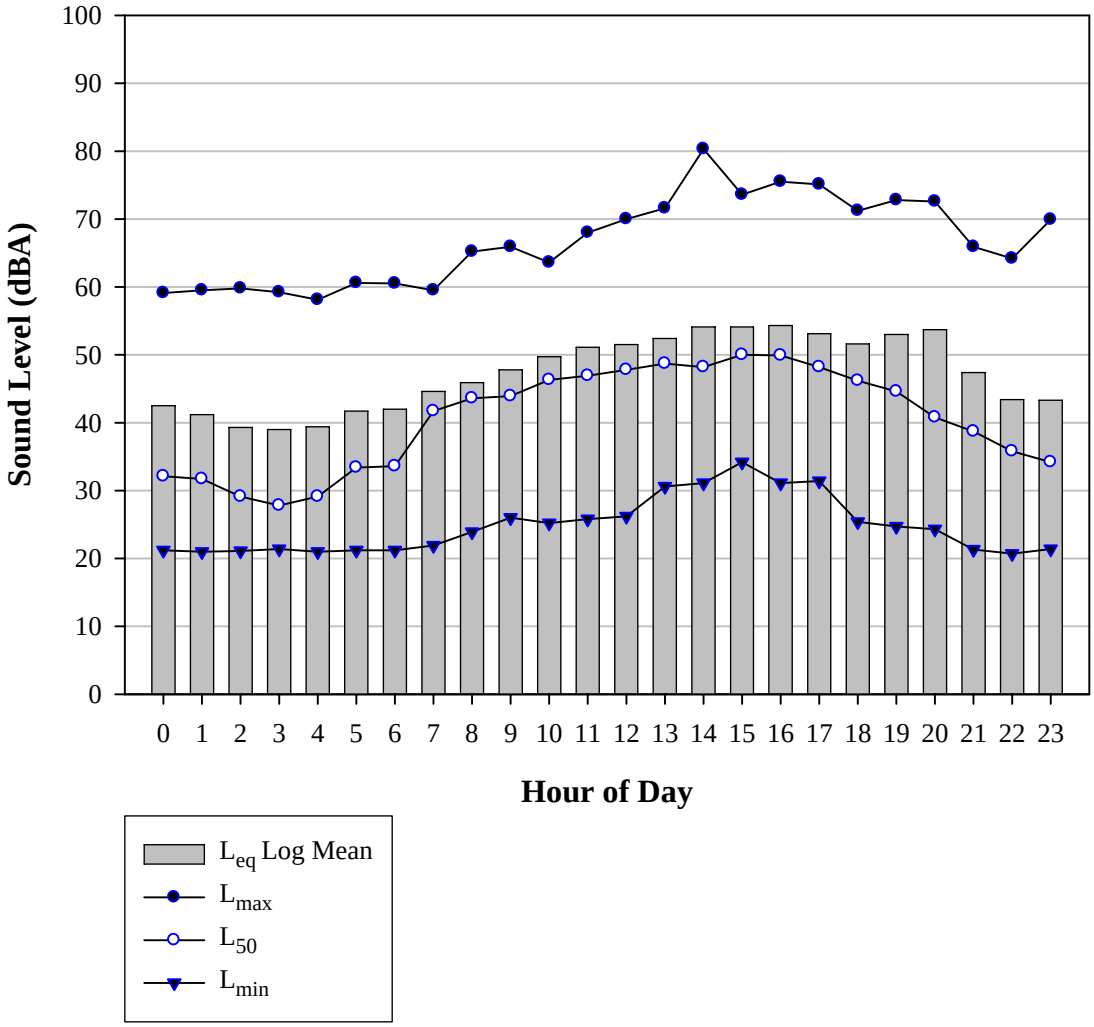


Figure VII-7. Acoustic metrics (dBA) for Arches National Park, Entrance Station Area (ARCH003), March 2003 (n=85).

Table VII-10. Acoustic metrics (dBA) for Canyonlands National Park, Murphy Trailhead (CANY001), winter 2005 (n=754).

Hour of Day	Num. Hours	L_{min}	L_{max}	L_{eq} L. Mean	L_{eq} A. Mean	L_{eq} Median	L_{10} Median	L_{50} Median	L_{90} Median	L_{nat} Median
0	32	17.6	67.1	37.7	23.9	21.9	20.5	18.5	18.1	18.5
1	31	17.6	63.3	34.9	24.6	23.3	21.5	18.5	18.1	18.5
2	30	17.6	55.7	24.3	22.2	20.3	20.8	18.5	18.1	18.5
3	30	17.6	57.7	27.5	23.2	21.0	21.2	19.0	18.2	18.9
4	30	17.6	60.5	29.1	23.4	21.1	21.5	18.5	18.1	18.5
5	31	17.6	61.4	35.6	23.5	20.4	20.4	18.5	18.1	18.4
6	30	17.7	66.5	32.9	22.6	20.2	20.1	18.4	18.0	18.4
7	31	17.7	56.0	31.0	25.8	24.5	24.9	19.1	18.2	19.0
8	32	17.5	58.1	32.6	27.8	26.8	27.3	19.6	18.2	19.0
9	32	17.7	59.3	30.1	27.9	28.5	29.0	19.7	18.3	18.9
10	32	17.7	56.5	31.6	28.1	27.8	30.5	21.1	18.4	19.5
11	32	17.7	67.1	31.9	28.8	27.9	29.0	19.7	18.3	18.8
12	32	17.7	58.5	30.1	27.6	27.2	28.9	19.8	18.3	18.8
13	32	17.7	60.3	33.3	27.7	26.7	27.9	19.6	18.3	18.9
14	31	17.7	70.0	31.7	28.6	28.1	30.2	19.9	18.3	19.2
15	32	17.7	69.4	34.2	29.0	27.4	28.4	19.3	18.1	18.5
16	32	17.5	63.3	34.6	27.9	25.6	26.5	19.3	18.1	18.6
17	32	17.6	64.7	36.9	27.7	25.7	26.9	19.0	18.1	18.4
18	32	17.6	66.4	32.2	27.6	27.1	28.1	18.9	18.1	18.5
19	32	17.6	65.7	35.7	27.3	26.1	26.2	19.0	18.2	18.5
20	31	17.6	62.6	32.8	27.3	25.6	28.2	19.0	18.2	18.8
21	32	17.6	64.0	37.1	29.8	29.1	28.7	19.8	18.3	18.9
22	31	17.6	64.1	35.7	27.4	26.1	27.1	19.7	18.4	19.1
23	32	17.6	65.4	37.1	25.8	24.1	25.2	18.7	18.1	18.4

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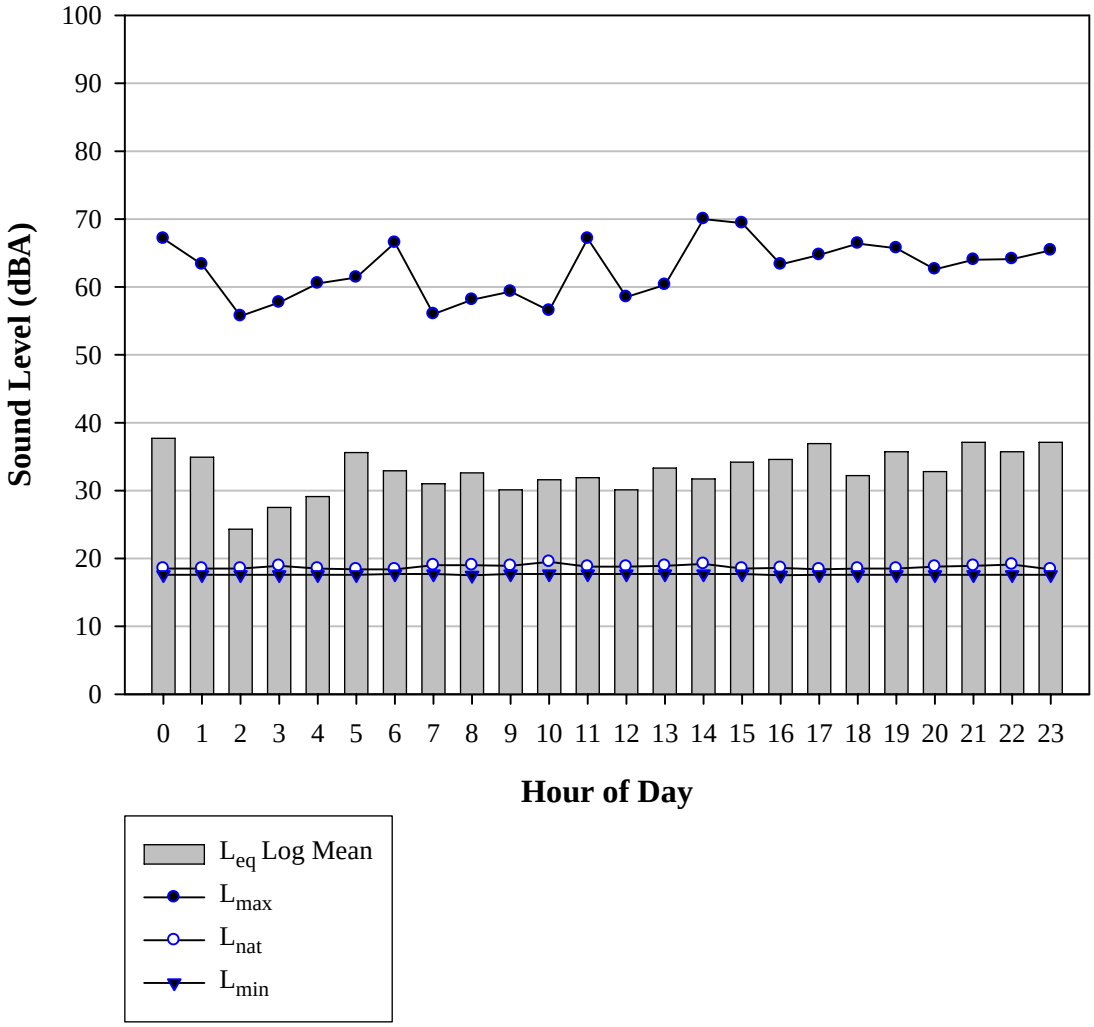


Figure VII-8. Acoustic metrics (dBA) for Canyonlands National Park, Murphy Trailhead (CANY001), winter 2005 (n=754).

Table VII-11. Acoustic metrics (dBA) for Canyonlands National Park, Murphy Trailhead (CANY001), summer 2006 (n=669).

Hour of Day	Num. Hours	L_{min}	L_{max}	L_{eq} L. Mean	L_{eq} A. Mean	L_{eq} Median	L_{10} Median	L_{50} Median	L_{90} Median	L_{nat} Median
0	28	19.2	58.4	32.7	30.1	28.9	32.1	28.0	25.5	27.6
1	28	18.3	65.9	31.0	29.5	28.6	29.7	27.4	24.5	26.9
2	28	18.8	54.9	32.0	29.3	28.9	30.3	27.9	25.3	27.6
3	28	20.8	55.0	31.5	29.6	29.7	31.2	29.1	27.1	29.0
4	28	20.5	46.8	30.3	29.4	30.0	31.3	29.5	27.7	29.4
5	28	16.3	52.0	30.3	27.6	26.8	29.4	26.2	19.0	26.1
6	28	16.1	54.5	29.0	24.7	23.6	23.3	17.7	17.0	17.6
7	28	16.3	63.5	28.5	25.4	24.9	26.0	18.1	17.2	17.7
8	28	16.4	59.8	31.1	29.7	29.6	31.3	20.4	17.8	18.2
9	28	16.2	68.6	30.3	28.0	27.7	29.6	20.4	17.7	18.0
10	28	16.5	65.3	31.4	28.8	27.7	30.1	20.4	18.0	18.4
11	28	16.6	61.7	33.6	29.3	27.9	30.1	20.5	18.2	18.9
12	27	16.7	65.5	32.0	28.1	26.4	29.2	20.6	18.7	19.4
13	28	16.7	59.2	32.4	30.7	29.5	31.8	22.8	19.1	20.4
14	28	16.8	69.2	35.0	31.5	30.4	32.6	22.9	19.0	20.2
15	28	16.7	61.4	33.6	31.0	29.9	31.9	21.8	18.8	19.9
16	28	16.9	76.0	38.3	32.6	32.6	34.7	24.1	18.8	21.2
17	26	16.8	80.0	44.2	33.9	32.3	35.6	25.1	19.6	22.7
18	28	16.7	88.4	46.0	35.8	35.4	36.2	25.0	19.3	23.1
19	28	16.6	66.1	39.3	31.4	30.5	32.6	22.9	18.8	20.8
20	28	16.4	59.2	32.4	29.2	29.1	29.6	21.7	18.3	20.5
21	28	16.4	57.9	31.0	29.2	28.8	31.4	25.7	21.1	24.4
22	28	17.0	83.9	42.0	31.7	29.5	32.1	27.3	24.4	26.6
23	28	17.9	56.3	34.0	30.9	30.1	32.3	27.2	24.4	26.7

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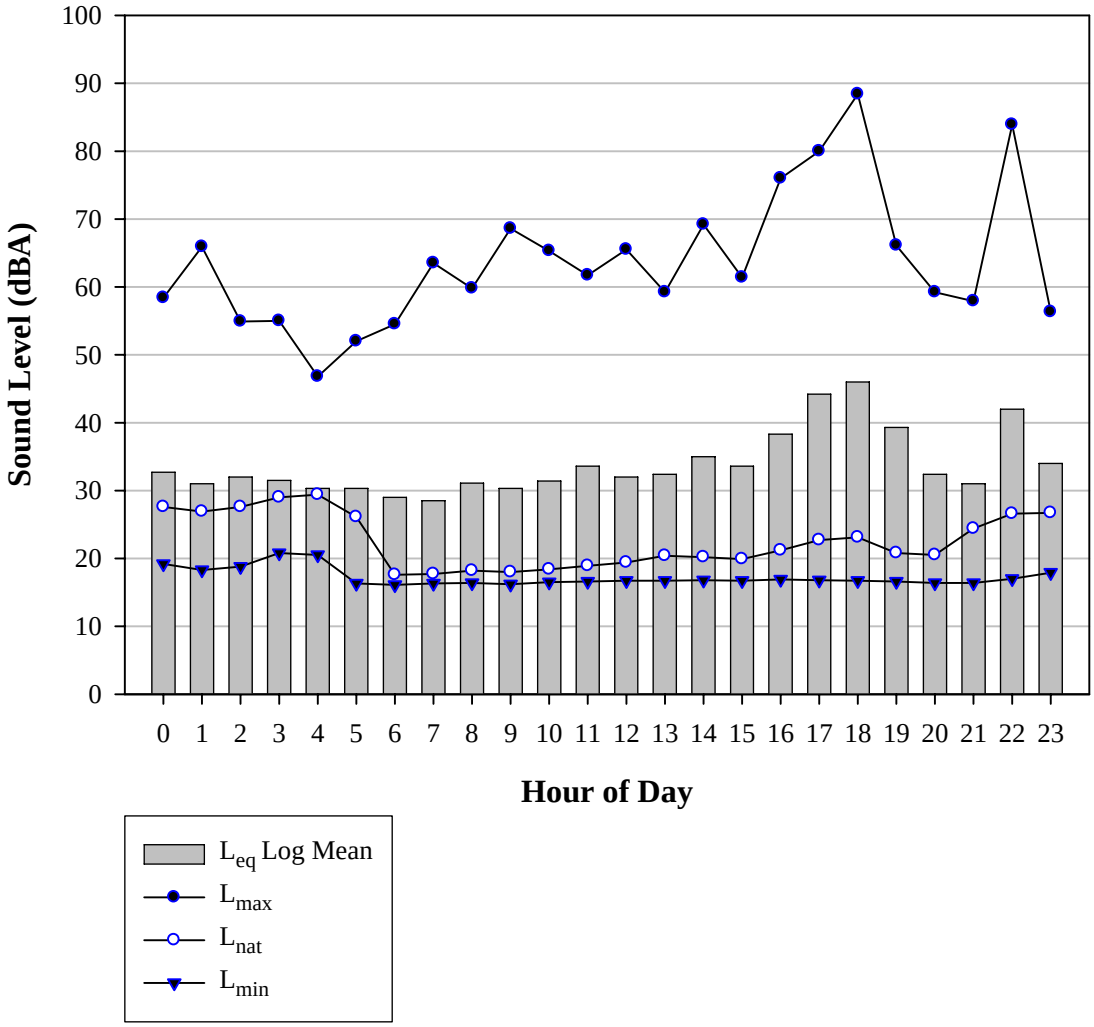


Figure VII-9. Acoustic metrics (dBA) for Canyonlands National Park, Murphy Trailhead (CANY001), summer 2006 (n=669).

Table VII-12. Acoustic metrics (dBA and un-weighted one-third octave bands 20-20k Hz) for all hours, CANY, Murphy Trailhead (CANY001), winter 2005.

dBA/Freq	Num. Hours	Lmin	Lmax	Leq L. Mean	Leq Median	L10 Median	L50 Median	L90 Median	Lnat Median
dBA	754	17.5	70.0	34.0	25.3	26.4	19.2	18.2	18.7
20	754	-11.7	80.8	42.8	33.9	36.5	29.1	22.4	27.5
25	754	-10.3	78.2	40.9	33.1	35.7	27.8	21.5	26.2
31.5	754	-6.9	75.7	39.0	32.1	35.1	26.1	19.7	24.2
40	754	-7.2	74.1	37.3	31.5	34.5	24.3	17.7	22.2
50	754	-8.2	73.0	35.6	30.3	33.4	22.1	14.7	19.8
63	754	-10.2	76.7	34.2	28.5	31.7	20.2	12.1	17.7
80	754	-11.8	79.3	33.2	26.9	30.0	18.3	9.6	15.5
100	754	-12.5	74.3	32.0	26.9	28.5	15.6	6.6	13.0
125	754	-12.8	76.2	32.1	28.0	28.1	12.8	4.0	10.0
160	754	-12.6	70.7	30.9	27.6	28.5	10.2	1.5	7.5
200	754	-11.9	67.0	28.5	24.6	26.0	8.3	-0.4	5.3
250	754	-11.0	69.5	28.2	23.6	22.4	6.6	-1.4	3.8
315	754	-10.9	72.2	26.9	20.8	19.9	4.9	-1.9	2.6
400	754	-9.7	63.7	26.5	18.8	17.0	3.6	-2.1	1.9
500	754	-8.5	64.7	25.6	15.2	13.6	2.9	-2.1	1.4
630	754	-7.7	61.6	25.2	10.6	10.8	1.8	-2.1	0.5
800	754	-6.5	61.0	25.1	7.7	8.2	0.8	-2.1	-0.1
1000	754	-5.4	62.3	24.3	5.1	5.5	-0.1	-1.9	-0.7
1250	754	-4.2	60.3	23.4	3.4	3.8	0.1	-1.2	-0.2
1600	754	-2.4	59.3	22.0	3.0	3.3	0.9	0.0	0.7
2000	754	-2.6	58.8	20.1	3.1	3.3	1.9	1.1	1.7
2500	754	-4.2	58.6	18.6	3.9	4.0	3.1	2.4	2.9
3150	754	-6.2	57.2	17.8	4.9	5.1	4.4	3.8	4.3
4000	754	-6.4	60.5	17.4	6.3	6.5	5.9	5.5	5.8
5000	754	-7.9	58.7	16.6	7.9	8.1	7.6	7.2	7.5
6300	754	-10.7	63.9	16.3	9.3	9.4	8.9	8.5	8.8
8000	754	-10.3	60.2	16.5	10.8	10.9	10.5	10.2	10.4
10000	754	-9.2	55.8	16.7	12.4	12.6	12.3	12.0	12.2
12500	754	-8.3	69.6	17.7	13.3	13.5	13.2	13.0	13.2
16000	754	-6.4	58.9	17.8	13.2	13.4	13.1	12.8	13.0
20000	754	-4.4	56.4	19.0	12.5	12.7	12.4	12.1	12.3

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Table VII-13. Acoustic metrics (dBA and un-weighted one-third octave bands 12.5-20k Hz) for all hours, CANY, Murphy Trailhead (CANY001), summer 2006.

dBA/Freq	Num. Hours	L_{min}	L_{max}	L_{eq} L. Mean	L_{eq} Median	L_{10} Median	L_{50} Median	L_{90} Median	L_{nat} Median
dBA	669	16.1	88.4	37.2	28.9	30.7	24.4	19.3	22.2
12.5	669	14.3	84.8	50.1	41.5	41.3	33.9	29.5	32.2
15.8	669	10.2	82.3	47.9	38.7	38.8	31.4	26.8	29.4
20	669	9.4	85.8	45.7	36.2	36.9	29.8	25.2	27.7
25	669	6.7	89.3	43.7	34.5	36.3	28.7	23.7	26.4
31.5	669	4.9	89.3	42.1	33.4	35.5	27.6	22.5	25.3
40	669	1.7	86.6	40.2	32.1	35.0	26.4	20.2	23.3
50	669	-0.3	86.8	39.1	30.9	34.2	25.2	18.1	21.6
63	669	-2.6	85.4	38.3	29.6	32.9	24.0	15.9	20.0
80	669	-3.7	85.7	38.0	28.7	31.5	22.6	14.2	18.5
100	669	-4.8	86.4	37.4	27.5	30.0	20.6	12.3	16.4
125	669	-5.4	86.4	37.2	28.1	29.1	18.4	10.0	14.0
160	669	-5.7	84.8	36.7	27.6	29.0	16.1	8.2	12.2
200	669	-5.8	82.9	35.4	24.8	27.6	14.1	6.1	9.9
250	669	-5.3	83.6	34.1	24.0	25.5	12.4	4.3	8.0
315	669	-4.9	84.1	32.6	22.4	24.0	11.2	3.1	7.0
400	669	-4.8	84.2	31.5	21.2	22.4	9.9	2.6	6.1
500	669	-3.7	83.0	30.0	18.6	20.5	9.1	2.8	5.6
630	669	-3.1	81.9	28.5	16.0	17.8	7.9	2.7	5.2
800	669	-2.3	80.3	27.5	13.7	15.4	7.1	2.9	5.1
1000	669	-1.6	79.1	26.1	11.3	12.5	5.5	2.4	4.0
1250	669	-0.7	76.3	24.4	9.1	10.1	4.0	2.0	3.0
1600	669	0.2	74.2	22.7	7.3	7.7	3.4	2.2	2.8
2000	669	1.2	71.1	20.8	6.2	6.6	3.3	2.6	2.9
2500	669	1.9	66.9	19.0	6.6	6.4	3.8	3.3	3.6
3150	669	3.0	63.6	17.1	7.3	6.6	4.5	4.1	4.4
4000	669	4.1	59.1	18.8	12.9	11.8	7.8	7.1	7.5
5000	669	4.9	67.3	22.1	13.8	12.5	9.4	8.7	9.2
6300	669	5.5	59.2	17.0	8.6	8.2	7.1	6.9	7.0
8000	669	5.1	59.1	17.5	9.0	9.0	8.2	7.8	8.0
10000	669	4.6	63.0	15.4	9.8	9.6	8.9	8.7	8.8
12500	669	3.6	61.2	16.0	9.6	9.5	9.2	9.1	9.2
16000	669	3.5	56.4	13.7	10.1	10.2	9.8	9.5	9.8
20000	669	4.1	54.8	12.8	11.4	10.8	10.5	10.4	10.5

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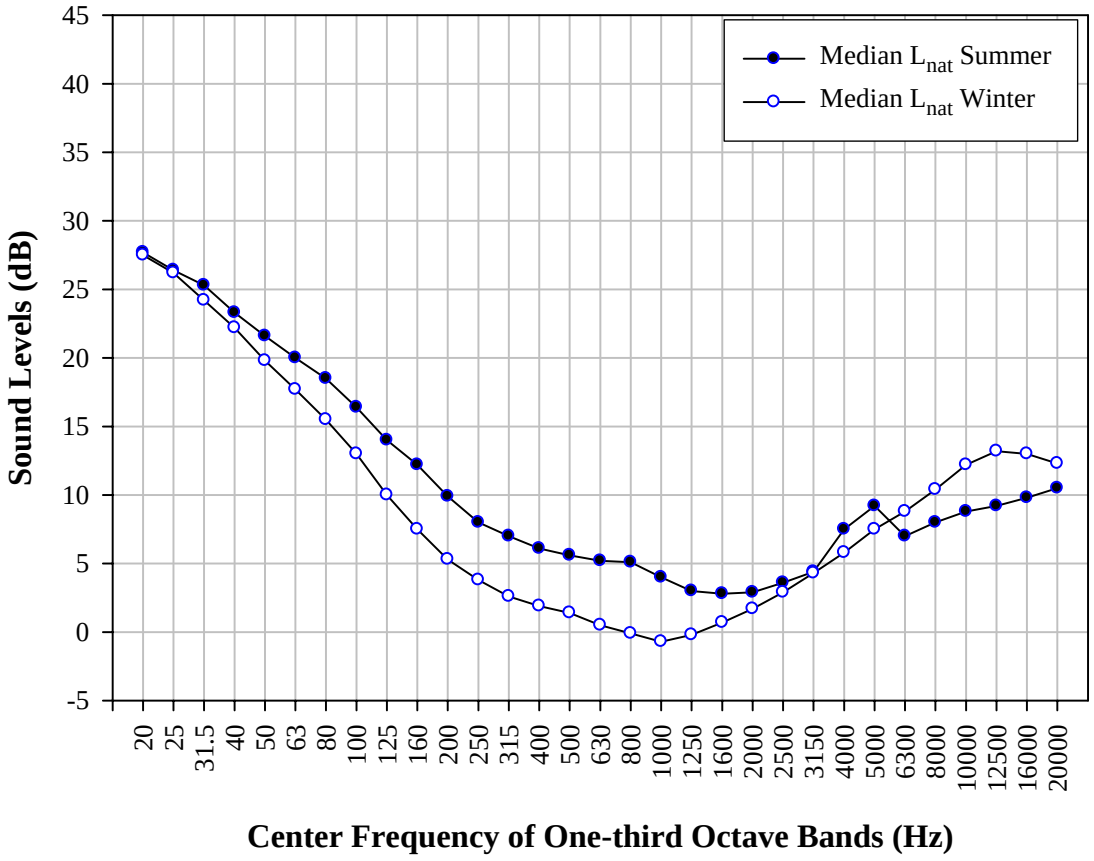


Figure VII-10. L_{nat} for one-third octave bands (20-20k Hz, un-weighted) for all hours, Canyonlands National Park, Murphy Trailhead (CANY001), winter 2005 and summer 2006.

Table VII-14. Acoustic metrics (dBA) for Canyonlands National Park, south of Murphy Trailhead (CANY003), summer 2005 (n=949).

Hour of Day	Num. Hours	L_{min}	L_{max}	L_{eq} L. Mean	L_{eq} A. Mean	L_{eq} Median	L_{10} Median	L_{50} Median	L_{90} Median	L_{nat} Median
0	40	17.6	64.3	36.2	26.4	24.7	25.3	21.4	18.9	20.8
1	40	17.6	65.6	40.1	25.7	23.9	26.1	20.9	19.3	20.5
2	40	17.6	67.4	35.9	24.8	23.0	24.5	20.3	19.0	20.0
3	40	17.5	56.8	28.2	23.8	22.5	24.0	20.4	19.2	20.4
4	40	17.6	58.0	27.5	22.7	21.2	22.3	19.7	18.5	19.5
5	40	17.5	58.1	27.3	23.2	22.3	22.8	18.8	18.2	18.8
6	40	17.6	61.2	28.2	26.8	26.5	26.2	18.8	18.2	18.8
7	40	17.6	77.9	41.3	28.2	27.0	27.6	19.3	18.4	19.0
8	40	17.6	63.9	35.3	30.0	28.5	29.9	20.4	18.6	18.9
9	39	17.7	63.7	36.4	32.3	32.3	32.2	22.0	19.1	19.5
10	39	17.8	66.5	39.5	34.6	32.9	33.7	24.3	19.8	20.6
11	39	17.8	66.6	40.7	35.6	35.4	33.6	24.6	20.1	21.0
12	39	18.2	79.5	40.9	36.3	37.2	37.6	27.0	20.9	23.0
13	39	18.2	73.0	41.4	37.7	37.5	39.7	28.0	21.2	23.8
14	39	18.2	71.0	41.8	37.9	37.9	40.6	29.8	23.2	26.3
15	39	18.4	74.0	42.0	37.9	37.8	39.9	30.8	22.5	26.0
16	39	18.4	63.5	40.3	36.7	37.2	40.1	30.3	22.4	26.4
17	39	18.2	86.0	44.0	37.2	37.7	40.0	30.8	23.4	28.3
18	39	17.6	64.7	38.3	34.4	34.8	36.5	28.3	21.9	26.2
19	40	17.6	72.5	38.7	33.2	33.5	35.2	25.2	20.4	22.6
20	40	17.6	65.9	38.9	30.7	28.9	30.5	21.6	19.2	20.5
21	40	17.6	67.8	35.8	29.1	27.2	29.9	22.7	19.8	21.6
22	39	17.6	67.2	36.6	27.6	26.2	28.6	22.6	19.8	21.1
23	40	17.6	67.0	38.1	26.7	24.6	26.8	21.6	19.5	21.3

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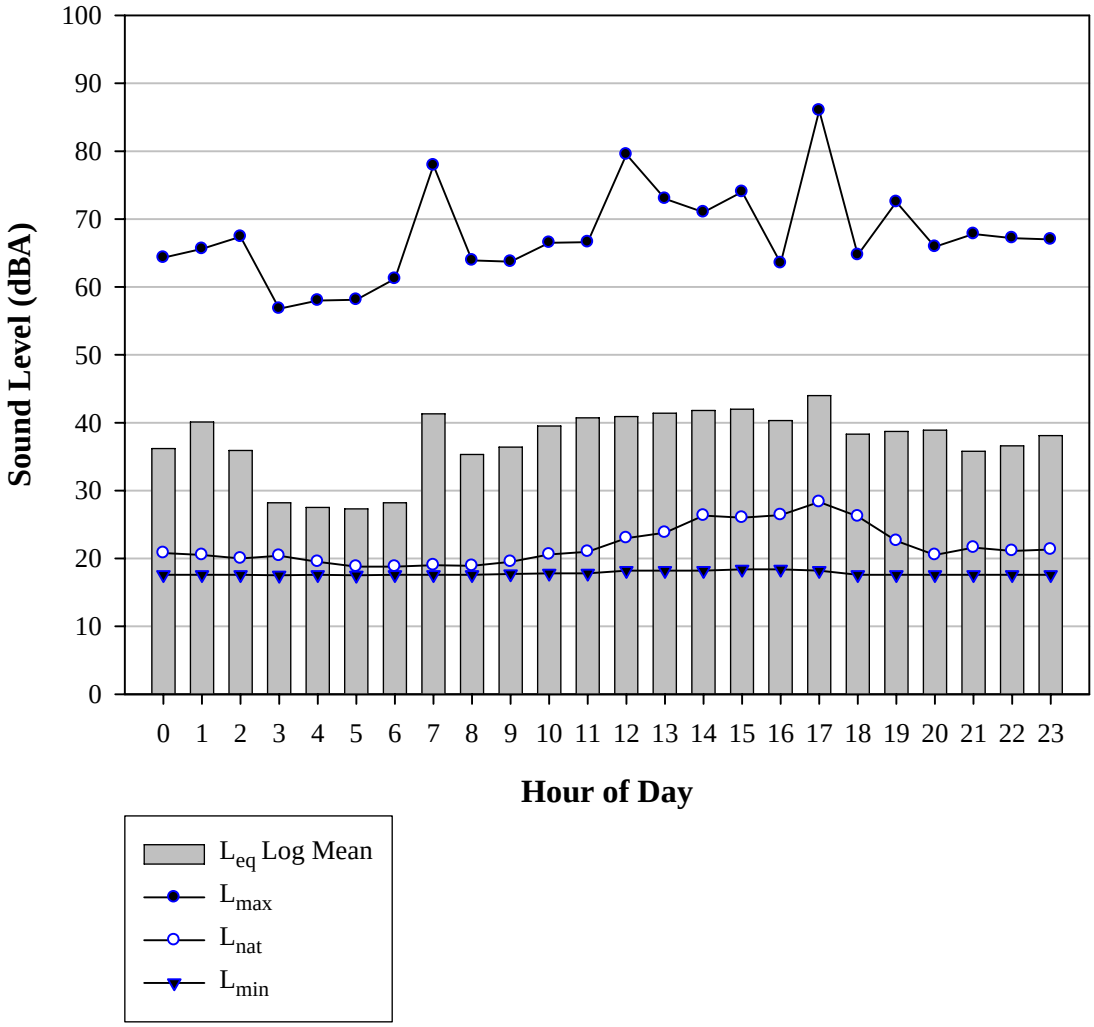


Figure VII-11. Acoustic metrics (dBA) for Canyonlands National Park, south of Murphy Trailhead (CANY003), summer 2005 (n=949).

Table VII-15. Acoustic metrics (dBA and un-weighted one-third octave bands 12.5-20k Hz) for all hours, CANY, south of Murphy Trailhead (CANY003), summer 2005.

dBA/Freq	Num. Hours	Lmin	Lmax	Leq L. Mean	Leq Median	L10 Median	L50 Median	L90 Median	Lnat Median
dBA	949	17.5	86.0	39.0	29.4	30.9	22.8	19.7	21.3
12.5	949	9.9	89.7	60.4	51.7	54.6	42.9	33.3	38.5
15.8	949	10.8	86.3	58.2	49.0	52.0	40.4	30.1	35.9
20	949	8.7	85.4	55.8	46.3	49.2	38.1	28.7	33.8
25	949	4.7	83.0	53.2	43.7	46.8	35.9	26.5	31.5
31.5	949	1.5	81.4	50.5	41.0	44.5	33.5	24.4	29.5
40	949	0.2	79.1	47.7	38.5	42.1	31.3	21.8	27.0
50	949	-0.7	80.2	44.9	36.1	39.3	28.9	19.2	24.6
63	949	-3.7	82.4	42.2	33.6	36.4	26.2	16.2	21.9
80	949	-4.7	81.9	39.6	31.4	33.7	23.2	13.7	18.8
100	949	-5.1	83.1	36.9	28.7	30.9	19.6	11.1	15.6
125	949	-6.2	81.8	35.2	27.8	29.0	15.8	7.1	11.4
160	949	-6.1	81.1	32.8	27.0	28.4	14.3	5.4	10.0
200	949	-6.4	79.6	30.7	24.5	26.7	14.0	5.1	9.7
250	949	-6.4	83.5	30.7	23.3	25.1	13.9	5.5	9.7
315	949	-5.6	83.1	29.7	22.4	24.5	13.0	4.5	9.0
400	949	-5.0	82.6	29.5	21.5	23.6	11.5	4.6	8.3
500	949	-4.5	80.8	29.5	20.0	21.8	10.5	4.7	7.8
630	949	-3.9	80.3	29.9	17.6	19.3	9.2	3.9	6.8
800	949	-3.1	77.5	30.3	16.0	17.3	8.7	3.8	6.5
1000	949	-4.6	75.2	29.9	13.3	14.5	7.0	2.8	5.0
1250	949	-3.5	73.1	28.7	10.0	11.1	5.0	2.0	3.6
1600	949	-5.2	68.8	26.6	7.4	8.2	3.6	1.9	2.7
2000	949	-4.1	65.5	24.1	6.0	6.1	3.3	2.4	2.9
2500	949	-3.3	61.1	21.9	6.7	6.1	3.8	3.3	3.6
3150	949	-2.1	66.6	21.4	9.5	7.5	5.0	4.7	4.9
4000	949	-0.4	70.9	23.8	15.2	13.6	7.2	6.4	6.8
5000	949	0.5	73.8	24.7	13.1	12.1	8.2	7.8	8.0
6300	949	2.1	69.4	26.4	12.4	10.9	9.4	9.2	9.3
8000	949	3.8	70.3	26.6	12.1	11.6	11.0	10.8	10.9
10000	949	4.8	71.5	27.1	12.5	12.5	12.3	12.1	12.2
12500	949	5.4	65.1	19.3	12.6	12.6	12.5	12.3	12.4
16000	949	5.0	60.4	15.4	12.1	12.2	12.0	11.9	12.0
20000	949	5.3	53.3	12.9	11.6	11.7	11.6	11.4	11.5

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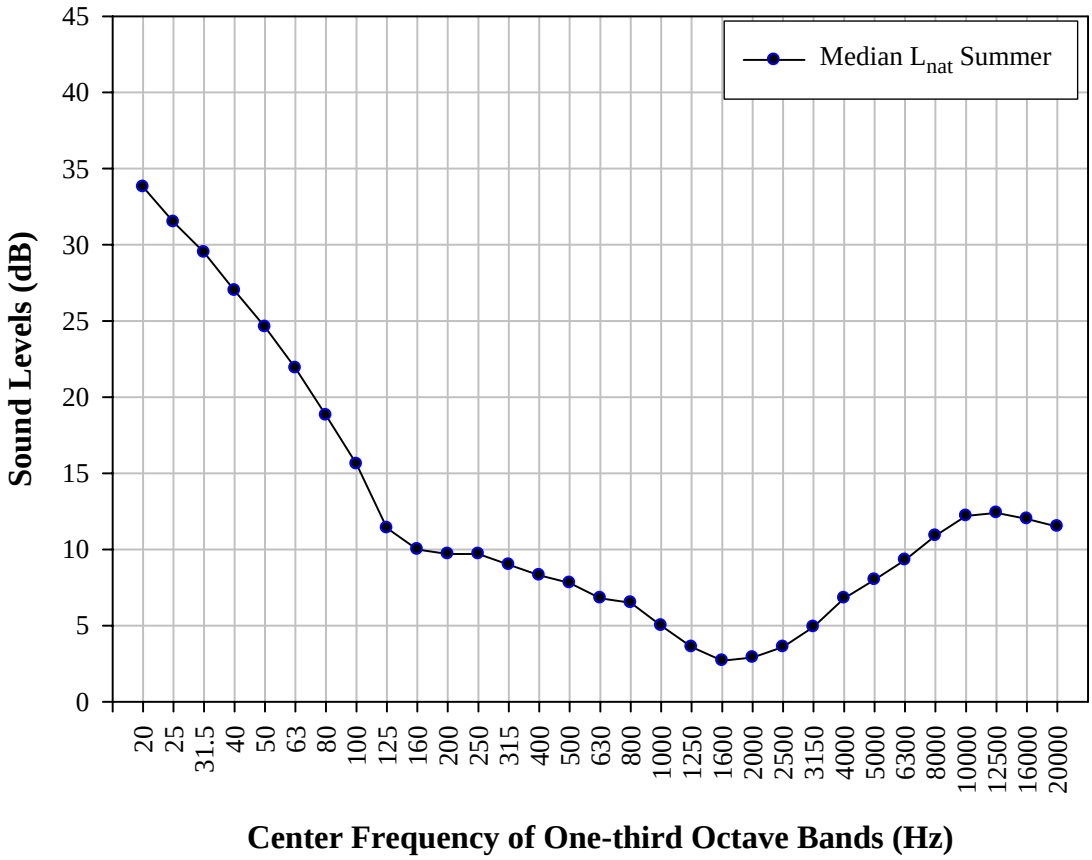


Figure VII-12. L_{nat} for one-third octave bands (20-20k Hz, un-weighted) for all hours, Canyonlands National Park, Canyonlands National Park, south of Murphy Trailhead (CANY003), summer 2005.

Table VII-16. Acoustic metrics (dBA) for Canyonlands National Park, Lower Salt Creek (CANY004), winter 2005 (n=694).

Hour of Day	Num. Hours	L_{min}	L_{max}	L_{eq} L. Mean	L_{eq} A. Mean	L_{eq} Median	L_{10} Median	L_{50} Median	L_{90} Median	L_{nat} Median
0	29	16.7	62.2	29.5	22.8	19.9	20.5	17.7	17.3	17.7
1	29	16.7	61.2	25.4	21.8	19.8	19.6	17.8	17.4	17.7
2	29	16.7	66.9	28.3	22.0	20.1	19.7	17.8	17.4	17.8
3	29	16.7	51.9	21.6	20.5	19.2	18.6	17.7	17.3	17.6
4	29	16.7	62.6	24.2	20.7	18.3	18.6	17.7	17.3	17.6
5	29	16.7	61.7	25.6	20.2	18.4	18.3	17.7	17.3	17.6
6	29	16.8	65.6	27.2	21.7	19.5	19.5	17.8	17.3	17.7
7	29	16.8	61.0	28.4	24.1	22.8	21.0	17.8	17.5	17.8
8	28	16.8	73.9	32.3	25.6	22.7	22.0	18.0	17.4	17.9
9	29	16.9	74.2	34.3	27.6	27.4	25.2	18.3	17.5	18.0
10	29	16.8	64.5	32.6	26.3	23.0	24.3	18.2	17.4	17.9
11	29	16.7	65.9	35.4	27.2	26.2	25.6	18.5	17.4	17.9
12	29	16.7	71.0	36.9	29.5	26.9	24.4	19.0	17.5	18.6
13	29	16.7	69.8	36.3	27.9	26.4	25.1	18.9	17.4	18.5
14	29	16.7	64.2	34.4	26.4	24.6	25.0	19.0	17.4	18.5
15	28	16.6	59.0	31.2	26.0	24.2	25.5	18.9	17.4	18.5
16	29	16.6	78.4	34.7	26.3	25.8	24.4	18.0	17.2	17.7
17	29	16.7	60.1	30.7	24.8	23.6	23.4	17.5	17.2	17.4
18	29	16.7	57.7	28.3	22.7	20.3	20.2	17.6	17.2	17.5
19	29	16.6	54.2	27.3	22.5	21.4	20.8	17.6	17.2	17.5
20	29	16.7	66.0	31.2	24.9	22.6	21.3	17.6	17.2	17.5
21	29	16.7	61.0	28.9	24.5	23.2	23.4	17.8	17.3	17.6
22	29	16.7	61.7	29.1	23.5	20.9	21.7	17.6	17.3	17.6
23	29	16.7	56.7	25.9	22.1	19.5	18.6	17.7	17.3	17.6

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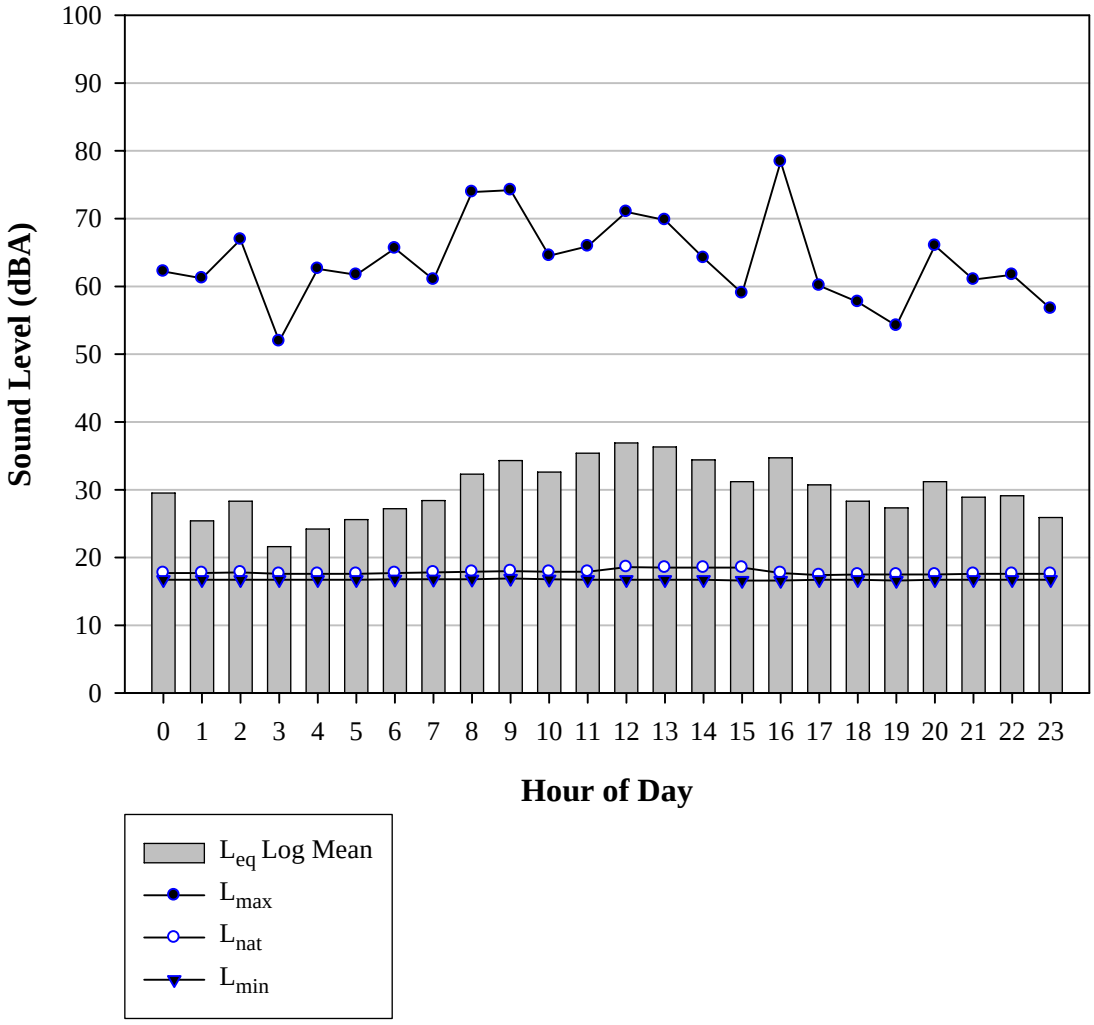


Figure VII-13. Acoustic metrics (dBA) for Canyonlands National Park, Lower Salt Creek (CANY004), winter 2005 (n=694).

Table VII-17. Acoustic metrics (dBA) for Canyonlands National Park, Lower Salt Creek (CANY004), summer 2006 (n=1321).

Hour of Day	Num. Hours	L_{min}	L_{max}	L_{eq} L. Mean	L_{eq} A. Mean	L_{eq} Median	L_{10} Median	L_{50} Median	L_{90} Median	L_{nat} Median
0	57	13.7	81.8	41.9	29.0	29.2	31.2	24.6	19.0	23.3
1	57	13.6	79.9	40.2	27.5	27.8	30.1	23.1	17.4	21.3
2	57	13.7	81.2	48.1	27.7	25.8	28.2	21.5	17.3	20.9
3	54	13.6	57.8	31.3	25.8	24.7	26.3	18.9	16.0	18.7
4	53	13.4	77.5	40.5	26.8	25.2	26.9	21.2	16.7	20.8
5	54	12.9	72.6	34.6	28.6	28.7	28.4	20.1	16.0	19.9
6	55	13.2	83.3	47.4	31.3	30.1	29.4	19.2	16.2	18.6
7	54	13.7	82.3	47.9	32.9	31.7	29.4	19.6	16.7	19.2
8	54	14.2	85.4	54.6	37.6	33.0	32.7	22.6	18.7	21.4
9	54	14.3	67.7	35.4	33.2	32.8	33.0	23.8	19.6	21.5
10	54	14.7	66.1	36.6	34.0	34.8	33.5	24.6	20.2	22.2
11	55	14.9	71.1	37.8	34.9	34.3	34.6	25.9	21.2	23.2
12	53	15.0	69.0	38.4	34.2	33.3	35.3	25.9	21.1	24.0
13	55	15.0	65.6	38.9	34.8	34.0	36.9	28.1	21.1	25.2
14	54	15.0	64.5	38.7	35.6	35.2	37.5	29.2	21.7	26.4
15	55	14.7	66.2	37.3	35.0	34.6	38.1	27.8	21.4	25.9
16	55	14.6	66.6	37.1	34.3	34.5	37.3	28.7	21.8	26.3
17	54	14.4	71.2	41.3	33.9	33.3	35.6	26.9	21.7	24.9
18	55	14.1	66.4	39.4	33.5	31.8	33.8	26.6	22.2	26.0
19	56	14.1	67.9	36.9	31.7	31.7	34.3	27.4	21.8	25.5
20	56	13.9	64.6	34.2	30.5	31.4	34.5	25.3	20.0	23.1
21	56	14.0	79.9	44.8	32.0	33.0	36.3	29.7	23.1	28.0
22	57	13.9	84.3	46.8	32.8	31.5	34.2	26.0	21.4	24.9
23	57	13.7	70.7	37.9	29.0	27.8	31.5	24.6	18.7	23.8

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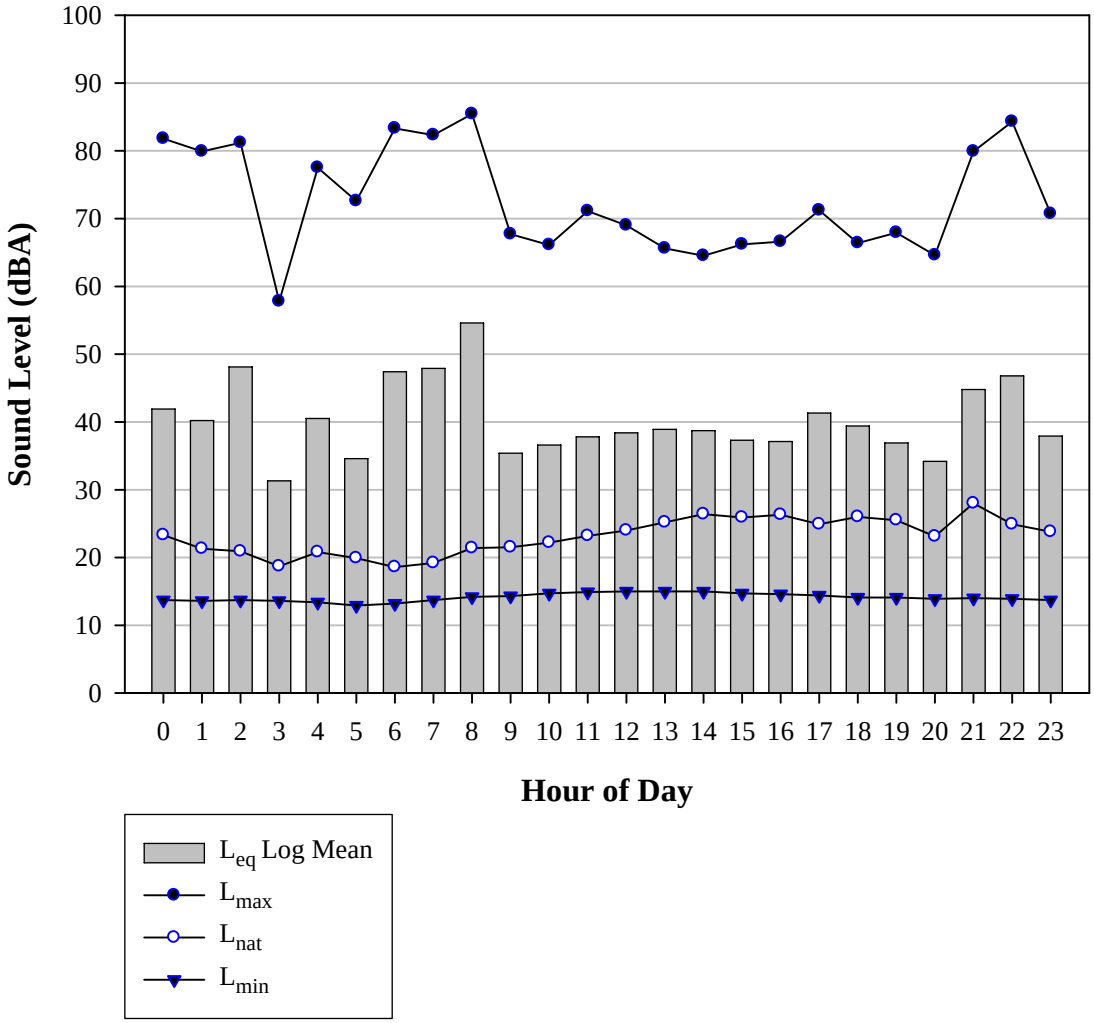


Figure VII-14. Acoustic metrics (dBA) for Canyonlands National Park, Lower Salt Creek (CANY004), summer 2006 (n=1321).

Table VII-18. Acoustic metrics (dBA and un-weighted one-third octave bands 20-20k Hz) for all hours, Canyonlands National Park, Lower Salt Creek (CANY004), winter 2005.

dBA/Freq	Num. Hours	L_{min}	L_{max}	L_{eq} L. Mean	L_{eq} Median	L_{10} Median	L_{50} Median	L_{90} Median	L_{nat} Median
dBA	694	16.6	78.4	31.7	22.1	22.0	17.9	17.4	17.8
20	694	-7.8	86.9	38.2	31.7	34.0	27.9	21.8	27.0
25	694	-3.3	86.0	36.7	30.5	32.7	26.2	20.4	25.1
31.5	694	-4.3	81.0	35.3	29.4	31.3	24.4	18.5	23.2
40	694	-5.9	76.8	34.1	27.8	29.9	21.8	16.0	20.7
50	694	-9.8	74.6	33.1	26.1	28.3	18.8	12.7	17.6
63	694	-10.3	76.3	32.1	24.2	25.9	15.2	9.2	13.9
80	694	-11.0	81.8	32.4	22.4	23.5	11.9	6.3	10.9
100	694	-12.7	78.2	31.8	22.5	20.9	9.4	3.3	8.0
125	694	-11.8	75.7	32.6	23.6	19.3	6.3	0.6	4.8
160	694	-9.9	73.2	31.3	22.6	18.8	4.2	-0.6	3.0
200	694	-8.9	75.8	29.2	19.6	17.5	3.7	-0.6	2.7
250	694	-7.0	76.1	29.0	18.9	16.3	5.0	0.5	3.9
315	694	-6.7	73.2	27.4	16.2	12.8	3.1	0.3	2.4
400	694	-5.2	74.3	26.5	13.9	10.5	2.9	0.3	2.3
500	694	-4.3	72.5	24.4	10.4	8.6	2.5	0.4	2.1
630	694	-2.6	69.9	22.3	8.0	7.1	2.9	1.3	2.6
800	694	-1.7	66.8	20.9	6.3	6.5	3.1	1.7	2.8
1000	694	-1.1	66.8	19.8	6.7	7.0	3.7	2.5	3.5
1250	694	0.5	67.7	18.7	6.3	6.5	4.2	3.2	4.0
1600	694	1.7	64.8	17.5	6.4	6.8	5.0	4.0	4.8
2000	694	2.6	63.7	16.7	6.6	7.4	5.5	4.7	5.4
2500	694	3.5	64.9	16.2	6.9	7.5	6.0	5.3	5.9
3150	694	4.3	62.4	15.9	7.4	8.0	6.5	5.8	6.4
4000	694	4.5	63.8	15.6	7.6	8.2	6.8	6.2	6.7
5000	694	5.1	63.2	14.5	7.6	8.1	6.9	6.4	6.8
6300	694	5.3	63.6	13.0	7.6	8.0	7.0	6.5	7.0
8000	694	5.7	61.7	12.2	7.7	8.2	7.3	6.8	7.2
10000	694	6.0	58.2	11.1	7.9	8.3	7.4	7.0	7.3
12500	694	5.8	55.1	10.1	8.0	8.5	7.4	7.1	7.4
16000	694	6.0	51.0	9.3	8.0	9.1	7.3	6.9	7.2
20000	694	5.1	49.5	8.6	7.8	10.0	6.6	6.2	6.5

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Table VII-19. Acoustic metrics (dBA and un-weighted one-third octave bands 20-20k Hz) for all hours, CANY, Lower Salt Creek (CANY004), summer 2006.

dBA/Freq	Num. Hours	L_{min}	L_{max}	L_{eq} L. Mean	L_{eq} Median	L_{10} Median	L_{50} Median	L_{90} Median	L_{nat} Median
dBA	1321	12.9	85.4	44.5	32.2	33.5	24.9	20.0	23.2
20	1321	-21.1	87.4	46.2	32.0	34.3	24.5	17.5	23.0
25	1321	-17.7	87.5	45.4	31.4	33.7	23.1	16.4	21.4
31.5	1321	-12.4	87.2	44.6	30.6	32.9	21.6	14.2	19.3
40	1321	-12.4	87.1	43.8	29.7	31.8	19.2	11.9	16.9
50	1321	-14.5	84.2	43.1	28.6	30.4	17.9	10.4	15.5
63	1321	-14.0	86.1	42.5	28.4	30.4	19.1	10.9	16.6
80	1321	-12.1	82.4	41.8	25.3	26.5	13.8	6.4	11.3
100	1321	-11.5	83.9	41.1	24.8	24.4	11.8	4.5	9.3
125	1321	-13.8	84.4	40.9	26.1	24.4	10.4	3.4	7.8
160	1321	-11.1	83.5	39.8	25.2	24.0	11.9	5.0	9.8
200	1321	-10.7	82.3	38.8	22.5	22.9	11.4	5.3	9.8
250	1321	-9.5	80.0	38.3	22.0	22.0	10.6	4.8	9.1
315	1321	-10.4	80.8	37.4	21.0	21.9	12.9	6.7	11.2
400	1321	-7.8	77.7	36.8	19.9	20.3	13.2	7.7	11.7
500	1321	-7.5	77.7	36.0	19.1	19.2	11.6	6.5	10.3
630	1321	-6.2	77.1	35.2	16.5	17.1	10.6	5.9	9.4
800	1321	-5.3	77.7	34.5	15.1	16.0	9.7	5.2	8.5
1000	1321	-4.4	77.0	33.7	14.4	15.5	9.4	5.2	8.2
1250	1321	-3.2	75.3	33.0	13.9	15.0	8.5	4.5	7.4
1600	1321	-2.3	74.2	32.4	13.3	14.1	7.2	3.6	6.1
2000	1321	-4.6	74.1	31.7	12.0	12.6	6.0	3.3	5.1
2500	1321	-4.4	73.3	31.1	14.7	14.3	5.8	3.4	4.9
3150	1321	-7.1	72.6	30.7	18.4	17.0	6.9	4.0	5.7
4000	1321	-8.6	72.3	30.9	22.4	22.7	11.7	5.4	9.3
5000	1321	-10.1	71.5	30.3	20.4	19.9	9.4	5.2	7.7
6300	1321	-10.8	71.0	27.9	14.8	12.9	5.9	4.5	5.4
8000	1321	-11.7	70.9	26.8	12.0	11.7	6.6	5.3	6.0
10000	1321	-12.0	70.2	26.1	10.2	10.7	6.9	6.1	6.6
12500	1321	-11.9	69.3	25.2	9.2	9.7	6.8	6.1	6.5
16000	1321	-11.7	68.0	24.1	6.2	6.6	4.9	4.5	4.8
20000	1321	-11.4	65.7	22.1	2.7	2.8	2.1	1.8	2.0

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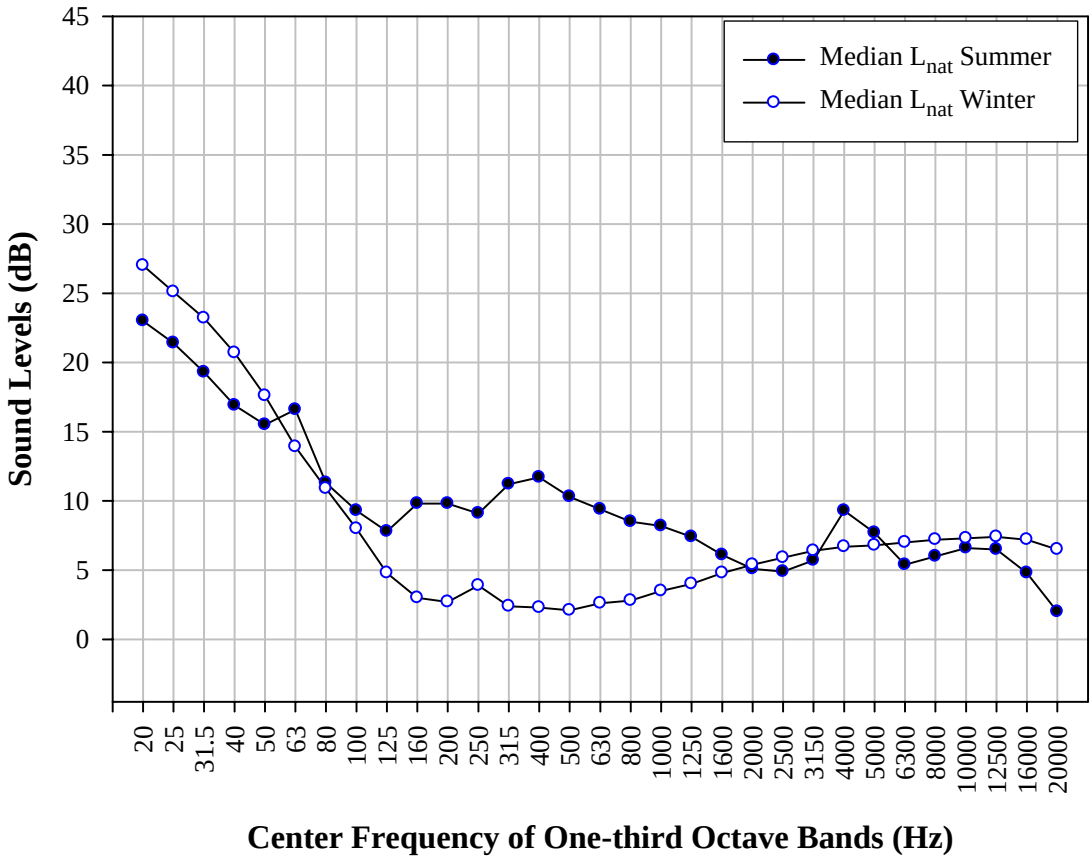


Figure VII-15. L_{nat} for one-third octave bands (20-20k Hz, un-weighted) for all hours, Canyonlands National Park, Canyonlands National Park, Lower Salt Creek (CANY004), winter 2005 and summer 2006.

Table VII-20. Acoustic metrics (dBA) for Canyonlands National Park, Horseshoe Canyon, Moonshine Spring (CANY005), winter 2005 (n=365).

Hour of Day	Num. Hours	L_{min}	L_{max}	L_{eq} L. Mean	L_{eq} A. Mean	L_{eq} Median	L_{10} Median	L_{50} Median	L_{90} Median	L_{nat} Median
0	15	7.7	51.1	26.4	22.6	20.7	18.6	15.9	15.7	15.8
1	15	7.7	58.8	26.9	20.7	17.6	16.4	15.9	15.7	15.8
2	15	7.7	50.0	23.7	20.2	18.3	16.3	15.9	15.7	15.9
3	15	7.9	55.1	23.6	20.9	21.4	16.8	15.9	15.7	15.9
4	15	8.0	49.7	17.7	15.9	16.0	16.4	15.9	15.7	15.9
5	15	8.0	48.4	19.5	16.3	16.0	16.5	15.9	15.7	15.9
6	15	7.9	61.2	26.5	19.3	19.1	17.4	16.0	15.8	16.0
7	15	7.9	73.3	37.4	26.6	25.3	25.7	16.1	15.8	16.0
8	15	8.1	61.0	32.1	29.2	28.8	30.4	16.8	15.9	16.1
9	15	8.2	62.8	33.0	30.1	29.6	30.2	17.1	15.9	16.2
10	14	8.2	60.2	31.8	29.6	29.4	31.9	17.8	16.1	16.3
11	14	8.5	67.0	33.9	29.2	27.9	30.4	17.9	16.0	16.7
12	14	8.5	68.9	37.0	30.2	29.4	32.7	20.0	16.2	17.1
13	14	8.5	63.7	34.2	29.7	28.8	31.7	18.6	16.3	17.0
14	15	7.6	60.2	31.5	28.6	27.8	29.5	17.2	16.1	16.4
15	16	7.4	59.2	32.2	30.4	30.7	32.3	18.2	16.0	16.4
16	16	7.4	56.8	28.6	27.5	27.6	28.2	16.8	15.9	16.1
17	16	7.2	58.0	29.9	26.7	27.6	29.4	17.2	16.0	16.5
18	16	7.4	60.4	28.8	25.7	24.3	27.0	17.1	16.0	16.2
19	16	7.4	60.1	30.6	26.8	26.4	27.4	16.5	15.9	16.1
20	16	7.4	54.5	27.7	24.1	22.4	23.9	16.2	15.8	16.0
21	16	7.5	57.5	29.0	26.6	26.8	28.6	16.7	15.9	16.1
22	16	7.7	56.5	29.9	26.0	24.6	25.5	16.4	15.8	16.0
23	16	7.7	70.0	33.5	23.5	21.4	21.5	16.0	15.8	15.9

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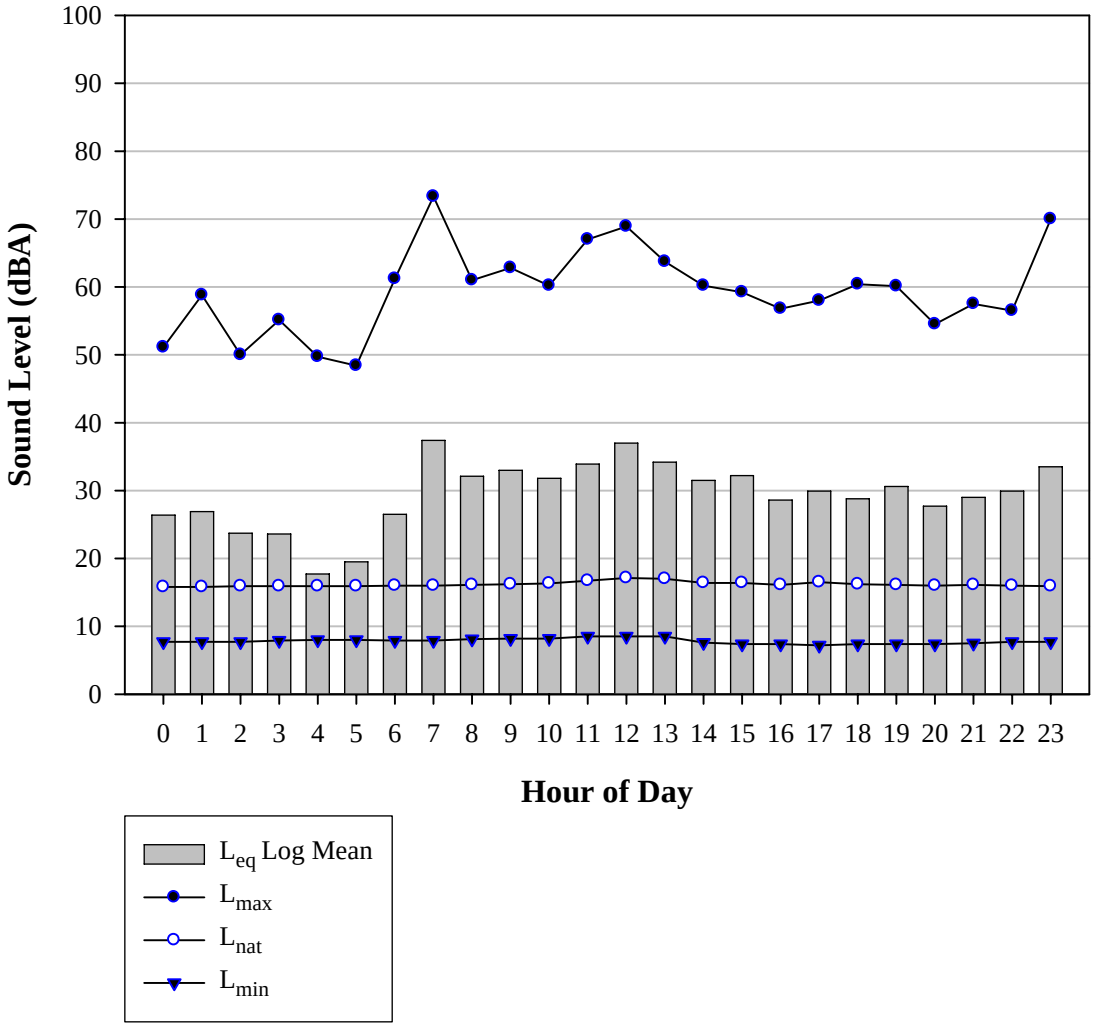


Figure VII-16. Acoustic metrics (dBA) for Canyonlands National Park, Horseshoe Canyon, Moonshine Spring (CANY005), winter 2005 (n=365).

Table VII-21. Acoustic metrics (dBA) for Canyonlands National Park, Horseshoe Canyon, Moonshine Spring (CANY005), summer 2006 (n=473).

Hour of Day	Num. Hours	L_{min}	L_{max}	L_{eq} L. Mean	L_{eq} A. Mean	L_{eq} Median	L_{10} Median	L_{50} Median	L_{90} Median	L_{nat} Median
0	20	12.9	56.7	38.8	30.9	35.1	37.6	34.7	30.9	34.5
1	20	12.8	50.6	38.1	30.2	33.4	36.2	32.4	29.7	31.8
2	21	12.8	56.0	36.8	29.4	31.9	33.8	31.5	29.2	31.3
3	21	12.8	60.3	38.5	29.4	33.4	35.5	31.8	29.8	31.7
4	20	12.7	57.3	37.1	28.7	34.3	36.6	32.5	29.9	32.4
5	20	12.7	52.1	31.6	26.2	31.2	33.8	30.6	23.9	30.5
6	19	12.8	57.4	26.3	24.7	25.6	25.2	19.0	17.4	18.7
7	19	12.8	59.0	26.5	25.2	26.1	27.0	18.4	17.2	18.1
8	19	12.9	59.7	30.1	28.8	28.7	29.8	20.3	17.3	17.7
9	19	13.1	59.7	30.2	28.6	28.7	30.5	20.8	17.9	18.6
10	19	14.2	67.7	32.1	29.2	27.9	30.3	21.7	18.2	19.2
11	19	14.7	58.2	29.5	28.7	28.4	30.1	22.6	18.8	20.4
12	18	15.3	57.4	29.2	28.4	28.9	30.6	22.2	18.9	19.8
13	18	14.5	60.1	30.0	28.7	28.4	31.3	22.7	19.2	21.2
14	19	14.2	56.3	29.2	28.1	28.0	31.0	22.7	19.0	20.8
15	19	14.3	56.9	29.1	28.4	28.4	31.6	22.6	19.1	20.8
16	20	14.0	58.0	32.6	28.2	27.0	29.5	21.7	18.8	19.9
17	20	14.2	55.7	30.7	27.6	26.2	29.4	21.7	18.7	20.4
18	20	14.4	65.9	32.4	28.4	25.9	27.7	21.5	18.5	20.2
19	20	13.6	63.7	29.5	26.3	24.8	27.5	19.7	18.0	18.6
20	20	13.1	58.4	27.1	24.6	24.6	25.9	18.9	17.8	18.3
21	21	13.0	59.0	36.2	30.9	31.5	33.9	28.5	21.6	24.3
22	21	12.9	56.5	38.1	32.6	35.7	39.2	31.8	28.5	30.9
23	21	12.9	56.4	40.1	31.8	35.5	38.8	32.1	29.3	31.5

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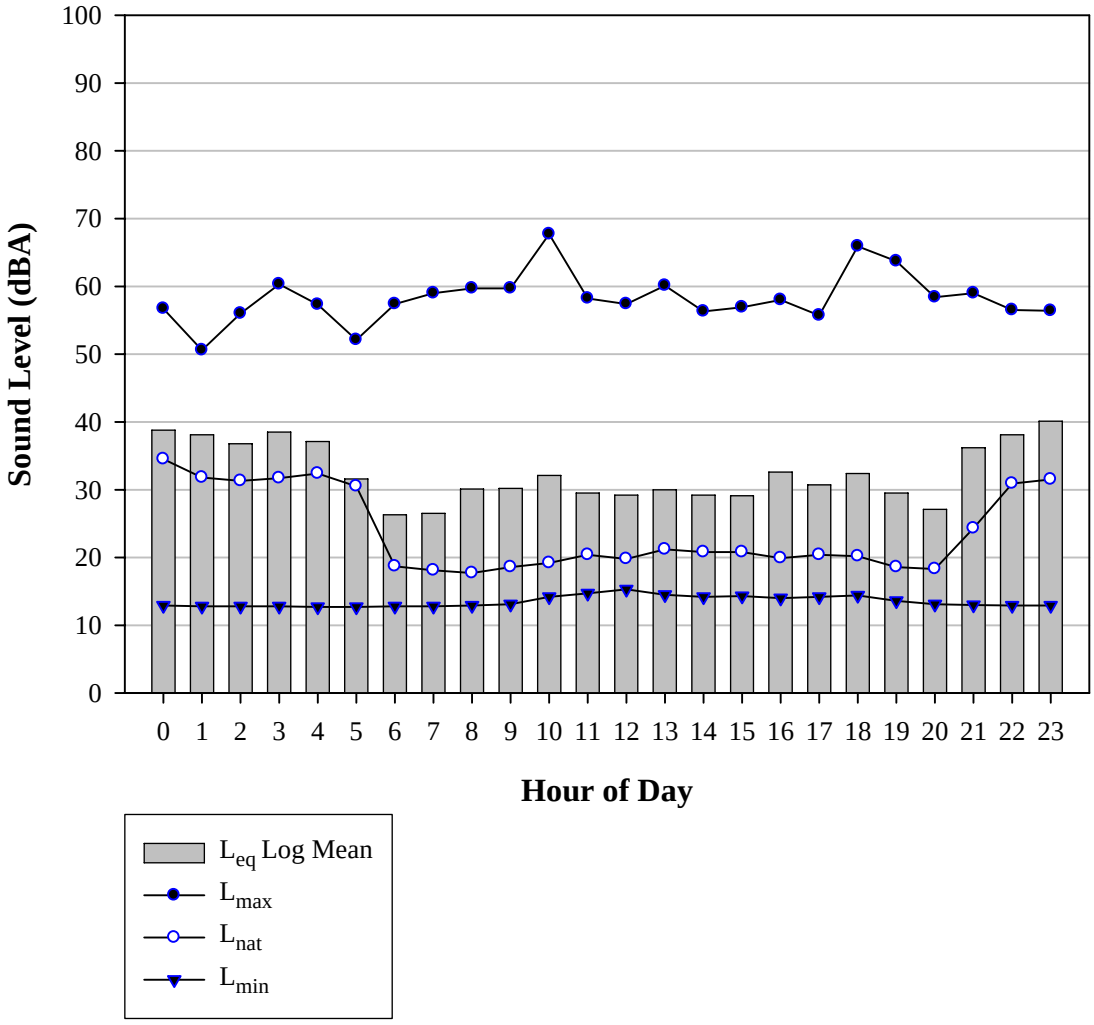


Figure VII-17. Acoustic metrics (dBA) for Canyonlands National Park, Horseshoe Canyon, Moonshine Spring (CANY005), summer 2006 (n=473).

Table VII-22. Acoustic metrics (dBA and un-weighted one-third octave bands 20-20k Hz) for all hours, CANY, Moonshine Spring (CANY005), winter 2005.

dBA/Freq	Num. Hours	L_{min}	L_{max}	L_{eq} L. Mean	L_{eq} Median	L_{10} Median	L_{50} Median	L_{90} Median	L_{nat} Median
dBA	365	7.2	73.3	31.4	25.5	26.2	16.2	15.8	16.1
20	365	-6.9	69.6	33.9	32.4	35.4	28.7	22.1	26.2
25	365	-4.6	74.5	33.3	31.8	34.9	27.1	21.0	24.6
31.5	365	-3.2	66.5	33.0	31.6	34.9	25.6	19.0	22.8
40	365	-6.1	64.6	32.7	31.2	34.9	23.5	16.7	20.4
50	365	-12.0	69.6	32.6	30.9	34.4	21.1	13.5	17.5
63	365	-9.7	80.0	33.2	29.5	33.1	18.2	10.4	14.2
80	365	-10.9	76.3	31.8	27.5	30.7	14.7	6.0	10.2
100	365	-17.4	72.1	31.0	27.5	29.5	11.5	1.4	6.9
125	365	-18.7	73.0	32.5	28.7	29.8	9.7	-0.6	5.0
160	365	-17.5	72.9	32.6	28.6	29.8	8.6	-1.2	3.6
200	365	-17.4	77.5	31.0	26.2	27.5	6.8	-2.1	2.4
250	365	-15.1	73.4	29.8	24.2	24.2	4.1	-2.8	0.4
315	365	-14.9	71.5	29.2	22.8	21.4	2.1	-2.9	-0.4
400	365	-13.9	72.1	28.9	19.9	17.6	0.7	-2.7	-0.9
500	365	-11.7	70.3	26.9	16.0	13.7	0.3	-2.1	-0.8
630	365	-10.7	66.8	23.0	11.3	9.5	0.5	-1.3	-0.2
800	365	-9.7	64.5	18.9	6.2	6.2	0.8	-0.6	0.3
1000	365	-9.4	60.5	15.4	3.2	3.9	1.1	0.1	0.8
1250	365	-8.4	54.8	11.7	2.2	3.0	1.5	0.6	1.2
1600	365	-7.3	50.8	10.1	3.1	3.8	2.4	1.7	2.2
2000	365	-6.9	45.3	8.7	3.4	4.1	3.2	2.5	3.0
2500	365	-6.2	46.0	8.6	4.0	4.6	3.8	3.2	3.7
3150	365	-5.5	47.4	9.2	4.7	5.2	4.5	4.0	4.4
4000	365	-4.7	50.8	9.8	5.3	5.7	5.1	4.7	5.0
5000	365	-4.5	50.6	8.9	5.7	6.1	5.6	5.2	5.5
6300	365	-5.1	45.6	8.4	6.0	6.4	6.0	5.6	5.8
8000	365	-5.3	55.7	8.4	6.4	6.7	6.3	6.0	6.2
10000	365	-4.8	47.5	7.1	6.6	6.8	6.5	6.1	6.4
12500	365	-5.2	45.8	6.2	6.2	6.4	6.2	5.9	6.1
16000	365	-5.0	39.6	5.5	5.6	5.8	5.5	5.3	5.4
20000	365	-6.7	38.2	4.8	4.3	4.5	4.2	4.0	4.1

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Table VII-23. Acoustic metrics (dBA and un-weighted one-third octave bands 20-20k Hz) for all hours, CANY, Moonshine Spring (CANY005), summer 2006.

dBA/Freq	Num. Hours	L_{min}	L_{max}	L_{eq} L. Mean	L_{eq} Median	L_{10} Median	L_{50} Median	L_{90} Median	L_{nat} Median
dBA	473	12.7	67.7	34.7	28.1	29.8	21.5	18.5	19.8
20	473	-15.8	71.1	32.9	28.0	31.1	21.9	14.4	19.2
25	473	-14.5	70.2	32.2	27.9	31.2	20.8	13.3	17.7
31.5	473	-13.9	69.0	31.5	28.3	31.5	19.7	11.4	16.1
40	473	-12.8	67.3	30.9	28.1	31.5	19.3	10.6	15.2
50	473	-15.0	66.7	30.6	27.8	31.3	18.2	8.9	13.8
63	473	-10.7	75.6	30.4	26.8	30.3	16.7	7.8	12.1
80	473	-11.7	73.3	28.8	25.0	28.2	14.9	7.2	11.2
100	473	-14.2	70.1	27.5	24.2	25.7	12.8	5.0	9.0
125	473	-16.5	80.8	29.8	25.2	25.2	11.0	5.0	8.2
160	473	-13.5	71.1	28.6	25.4	25.3	11.4	4.6	8.0
200	473	-13.4	63.4	26.1	23.0	23.7	9.6	3.2	6.7
250	473	-11.9	66.4	24.3	20.0	21.0	7.9	2.1	5.3
315	473	-11.3	69.3	23.9	18.9	18.7	6.9	1.7	4.4
400	473	-10.1	64.0	22.4	16.7	16.6	6.5	2.0	4.6
500	473	-8.7	62.1	20.5	14.2	13.9	5.1	1.6	3.6
630	473	-7.6	61.6	18.3	11.1	11.6	4.6	1.8	3.4
800	473	-6.8	55.4	16.8	9.4	10.3	4.9	2.1	3.7
1000	473	-5.4	50.3	15.9	8.3	9.0	4.8	2.6	4.0
1250	473	-4.5	59.5	15.5	8.0	9.2	4.7	2.7	3.8
1600	473	-3.0	56.4	14.2	7.4	8.7	4.5	2.9	3.9
2000	473	-1.9	50.9	12.8	7.3	8.5	4.9	3.7	4.5
2500	473	-0.8	56.6	25.6	11.4	12.2	6.1	4.6	5.3
3150	473	0.1	56.3	30.2	12.8	13.1	6.4	5.4	5.9
4000	473	0.8	61.7	20.8	16.0	15.7	7.9	6.3	6.9
5000	473	-1.5	55.9	23.5	13.8	14.1	7.8	7.0	7.4
6300	473	-3.1	59.0	16.0	10.0	10.1	8.0	7.5	7.8
8000	473	-3.7	54.4	14.5	10.0	10.2	8.4	8.0	8.2
10000	473	-5.1	57.5	17.8	9.9	10.0	8.8	8.5	8.7
12500	473	-5.5	57.0	17.0	9.8	9.8	9.0	8.7	8.9
16000	473	-6.0	50.6	13.4	9.5	9.6	9.1	8.8	9.0
20000	473	-8.6	46.6	9.5	8.2	8.3	7.9	7.7	7.8

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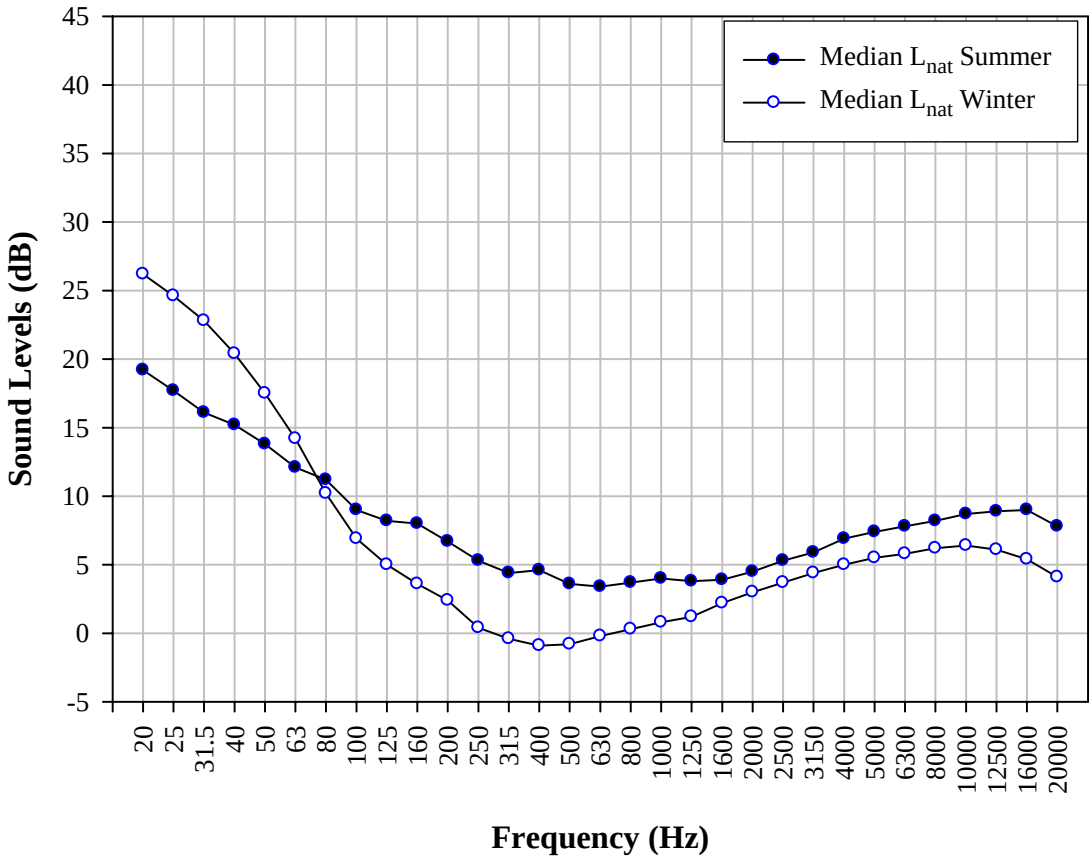


Figure VII-18. L_{nat} for one-third octave bands (20-20k Hz, un-weighted) for all hours, Canyonlands National Park, Horseshoe Canyon, Moonshine Spring (CANY005), winter 2005 and summer 2006.

Table VII-24. Acoustic metrics (dBA) for Canyonlands National Park, Colorado River, Little Bridge Canyon (CANY006), summer 2006 (n=644).

Hour of Day	Num. Hours	L_{min}	L_{max}	L_{eq} L. Mean	L_{eq} A. Mean	L_{eq} Median	L_{10} Median	L_{50} Median	L_{90} Median	L_{nat} Median
0	28	15.6	56.9	37.8	35.2	34.8	38.8	32.2	27.8	31.4
1	28	16.9	56.9	40.1	35.2	34.2	36.8	31.6	29.1	30.8
2	28	16.7	57.1	38.8	34.7	32.8	35.7	31.0	27.5	30.5
3	28	17.1	55.1	37.5	34.5	34.9	38.3	31.7	27.8	31.2
4	28	19.8	54.3	38.9	35.4	35.2	37.8	33.5	30.4	33.3
5	28	17.1	60.6	37.8	35.6	35.3	37.8	34.0	30.7	33.9
6	28	13.8	63.0	33.8	31.8	31.7	32.1	28.4	25.4	28.2
7	27	13.8	66.5	33.4	31.5	32.1	30.2	24.9	22.5	24.4
8	24	13.8	67.6	40.1	34.7	33.3	32.8	26.2	22.2	22.9
9	25	14.2	67.3	45.0	41.2	40.1	42.2	28.2	22.2	22.7
10	26	14.1	87.2	50.2	42.4	41.9	43.4	29.8	22.0	23.0
11	26	12.6	79.2	47.8	42.0	41.1	43.6	27.1	20.8	21.3
12	26	12.9	68.5	47.9	40.4	39.5	39.2	24.7	20.5	21.8
13	26	13.1	74.6	47.2	40.9	39.9	41.4	25.4	20.2	21.3
14	26	12.9	71.5	49.4	41.6	41.3	47.1	26.3	19.9	20.9
15	26	12.8	68.5	47.6	38.1	37.2	39.0	25.0	19.5	20.9
16	26	12.6	65.2	43.9	36.0	35.3	34.9	24.2	18.7	20.6
17	25	12.7	75.3	46.2	37.0	34.9	38.9	24.9	19.1	21.7
18	25	12.6	61.2	41.7	33.2	32.0	34.6	22.9	18.1	20.3
19	28	12.5	62.7	41.2	30.5	28.1	28.4	20.5	17.5	18.7
20	28	13.3	69.5	49.1	40.4	39.6	43.6	32.1	20.0	23.4
21	28	15.7	66.6	40.1	35.8	34.8	36.8	32.3	26.9	29.8
22	28	15.8	59.8	38.7	35.3	34.3	37.4	31.7	28.0	30.6
23	28	15.4	54.3	38.0	35.6	35.8	39.8	31.8	29.0	31.0

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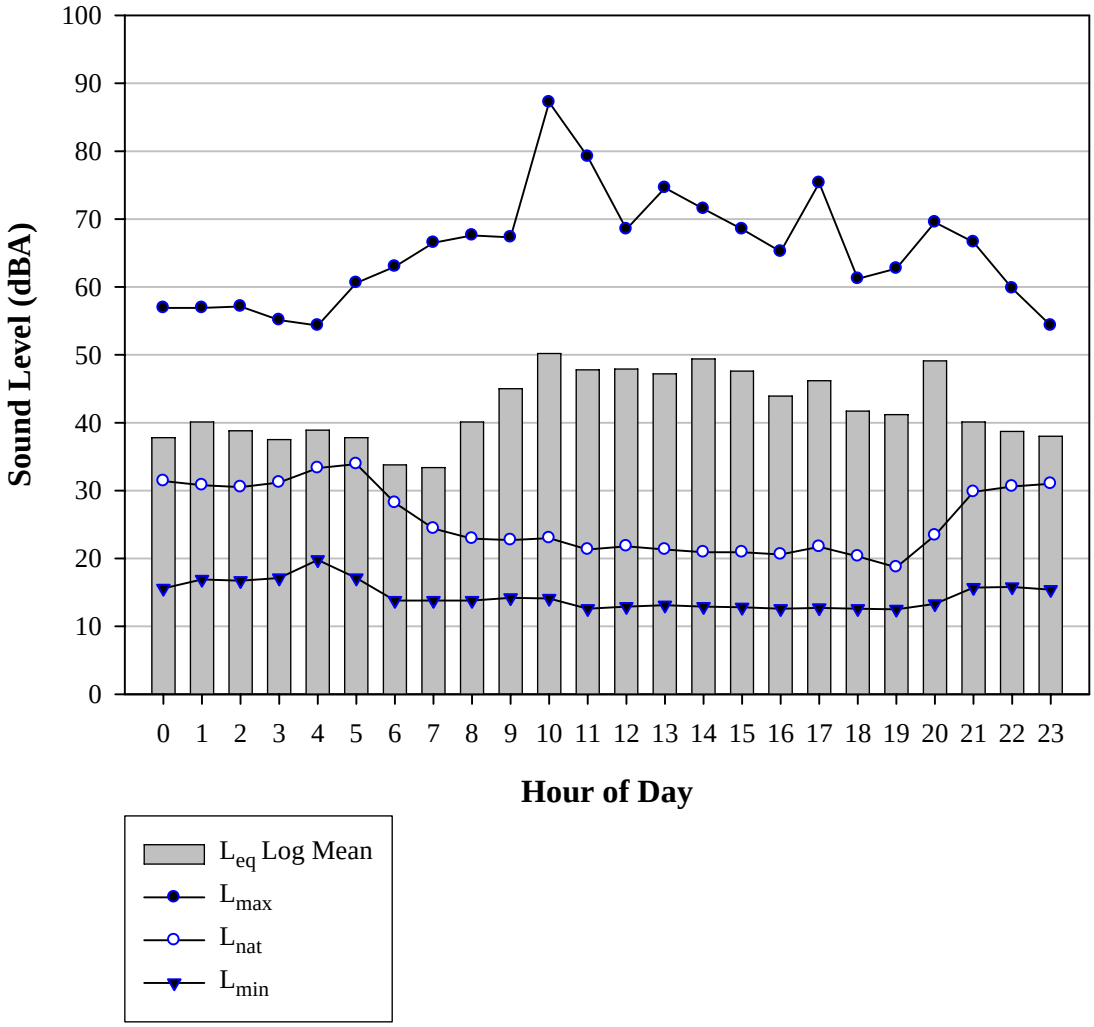


Figure VII-19. Acoustic metrics (dBA) for Canyonlands National Park, Colorado River, Little Bridge Canyon (CANY006), summer 2006 (n=644).

Table VII-25. Acoustic metrics (dBA) for Canyonlands National Park, Colorado River, Little Bridge Canyon (CANY006), November 2006 (n=255).

Hour of Day	Num. Hours	L_{min}	L_{max}	L_{eq} L. Mean	L_{eq} A. Mean	L_{eq} Median	L_{10} Median	L_{50} Median	L_{90} Median	L_{nat} Median
0	11	19.5	39.8	22.0	21.7	21.6	21.1	20.4	20.0	20.4
1	11	19.5	44.3	22.6	22.4	22.3	21.3	20.2	19.9	20.2
2	11	19.5	53.0	22.5	22.2	21.7	21.3	20.1	19.8	20.1
3	11	19.5	43.8	22.8	21.6	20.5	20.9	20.1	19.8	20.1
4	11	19.4	48.5	27.4	22.7	20.3	20.7	20.1	19.8	20.1
5	10	19.5	51.6	30.0	22.5	20.8	20.9	20.3	19.7	20.3
6	10	19.5	53.0	32.4	24.6	22.8	22.7	20.4	19.9	20.3
7	10	19.5	56.3	32.2	29.1	29.6	29.1	20.6	20.0	20.4
8	10	19.5	63.6	34.2	32.0	30.1	31.5	20.9	20.0	20.3
9	10	19.5	66.2	34.3	33.1	32.9	32.7	21.9	20.2	20.4
10	10	19.5	72.4	38.5	33.4	33.1	33.6	21.6	20.3	20.6
11	10	19.6	70.1	41.2	33.6	33.4	32.5	21.8	20.4	20.9
12	10	19.5	64.8	38.4	31.6	29.0	29.6	21.1	20.2	20.6
13	10	19.6	54.9	33.9	30.2	29.1	29.8	21.4	20.1	20.5
14	11	19.5	62.8	32.1	29.5	31.9	29.3	20.6	19.8	20.1
15	11	19.5	57.9	33.5	29.4	28.5	30.9	20.5	19.9	20.0
16	11	19.5	61.7	32.9	30.6	29.3	29.7	20.8	19.9	20.1
17	11	19.5	59.8	30.9	28.1	26.5	29.2	20.5	20.0	20.3
18	11	19.5	49.2	26.2	25.3	25.7	24.7	20.2	19.9	20.1
19	11	19.5	43.3	24.3	23.4	22.7	22.3	20.3	19.8	20.1
20	11	19.5	53.3	24.7	23.9	22.8	24.4	20.5	19.9	20.2
21	11	19.5	63.1	29.0	25.0	22.5	22.5	20.6	20.0	20.5
22	11	19.5	47.3	24.0	23.2	21.8	22.3	20.6	20.0	20.5
23	11	19.5	54.2	23.6	23.0	22.5	22.5	20.4	19.8	20.3

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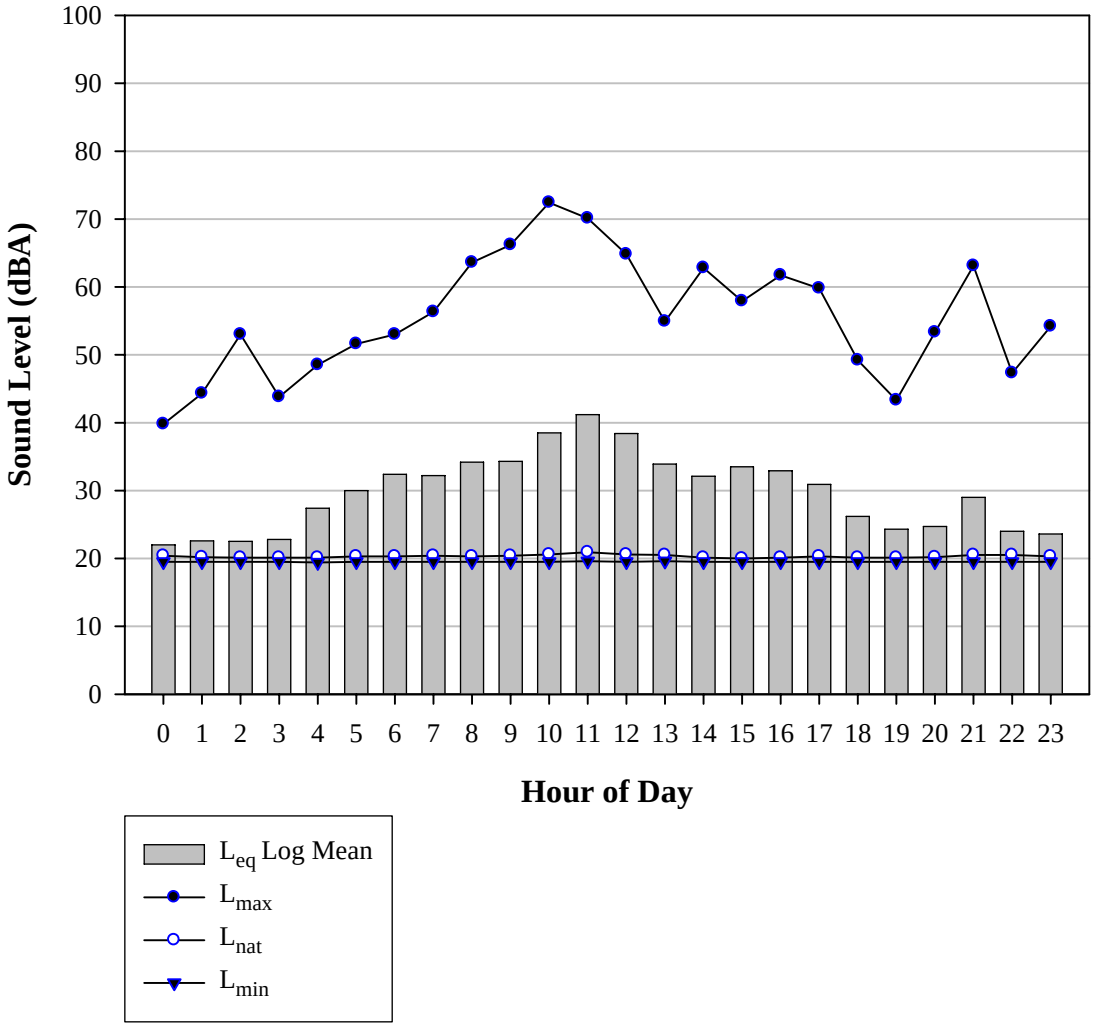


Figure VII-20. Acoustic metrics (dBA) for Canyonlands National Park, Colorado River, Little Bridge Canyon (CANY006), November 2006 (n=255).

Table VII-26. Acoustic metrics (dBA and un-weighted one-third octave bands 20-20k Hz) for all hours, CANY, CO River, Little Bridge Canyon (CANY006), summer 2006.

dBA/Freq	Num. Hours	L_{min}	L_{max}	L_{eq} L. Mean	L_{eq} Median	L_{10} Median	L_{50} Median	L_{90} Median	L_{nat} Median
dBA	644	12.5	87.2	44.7	35.9	37.4	28.7	22.5	24.5
20	644	-13.0	78.0	32.4	28.0	30.7	24.4	18.0	21.2
25	644	-4.0	80.6	32.1	27.4	29.9	22.5	16.6	19.6
31.5	644	-8.2	85.5	32.2	27.1	29.8	21.8	15.3	18.5
40	644	-9.9	86.1	32.9	26.2	29.1	18.8	11.9	14.8
50	644	-14.1	81.3	34.9	25.2	28.1	16.2	8.3	11.2
63	644	-12.7	77.5	31.8	22.8	25.9	13.3	5.0	7.9
80	644	-13.8	78.4	32.5	20.9	23.4	10.1	2.5	5.2
100	644	-15.6	77.7	35.3	21.4	22.5	8.4	0.7	3.3
125	644	-15.1	81.5	37.6	23.2	22.8	7.5	-0.2	2.7
160	644	-13.4	84.0	34.2	23.0	23.2	8.2	1.8	4.1
200	644	-13.3	83.6	31.9	19.9	20.8	7.9	2.3	4.6
250	644	-11.6	83.4	31.1	18.1	18.6	6.6	2.0	4.0
315	644	-9.9	83.0	30.7	17.4	17.1	7.0	2.7	5.0
400	644	-9.2	85.0	30.6	15.5	15.5	7.1	3.3	5.3
500	644	-8.2	81.9	29.5	13.5	14.4	8.3	4.7	6.5
630	644	-7.1	82.0	28.4	11.2	12.4	7.1	3.9	5.4
800	644	-5.9	79.6	26.5	10.4	12.1	7.3	4.3	5.6
1000	644	-5.6	80.0	25.2	9.6	11.0	6.1	3.5	4.7
1250	644	-4.8	75.6	22.6	8.6	9.8	4.9	2.6	3.6
1600	644	-3.8	73.5	20.2	9.2	10.3	4.2	2.1	2.9
2000	644	-3.2	70.8	17.9	11.1	12.1	3.9	1.6	2.4
2500	644	-2.2	67.1	17.8	13.6	14.0	4.6	2.2	2.9
3150	644	-1.9	62.4	19.4	14.1	12.8	5.4	3.1	3.9
4000	644	-2.3	65.5	25.6	20.4	20.0	12.2	6.8	8.7
5000	644	-1.4	63.1	33.7	25.4	28.1	21.8	16.3	18.7
6300	644	-3.9	62.4	33.3	13.1	12.8	6.8	5.0	5.4
8000	644	-2.3	70.6	42.6	11.9	12.8	7.2	5.7	6.0
10000	644	-4.5	69.0	40.3	13.8	15.7	8.0	6.7	7.0
12500	644	-6.2	62.0	31.1	11.6	11.2	7.8	7.3	7.5
16000	644	-8.3	58.1	28.7	10.2	10.8	8.5	8.1	8.3
20000	644	-12.3	57.1	26.8	9.3	9.8	8.6	8.3	8.4

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Table VII-27. Acoustic metrics (dBA and un-weighted one-third octave bands 20-20k Hz) for all hours, CANY, CO River, Little Bridge Canyon (CANY006), November 2006.

dBA/Freq	Num. Hours	Lmin	Lmax	Leq L. Mean	Leq Median	L10 Median	L50 Median	L90 Median	Lnat Median
dBA	255	19.4	72.4	33.0	24.7	25.9	20.5	19.9	20.3
20	255	7.2	71.6	32.6	28.0	30.5	23.1	20.1	22.0
25	255	5.6	85.8	36.4	28.1	31.2	21.9	18.2	20.3
31.5	255	4.4	75.5	32.9	28.0	31.4	20.8	16.7	19.1
40	255	1.1	81.5	33.7	27.6	31.3	19.0	14.5	17.3
50	255	-0.1	73.5	31.8	26.6	30.3	16.9	11.9	14.9
63	255	-0.3	76.0	32.1	25.1	28.9	16.0	9.9	13.2
80	255	-2.8	80.7	34.2	22.6	26.0	12.3	6.1	9.5
100	255	-3.7	77.7	31.6	24.0	25.4	9.8	3.6	6.9
125	255	-4.5	74.8	32.4	25.5	25.7	9.3	3.7	7.3
160	255	-5.0	72.4	31.5	25.3	26.1	8.3	2.4	5.9
200	255	-5.1	72.0	28.5	21.2	23.5	5.7	1.0	4.1
250	255	-4.6	71.0	28.5	20.5	19.7	4.6	0.4	3.2
315	255	-4.2	68.2	27.6	19.0	17.6	5.6	1.8	4.4
400	255	-3.3	68.3	27.4	16.8	14.1	4.2	1.5	3.5
500	255	-2.1	66.6	25.3	13.0	12.0	6.4	3.5	5.8
630	255	-1.3	65.3	23.6	9.6	10.8	6.1	3.5	5.5
800	255	-1.1	63.8	22.8	8.7	10.4	6.3	3.7	5.7
1000	255	-0.9	62.7	21.7	6.6	8.0	4.3	2.3	3.9
1250	255	-0.3	60.8	20.5	5.6	6.7	3.6	1.9	3.1
1600	255	0.5	58.5	19.3	4.1	4.9	2.7	1.8	2.5
2000	255	1.6	56.2	17.7	3.8	4.3	3.0	2.5	2.9
2500	255	2.9	55.3	16.6	4.7	4.9	3.8	3.5	3.7
3150	255	4.5	59.3	16.5	6.2	6.3	5.3	5.0	5.2
4000	255	6.3	64.7	18.3	8.2	8.1	7.0	6.7	6.9
5000	255	8.2	57.9	17.6	9.8	9.7	8.8	8.6	8.8
6300	255	10.0	57.0	17.2	11.2	11.2	10.5	10.4	10.5
8000	255	11.8	59.3	18.7	12.7	12.8	12.2	12.1	12.2
10000	255	13.4	57.1	17.0	14.0	14.1	13.8	13.7	13.8
12500	255	14.6	56.7	17.7	15.2	15.3	15.0	14.9	15.0
16000	255	15.3	55.6	17.9	15.9	16.0	15.7	15.6	15.7
20000	255	14.7	52.2	16.6	15.3	15.4	15.2	15.1	15.2

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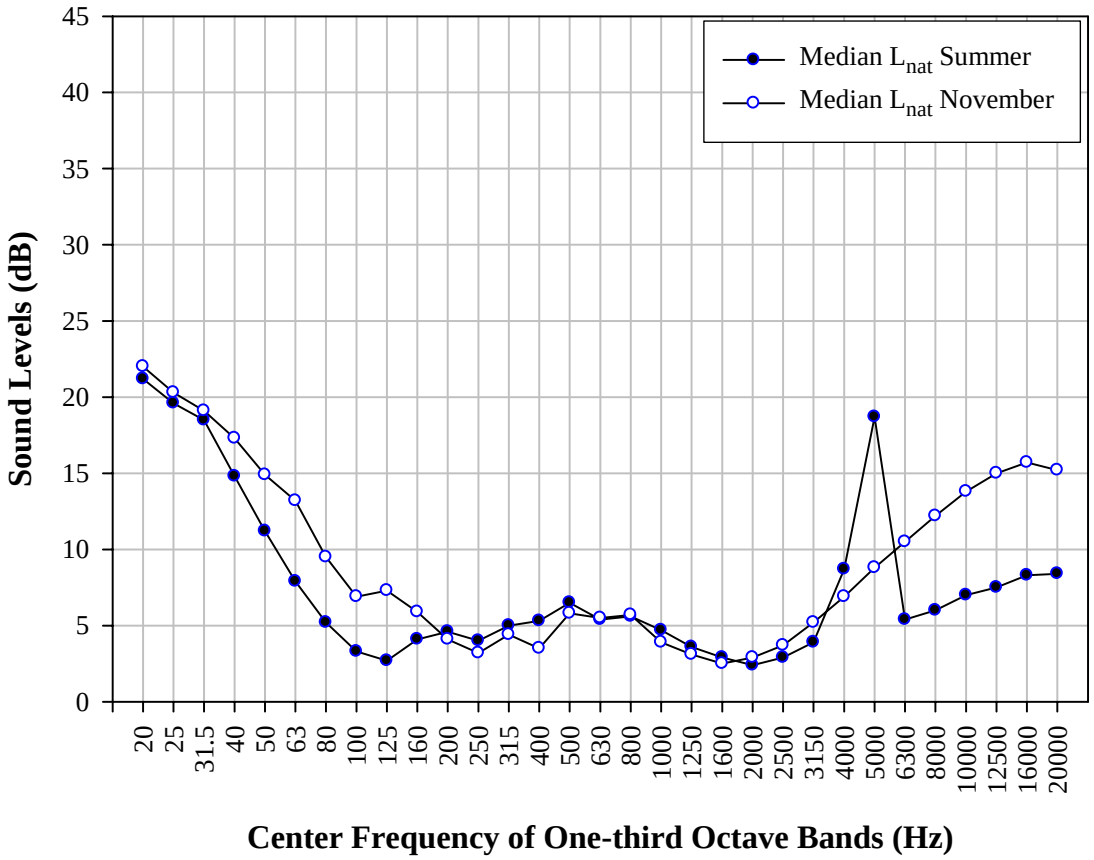


Figure VII-21. L_{nat} for one-third octave bands (20-20k Hz, un-weighted) for all hours, Canyonlands National Park, Colorado River, Little Bridge Canyon (CANY006), summer 2006 and November 2006.

Table VII-28. Acoustic metrics (dBA) for Canyonlands National Park, Green River, Upheaval Bottom (CANY007), summer 2006-2007 (n=831).

Hour of Day	Num. Hours	L_{min}	L_{max}	L_{eq} L. Mean	L_{eq} A. Mean	L_{eq} Median	L_{10} Median	L_{50} Median	L_{90} Median	L_{nat} Median
0	35	20.3	74.2	53.3	45.6	47.0	48.8	44.5	41.6	44.2
1	35	16.2	77.4	52.9	45.7	46.8	48.0	43.4	39.5	43.1
2	35	15.6	77.9	52.2	44.3	45.7	48.1	44.2	40.9	43.9
3	35	17.4	74.7	50.3	43.6	45.7	47.7	42.4	36.3	42.2
4	35	16.0	76.0	47.8	40.0	41.0	44.8	37.8	30.6	37.2
5	35	14.0	74.3	42.9	32.3	31.6	34.0	27.7	25.4	27.6
6	35	13.0	75.3	42.6	32.0	30.7	31.2	25.0	20.9	23.9
7	35	12.9	79.4	42.9	31.7	29.7	30.6	25.5	21.1	24.0
8	34	13.0	79.7	50.7	35.0	32.6	32.9	26.1	22.0	23.0
9	33	13.2	77.4	47.9	37.6	33.7	35.0	26.2	21.8	22.7
10	33	13.9	76.3	51.3	44.2	47.4	41.8	28.8	24.0	25.3
11	33	14.3	83.6	49.7	40.0	39.1	36.4	28.0	22.2	25.0
12	35	14.9	79.7	50.0	36.7	32.8	33.4	26.2	21.4	24.8
13	36	14.6	74.9	49.0	38.2	35.6	36.8	27.3	24.4	25.1
14	36	14.6	76.0	49.1	38.8	37.3	34.2	27.2	24.1	25.0
15	36	14.7	74.7	47.7	37.8	35.5	34.8	27.2	23.8	25.2
16	32	14.4	81.5	49.0	41.6	45.3	39.8	28.4	23.3	24.9
17	30	14.8	87.7	51.9	42.3	45.5	39.3	28.6	24.2	26.3
18	33	14.7	78.2	47.3	39.8	38.0	39.6	27.2	21.9	25.4
19	35	14.6	80.2	49.7	42.0	46.5	45.5	28.7	23.8	26.9
20	36	14.7	74.9	53.5	43.4	46.0	45.5	29.0	22.2	24.8
21	36	18.9	77.2	53.6	47.2	50.0	53.0	48.2	39.0	46.5
22	36	19.3	75.3	53.6	46.5	49.3	51.0	46.4	38.9	43.7
23	37	19.1	73.5	51.6	44.6	47.5	49.6	43.9	39.9	42.8

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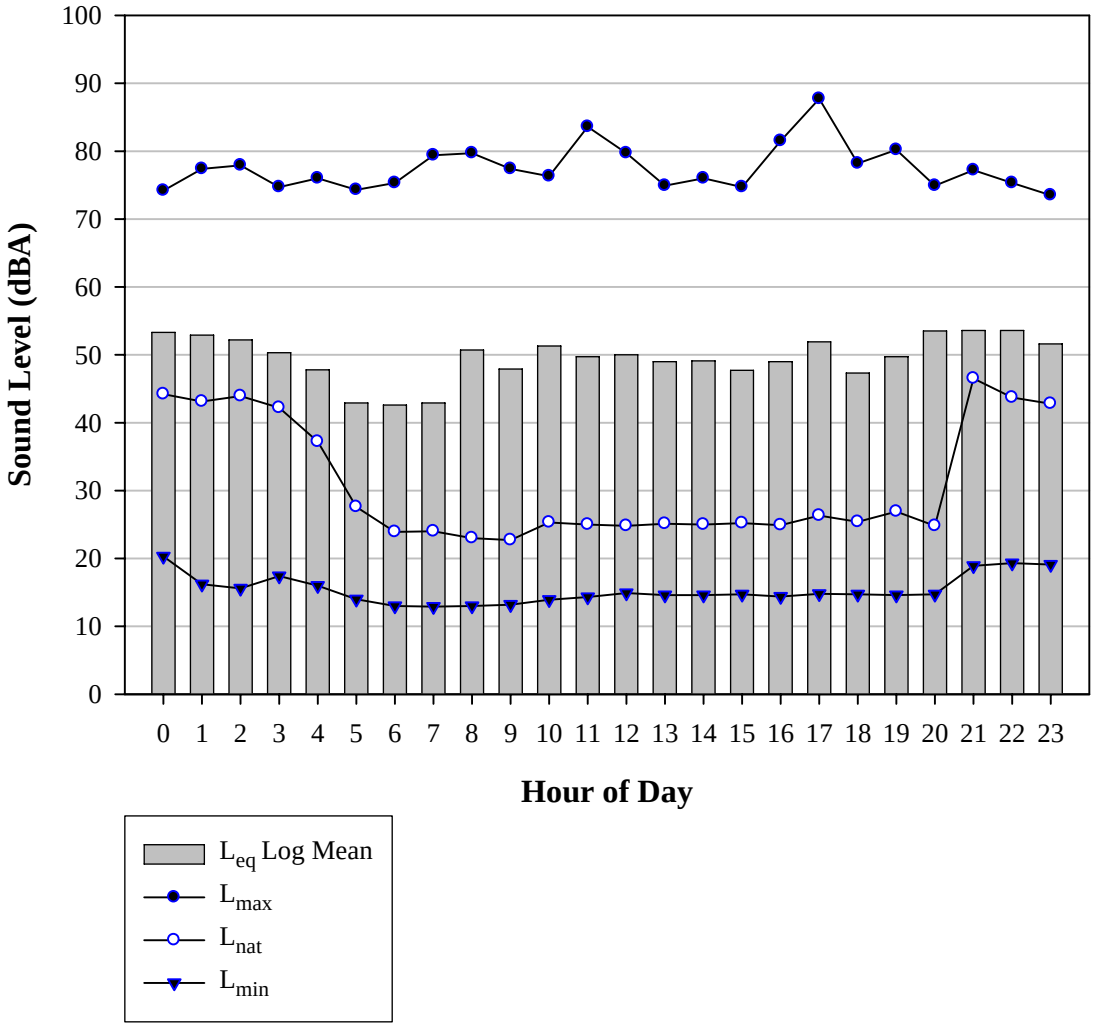


Figure VII-22. Acoustic metrics (dBA) for Canyonlands National Park, Green River, Upheaval Bottom (CANY007), summer 2006-2007 (n=831).

Table VII-29. Acoustic metrics (dBA) for Canyonlands National Park, Green River, Upheaval Bottom (CANY007), November 2006 (n=563).

Hour of Day	Num. Hours	L_{min}	L_{max}	L_{eq} L. Mean	L_{eq} A. Mean	L_{eq} Median	L_{10} Median	L_{50} Median	L_{90} Median	L_{nat} Median
0	24	16.4	53.6	25.3	20.5	18.8	18.2	17.1	16.8	17.0
1	24	16.4	60.1	29.1	21.3	20.5	18.5	16.8	16.7	16.8
2	24	16.4	48.9	25.8	20.9	19.4	18.3	16.8	16.6	16.7
3	24	16.4	51.1	27.6	21.3	19.5	17.7	16.8	16.6	16.7
4	24	16.4	51.8	26.9	19.9	18.7	17.2	16.7	16.6	16.7
5	24	16.4	52.0	25.6	20.1	19.0	18.2	16.8	16.7	16.8
6	23	16.4	50.6	24.6	21.3	20.9	19.2	17.0	16.7	17.0
7	23	16.4	63.9	31.9	26.3	24.4	25.8	17.1	16.8	16.9
8	23	16.5	58.5	31.6	30.0	30.6	32.2	20.1	17.0	17.4
9	23	16.5	67.3	35.2	30.8	29.6	33.5	20.7	17.5	17.8
10	23	16.7	65.7	39.3	31.2	29.9	32.3	21.9	19.2	19.3
11	24	16.7	70.4	42.5	32.8	31.1	32.5	22.1	19.3	19.4
12	24	16.6	79.0	43.9	32.4	29.5	32.1	22.0	19.3	19.9
13	24	16.7	59.6	34.1	30.0	28.4	29.8	21.1	18.7	19.8
14	24	16.7	61.4	33.2	30.9	30.0	32.3	21.1	18.4	18.9
15	24	16.5	67.5	36.7	31.0	29.0	32.3	20.5	18.0	18.7
16	23	16.6	58.5	32.9	29.6	28.3	29.8	20.3	19.0	19.0
17	23	16.6	58.2	31.3	27.8	27.5	27.7	19.4	17.3	17.5
18	23	16.5	59.1	29.0	26.0	24.0	28.1	18.4	17.1	17.4
19	23	16.5	64.0	32.0	25.9	25.2	28.0	19.0	17.4	17.6
20	23	16.5	56.4	30.0	25.2	24.4	26.0	17.7	17.1	17.3
21	23	16.5	55.0	30.9	25.9	23.6	26.4	18.4	17.2	17.6
22	23	16.5	65.0	32.9	25.7	24.0	26.5	17.8	16.7	16.8
23	23	16.4	53.9	26.8	22.5	20.7	21.8	17.3	16.7	17.0

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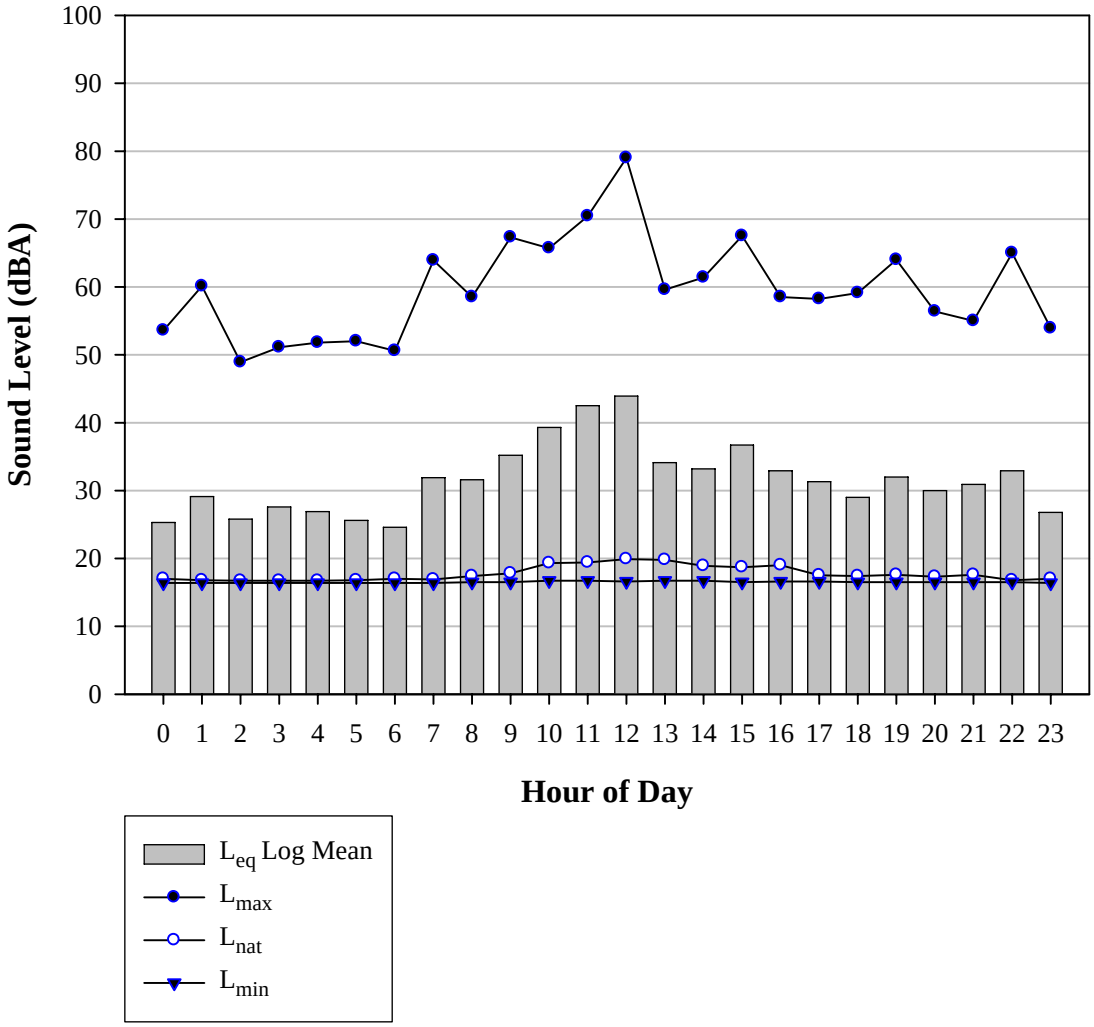


Figure VII-23. Acoustic metrics (dBA) for Canyonlands National Park, Green River, Upheaval Bottom (CANY007), November 2006 (n=563).

Table VII-30. Acoustic metrics (dBA and un-weighted one-third octave bands 12.5-20k Hz) for all hours, CANY, Green R., Upheaval Bottom (CANY007), summer 2006-2007.

dBA/Freq	Num. Hours	Lmin	Lmax	Leq L. Mean	Leq Median	L10 Median	L50 Median	L90 Median	Lnat Median
dBA	831	12.9	87.7	50.6	40.5	39.4	30.1	25.2	27.7
12.5	186	8.9	82.0	41.7	32.2	34.2	28.6	24.7	27.1
15.8	186	7.0	78.9	40.8	31.1	33.5	26.5	21.8	24.2
20	831	-17.4	79.2	48.7	31.7	33.9	24.7	17.2	21.6
25	831	-12.9	79.0	48.1	31.6	34.2	24.2	16.4	20.4
31.5	831	-12.5	81.8	47.4	31.7	34.4	23.8	15.2	19.5
40	831	-14.5	84.5	46.8	31.6	34.4	23.3	13.9	18.1
50	831	-14.1	83.8	46.2	31.2	34.2	22.6	12.1	16.8
63	831	-12.9	84.2	45.5	30.4	33.2	21.4	10.3	15.2
80	831	-13.4	82.8	44.9	29.3	31.6	19.9	9.3	13.9
100	831	-12.6	81.1	44.1	29.4	31.0	18.2	7.8	12.4
125	831	-13.2	82.2	43.6	30.6	31.5	16.1	6.3	10.6
160	831	-11.7	84.0	43.0	29.7	31.2	15.1	6.4	10.5
200	831	-11.3	84.3	42.2	26.2	28.4	14.9	6.6	10.5
250	831	-9.7	83.1	41.5	25.1	26.0	12.8	5.1	8.8
315	831	-9.1	83.0	40.7	23.5	24.1	12.0	5.5	9.0
400	831	-8.2	83.7	39.9	22.3	22.5	12.4	6.0	9.6
500	831	-7.3	80.9	39.1	19.3	20.1	11.3	5.8	8.9
630	831	-6.1	80.6	38.4	17.1	18.1	10.7	5.2	8.2
800	831	-5.5	78.8	37.7	15.8	16.8	10.1	5.2	7.9
1000	831	-4.5	78.2	37.1	14.7	15.7	9.5	5.0	7.3
1250	831	-6.9	76.9	36.5	13.6	14.6	8.8	4.9	7.0
1600	831	-8.1	76.8	36.1	13.0	14.3	8.6	5.0	7.0
2000	831	-8.4	74.4	35.7	14.5	15.3	8.8	6.0	7.8
2500	831	-9.9	76.6	37.1	21.1	21.3	11.0	7.4	9.2
3150	831	-14.0	76.2	43.0	28.0	26.1	13.7	8.6	10.8
4000	831	-12.1	77.4	42.4	26.2	26.6	17.2	11.1	14.2
5000	831	-14.4	73.1	35.7	26.0	26.9	19.0	13.0	16.3
6300	831	-12.8	75.1	34.9	19.3	19.9	12.6	10.0	12.0
8000	831	-10.8	72.4	35.0	18.5	19.4	13.3	9.4	11.6
10000	831	-11.4	74.1	35.1	17.9	18.5	12.4	9.5	10.9
12500	831	-12.4	71.3	35.2	20.7	19.9	12.5	9.8	11.0
16000	831	-15.1	74.2	35.5	20.9	20.9	12.6	10.0	11.1
20000	831	-17.0	73.9	35.2	23.0	22.1	11.8	9.2	10.2

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Table VII-31. Acoustic metrics (dBA and un-weighted one-third octave bands 20-20k Hz) for all hours, CANY, Green River, Upheaval Bottom (CANY007), November 2006.

dBA/Freq	Num. Hours	L_{min}	L_{max}	L_{eq} L. Mean	L_{eq} Median	L_{10} Median	L_{50} Median	L_{90} Median	L_{nat} Median
dBA	563	16.4	79.0	35.3	25.5	27.4	19.0	17.5	17.8
20	563	13.4	75.0	37.9	31.3	34.1	28.5	25.6	26.6
25	563	10.1	89.3	38.6	30.8	34.3	26.6	22.9	23.9
31.5	563	5.1	80.5	35.8	30.7	34.7	24.9	19.8	21.2
40	563	2.1	82.1	36.2	31.0	35.0	23.6	16.8	18.3
50	563	-1.5	78.6	35.0	30.7	34.8	22.2	13.7	15.4
63	563	-2.3	79.6	36.0	29.6	33.7	20.6	10.8	13.1
80	563	-3.7	85.8	37.4	28.0	31.8	19.3	8.1	10.5
100	563	-5.4	76.5	35.1	26.8	29.7	16.5	4.2	7.0
125	563	-5.8	80.0	34.7	27.9	29.5	12.6	1.5	4.0
160	563	-6.0	81.4	33.8	28.2	30.1	8.9	-0.4	1.3
200	563	-5.8	78.7	31.9	25.0	27.9	5.9	-1.6	-0.2
250	563	-5.5	78.3	30.7	22.1	23.7	3.8	-2.3	-1.2
315	563	-4.9	76.2	29.9	20.6	20.0	2.0	-2.3	-1.4
400	563	-4.3	76.5	29.1	17.3	15.9	0.7	-2.1	-1.4
500	563	-3.8	74.0	27.3	13.1	11.6	0.3	-1.6	-1.1
630	563	-2.8	75.3	26.2	9.2	7.7	0.4	-1.0	-0.5
800	563	-2.0	70.0	24.5	6.0	5.8	0.8	-0.3	0.1
1000	563	-1.0	67.9	23.4	4.2	4.8	1.3	0.4	0.7
1250	563	0.0	66.1	22.2	3.9	4.3	1.8	1.2	1.4
1600	563	0.9	62.7	20.6	4.1	4.7	2.6	2.1	2.3
2000	563	1.9	60.4	19.0	4.6	5.1	3.5	3.1	3.3
2500	563	3.0	56.7	18.0	5.1	5.6	4.5	4.1	4.3
3150	563	4.1	53.8	18.2	6.4	6.7	5.6	5.1	5.2
4000	563	5.3	54.4	20.1	7.9	8.0	6.7	6.1	6.2
5000	563	6.4	53.3	20.9	8.9	9.0	7.4	7.0	7.1
6300	563	7.3	53.6	20.8	10.1	10.1	8.1	7.8	7.8
8000	563	7.8	57.4	23.3	11.2	11.2	8.7	8.3	8.4
10000	563	8.2	55.8	22.2	10.5	10.6	8.9	8.6	8.7
12500	563	8.3	55.8	22.0	9.9	10.5	9.1	8.8	8.9
16000	563	8.2	54.0	20.3	9.7	10.0	9.1	8.9	8.9
20000	563	7.2	50.8	16.7	8.5	8.8	8.1	7.9	8.0

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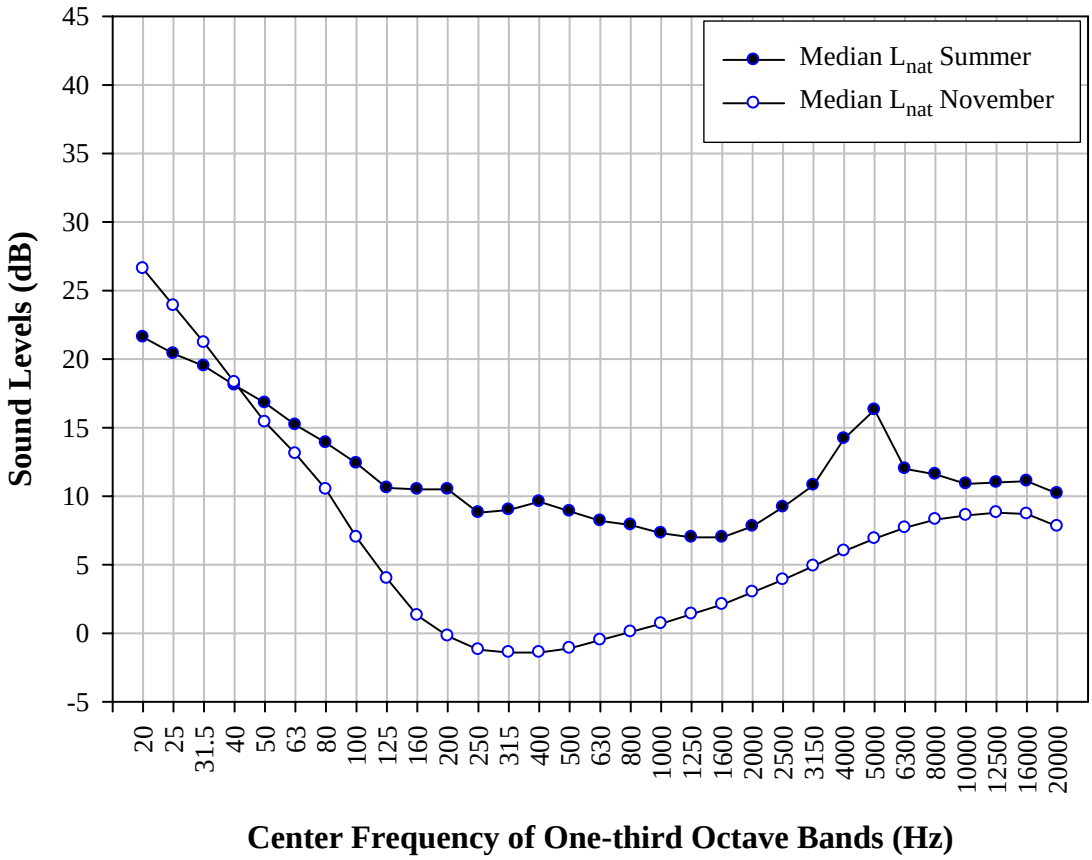


Figure VII-24. L_{nat} for one-third octave bands (20-20k Hz, un-weighted) for all hours, Canyonlands National Park, Green River, Upheaval Bottom (CANY007), summer 2006-2007 and November 2006.

Table VII-32. Acoustic metrics (dBA) for Canyonlands National Park, Gray's Pasture (CANY009), summer 2006 (n=1332).

Hour of Day	Num. Hours	L_{min}	L_{max}	L_{eq} L. Mean	L_{eq} A. Mean	L_{eq} Median	L_{10} Median	L_{50} Median	L_{90} Median	L_{nat} Median
0	56	15.6	66.0	30.0	25.7	25.7	26.9	21.8	18.7	20.7
1	56	15.4	71.9	28.1	24.8	24.1	24.8	19.8	18.2	19.5
2	56	15.3	75.3	34.1	23.5	22.7	22.5	18.5	17.9	18.4
3	56	15.2	89.2	37.9	22.7	21.4	20.1	18.1	17.4	18.0
4	56	15.2	65.6	26.7	21.0	19.5	19.2	17.8	17.2	17.8
5	56	15.2	61.7	27.4	21.4	20.8	19.3	17.3	17.1	17.3
6	55	15.1	58.3	26.4	23.9	23.6	22.1	17.2	17.2	17.2
7	55	15.2	67.3	32.6	27.4	26.0	28.6	17.9	17.2	17.3
8	55	15.4	68.5	33.4	30.6	30.5	33.0	21.4	17.5	17.5
9	55	15.5	68.2	33.2	30.5	30.1	32.7	22.4	18.1	18.3
10	53	15.6	63.8	33.6	31.2	30.5	33.2	22.8	19.0	19.2
11	54	15.6	69.0	33.9	31.3	30.5	32.8	23.2	19.4	20.1
12	54	16.0	69.8	33.7	30.2	29.6	31.6	23.0	19.8	20.5
13	55	16.0	78.6	38.3	32.2	31.2	32.5	23.5	19.8	21.2
14	56	15.7	86.9	43.0	32.5	31.2	32.2	23.9	20.0	21.6
15	56	15.6	70.5	35.5	31.3	29.5	31.9	24.3	20.1	21.5
16	56	15.8	69.1	34.3	31.3	30.5	33.2	24.6	20.2	21.8
17	56	15.7	74.3	37.6	30.4	28.8	31.6	22.8	18.9	20.3
18	56	15.6	88.7	46.9	30.4	28.3	31.1	22.1	18.5	19.9
19	56	15.7	71.0	33.7	29.8	29.1	32.1	22.5	18.3	19.6
20	56	15.5	81.4	42.1	30.3	28.6	31.5	23.0	18.5	20.3
21	56	16.2	86.1	46.7	31.1	29.9	31.9	25.3	21.4	23.2
22	56	15.6	70.8	34.5	27.8	27.4	29.8	23.2	19.8	22.3
23	56	15.7	62.7	31.0	26.6	26.1	27.6	21.1	19.1	20.2

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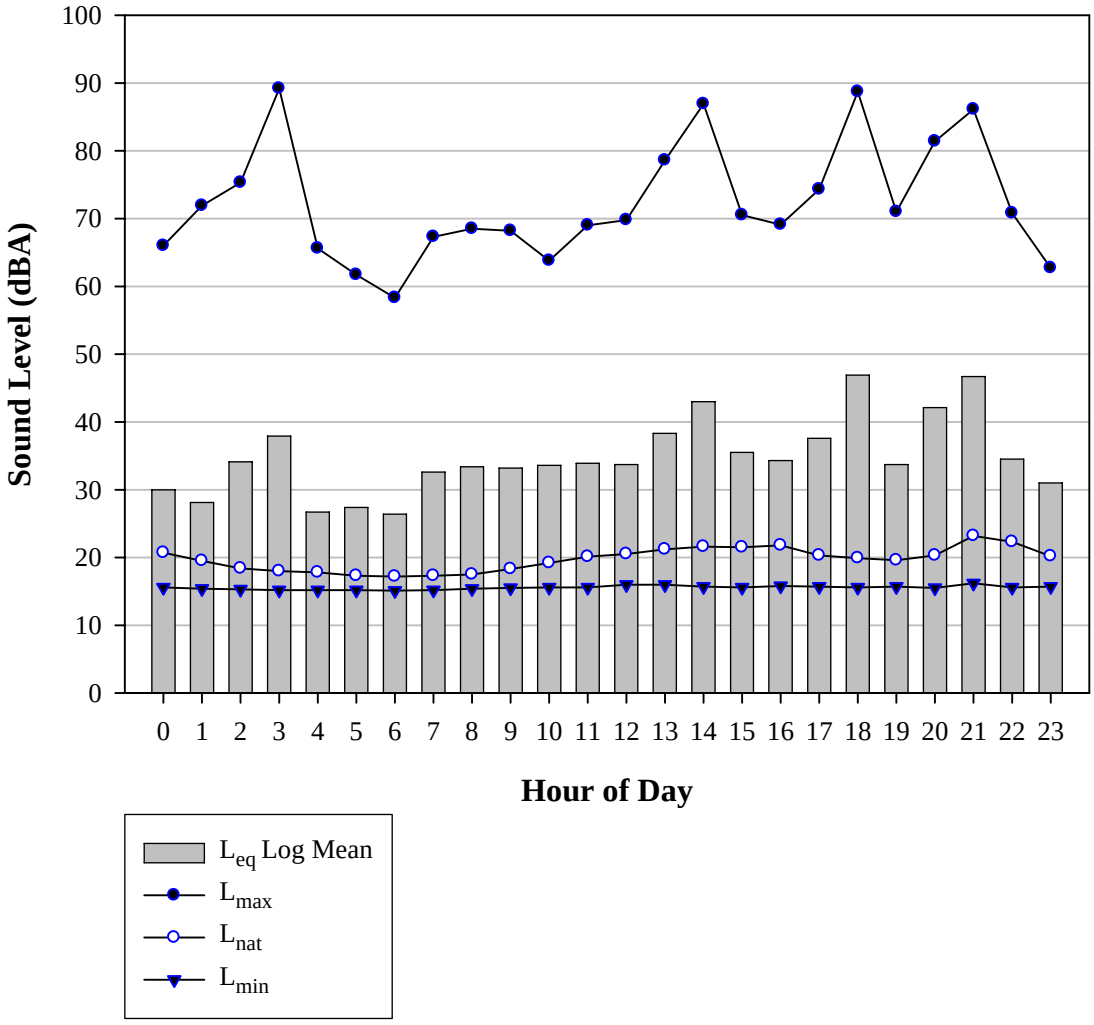


Figure VII-25. Acoustic metrics (dBA) for Canyonlands National Park, Gray's Pasture (CANY009), summer 2006 (n=1332).

Table VII-33. Acoustic metrics (dBA) for Canyonlands National Park, Gray's Pasture (CANY009), winter 2006 (n=446).

Hour of Day	Num. Hours	L_{min}	L_{max}	L_{eq} L. Mean	L_{eq} A. Mean	L_{eq} Median	L_{10} Median	L_{50} Median	L_{90} Median	L_{nat} Median
0	20	16.8	61.4	26.5	24.5	24.2	20.7	18.9	18.4	18.8
1	19	16.9	50.0	24.8	23.0	23.2	19.8	18.6	18.5	18.6
2	18	17.7	51.3	23.7	21.6	19.8	19.3	18.7	18.4	18.6
3	17	17.8	41.6	22.4	21.0	19.3	19.5	18.9	18.5	18.9
4	17	18.3	78.4	39.8	23.5	19.3	19.5	19.3	18.8	19.3
5	16	18.3	55.8	27.9	22.5	20.8	20.0	19.1	18.7	19.0
6	16	18.3	66.7	34.3	26.1	24.9	22.8	19.1	18.6	19.0
7	16	18.3	53.5	26.6	25.5	25.6	25.7	19.3	18.8	18.9
8	16	18.3	62.8	36.3	31.8	30.8	33.5	21.0	18.8	19.2
9	15	18.4	64.8	38.7	29.3	28.6	29.8	20.6	18.9	19.0
10	16	18.4	76.4	34.9	29.9	29.2	32.4	22.3	19.5	19.8
11	17	18.4	77.8	41.5	30.7	28.2	31.9	20.8	19.2	19.3
12	16	18.4	74.3	40.0	29.5	28.8	30.0	20.4	18.8	19.0
13	17	18.4	81.4	43.8	31.7	28.7	31.0	20.8	18.8	19.0
14	19	18.3	77.9	44.4	30.9	28.2	29.5	19.8	18.7	18.8
15	21	18.2	75.5	40.1	31.7	29.7	33.2	20.8	18.9	18.9
16	22	16.8	73.6	40.3	30.6	29.4	32.9	20.7	18.7	19.1
17	22	16.7	86.0	49.8	31.5	29.6	33.5	20.3	18.5	18.8
18	21	16.8	65.3	32.8	28.1	25.8	28.4	19.3	18.4	18.5
19	21	16.8	75.2	35.8	27.6	28.5	28.0	19.0	18.5	18.6
20	22	16.8	78.0	37.2	28.0	26.3	27.9	18.7	18.5	18.5
21	21	16.8	57.8	30.5	27.1	26.8	29.3	18.8	18.5	18.6
22	20	16.8	53.1	28.0	25.4	26.7	26.1	18.9	18.4	18.6
23	21	16.8	59.5	28.4	25.3	24.0	26.2	18.6	18.4	18.4

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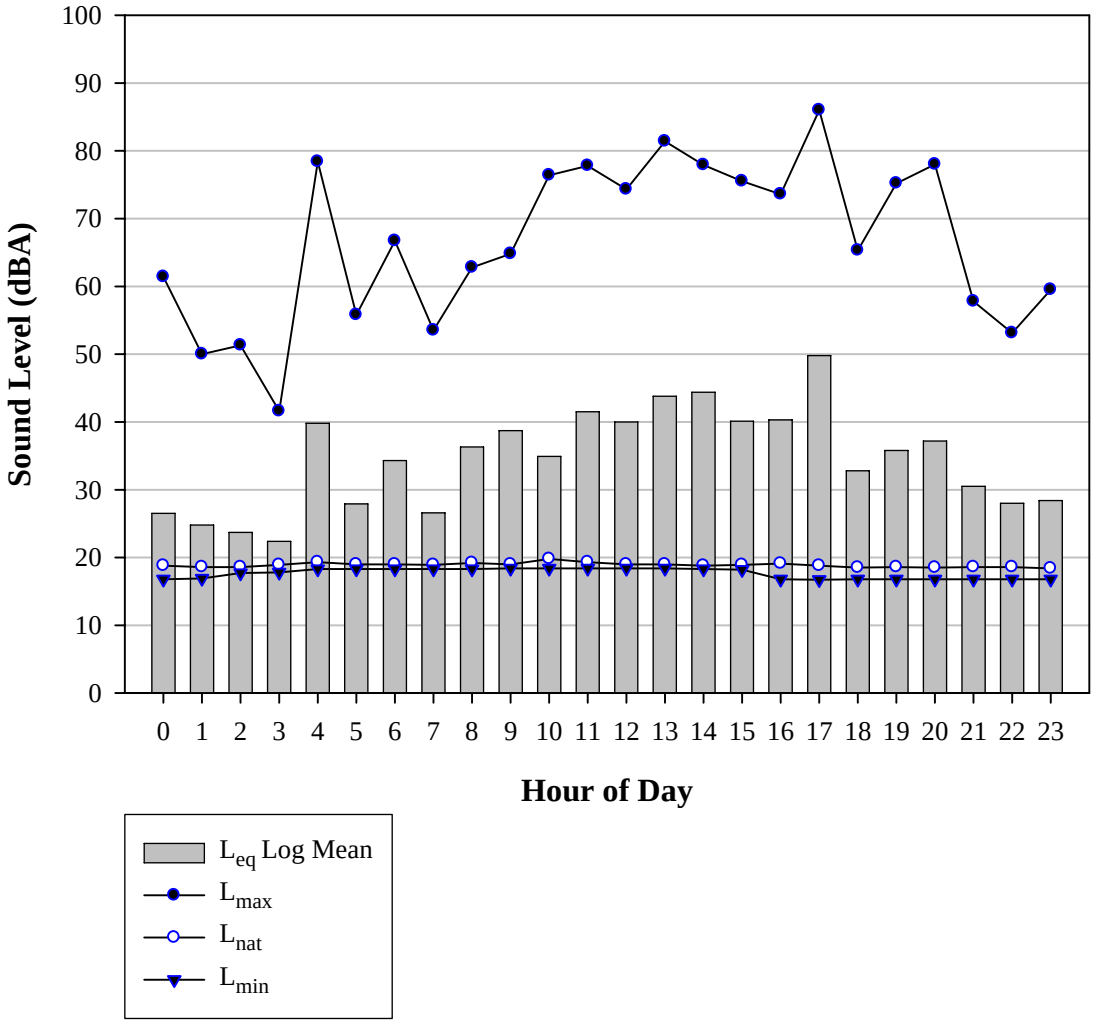


Figure VII-26. Acoustic metrics (dBA) for Canyonlands National Park, Gray's Pasture (CANY009), winter 2006 (n=446).

Table VII-34. Acoustic metrics (dBA and un-weighted one-third octave bands 12.5-20k Hz) for all hours, CANY, Gray's Pasture (CANY009), summer 2006.

dBA/Freq	Num. Hours	L_{min}	L_{max}	L_{eq} L. Mean	L_{eq} Median	L_{10} Median	L_{50} Median	L_{90} Median	L_{nat} Median
dBA	1332	15.1	89.2	38.8	27.9	30.0	22.1	18.5	19.7
12.5	1332	0.7	87.9	59.0	46.6	49.7	36.6	29.1	32.5
15.8	1332	3.0	86.7	57.2	43.7	46.2	34.5	27.2	30.4
20	1332	1.0	86.9	55.3	40.5	42.5	32.6	25.6	28.4
25	1332	-0.3	85.2	53.2	37.5	40.0	31.3	23.8	26.8
31.5	1332	-2.6	85.2	50.6	35.7	38.8	30.4	22.4	25.6
40	1332	-2.7	86.8	47.8	34.6	38.0	29.4	20.2	24.0
50	1332	-3.0	85.6	45.1	33.5	36.9	28.3	18.1	22.3
63	1332	-4.1	86.8	42.7	32.3	35.5	27.0	16.2	20.5
80	1332	-5.0	86.8	40.9	30.8	33.6	25.2	14.1	18.7
100	1332	-5.1	86.0	39.3	29.4	32.0	22.8	11.8	16.4
125	1332	-5.7	86.3	38.8	29.7	31.1	19.9	9.8	13.6
160	1332	-6.1	88.2	38.6	28.9	31.2	17.6	7.9	11.5
200	1332	-6.4	86.2	37.1	26.0	28.9	15.8	5.5	9.5
250	1332	-5.9	85.7	36.0	24.0	25.8	13.7	3.0	6.6
315	1332	-5.8	83.9	35.1	22.9	23.6	9.7	1.2	3.7
400	1332	-4.7	82.5	34.1	20.9	21.2	7.3	0.9	2.8
500	1332	-4.1	83.3	32.6	18.0	18.2	6.4	1.0	2.9
630	1332	-3.5	82.6	31.1	15.4	16.3	6.8	1.3	3.4
800	1332	-2.8	80.8	29.2	14.4	15.7	7.4	1.4	3.3
1000	1332	-1.7	81.4	27.1	12.3	13.6	5.6	1.0	2.4
1250	1332	-0.9	79.7	24.3	8.4	9.5	3.3	1.1	1.6
1600	1332	0.0	79.0	21.9	6.7	7.3	2.8	1.6	2.0
2000	1332	0.9	77.1	19.8	6.4	7.2	3.3	2.4	2.7
2500	1332	1.8	74.7	18.5	6.7	7.8	4.0	3.2	3.5
3150	1332	2.9	70.7	18.0	6.9	7.5	4.7	4.0	4.3
4000	1332	3.9	65.7	15.7	8.4	9.4	6.9	6.2	6.4
5000	1332	4.7	60.8	16.0	9.5	10.4	8.9	8.3	8.6
6300	1332	5.3	58.0	15.9	8.7	9.3	7.8	7.4	7.6
8000	1332	6.1	56.6	16.0	9.3	9.7	8.7	8.3	8.5
10000	1332	6.7	56.6	16.7	10.1	10.4	9.5	9.2	9.3
12500	1332	6.8	58.9	17.0	10.6	10.8	10.4	9.8	10.0
16000	1332	6.1	55.9	16.2	12.6	13.1	12.4	11.8	12.1
20000	1332	4.3	55.8	15.2	14.5	14.6	14.0	11.2	12.7

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Table VII-35. Acoustic metrics (dBA and un-weighted one-third octave bands 12.5-20k Hz) for all hours, CANY, Gray's Pasture (CANY009), winter 2006.

dBA/Freq	Num. Hours	L_{min}	L_{max}	L_{eq} L. Mean	L_{eq} Median	L_{10} Median	L_{50} Median	L_{90} Median	L_{nat} Median
dBA	446	16.7	86.0	40.2	26.2	28.3	19.6	18.7	18.9
20	446	15.7	83.9	48.1	37.2	40.5	34.8	29.6	32.3
25	446	12.5	83.0	46.5	36.3	39.9	33.2	27.5	30.2
31.5	446	9.6	82.5	44.9	35.1	38.9	31.0	25.1	27.8
40	446	6.5	82.3	43.6	33.4	37.3	29.0	22.3	24.7
50	446	2.6	80.9	42.2	31.9	35.9	26.8	19.1	21.8
63	446	-0.9	78.8	40.8	29.8	33.7	23.9	15.5	18.5
80	446	-2.1	80.2	39.4	27.1	31.1	21.2	11.9	14.9
100	446	-3.1	77.5	38.2	26.6	29.8	17.7	9.1	11.2
125	446	-5.0	83.6	38.7	28.9	30.3	13.7	3.4	6.5
160	446	-5.3	79.3	37.3	29.1	30.7	10.9	0.3	4.0
200	446	-5.6	77.6	35.5	26.4	29.0	9.1	-1.1	1.0
250	446	-5.5	76.8	34.5	23.9	25.8	7.3	-1.7	-0.2
315	446	-5.0	74.4	33.4	22.8	22.5	5.0	-1.7	-0.4
400	446	-4.6	73.9	32.6	19.9	19.3	3.6	-1.7	-0.6
500	446	-4.1	74.0	31.2	16.3	16.4	2.8	-1.7	-0.7
630	446	-3.4	73.6	30.1	13.3	12.6	1.6	-1.4	-1.0
800	446	-2.7	73.4	29.2	10.3	9.9	0.8	-1.0	-0.7
1000	446	-1.8	72.9	28.3	7.9	6.2	0.3	-0.3	-0.1
1250	446	-0.8	72.5	27.5	4.4	3.1	0.9	0.5	0.6
1600	446	0.4	71.2	26.5	2.8	2.3	1.8	1.5	1.6
2000	446	1.4	71.5	25.8	3.2	3.3	2.8	2.6	2.6
2500	446	2.7	70.7	25.3	4.1	4.2	3.9	3.7	3.8
3150	446	3.9	73.9	25.5	5.3	5.4	5.2	5.0	5.1
4000	446	4.8	71.4	25.4	6.7	6.9	6.7	6.5	6.6
5000	446	5.9	71.8	25.4	8.3	8.4	8.2	8.1	8.2
6300	446	6.8	73.4	25.9	9.6	9.7	9.6	9.4	9.5
8000	446	7.5	77.8	26.8	10.8	10.9	10.8	10.7	10.7
10000	446	8.2	80.3	27.7	11.9	12.0	11.9	11.8	11.8
12500	446	7.9	82.7	29.0	12.9	13.0	12.9	12.8	12.8
16000	446	7.7	88.0	31.9	14.0	14.1	13.9	13.8	13.8
20000	446	8.7	87.9	32.8	13.8	13.9	13.7	13.5	13.6

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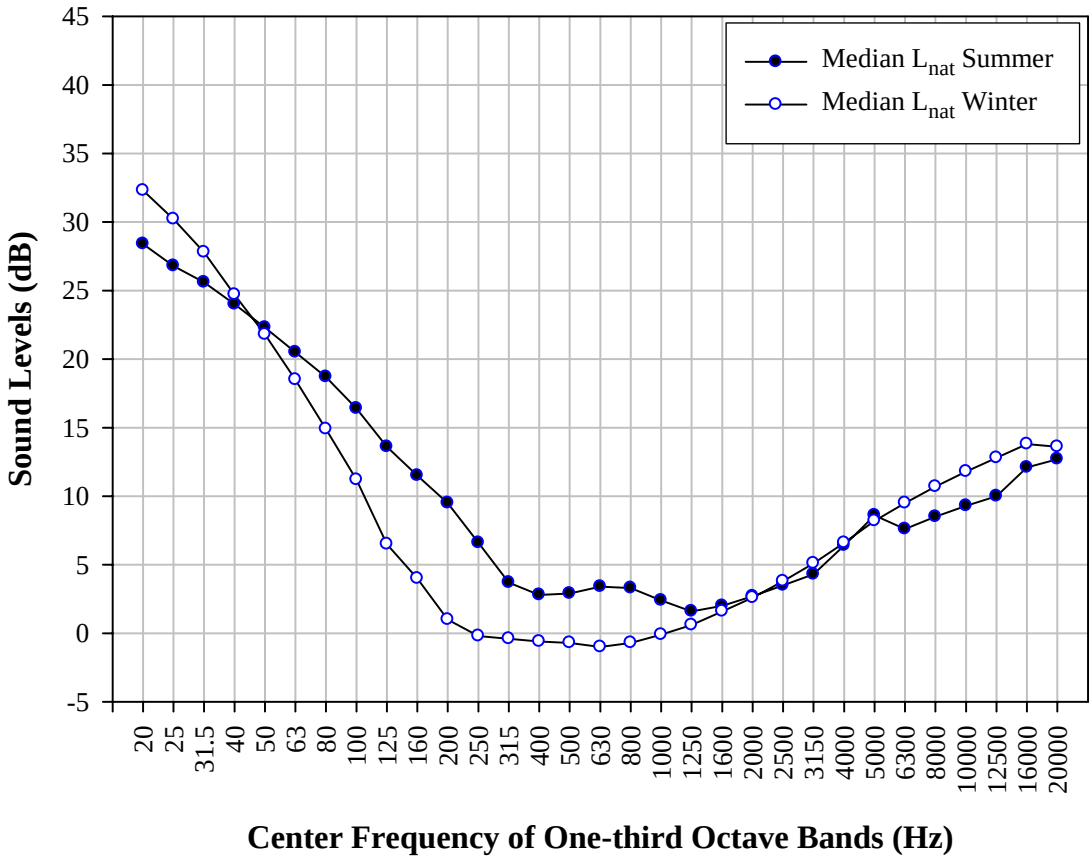


Figure VII-27. L_{nat} for one-third octave bands (20-20k Hz, un-weighted) for all hours, Canyonlands National Park, Gray's Pasture (CANY009), summer and winter 2006.

Table VII-36. Acoustic metrics (dBA) for Hovenweep National Monument, Hackberry Unit (HOVE001) winter 2005 (n=957).

Hour of Day	Num. Hours	L_{min}	L_{max}	L_{eq} L. Mean	L_{eq} A. Mean	L_{eq} Median	L_{10} Median	L_{50} Median	L_{90} Median	L_{nat} Median
0	39	14.7	64.4	29.9	21.7	21.2	21.0	15.9	15.4	15.7
1	40	14.7	51.2	23.6	21.1	20.4	20.5	15.9	15.4	15.8
2	40	14.7	51.5	26.2	20.5	18.0	17.4	15.7	15.3	15.6
3	40	14.8	48.8	22.0	18.9	17.8	17.0	15.8	15.4	15.8
4	40	14.7	49.3	22.8	18.9	17.1	16.9	15.8	15.5	15.8
5	40	14.7	52.7	23.0	19.2	17.8	18.1	16.0	15.4	15.9
6	40	14.9	56.7	26.0	20.6	18.4	18.6	16.4	15.7	16.3
7	40	14.8	64.6	30.0	22.0	20.1	19.3	16.4	15.6	16.3
8	40	14.8	65.6	27.9	24.1	22.7	22.5	17.3	16.1	16.9
9	40	14.9	59.8	27.1	24.8	23.6	25.5	18.6	16.6	17.9
10	40	15.1	68.5	30.5	27.6	27.2	29.4	19.2	16.8	18.0
11	41	15.0	60.6	32.0	27.9	26.3	28.5	18.9	16.6	17.7
12	40	14.9	71.8	35.8	28.1	25.9	28.7	19.1	16.6	17.8
13	40	14.9	65.1	32.1	27.6	26.1	28.5	19.2	16.8	18.2
14	40	14.9	56.1	30.8	27.7	27.1	27.5	19.0	16.6	17.9
15	39	14.9	62.2	31.4	28.0	26.7	28.0	18.5	16.1	17.6
16	39	14.8	61.6	29.0	26.0	25.3	25.7	17.5	16.0	16.9
17	39	14.8	58.7	28.6	25.4	24.7	25.9	16.4	15.6	16.1
18	40	14.7	69.4	32.8	25.8	24.2	26.9	16.5	15.5	16.2
19	40	14.7	61.5	31.6	25.3	23.3	25.6	16.6	15.5	16.1
20	40	14.7	59.4	31.9	25.7	25.1	25.7	16.3	15.5	16.0
21	40	14.8	61.3	31.0	27.0	26.6	25.6	16.4	15.5	16.1
22	40	14.8	58.6	25.8	22.8	22.2	21.9	16.5	15.5	16.2
23	40	14.6	53.0	21.9	20.2	19.2	20.1	16.1	15.5	16.0

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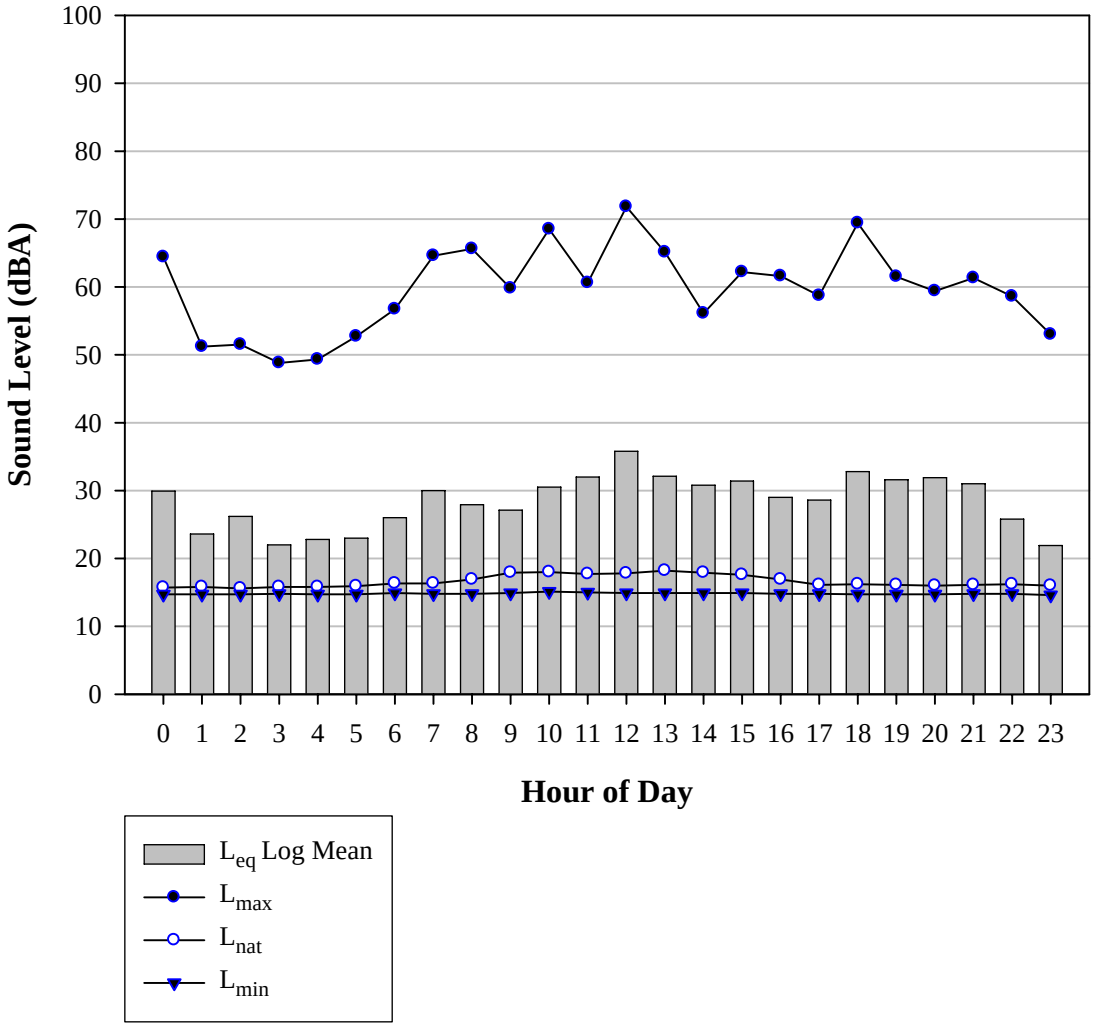


Figure VII-28. Acoustic metrics (dBA) for Hovenweep National Monument, Hackberry Unit (HOVE001) winter 2005 (n=957).

Table VII-37. Acoustic metrics (dBA) for Hovenweep National Monument, Hackberry Unit (HOVE001) summer 2006 (n=384).

Hour of Day	Num. Hours	L_{min}	L_{max}	L_{eq} L. Mean	L_{eq} A. Mean	L_{eq} Median	L_{10} Median	L_{50} Median	L_{90} Median	L_{nat} Median
0	16	16.0	48.4	28.7	26.8	27.9	31.9	22.8	19.7	21.3
1	16	15.9	57.0	28.4	26.9	27.5	27.4	22.1	18.7	20.1
2	16	15.9	50.2	26.5	24.6	25.4	24.7	18.7	17.3	17.9
3	15	15.9	56.0	25.9	24.2	25.3	25.4	20.9	18.3	20.2
4	16	15.8	47.4	25.0	23.2	23.1	24.5	19.6	17.5	19.0
5	16	15.8	55.4	23.6	23.2	22.6	23.8	18.1	16.4	17.5
6	16	15.8	57.8	22.1	21.1	20.2	20.8	16.5	16.2	16.3
7	15	15.8	59.1	24.4	21.6	20.2	19.9	16.8	16.2	16.5
8	16	15.9	58.6	29.1	26.3	25.7	25.5	17.1	16.4	16.5
9	14	15.9	54.0	27.2	26.0	25.2	27.6	18.5	16.6	16.6
10	17	15.9	56.2	29.1	28.0	28.1	30.7	19.7	16.7	17.0
11	17	16.0	57.8	29.1	28.0	29.0	30.3	21.5	17.1	17.8
12	16	16.2	82.5	39.0	30.2	27.5	30.2	21.5	17.1	18.6
13	17	15.9	64.9	34.1	31.1	29.6	31.2	22.1	17.6	19.7
14	17	15.9	58.1	32.1	30.0	28.5	32.1	22.8	18.5	19.9
15	17	15.9	60.3	31.8	29.3	29.0	30.9	21.4	17.4	19.2
16	16	16.1	61.8	31.6	29.0	29.6	30.7	22.4	17.5	19.7
17	16	16.0	70.1	35.4	30.7	29.5	30.9	22.9	18.0	19.8
18	16	16.0	79.7	45.6	31.4	29.9	32.4	25.6	18.5	23.0
19	15	16.0	85.5	51.6	30.9	29.4	31.0	25.1	17.6	20.9
20	16	15.9	62.9	36.2	31.8	31.3	34.7	24.6	17.3	19.6
21	16	16.5	65.8	37.9	33.5	33.6	36.0	30.8	26.3	29.3
22	16	16.0	67.3	35.3	32.2	32.1	32.9	25.3	20.0	22.5
23	16	15.9	52.5	31.9	29.3	30.0	32.9	28.0	21.2	24.7

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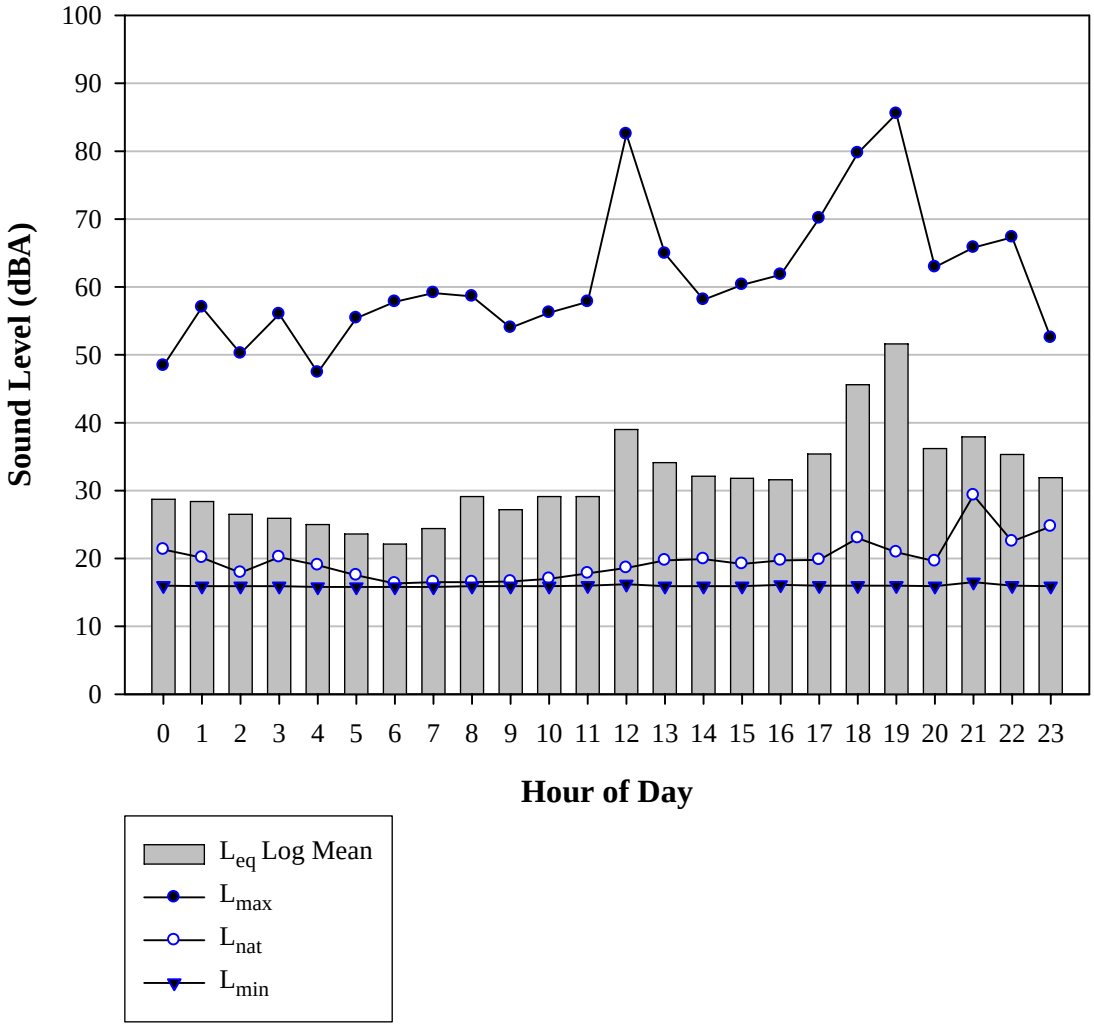


Figure VII-29. Acoustic metrics (dBA) for Hovenweep National Monument, Hackberry Unit (HOVE001) summer 2006 (n=384).

Table VII-38. Acoustic metrics (dBA and un-weighted one-third octave bands 12.5-20k Hz) for all hours, HOVE, Hackberry Unit (HOVE001) winter 2005.

dBA/Freq	Num. Hours	L_{min}	L_{max}	L_{eq} L. Mean	L_{eq} Median	L_{10} Median	L_{50} Median	L_{90} Median	L_{nat} Median
dBA	957	14.6	71.8	29.9	23.0	23.8	16.9	15.8	16.5
12.5	957	9.8	87.8	53.0	37.5	39.0	33.8	29.3	32.7
15.8	957	13.9	86.2	51.1	35.4	37.3	32.7	28.9	31.9
20	957	13.3	85.3	48.9	34.7	36.9	32.4	28.8	31.6
25	957	14.1	83.7	46.1	33.9	36.3	31.5	27.9	30.7
31.5	957	10.4	81.2	43.1	32.9	35.6	30.3	26.8	29.5
40	957	9.2	78.8	40.1	32.2	34.8	29.0	25.6	28.1
50	957	7.1	77.2	37.7	31.8	34.5	28.2	24.7	27.4
63	957	5.6	77.3	36.3	31.4	33.9	28.0	24.2	27.0
80	957	1.9	80.7	34.0	28.9	31.4	25.3	21.6	24.4
100	957	-0.8	79.5	32.5	27.5	29.6	23.0	19.1	22.0
125	957	-3.0	76.7	32.2	27.3	27.4	19.3	15.5	18.3
160	957	-4.0	78.5	31.9	26.7	25.3	14.3	10.1	13.3
200	957	-4.5	74.2	28.4	23.5	24.1	9.9	5.6	8.7
250	957	-4.5	67.7	26.9	21.7	21.5	6.3	2.2	5.0
315	957	-4.2	69.1	25.6	19.2	17.9	3.8	0.3	2.6
400	957	-4.1	69.1	25.1	16.6	14.2	1.8	-0.6	0.9
500	957	-3.3	69.9	22.9	12.3	9.8	0.5	-1.0	-0.1
630	957	-2.8	66.9	20.8	7.7	6.0	-0.2	-1.0	-0.4
800	957	-1.9	62.5	19.3	4.1	2.7	0.0	-0.6	-0.2
1000	957	-1.2	56.1	18.3	2.5	1.6	0.5	0.1	0.4
1250	957	-0.2	63.4	17.1	1.9	1.7	1.2	0.8	1.1
1600	957	0.6	58.9	15.5	2.1	2.2	1.9	1.6	1.8
2000	957	1.5	56.9	13.3	2.7	2.8	2.6	2.3	2.5
2500	957	2.3	59.3	11.1	3.3	3.5	3.2	3.0	3.2
3150	957	3.1	62.9	9.3	3.9	4.1	3.9	3.7	3.8
4000	957	3.6	53.7	7.7	4.5	4.6	4.4	4.2	4.4
5000	957	4.1	58.1	7.3	4.9	5.0	4.8	4.7	4.8
6300	957	4.4	54.6	7.4	5.1	5.3	5.1	4.9	5.1
8000	957	4.6	52.0	7.1	5.2	5.4	5.2	5.1	5.2
10000	957	4.6	49.2	6.7	5.4	5.5	5.3	5.2	5.3
12500	957	3.7	46.1	5.7	4.5	4.6	4.5	4.4	4.5
16000	957	1.8	43.2	4.3	3.5	3.6	3.5	3.4	3.5
20000	957	-0.7	37.1	3.4	2.9	3.1	2.9	2.8	2.9

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Table VII-39. Acoustic metrics (dBA and un-weighted one-third octave bands 12.5-20k Hz) for all hours, HOVE, Hackberry Unit (HOVE001) summer 2006.

dBA/Freq	Num. Hours	L_{min}	L_{max}	L_{eq} L. Mean	L_{eq} Median	L_{10} Median	L_{50} Median	L_{90} Median	L_{nat} Median
dBA	384	15.8	85.5	39.4	27.8	29.4	21.0	17.3	18.5
12.5	384	11.0	85.0	57.0	46.2	48.0	35.3	29.0	31.6
15.8	384	10.9	84.9	55.3	43.0	44.0	32.5	27.2	29.4
20	384	9.9	82.7	53.1	39.2	40.6	31.5	26.3	28.6
25	384	8.6	80.7	50.6	36.3	38.4	30.1	24.7	27.1
31.5	384	6.0	83.3	47.9	34.3	37.1	29.0	23.4	25.6
40	384	4.6	82.7	45.3	33.5	36.5	27.9	22.1	24.2
50	384	3.6	85.1	43.2	32.0	35.4	26.7	20.7	23.2
63	384	2.7	85.2	41.8	31.2	34.3	26.1	20.6	22.8
80	384	-0.8	84.2	40.5	29.0	31.8	23.6	17.8	20.4
100	384	-0.8	84.0	40.2	28.0	29.6	21.3	15.6	18.1
125	384	-3.6	87.1	40.9	27.8	28.0	18.3	12.4	14.7
160	384	-3.8	86.1	40.4	27.1	27.6	14.9	8.5	10.9
200	384	-4.2	85.3	38.9	24.1	25.9	12.7	4.8	7.6
250	384	-4.5	84.1	37.9	23.4	24.0	9.8	1.4	3.9
315	384	-5.0	82.3	36.4	21.5	21.8	7.0	-0.3	1.5
400	384	-4.3	81.9	35.2	20.6	20.2	5.2	-0.7	0.7
500	384	-3.9	79.5	33.2	18.1	17.6	3.5	-0.8	0.4
630	384	-3.3	77.0	31.1	14.3	14.9	2.6	-0.5	0.5
800	384	-2.5	75.8	29.0	10.7	11.0	2.0	-0.2	0.5
1000	384	-1.5	73.6	26.4	8.2	7.6	1.6	0.2	0.6
1250	384	-0.8	70.1	23.2	6.1	5.3	1.6	0.8	1.0
1600	384	0.2	68.3	20.2	4.7	4.0	2.0	1.5	1.6
2000	384	1.3	65.5	18.1	4.3	4.1	2.6	2.2	2.4
2500	384	2.2	60.5	17.9	5.7	6.0	3.6	3.2	3.3
3150	384	3.2	56.5	19.8	8.3	8.1	4.6	4.2	4.4
4000	384	3.8	51.6	18.7	8.3	8.3	5.5	5.2	5.3
5000	384	4.6	51.4	19.9	8.4	8.0	6.4	6.1	6.2
6300	384	5.3	52.3	17.3	7.5	7.4	6.9	6.7	6.8
8000	384	5.0	52.7	15.7	7.7	7.8	7.5	7.3	7.4
10000	384	4.7	53.5	16.3	8.3	8.4	8.1	7.9	8.0
12500	384	4.6	59.3	16.7	8.1	8.1	7.9	7.7	7.8
16000	384	2.9	52.5	17.5	7.5	7.6	7.4	7.2	7.3
20000	384	1.0	53.8	14.7	6.5	6.5	6.3	6.2	6.2

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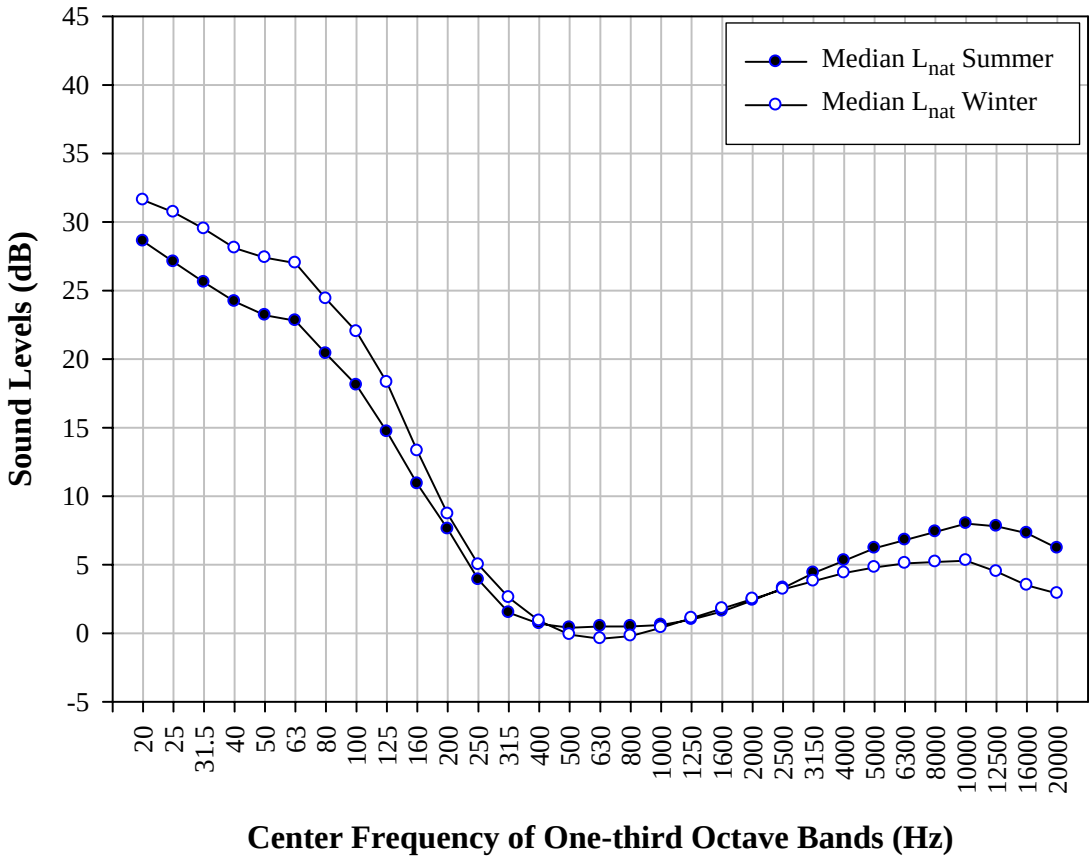


Figure VII-30. L_{nat} for one-third octave bands (20-20k Hz, un-weighted) for all hours, Hovenweep National Monument, Hackberry Unit (HOVE001) winter 2005 and summer 2006.

Table VII-40. Acoustic metrics (dBA) for Hovenweep National Monument, Visitor Center (HOVE002) winter 2005 (n=144).

Hour of Day	Num. Hours	L_{min}	L_{max}	L_{eq} L. Mean	L_{eq} A. Mean	L_{eq} Median	L_{10} Median	L_{50} Median	L_{90} Median
0	6	16.0	43.6	20.5	20.4	20.8	20.0	18.0	17.3
1	6	16.1	46.3	20.0	19.7	19.6	20.1	18.0	17.3
2	6	16.2	46.8	21.4	21.0	20.9	21.6	18.3	17.2
3	6	16.1	38.5	20.0	19.6	19.0	20.9	18.2	17.3
4	6	16.2	40.4	22.4	22.1	22.6	23.8	22.5	19.7
5	6	18.3	54.2	26.1	25.3	24.9	24.0	21.9	21.3
6	6	16.5	53.1	27.4	27.0	26.6	25.7	22.5	21.5
7	6	18.1	51.8	27.5	26.6	25.8	25.7	23.0	21.7
8	5	16.8	57.9	27.4	27.0	26.9	28.9	22.2	19.0
9	5	17.1	79.5	42.2	33.1	28.9	31.0	22.8	19.2
10	5	16.4	50.9	29.5	29.4	29.5	33.6	21.1	18.6
11	5	16.4	50.6	28.4	27.6	26.9	28.5	20.4	18.4
12	5	16.2	53.7	28.9	27.5	27.5	28.0	20.6	18.5
13	5	16.2	50.7	31.0	30.2	30.3	34.4	25.5	20.3
14	5	16.4	55.5	30.8	30.2	30.4	34.3	26.7	19.8
15	7	16.4	61.3	39.3	33.4	30.9	33.5	22.3	18.7
16	7	16.7	58.0	35.3	31.3	29.2	31.0	22.2	18.5
17	7	16.3	57.8	31.0	28.4	27.4	30.3	19.0	17.5
18	7	16.1	70.2	36.6	30.0	28.4	28.3	19.0	17.5
19	7	16.1	77.8	45.5	32.3	29.3	29.3	19.0	17.5
20	7	16.1	53.4	28.3	27.4	27.3	28.1	18.6	17.2
21	7	16.1	59.5	30.7	28.5	26.0	25.7	18.7	17.2
22	6	16.3	52.4	23.5	22.4	22.0	20.8	18.5	17.6
23	6	16.2	43.5	20.8	19.9	19.2	20.1	17.9	17.2

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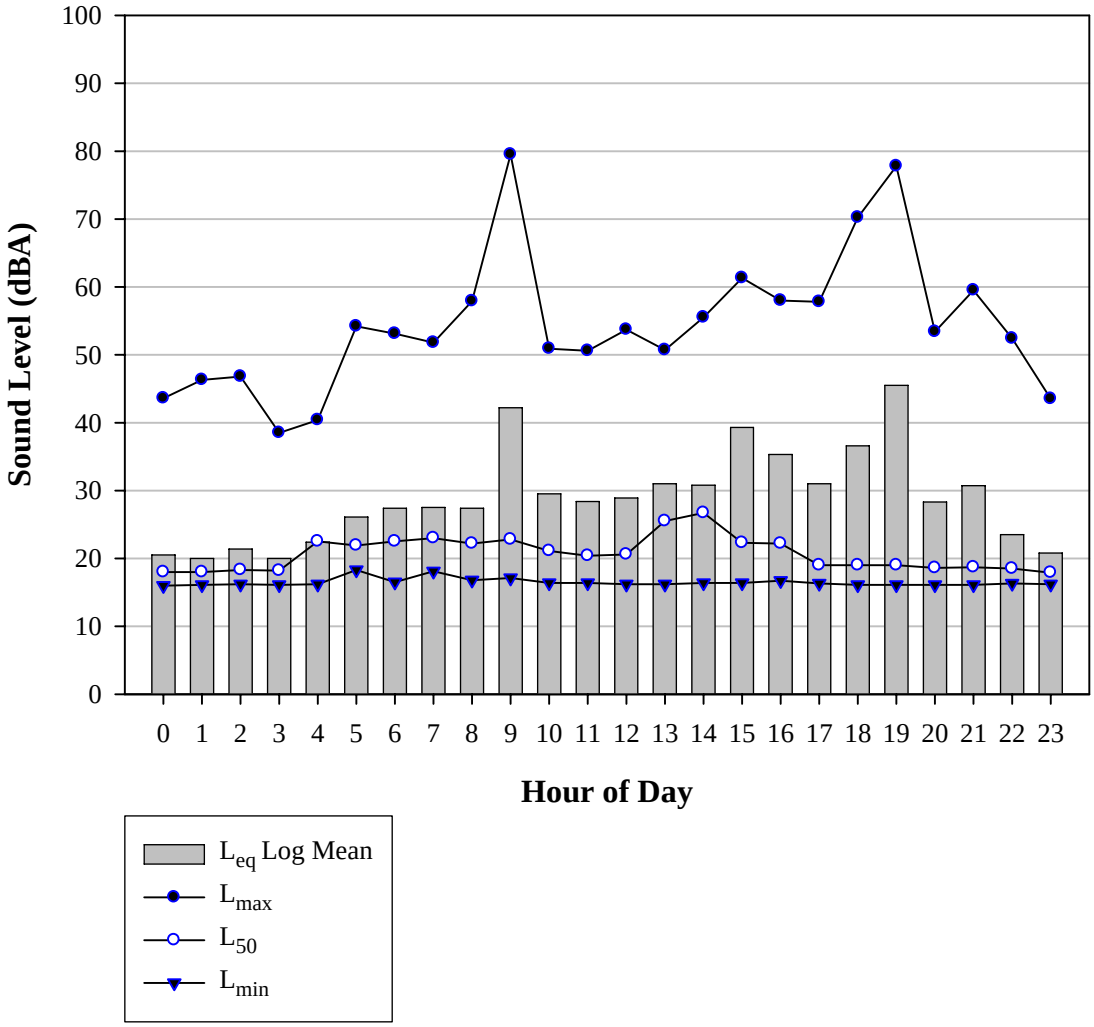


Figure VII-31. Acoustic metrics (dBA) for Hovenweep National Monument, Visitor Center (HOVE002) winter 2005 (n=144).

Table VII-41. Acoustic metrics (dBA) for Hovenweep National Monument, Visitor Center (HOVE002) August 2006 (n=150).

Hour of Day	Num. Hours	L_{min}	L_{max}	L_{eq} L. Mean	L_{eq} A. Mean	L_{eq} Median	L_{10} Median	L_{50} Median	L_{90} Median
0	6	21.2	68.4	43.2	38.9	36.3	40.5	33.8	31.0
1	6	21.6	56.8	37.6	34.9	32.6	34.3	31.9	27.5
2	6	20.3	49.5	31.5	30.8	31.2	31.1	28.4	26.2
3	6	19.3	52.4	27.8	27.1	26.7	28.0	25.8	24.1
4	6	17.9	49.3	27.8	26.0	24.8	26.8	23.0	20.3
5	6	17.1	47.2	24.1	22.6	21.1	22.1	19.4	18.3
6	6	16.9	52.3	26.6	26.3	26.1	27.3	24.9	18.2
7	6	16.8	53.0	29.6	28.9	29.0	26.7	20.4	18.1
8	6	16.9	50.0	30.3	29.7	29.3	30.5	24.6	18.5
9	6	16.9	51.1	29.5	28.8	28.8	31.5	24.4	17.8
10	6	17.0	51.8	30.9	30.5	30.6	32.9	25.8	20.1
11	6	17.4	57.8	30.8	30.1	30.1	32.3	26.2	21.5
12	7	17.3	63.4	32.9	32.0	31.3	33.4	26.9	20.2
13	7	17.4	55.1	32.4	32.0	32.3	34.1	27.3	23.6
14	7	17.9	61.3	31.5	31.2	30.8	33.7	27.8	24.5
15	7	17.6	55.5	33.1	32.7	32.8	35.7	28.2	24.2
16	7	17.4	60.6	34.5	33.5	34.7	37.8	28.3	25.2
17	7	17.4	54.2	35.3	32.5	32.1	34.5	28.7	23.5
18	6	17.4	54.5	32.8	32.3	32.0	35.1	28.3	21.2
19	6	17.3	55.5	31.5	29.5	28.4	30.2	22.4	19.1
20	6	17.4	74.7	46.1	41.9	40.2	41.0	33.7	21.0
21	6	30.3	81.6	50.7	46.7	47.1	50.0	44.4	37.7
22	6	26.0	79.4	49.1	42.5	38.2	41.8	37.5	33.6
23	6	22.1	72.5	45.4	39.8	38.3	41.1	36.1	32.5

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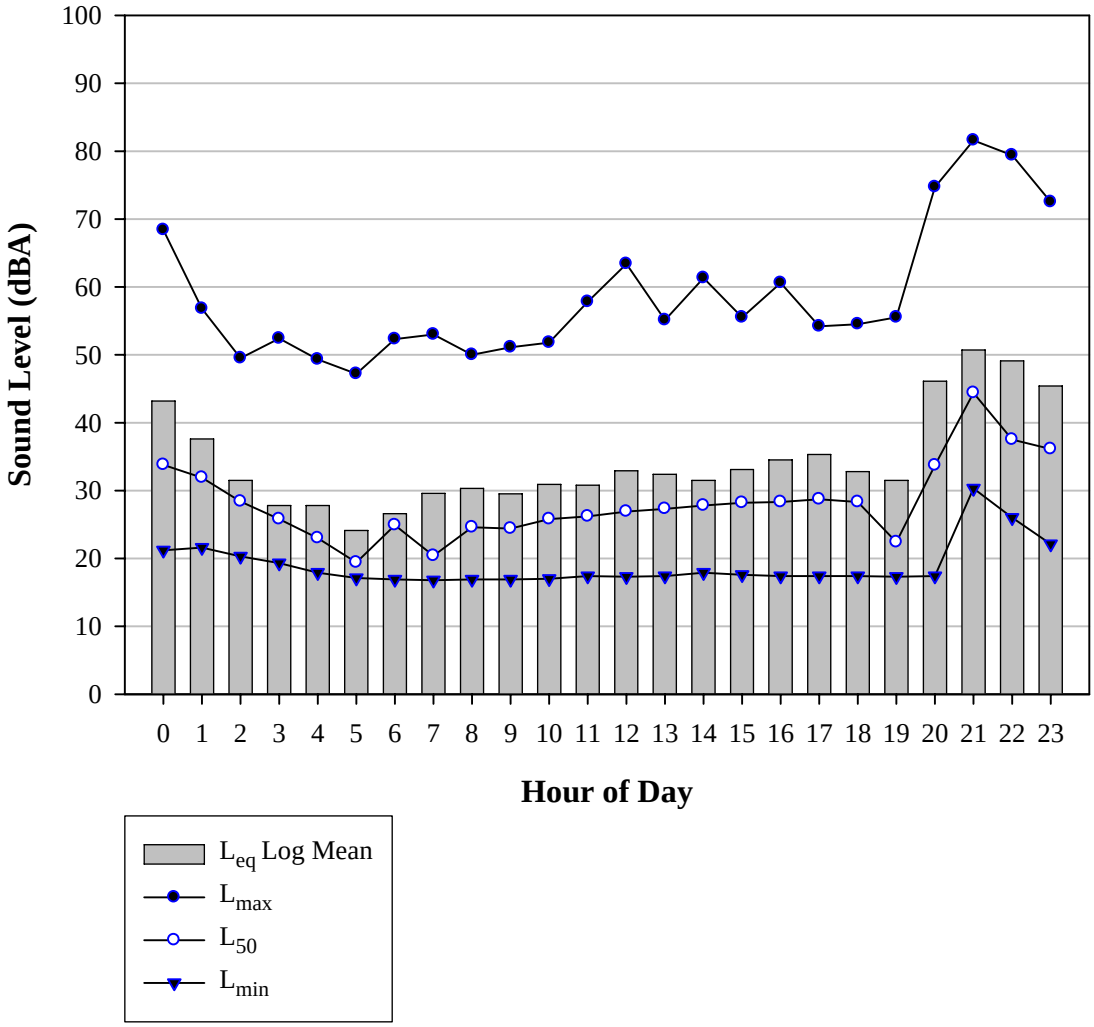


Figure VII-32. Acoustic metrics (dBA) for Hovenweep National Monument, Visitor Center (HOVE002) August 2006 (n=150).

Table VII-42. Acoustic metrics (dBA and un-weighted one-third octave bands 20-20k Hz) for all hours, HOVE, Visitor Center (HOVE002) winter 2005.

dBA/Freq	Num. Hours	L_{min}	L_{max}	L_{eq} L. Mean	L_{eq} Median	L_{10} Median	L_{50} Median	L_{90} Median
dBA	144	16.0	79.5	35.5	26.4	26.4	20.4	18.2
20	144	-3.5	76.5	40.7	34.9	38.1	32.5	26.6
25	144	-1.4	77.9	39.2	35.0	38.1	32.6	27.1
31.5	144	3.9	76.4	38.1	34.5	37.3	31.6	26.5
40	144	-0.4	75.8	37.1	33.7	36.4	30.7	25.5
50	144	-6.1	77.7	36.8	33.5	36.0	29.9	24.6
63	144	-5.4	78.2	36.4	32.4	34.5	28.2	23.7
80	144	-6.9	76.1	35.1	31.2	33.4	28.1	23.9
100	144	1.2	74.8	33.7	29.5	31.5	24.7	20.2
125	144	-2.5	78.5	35.3	32.1	33.4	26.2	22.3
160	144	-5.3	77.6	33.7	28.3	28.9	16.7	13.2
200	144	-4.7	75.2	31.7	25.9	26.9	14.4	10.9
250	144	-5.8	74.7	29.7	23.3	24.2	11.5	7.0
315	144	-5.4	71.7	29.3	21.8	20.8	7.9	3.7
400	144	-5.6	73.0	28.0	19.0	17.3	6.6	2.5
500	144	-5.7	72.5	26.7	17.3	14.7	4.4	0.5
630	144	-4.1	71.1	25.7	13.5	11.3	3.0	0.3
800	144	-6.9	70.5	25.2	11.2	9.0	2.6	0.1
1000	144	-3.0	69.7	24.5	9.7	7.2	2.3	0.5
1250	144	-7.5	69.7	23.9	8.3	6.6	3.5	2.1
1600	144	-8.0	67.0	23.1	5.6	5.6	2.7	1.8
2000	144	0.8	66.9	22.5	4.5	4.5	3.4	2.6
2500	144	-7.3	66.5	22.0	4.4	4.7	3.9	3.3
3150	144	2.8	64.1	21.1	5.1	5.4	4.7	4.2
4000	144	3.3	63.4	20.5	5.8	6.1	5.5	5.0
5000	144	4.3	62.1	19.8	6.4	6.8	6.3	5.9
6300	144	4.8	60.6	19.1	7.0	7.3	6.9	6.3
8000	144	4.3	59.1	18.6	7.6	7.9	7.5	6.7
10000	144	5.8	59.6	17.9	8.1	8.4	8.1	7.1
12500	144	2.4	60.2	17.0	8.1	8.4	8.1	7.3
16000	144	2.3	60.1	16.0	7.8	8.3	7.6	7.3
20000	144	4.3	59.6	14.4	7.4	8.0	7.2	6.9

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Table VII-43. Acoustic metrics (dBA and un-weighted one-third octave bands 20-20k Hz) for all hours, HOVE, Visitor Center (HOVE002) summer 2006.

dBA/Freq	Num. Hours	L_{min}	L_{max}	L_{eq} L. Mean	L_{eq} Median	L_{10} Median	L_{50} Median	L_{90} Median
dBA	150	16.8	81.6	41.2	31.7	33.7	27.5	22.7
20	150	-5.0	85.1	51.7	36.9	38.8	31.9	25.2
25	150	3.2	84.8	49.5	36.0	38.2	31.1	25.1
31.5	150	2.0	83.9	47.0	35.1	37.7	30.8	24.6
40	150	3.4	89.7	45.3	35.1	37.9	31.0	25.6
50	150	2.7	85.9	43.8	39.8	42.7	35.6	24.4
63	150	2.4	87.2	42.6	38.6	41.8	34.6	23.9
80	150	7.0	88.3	40.9	33.0	34.6	29.0	23.1
100	150	4.0	87.6	39.5	32.0	33.4	28.5	20.3
125	150	11.4	87.9	39.6	34.0	37.2	30.3	23.5
160	150	5.1	87.2	38.2	30.1	31.5	24.7	16.4
200	150	-3.5	84.7	36.8	27.9	29.4	22.2	14.7
250	150	-2.6	78.6	34.7	25.0	26.1	18.9	11.3
315	150	-4.9	80.0	33.9	23.0	24.5	15.6	7.6
400	150	-4.2	77.3	32.6	21.7	22.8	15.1	6.7
500	150	-4.4	75.2	31.6	19.9	20.7	13.5	4.7
630	150	-4.3	73.2	30.4	19.5	20.7	14.0	2.8
800	150	-2.1	72.1	29.4	18.1	17.9	12.0	3.2
1000	150	-3.6	69.0	28.4	16.3	15.7	10.2	2.1
1250	150	-1.8	68.0	27.7	14.2	13.5	7.7	2.5
1600	150	-1.3	66.8	26.6	12.4	12.3	6.5	1.9
2000	150	-0.2	66.5	25.5	10.8	10.1	5.4	2.3
2500	150	0.9	64.7	25.1	10.9	10.8	5.6	3.6
3150	150	2.3	64.6	30.8	10.7	10.1	5.4	4.2
4000	150	3.3	63.7	33.5	10.9	11.5	6.3	5.1
5000	150	4.7	63.7	25.5	10.4	10.0	6.9	6.1
6300	150	5.8	62.9	23.7	9.4	9.5	7.5	6.9
8000	150	7.1	62.4	23.1	9.5	10.0	8.6	8.1
10000	150	8.6	62.5	24.2	11.2	11.8	10.1	9.6
12500	150	9.4	62.6	25.0	11.8	12.1	10.8	10.4
16000	150	8.6	63.1	23.9	10.7	11.2	10.1	9.7
20000	150	7.0	64.0	22.6	8.9	9.3	8.4	8.1

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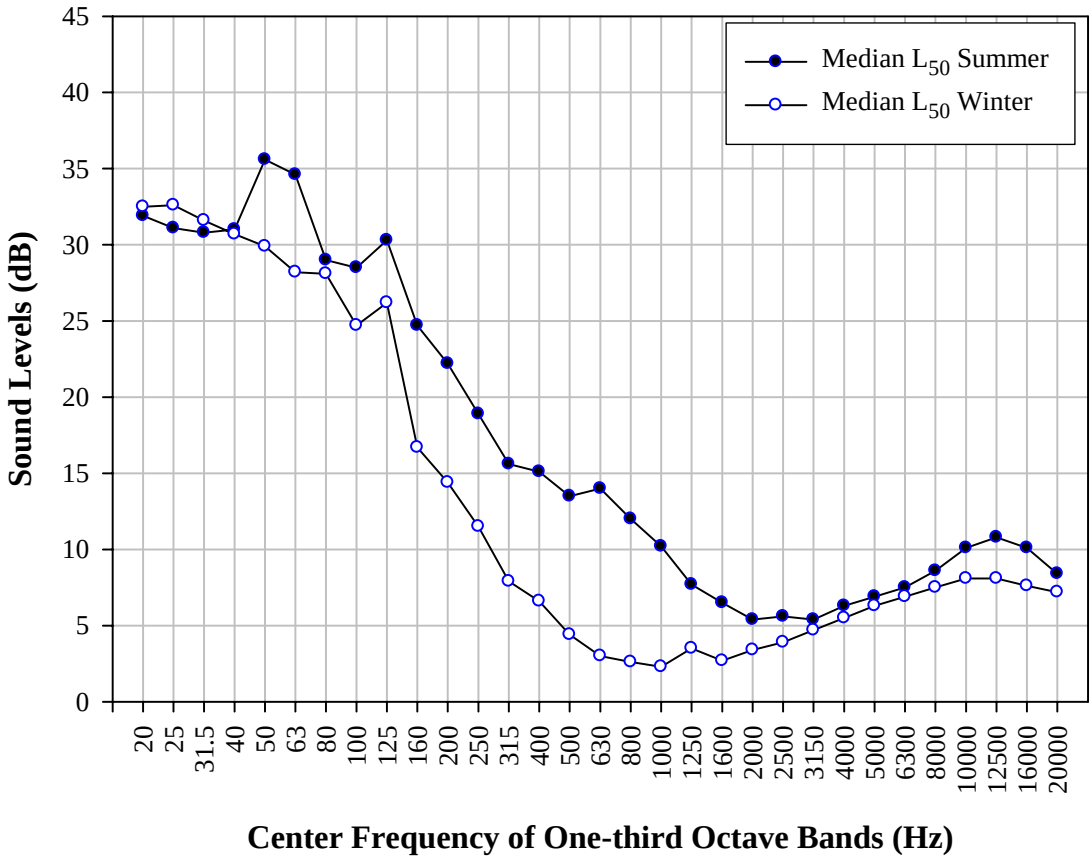


Figure VII-33. L_{50} for one-third octave bands (20-20k Hz, un-weighted) for all hours, Hovenweep National Monument, Visitor Center (HOVE002) winter 2005 and summer 2006.

Table VII-44. Acoustic metrics (dBA) for Natural Bridges NM, Owochomo Bridge (NABR001) winter 2005-2006 (n=1201).

Hour of Day	Num. Hours	L_{min}	L_{max}	L_{eq} L. Mean	L_{eq} A. Mean	L_{eq} Median	L_{10} Median	L_{50} Median	L_{90} Median	L_{nat} Median
0	50	14.6	66.8	32.7	24.7	22.9	25.2	15.9	15.1	15.2
1	50	14.6	66.6	33.3	27.0	25.7	27.4	16.3	15.1	15.3
2	50	14.6	70.1	37.4	24.0	21.3	20.8	15.4	15.1	15.1
3	50	14.6	57.4	28.2	20.7	18.4	18.3	15.4	15.1	15.4
4	50	14.6	55.8	27.7	20.1	17.7	17.9	15.2	15.1	15.2
5	50	14.6	62.0	28.7	23.4	22.2	21.9	15.5	15.2	15.4
6	50	14.6	60.7	29.4	22.7	19.5	20.6	15.3	15.1	15.2
7	50	14.6	61.8	29.8	25.4	25.1	24.7	16.0	15.1	15.3
8	49	14.7	78.9	35.1	29.7	27.7	31.4	18.9	15.6	15.8
9	49	14.8	66.7	36.0	30.3	28.6	31.4	21.3	17.0	17.1
10	50	14.9	67.3	36.5	32.8	32.5	34.9	24.1	18.1	18.8
11	51	15.0	71.5	37.1	32.0	30.2	33.0	24.0	19.1	20.0
12	51	15.0	64.8	35.5	32.2	32.0	33.9	25.1	19.2	21.0
13	51	15.2	72.0	37.6	32.7	31.6	33.8	25.8	20.3	20.5
14	50	15.1	68.2	37.1	31.5	29.9	33.3	22.8	18.7	18.8
15	50	15.0	70.1	35.7	31.2	30.5	32.7	22.0	17.9	18.1
16	50	14.9	65.2	35.7	30.5	29.5	31.2	20.3	16.4	16.7
17	50	14.9	62.5	35.5	30.0	28.6	32.0	20.2	15.6	16.1
18	50	14.8	80.1	40.7	29.7	28.2	30.9	18.9	15.3	15.6
19	50	14.8	67.8	37.2	28.0	26.2	30.0	18.2	15.3	15.6
20	50	14.8	66.5	34.9	28.0	26.4	28.9	17.7	15.1	15.4
21	50	14.7	66.6	34.5	28.4	27.0	30.1	18.0	15.1	15.3
22	50	14.7	61.8	34.9	26.7	25.9	29.0	17.1	15.1	15.3
23	50	14.6	64.2	37.4	25.8	24.3	26.2	15.6	15.1	15.2

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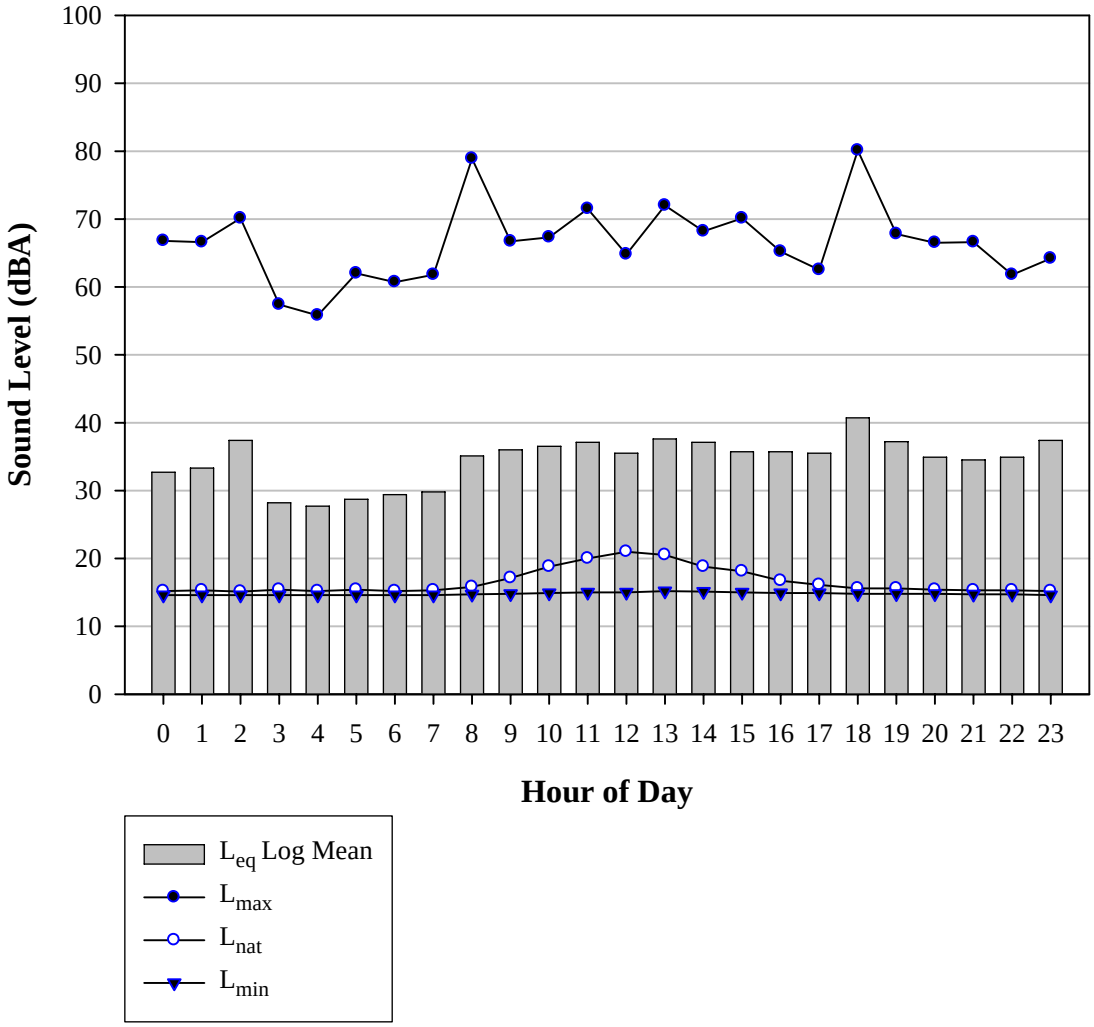


Figure VII-34. Acoustic metrics (dBA) for Natural Bridges NM, Owochomo Bridge (NABR001) winter 2005-2006 (n=1201).

Table VII-45. Acoustic metrics (dBA) for Natural Bridges NM, Owochomo Bridge (NABR001) summer 2006 (n=349).

Hour of Day	Num. Hours	L_{min}	L_{max}	L_{eq} L. Mean	L_{eq} A. Mean	L_{eq} Median	L_{10} Median	L_{50} Median	L_{90} Median	L_{nat} Median
0	15	17.2	73.3	32.9	29.9	28.8	31.4	25.8	22.8	24.6
1	15	17.3	59.2	31.4	29.2	28.8	31.2	24.5	21.8	23.0
2	15	17.2	64.6	32.7	26.2	24.1	25.4	22.2	20.2	21.6
3	14	17.0	58.3	27.3	25.1	24.8	25.3	21.8	20.3	21.6
4	14	16.9	60.0	32.9	27.1	27.2	27.3	22.9	19.9	22.3
5	14	16.7	59.6	29.5	27.1	27.4	25.3	21.1	18.3	20.4
6	14	16.7	60.8	29.2	27.2	27.1	27.5	19.1	17.4	18.0
7	14	16.8	58.7	28.8	27.1	26.3	28.3	19.5	17.5	18.1
8	14	16.8	69.5	34.0	32.5	32.0	34.1	22.5	18.2	18.7
9	14	16.9	72.8	35.8	34.3	33.6	35.0	27.0	20.3	20.9
10	14	17.0	62.0	34.8	33.4	32.8	36.3	26.0	20.1	20.8
11	14	17.1	74.2	41.1	34.4	34.3	34.4	24.8	19.9	20.6
12	14	17.4	69.6	39.8	34.0	31.4	34.5	26.9	20.8	22.0
13	14	17.3	65.2	39.3	35.2	33.0	35.6	26.8	21.5	22.2
14	15	17.2	67.8	39.5	33.8	32.5	34.4	26.9	20.8	21.4
15	15	17.1	83.8	47.4	35.3	33.9	35.7	27.6	22.0	22.8
16	15	17.3	68.3	35.4	33.2	33.1	34.5	26.3	19.8	20.7
17	15	17.1	57.9	34.2	32.8	33.2	37.0	26.8	20.3	21.5
18	15	17.1	77.8	42.1	32.5	29.8	33.7	25.3	19.9	21.4
19	15	17.0	80.5	44.5	34.5	31.6	33.7	24.6	19.4	20.8
20	15	16.9	79.2	38.7	32.8	31.5	34.6	24.4	19.2	19.9
21	15	17.1	54.4	33.4	32.6	33.7	36.2	30.6	28.3	29.6
22	15	17.2	63.6	33.4	32.0	32.2	34.3	28.9	26.4	27.4
23	15	17.3	56.4	29.7	29.1	28.8	30.6	26.3	23.9	25.4

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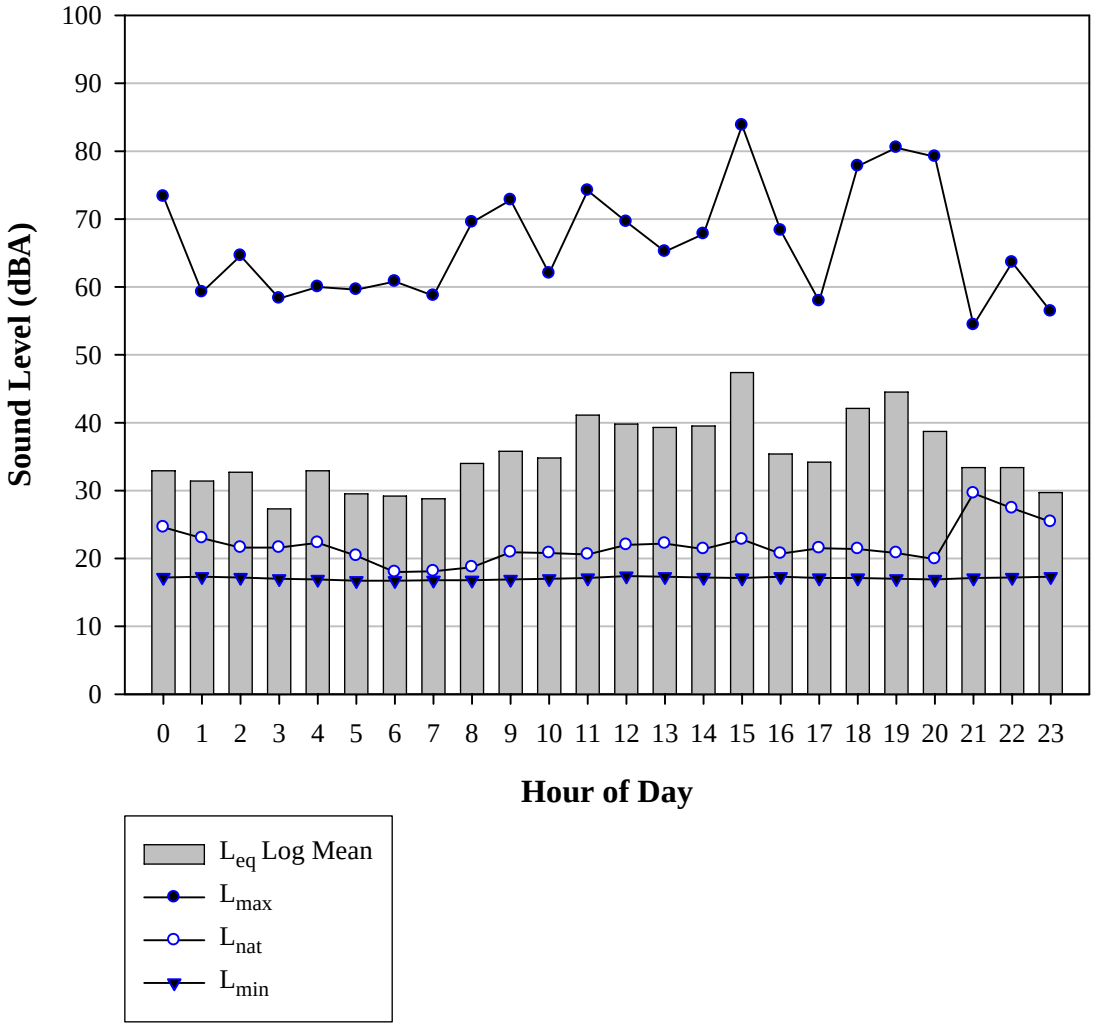


Figure VII-35. Acoustic metrics (dBA) for Natural Bridges NM, Owochomo Bridge (NABR001) summer 2006 (n=349).

Table VII-46. Acoustic metrics (dBA and un-weighted one-third octave bands 12.5-20k Hz) for all hours, NABR, Owochomo Bridge (NABR001) winter 2005-2006.

dBA/Freq	Num. Hours	L_{min}	L_{max}	L_{eq} L. Mean	L_{eq} Median	L_{10} Median	L_{50} Median	L_{90} Median	L_{nat} Median
dBA	1201	14.6	80.1	35.6	27.0	29.6	18.9	15.9	16.4
12.5	982	3.1	86.9	56.5	38.2	39.6	32.4	27.9	29.6
15.8	982	5.7	84.7	54.7	36.3	37.8	31.4	27.1	28.7
20	1201	3.3	83.7	52.7	35.1	37.6	31.4	26.7	28.3
25	1201	3.1	84.3	50.2	33.9	36.8	29.7	24.3	25.9
31.5	1201	-0.5	82.9	47.3	33.5	37.0	28.9	22.4	23.9
40	1201	-1.4	80.2	44.3	33.3	37.2	28.3	20.6	22.4
50	1201	-2.5	80.2	41.5	33.0	36.9	27.5	17.7	20.0
63	1201	-4.2	76.8	39.1	31.8	35.7	26.1	15.0	17.4
80	1201	-4.9	83.9	37.2	30.2	33.9	24.2	12.0	14.6
100	1201	-5.0	79.5	35.4	29.6	33.1	22.1	9.6	12.2
125	1201	-5.6	77.4	34.7	30.6	33.5	19.2	7.1	9.5
160	1201	-5.9	76.0	33.7	30.3	33.7	16.4	4.8	7.0
200	1201	-5.9	74.4	31.6	27.5	30.9	14.0	2.9	4.8
250	1201	-5.9	71.5	30.0	25.4	27.7	11.4	1.7	3.4
315	1201	-5.6	66.7	29.0	24.3	25.6	8.8	1.0	2.4
400	1201	-4.8	71.2	28.9	22.5	22.4	6.7	0.4	1.7
500	1201	-4.6	66.8	27.0	18.3	18.8	4.8	-0.3	0.7
630	1201	-3.9	77.3	26.1	13.6	14.9	2.9	-0.9	-0.2
800	1201	-3.2	72.1	25.6	10.2	11.3	1.3	-0.9	-0.5
1000	1201	-2.5	77.1	26.5	6.6	7.2	0.6	-0.4	-0.2
1250	1201	-1.4	74.9	25.0	4.6	4.5	0.7	0.1	0.3
1600	1201	-0.4	67.1	23.1	2.5	2.6	1.2	0.8	0.9
2000	1201	0.4	69.0	21.6	2.7	2.8	1.8	1.5	1.6
2500	1201	1.3	64.0	19.2	3.5	3.5	2.7	2.4	2.5
3150	1201	2.3	62.4	18.2	4.1	4.2	3.6	3.3	3.3
4000	1201	3.1	61.2	16.7	5.3	5.1	4.3	4.1	4.2
5000	1201	2.6	58.9	14.9	5.8	5.7	5.1	4.9	5.0
6300	1201	2.4	57.5	14.4	7.3	6.7	5.9	5.7	5.8
8000	1201	2.8	58.6	14.3	7.9	7.3	6.7	6.5	6.5
10000	1201	2.7	57.4	14.2	7.6	7.6	7.2	7.0	7.1
12500	1201	2.1	58.5	14.3	7.3	7.4	7.1	7.0	7.1
16000	1201	0.9	58.8	14.7	6.4	6.5	6.3	6.2	6.2
20000	1201	-1.0	57.7	15.8	4.7	4.7	4.6	4.5	4.5

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Table VII-47. Acoustic metrics (dBA and un-weighted one-third octave bands 20-20k Hz) for all hours, NABR, Owochomo Bridge (NABR001) summer 2006.

dBA/Freq	Num. Hours	L_{min}	L_{max}	L_{eq} L. Mean	L_{eq} Median	L_{10} Median	L_{50} Median	L_{90} Median	L_{nat} Median
dBA	349	16.7	83.8	38.8	30.7	33.3	25.0	20.4	21.7
20	349	-21.6	85.1	49.9	41.7	41.3	31.4	23.4	26.4
25	349	-19.6	81.8	47.4	39.1	39.7	30.8	22.9	25.7
31.5	349	-15.4	84.2	45.0	37.6	39.1	30.2	21.7	24.5
40	349	-18.3	83.7	43.2	36.4	39.0	29.9	20.6	23.7
50	349	-14.3	88.8	42.0	35.7	38.6	29.2	18.8	22.0
63	349	-11.9	83.8	40.9	34.5	37.3	28.0	17.6	20.7
80	349	-12.5	84.5	40.3	33.0	35.7	26.7	16.1	19.5
100	349	-10.5	82.2	39.0	31.4	34.0	24.8	14.1	17.3
125	349	-11.4	86.7	39.0	31.0	33.5	22.6	12.2	15.4
160	349	-11.9	84.9	39.1	30.7	33.5	20.4	10.4	13.4
200	349	-11.0	82.6	37.7	28.7	31.5	18.4	8.5	11.5
250	349	-9.5	82.3	36.3	26.6	29.2	16.7	7.0	9.9
315	349	-8.3	81.2	35.1	26.2	27.6	14.5	5.9	8.5
400	349	-8.7	79.4	33.6	25.4	26.3	13.2	5.6	8.0
500	349	-7.5	77.6	32.0	23.6	24.5	12.5	5.7	7.6
630	349	-9.0	76.7	30.2	20.5	22.1	11.9	5.4	7.2
800	349	-9.0	75.0	28.4	17.2	19.2	10.6	5.1	6.7
1000	349	-1.4	74.2	26.8	14.5	16.7	9.0	4.6	5.7
1250	349	-8.4	71.3	25.1	12.6	14.2	6.8	3.6	4.4
1600	349	-7.5	69.0	23.7	10.8	12.2	5.7	3.7	4.2
2000	349	2.0	65.5	22.3	9.9	11.1	5.9	4.6	4.9
2500	349	-7.1	63.1	21.7	11.8	12.4	6.6	5.1	5.4
3150	349	3.8	68.2	22.7	13.2	13.5	7.2	5.8	6.1
4000	349	4.8	59.6	20.4	13.8	14.0	8.1	6.5	6.7
5000	349	4.9	62.9	19.4	12.3	11.6	7.6	6.8	7.0
6300	349	6.0	70.6	18.9	9.2	9.2	7.6	7.2	7.3
8000	349	2.7	62.9	17.6	8.3	8.6	7.9	7.5	7.7
10000	349	3.7	67.7	17.6	8.5	8.9	8.3	7.9	8.1
12500	349	1.4	61.1	16.9	8.7	9.1	8.5	8.2	8.4
16000	349	0.7	55.8	15.8	8.8	9.3	8.7	8.4	8.6
20000	349	2.0	48.9	14.2	8.4	8.9	8.3	7.9	8.0

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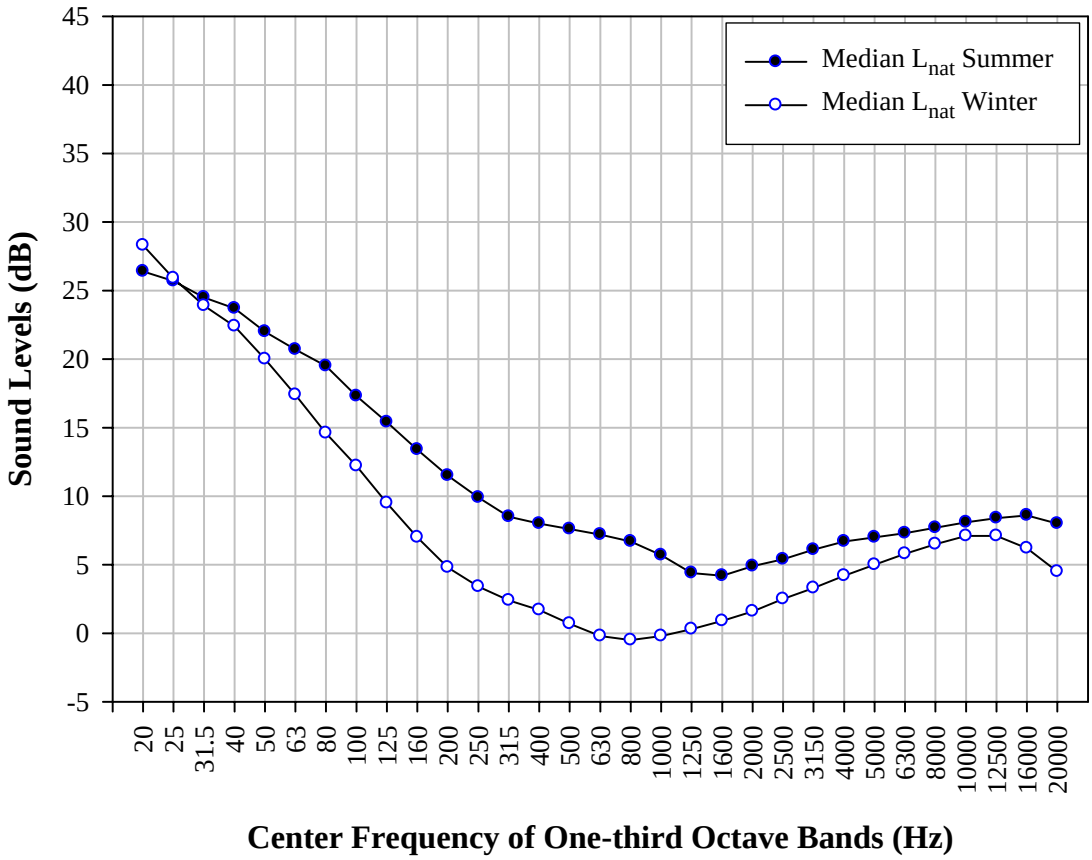


Figure VII-36. L_{nat} for one-third octave bands (20-20k Hz, un-weighted) for all hours, Natural Bridges NM, Owochomo Bridge (NABR001) winter 2005-2006 and summer 2006.

Table VII-48. Acoustic metrics (dBA) for Natural Bridges NM, Visitor Center (NABR002) January 2006 (n=268).

Hour of Day	Num. Hours	L_{min}	L_{max}	L_{eq} L. Mean	L_{eq} A. Mean	L_{eq} Median	L_{10} Median	L_{50} Median	L_{90} Median
0	11	17.9	67.4	40.0	32.5	30.4	32.2	25.8	19.3
1	11	17.9	68.8	40.6	32.9	32.3	31.5	26.4	19.7
2	11	18.0	68.1	40.9	32.7	30.2	30.8	27.0	22.0
3	11	17.9	69.1	40.4	29.2	27.5	28.4	26.3	21.9
4	11	17.9	69.5	41.2	30.7	28.9	28.8	25.9	19.6
5	11	17.7	70.2	40.5	32.5	30.8	30.4	25.1	19.6
6	11	17.8	69.4	40.1	32.8	30.4	30.2	26.8	20.5
7	11	18.0	70.1	41.9	33.0	30.3	30.2	26.9	22.1
8	11	18.0	70.3	43.6	34.4	31.2	33.3	27.4	21.5
9	11	17.9	70.6	42.4	33.5	31.1	32.8	27.9	21.3
10	11	17.8	67.1	40.7	34.8	34.9	36.0	28.4	22.4
11	11	17.9	65.6	40.7	36.7	36.7	38.3	28.4	22.5
12	12	17.9	68.2	40.4	36.1	35.5	37.0	28.3	23.3
13	12	17.9	69.6	43.2	36.7	34.5	37.1	27.6	22.8
14	12	16.7	69.0	43.2	35.9	34.0	35.4	28.6	22.4
15	12	18.2	69.0	43.2	34.7	32.3	34.4	25.8	21.2
16	11	18.2	70.1	43.3	33.7	30.9	33.1	25.4	19.8
17	11	18.1	69.7	43.8	33.7	32.2	34.9	25.8	19.8
18	11	16.6	67.8	39.5	30.4	28.6	30.6	24.7	18.6
19	11	17.8	66.5	40.0	33.0	30.7	31.3	25.0	19.0
20	11	17.8	61.4	34.8	32.3	31.6	31.7	24.8	19.3
21	11	17.7	66.9	37.9	33.6	31.9	34.4	26.7	19.9
22	11	17.8	68.1	40.9	34.3	33.8	33.5	26.0	19.4
23	11	17.8	69.2	39.7	32.2	31.7	32.9	26.6	19.1

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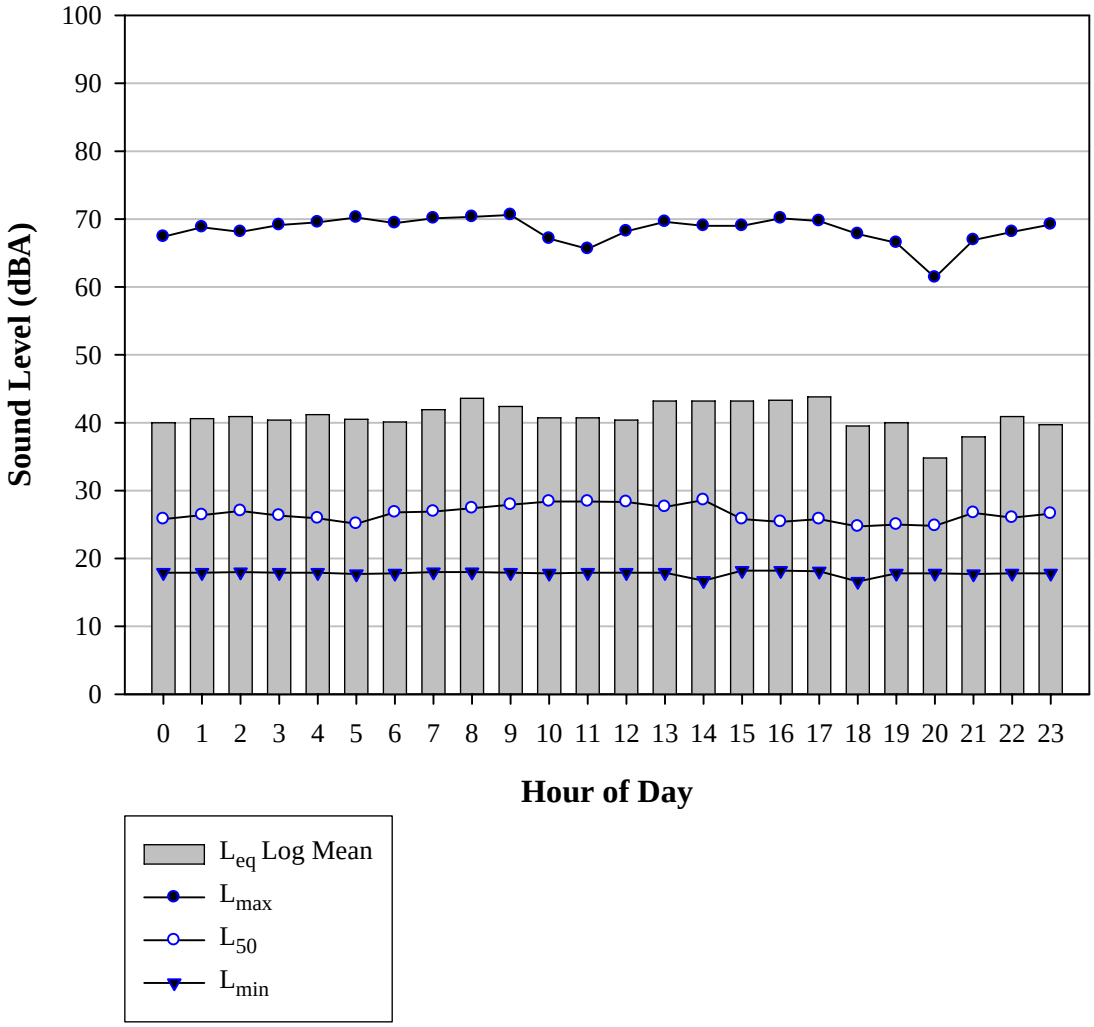


Figure VII-37. Acoustic metrics (dBA) for Natural Bridges NM, Visitor Center (NABR002) January 2006 (n=268).

Table VII-50. Acoustic metrics (dBA) for Natural Bridges NM, Visitor Center (NABR002) August 2006 (n=308).

Hour of Day	Num. Hours	L_{min}	L_{max}	L_{eq} L. Mean	L_{eq} A. Mean	L_{eq} Median	L_{10} Median	L_{50} Median	L_{90} Median
0	13	18.8	55.6	35.1	32.9	32.1	35.2	30.8	27.3
1	13	17.7	57.2	35.2	33.0	32.4	35.3	30.6	26.8
2	13	17.0	56.1	32.6	30.4	30.2	33.3	26.5	23.8
3	13	15.4	48.5	29.6	27.4	26.7	28.9	26.2	22.7
4	13	13.3	50.4	25.3	24.1	24.3	25.1	20.2	17.1
5	13	13.2	57.1	25.1	22.4	21.0	20.0	15.6	14.6
6	13	13.3	56.1	25.4	23.4	22.8	21.0	16.6	14.9
7	13	13.5	54.4	27.7	26.7	27.1	28.9	18.6	17.1
8	13	13.3	60.0	31.8	30.4	30.0	32.6	23.0	18.0
9	13	13.8	62.4	32.2	30.3	29.4	31.7	22.4	18.2
10	13	14.0	59.1	33.2	31.1	31.0	34.5	25.7	19.6
11	13	13.8	60.5	33.9	31.9	30.6	34.5	24.6	19.9
12	13	15.6	59.5	33.4	31.7	31.8	33.4	24.9	20.5
13	12	15.5	60.3	33.1	31.7	31.1	34.3	26.1	21.2
14	12	13.8	93.6	59.1	35.4	32.1	34.0	25.1	20.7
15	12	14.1	95.2	52.7	34.6	31.8	33.6	24.8	19.9
16	12	14.7	63.2	34.3	31.6	31.4	32.9	24.5	20.3
17	13	13.8	72.3	34.5	31.0	28.8	31.9	23.7	18.6
18	13	13.4	62.9	32.7	30.5	30.4	32.3	22.6	17.3
19	13	13.8	82.1	40.8	30.5	30.4	31.7	19.8	16.3
20	13	14.2	72.6	41.4	38.4	37.5	42.3	32.8	16.7
21	13	22.2	73.2	44.2	40.1	39.2	41.3	38.8	35.5
22	13	19.1	71.7	38.1	36.5	36.1	38.7	35.2	31.8
23	13	19.8	58.7	35.5	34.4	34.0	36.1	33.4	29.3

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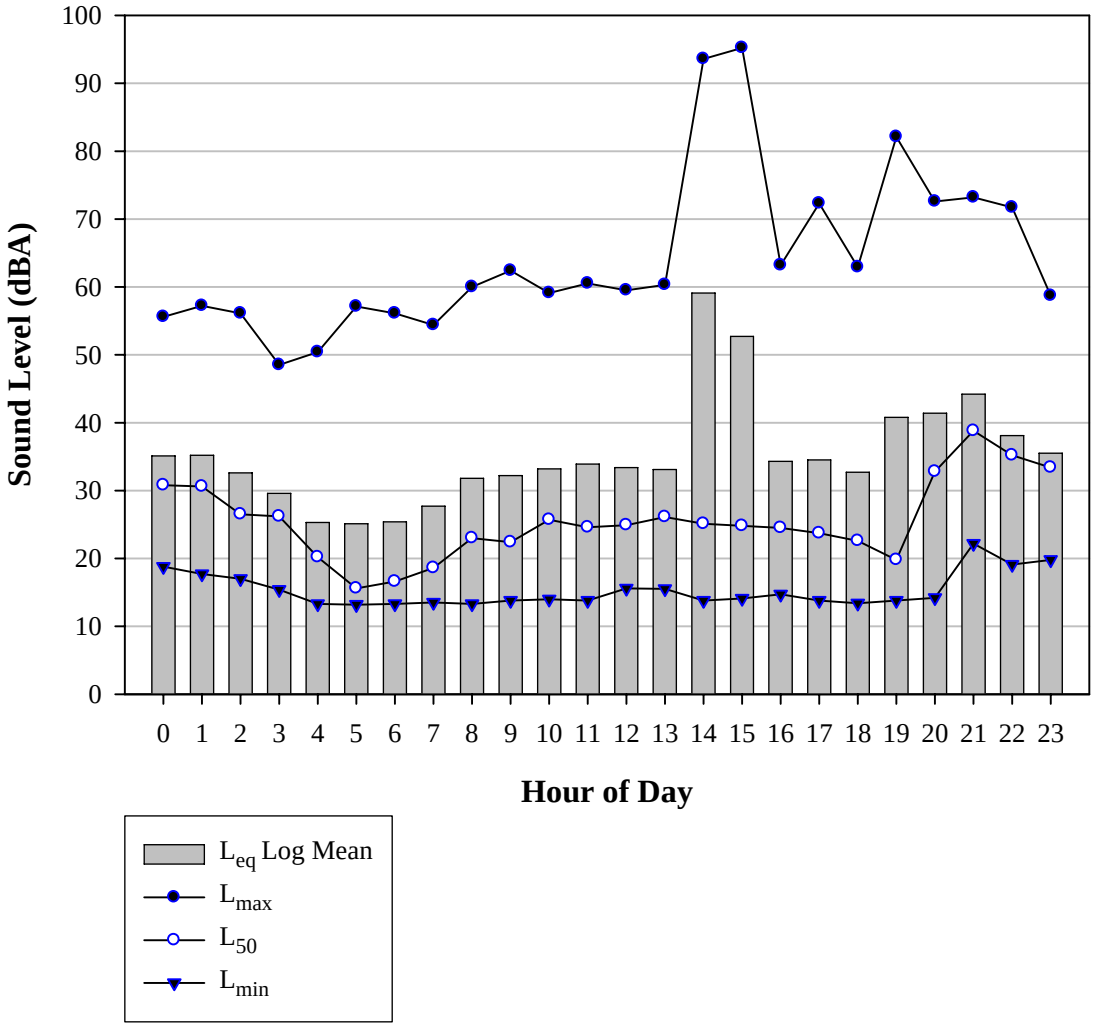


Figure VII-38. Acoustic metrics (dBA) for Natural Bridges NM, Visitor Center (NABR002) August 2006 (n=308).

Table VII-51. Acoustic metrics (dBA and un-weighted one-third octave bands 20-20k Hz) for all hours, NABR, Visitor Center (NABR002) winter 2006.

dBA/Freq	Num. Hours	L_{min}	L_{max}	L_{eq} L. Mean	L_{eq} Median	L_{10} Median	L_{50} Median	L_{90} Median
dBA	268	16.6	70.6	41.4	31.9	33.2	26.4	20.7
20	268	-24.9	82.1	48.8	37.2	39.3	32.1	25.2
25	268	-14.2	80.4	47.3	36.2	38.2	30.4	23.9
31.5	268	1.5	77.5	45.9	36.0	38.4	29.9	22.9
40	268	-1.6	76.6	44.8	35.9	38.4	29.2	21.2
50	268	-10.5	76.2	43.7	35.3	37.7	28.9	19.5
63	268	0.3	74.5	45.2	35.2	37.2	27.5	18.6
80	268	-5.4	79.7	41.4	32.4	34.3	25.3	16.6
100	268	-5.8	73.7	40.2	31.3	33.4	22.7	15.1
125	268	0.0	68.5	39.2	32.2	34.1	24.0	19.3
160	268	-6.5	70.8	38.4	31.5	34.2	19.3	11.4
200	268	-7.2	69.3	37.1	29.6	32.2	17.0	8.5
250	268	-5.9	69.5	36.1	28.7	29.6	17.6	12.9
315	268	-6.7	67.4	35.1	27.2	28.0	14.5	7.8
400	268	-3.5	68.3	34.5	26.4	26.2	16.2	10.6
500	268	-5.8	64.0	33.6	25.4	27.6	18.0	10.4
630	268	-7.6	62.7	32.4	22.5	23.9	17.5	6.4
800	268	-8.6	62.4	31.5	20.4	20.6	15.3	6.3
1000	268	-3.1	59.8	30.7	18.8	19.6	11.3	5.5
1250	268	-9.1	62.2	29.8	16.9	17.6	9.9	4.0
1600	268	-9.3	58.0	28.8	15.2	15.8	8.7	3.6
2000	268	0.4	58.1	27.7	13.7	13.8	6.0	3.4
2500	268	-8.7	56.6	26.8	13.1	13.5	5.1	3.7
3150	268	3.3	57.5	26.3	13.4	13.5	6.0	4.9
4000	268	4.6	55.5	25.6	12.6	13.1	6.8	6.1
5000	268	4.6	58.9	25.1	12.8	13.1	8.0	7.3
6300	268	6.1	54.6	24.5	13.2	13.1	8.9	8.3
8000	268	3.4	54.1	24.0	13.3	13.4	9.9	9.4
10000	268	4.8	53.7	23.6	13.6	13.7	11.1	10.6
12500	268	2.7	53.5	23.4	13.8	14.0	11.7	11.2
16000	268	2.7	54.2	24.0	14.2	14.5	12.0	11.6
20000	268	6.6	55.6	25.4	14.8	15.1	12.6	12.0

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Table VII-52. Acoustic metrics (dBA and un-weighted one-third octave bands 20-20k Hz) for all hours, NABR, Visitor Center (NABR002) summer 2006.

dBA/Freq	Num. Hours	LMin	LMax	Leq L. Mean	Leq Median	L10 Median	L50 Median	L90 Median
dBA	308	13.2	95.2	46.3	30.9	33.3	25.3	20.0
20	308	-7.0	86.9	45.8	35.1	35.3	28.6	22.0
25	308	-4.3	87.0	44.8	34.4	35.9	28.3	21.8
31.5	308	-6.9	87.8	44.1	33.6	36.5	28.0	20.9
40	308	-4.2	90.2	44.4	33.4	36.3	27.7	19.8
50	308	-1.3	90.9	44.5	33.4	36.0	27.3	19.2
63	308	-1.9	90.0	44.9	33.2	35.0	27.1	21.5
80	308	-5.6	91.5	43.8	31.3	33.3	24.5	16.9
100	308	-5.0	92.6	44.2	29.6	31.8	22.3	15.5
125	308	-5.6	91.2	44.8	30.2	32.0	24.9	20.9
160	308	-9.9	90.2	45.1	28.8	31.7	19.0	12.0
200	308	-8.5	88.8	43.0	26.2	29.1	17.9	10.6
250	308	-2.5	89.1	42.8	24.3	26.5	18.3	15.4
315	308	-9.3	87.5	42.2	22.4	24.0	12.6	4.7
400	308	-7.4	88.5	41.5	21.7	22.6	12.8	8.6
500	308	-7.5	90.1	40.1	19.6	21.2	10.5	4.9
630	308	-5.7	87.9	39.1	17.6	19.6	11.2	4.7
800	308	-5.6	88.6	38.1	16.3	17.9	7.8	2.8
1000	308	-6.1	85.6	35.9	13.8	15.2	5.8	1.0
1250	308	-4.9	86.1	34.2	10.8	11.7	4.9	0.6
1600	308	-4.2	83.7	31.4	8.6	9.7	3.4	0.2
2000	308	-2.7	81.9	28.4	9.5	10.6	5.6	3.1
2500	308	-1.7	80.6	28.3	13.2	14.2	6.0	3.0
3150	308	-0.9	76.4	29.0	8.3	8.0	3.1	1.8
4000	308	-0.2	72.7	20.5	4.6	4.4	2.5	1.8
5000	308	-4.5	69.6	18.7	4.9	4.3	3.0	2.3
6300	308	-4.0	67.1	17.7	5.4	4.2	3.2	2.7
8000	308	-4.1	64.7	16.3	4.2	4.2	3.5	3.1
10000	308	-3.5	62.3	15.7	4.3	4.3	3.8	3.5
12500	308	-2.7	60.1	15.1	4.4	4.4	4.0	3.7
16000	308	-3.8	57.2	13.6	4.2	4.4	4.1	3.8
20000	308	-4.6	55.5	11.9	3.7	3.9	3.6	3.3

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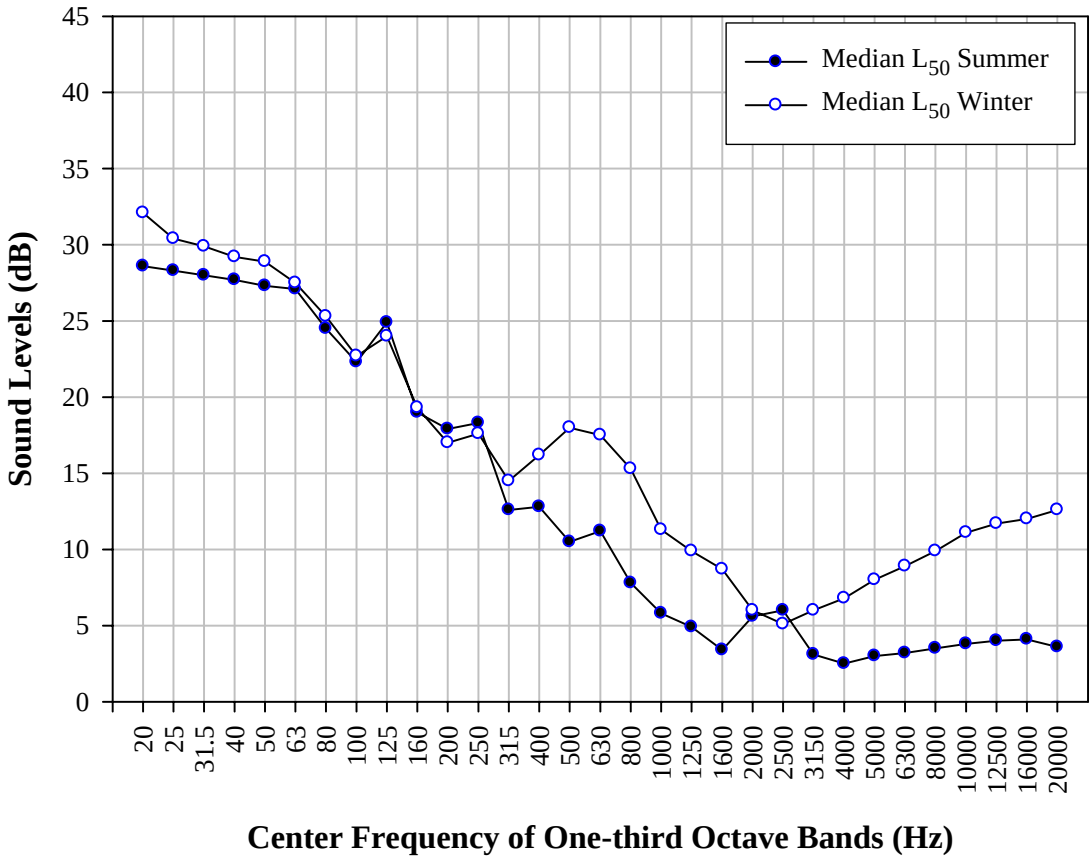


Figure VII-39. L_{50} for one-third octave bands (20-20k Hz, un-weighted) for all hours, Natural Bridges NM, Visitor Center (NABR002) winter and summer 2006.

Appendix VIII. Audibility Metrics for Primary Measurement Locations, Southeast Utah Group, 2001-2007.

Table VIII-1. Percent Time Non-natural Sounds were Audible, Arches National Park, Windows Area (ARCH001), 6-15-2002 to 6-21-2002.

Hour of Day	6-15-02 % Time Audible Non-natural Sources	6-16-02 % Time Audible Non-natural Sources	6-17-02 % Time Audible Non-natural Sources	6-18-02 % Time Audible Non-natural Sources	6-19-02 % Time Audible Non-natural Sources	6-20-02 % Time Audible Non-natural Sources	6-21-02 % Time Audible Non-natural Sources	Average % Time Audible Non-Natural Sources
0:00	41.7	8.3	0.0	16.7	33.3	16.7	50.0	**23.8**
1:00	16.7	0.0	16.7	8.3	41.7	0.0	41.7	**17.9**
2:00	16.7	16.7	8.3	0.0	25.0	0.0	0.0	**9.5**
3:00	16.7	0.0	8.3	8.3	0.0	0.0	0.0	**4.8**
4:00	0.0	0.0	0.0	8.3	0.0	16.7	0.0	**3.6**
5:00	33.3	0.0	8.3	0.0	8.3	66.7	0.0	**16.7**
6:00	33.3	8.3	25.0	8.3	66.7	91.7	0.0	**33.3**
7:00	58.3	25.0	66.7	41.7	33.3	83.3	0.0	**44.0**
8:00	91.7	75.0	83.3	25.0	75.0	100.0	0.0	**64.3**
9:00	58.3	58.3	41.7	66.7	58.3	100.0	0.0	**54.8**
10:00	58.3	66.7	58.3	66.7	75.0	83.3	25.0	**61.9**
11:00	66.7	50.0	25.0	41.7	66.7	50.0	8.3	**44.0**
12:00	16.7	33.3	25.0	83.3	50.0	16.7	25.0	**35.7**
13:00	16.7	25.0	16.7	33.3	50.0	8.3	41.7	**27.4**
14:00	33.3	25.0	16.7	41.7	41.7	0.0	8.3	**23.8**
15:00	33.3	25.0	25.0	16.7	58.3	16.7	8.3	**26.2**
16:00	8.3	33.3	16.7	16.7	25.0	16.7	25.0	**20.2**
17:00	8.3	16.7	41.7	25.0	50.0	16.7	50.0	**29.8**
18:00	41.7	16.7	33.3	25.0	58.3	25.0	25.0	**32.1**
19:00	25.0	16.7	25.0	8.3	25.0	8.3	25.0	**19.0**
20:00	41.7	33.3	33.3	41.7	50.0	16.7	75.0	**41.7**
21:00	66.7	58.3	33.3	33.3	8.3	33.3	66.7	**42.9**
22:00	66.7	16.7	25.0	16.7	16.7	58.3	66.7	**38.1**
23:00	25.0	16.7	0.0	16.7	0.0	33.3	25.0	**16.7**

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Table VIII-2. Percent Time Aircraft Sounds were Audible, Arches National Park, Windows Area (ARCH001), 6-15-2002 to 6-21-2002.

Hour of Day	6-15-02 % Time Audible Aircraft	6-16-02 % Time Audible Aircraft	6-17-02 % Time Audible Aircraft	6-18-02 % Time Audible Aircraft	6-19-02 % Time Audible Aircraft	6-20-02 % Time Audible Aircraft	6-21-02 % Time Audible Aircraft	Average % Time Audible Aircraft
0:00	0.0	8.3	0.0	16.7	16.7	8.3	25.0	**10.7**
1:00	16.7	0.0	16.7	0.0	8.3	0.0	25.0	**9.5**
2:00	16.7	16.7	8.3	0.0	16.7	0.0	0.0	**8.3**
3:00	16.7	0.0	8.3	8.3	0.0	0.0	0.0	**4.8**
4:00	0.0	0.0	0.0	8.3	0.0	8.3	0.0	**2.4**
5:00	16.7	0.0	0.0	0.0	0.0	8.3	0.0	**3.6**
6:00	8.3	0.0	0.0	0.0	0.0	8.3	0.0	**2.4**
7:00	33.3	8.3	16.7	8.3	8.3	8.3	0.0	**11.9**
8:00	16.7	50.0	33.3	16.7	58.3	8.3	0.0	**26.2**
9:00	33.3	33.3	33.3	33.3	33.3	50.0	0.0	**31.0**
10:00	58.3	41.7	50.0	41.7	75.0	75.0	25.0	**52.4**
11:00	66.7	41.7	16.7	41.7	50.0	16.7	8.3	**34.5**
12:00	16.7	33.3	25.0	83.3	33.3	16.7	25.0	**33.3**
13:00	0.0	25.0	16.7	25.0	50.0	8.3	33.3	**22.6**
14:00	16.7	25.0	8.3	41.7	41.7	0.0	8.3	**20.2**
15:00	16.7	16.7	25.0	16.7	50.0	16.7	8.3	**21.4**
16:00	8.3	33.3	8.3	16.7	16.7	16.7	25.0	**17.9**
17:00	8.3	16.7	33.3	25.0	33.3	8.3	33.3	**22.6**
18:00	33.3	16.7	25.0	25.0	41.7	25.0	25.0	**27.4**
19:00	25.0	16.7	8.3	8.3	16.7	8.3	8.3	**13.1**
20:00	16.7	25.0	25.0	41.7	16.7	16.7	16.7	**22.6**
21:00	50.0	58.3	33.3	25.0	8.3	33.3	41.7	**35.7**
22:00	58.3	16.7	16.7	16.7	16.7	50.0	50.0	**32.1**
23:00	25.0	16.7	0.0	8.3	0.0	25.0	25.0	**14.3**

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Table VIII-3. Percent Time All Sounds were Audible, Arches National Park, Windows Area (ARCH001), 6-15-2002 to 6-21-2002.

Audible Sound Sources	6-15-02 % Time Audible	6-16-02 % Time Audible	6-17-02 % Time Audible	6-18-02 % Time Audible	6-19-02 % Time Audible	6-20-02 % Time Audible	6-21-02 % Time Audible	Average % Time Audible
No Sound Audible	11.1	9.4	12.5	9.4	5.6	1.7	0.7	**7.2**
Aircraft (unknown type)	0.0	0.0	0.0	0.0	0.3	0.0	0.0	**0.0**
Aircraft, Jet	20.1	18.4	14.9	15.6	19.4	14.6	13.2	**16.6**
Aircraft, Propeller	3.1	1.7	2.1	5.6	4.9	2.4	1.7	**3.1**
Aircraft, Helicopter	0.0	0.7	0.0	0.0	0.0	0.3	1.0	**0.3**
Vehicle	3.5	2.8	4.2	2.8	5.6	11.8	4.2	**5.0**
Watercraft	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
Motor Sounds[1]	9.7	2.4	5.2	3.1	8.0	6.6	3.5	**5.5**
Grounds Care	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
People	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
Domestic Animal	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
Building Sounds	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
Construction	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
Non-natural Other	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
Non-natural Unknown	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
Wind	32.6	49.7	42.0	58.0	50.3	62.2	75.7	**52.9**
Water (rain, river, etc.)	0.0	0.0	0.0	0.0	0.0	0.0	0.7	**0.1**
Thunder	0.0	0.0	0.0	0.0	0.0	0.0	3.1	**0.4**
Mammal	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
Bird	12.2	8.0	5.9	1.7	6.6	9.4	5.2	**7.0**
Reptile	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
Amphibian	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
Insect	38.2	40.6	41.0	37.5	46.9	39.2	35.1	**39.8**
Animal (unknown type)	0.0	0.0	0.0	0.7	0.0	1.4	0.3	**0.3**
Natural Other	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
Natural Unknown	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
Unknown	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
Total Aircraft	**23.3**	**20.8**	**17.0**	**21.2**	**24.7**	**17.4**	**16.0**	**20.0**
Total Road Vehicles	**3.5**	**2.8**	**4.2**	**2.8**	**5.6**	**11.8**	**4.2**	**5.0**
Total Watercraft	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**
Total Non-natural	**36.5**	**26.0**	**26.4**	**27.1**	**38.2**	**35.8**	**23.6**	**30.5**
Total Natural	**75.0**	**76.0**	**72.9**	**79.2**	**78.5**	**82.3**	**93.4**	**79.6**

[1] Unable to distinguish between distant vehicle and distant aircraft, but most likely distant vehicle.

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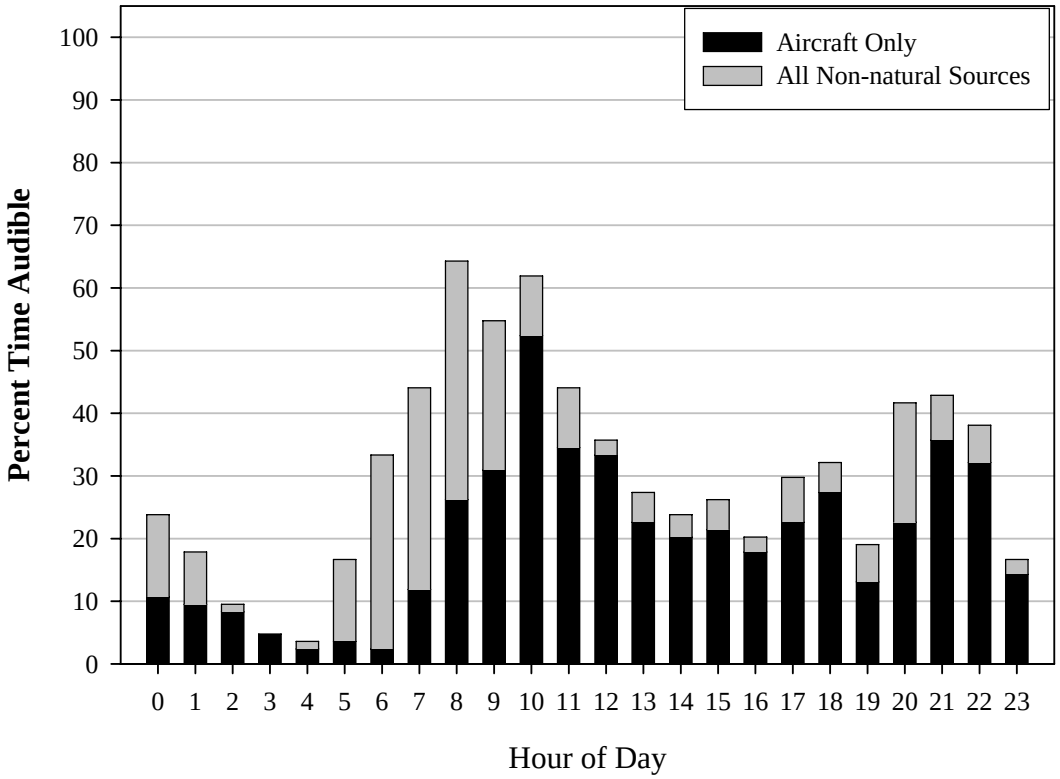


Figure VIII-1. Percent Time All Non-natural Sounds and Aircraft Sounds were Audible, Arches National Park, Windows Area (ARCH001), 6-15-2002 to 6-21-2002.

Table VIII-4. Percent Time Non-natural Sounds were Audible, Arches National Park, Windows Area (ARCH001), 1-15-2003 to 1-21-2003.

Hour of Day	1-15-03 % Time Audible Non-natural Sources	1-16-03 % Time Audible Non-natural Sources	1-17-03 % Time Audible Non-natural Sources	1-18-03 % Time Audible Non-natural Sources	1-19-03 % Time Audible Non-natural Sources	1-20-03 % Time Audible Non-natural Sources	1-21-03 % Time Audible Non-natural Sources	Average % Time Audible Non-Natural Sources
0:00	66.7	0.0	50.0	16.7	58.3	66.7	75.0	**47.6**
1:00	41.7	8.3	33.3	0.0	66.7	91.7	83.3	**46.4**
2:00	58.3	25.0	41.7	0.0	66.7	83.3	66.7	**48.8**
3:00	91.7	8.3	58.3	8.3	75.0	50.0	91.7	**54.8**
4:00	41.7	0.0	25.0	0.0	33.3	75.0	83.3	**36.9**
5:00	58.3	8.3	41.7	16.7	75.0	66.7	100.0	**52.4**
6:00	33.3	0.0	41.7	50.0	83.3	75.0	91.7	**53.6**
7:00	83.3	50.0	50.0	66.7	75.0	100.0	100.0	**75.0**
8:00	91.7	50.0	58.3	100.0	100.0	91.7	100.0	**84.5**
9:00	83.3	91.7	75.0	100.0	100.0	91.7	100.0	**91.7**
10:00	25.0	66.7	50.0	100.0	91.7	100.0	100.0	**76.2**
11:00	50.0	75.0	41.7	75.0	100.0	91.7	100.0	**76.2**
12:00	25.0	50.0	50.0	75.0	100.0	100.0	83.3	**69.0**
13:00	16.7	50.0	16.7	91.7	100.0	100.0	75.0	**64.3**
14:00	16.7	58.3	33.3	66.7	83.3	83.3	66.7	**58.3**
15:00	58.3	50.0	33.3	66.7	75.0	83.3	83.3	**64.3**
16:00	33.3	91.7	41.7	91.7	41.7	100.0	50.0	**64.3**
17:00	66.7	91.7	41.7	50.0	100.0	83.3	83.3	**73.8**
18:00	83.3	41.7	50.0	83.3	100.0	91.7	75.0	**75.0**
19:00	50.0	41.7	8.3	75.0	66.7	66.7	41.7	**50.0**
20:00	25.0	75.0	41.7	58.3	100.0	100.0	91.7	**70.2**
21:00	33.3	75.0	25.0	50.0	83.3	25.0	83.3	**53.6**
22:00	41.7	91.7	33.3	66.7	100.0	41.7	25.0	**57.1**
23:00	8.3	66.7	8.3	16.7	91.7	66.7	33.3	**41.7**

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Table VIII-5. Percent Time Aircraft were Audible, Arches National Park, Windows Area (ARCH001), 1-15-2003 to 1-21-2003.

Hour of Day	1-15-03 % Time Audible Aircraft	1-16-03 % Time Audible Aircraft	1-17-03 % Time Audible Aircraft	1-18-03 % Time Audible Aircraft	1-19-03 % Time Audible Aircraft	1-20-03 % Time Audible Aircraft	1-21-03 % Time Audible Aircraft	Average % Time Audible Aircraft
0:00	0.0	0.0	8.3	0.0	0.0	0.0	0.0	**1.2**
1:00	0.0	8.3	8.3	0.0	16.7	0.0	0.0	**4.8**
2:00	0.0	16.7	0.0	0.0	0.0	0.0	16.7	**4.8**
3:00	8.3	8.3	16.7	8.3	8.3	0.0	8.3	**8.3**
4:00	0.0	0.0	0.0	0.0	8.3	0.0	0.0	**1.2**
5:00	0.0	0.0	0.0	0.0	8.3	0.0	0.0	**1.2**
6:00	8.3	0.0	8.3	0.0	0.0	8.3	0.0	**3.6**
7:00	16.7	16.7	0.0	8.3	33.3	50.0	8.3	**19.0**
8:00	33.3	8.3	16.7	0.0	25.0	16.7	8.3	**15.5**
9:00	41.7	50.0	33.3	41.7	41.7	16.7	41.7	**38.1**
10:00	25.0	41.7	33.3	41.7	50.0	41.7	41.7	**39.3**
11:00	16.7	33.3	41.7	58.3	66.7	58.3	50.0	**46.4**
12:00	25.0	8.3	33.3	25.0	33.3	41.7	33.3	**28.6**
13:00	8.3	33.3	16.7	41.7	41.7	50.0	33.3	**32.1**
14:00	8.3	41.7	16.7	41.7	16.7	16.7	41.7	**26.2**
15:00	58.3	41.7	25.0	41.7	58.3	75.0	66.7	**52.4**
16:00	25.0	75.0	25.0	41.7	41.7	66.7	16.7	**41.7**
17:00	25.0	50.0	16.7	25.0	25.0	33.3	41.7	**31.0**
18:00	33.3	33.3	33.3	50.0	58.3	58.3	50.0	**45.2**
19:00	41.7	33.3	8.3	8.3	8.3	8.3	16.7	**17.9**
20:00	16.7	50.0	8.3	33.3	41.7	41.7	41.7	**33.3**
21:00	33.3	8.3	16.7	25.0	8.3	16.7	33.3	**20.2**
22:00	41.7	33.3	33.3	41.7	25.0	41.7	16.7	**33.3**
23:00	8.3	8.3	8.3	8.3	0.0	41.7	25.0	**14.3**

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Table VIII-6. Percent Time All Sounds were Audible, Arches National Park, Windows Area (ARCH001), 1-15-2003 to 1-21-2003.

Audible Sound Sources	1-15-03 % Time Audible	1-16-03 % Time Audible	1-17-03 % Time Audible	1-18-03 % Time Audible	1-19-03 % Time Audible	1-20-03 % Time Audible	1-21-03 % Time Audible	Average % Time Audible
No Sound Audible	22.9	26.0	53.1	39.6	11.1	13.2	16.0	**26.0**
Aircraft (unknown type)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
Aircraft, Jet	14.9	22.2	16.0	16.7	20.8	22.2	21.2	**19.1**
Aircraft, Propeller	4.9	2.8	1.0	5.9	4.9	5.9	3.5	**4.1**
Aircraft, Helicopter	0.0	0.0	0.0	0.0	0.0	0.3	0.0	**0.0**
Vehicle	24.3	10.8	9.0	9.7	37.2	29.2	47.2	**23.9**
Watercraft	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
Motor Sounds[1]	5.2	12.8	13.5	22.9	20.8	23.3	6.6	**15.0**
Grounds Care	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
People	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
Domestic Animal	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
Building Sounds	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
Construction	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
Non-natural Other	0.0	0.0	0.0	0.0	0.0	0.3	0.0	**0.0**
Non-natural Unknown	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
Wind	34.7	29.9	8.0	8.7	9.4	8.7	9.0	**15.5**
Water (rain, river, etc.)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
Thunder	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
Mammal	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
Bird	0.3	0.7	1.0	1.4	1.4	2.1	1.0	**1.1**
Reptile	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
Amphibian	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
Insect	0.0	0.0	0.0	0.0	0.3	0.0	0.0	**0.0**
Animal (unknown type)	0.0	0.0	0.0	0.3	0.0	0.0	0.0	**0.0**
Natural Other	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
Natural Unknown	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
Unknown	0.0	0.0	0.0	0.0	0.3	0.0	0.0	**0.0**
Total Aircraft	**19.8**	**25.0**	**17.0**	**22.6**	**25.7**	**28.5**	**24.7**	**23.3**
Total Road Vehicles	**24.3**	**10.8**	**9.0**	**9.7**	**37.2**	**29.2**	**47.2**	**23.9**
Total Watercraft	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**
Total Non-natural	**49.3**	**48.6**	**39.6**	**55.2**	**81.9**	**80.2**	**78.5**	**61.9**
Total Natural	**35.1**	**29.9**	**8.7**	**10.4**	**10.4**	**10.8**	**10.1**	**16.5**

[1] Unable to distinguish between distant vehicle and distant aircraft, but most likely distant vehicle.

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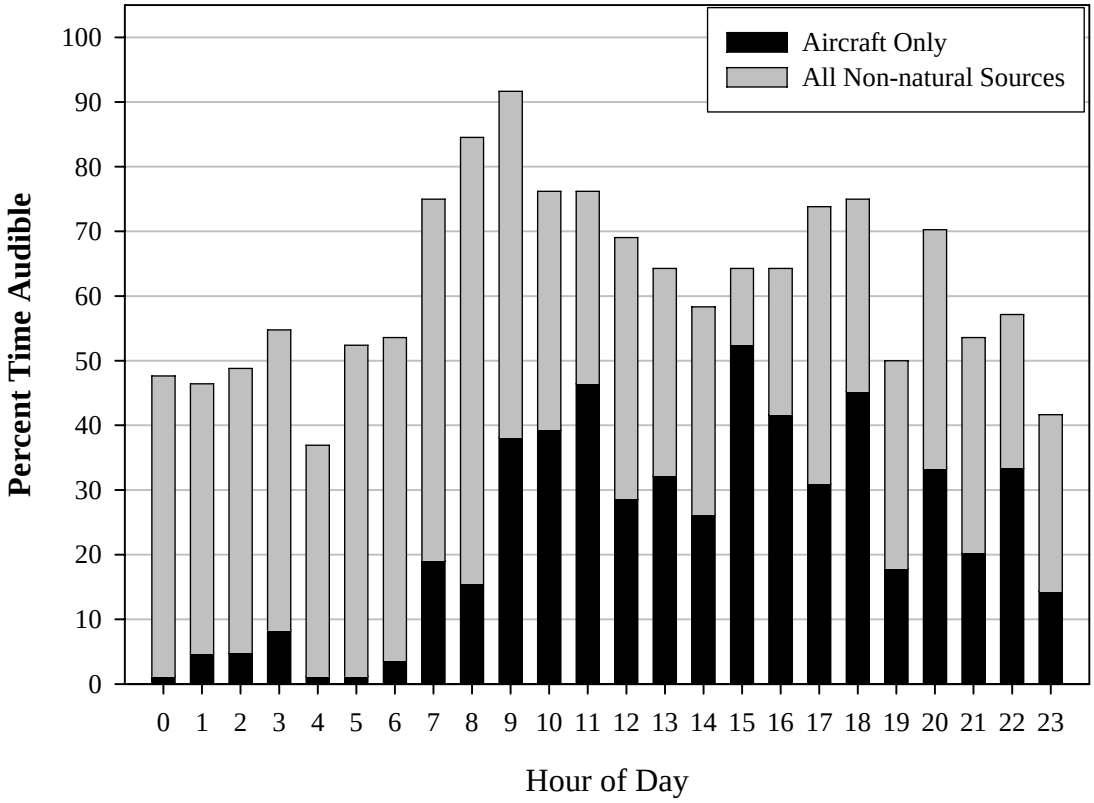


Figure VIII-2. Percent Time All Non-natural Sounds and Aircraft Sounds were Audible, Arches National Park, Windows Area (ARCH001), 1-15-2003 to 1-21-2003.

Table VIII-7. Percent Time Non-natural Sounds were Audible, Arches National Park, Salt Valley Road (ARCH002), 6-15-2002 to 6-21-2002.

Hour of Day	6-15-02 % Time Audible Non-natural Sources	6-16-02 % Time Audible Non-natural Sources	6-17-02 % Time Audible Non-natural Sources	6-18-02 % Time Audible Non-natural Sources	6-19-02 % Time Audible Non-natural Sources	6-20-02 % Time Audible Non-natural Sources	6-21-02 % Time Audible Non-natural Sources	Average % Time Audible Non-Natural Sources
0:00	16.7	16.7	0.0	25.0	16.7	8.3	41.7	**17.9**
1:00	16.7	0.0	8.3	25.0	0.0	8.3	0.0	**8.3**
2:00	16.7	8.3	8.3	16.7	8.3	8.3	16.7	**11.9**
3:00	8.3	0.0	16.7	16.7	0.0	8.3	0.0	**7.1**
4:00	8.3	0.0	0.0	8.3	16.7	0.0	16.7	**7.1**
5:00	0.0	8.3	0.0	0.0	0.0	41.7	0.0	**7.1**
6:00	33.3	0.0	16.7	16.7	16.7	41.7	0.0	**17.9**
7:00	25.0	25.0	41.7	33.3	25.0	25.0	25.0	**28.6**
8:00	66.7	50.0	33.3	25.0	83.3	25.0	8.3	**41.7**
9:00	66.7	50.0	50.0	50.0	33.3	50.0	16.7	**45.2**
10:00	66.7	41.7	66.7	41.7	66.7	100.0	41.7	**60.7**
11:00	75.0	58.3	25.0	41.7	66.7	41.7	16.7	**46.4**
12:00	8.3	50.0	41.7	75.0	25.0	16.7	41.7	**36.9**
13:00	16.7	16.7	16.7	41.7	66.7	16.7	33.3	**29.8**
14:00	8.3	33.3	16.7	33.3	50.0	16.7	16.7	**25.0**
15:00	8.3	25.0	0.0	0.0	50.0	25.0	8.3	**16.7**
16:00	8.3	16.7	8.3	16.7	8.3	8.3	16.7	**11.9**
17:00	25.0	25.0	25.0	8.3	25.0	16.7	33.3	**22.6**
18:00	50.0	25.0	33.3	25.0	41.7	25.0	58.3	**36.9**
19:00	50.0	8.3	25.0	25.0	33.3	0.0	0.0	**20.2**
20:00	41.7	33.3	25.0	33.3	16.7	8.3	8.3	**23.8**
21:00	58.3	33.3	41.7	25.0	8.3	33.3	33.3	**33.3**
22:00	66.7	25.0	16.7	16.7	8.3	25.0	50.0	**29.8**
23:00	25.0	8.3	8.3	8.3	8.3	8.3	33.3	**14.3**

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Table VIII-8. Percent Time Aircraft were Audible, Arches National Park, Salt Valley Road (ARCH002), 6-15-2002 to 6-21-2002.

Hour of Day	6-15-02 % Time Audible Aircraft	6-16-02 % Time Audible Aircraft	6-17-02 % Time Audible Aircraft	6-18-02 % Time Audible Aircraft	6-19-02 % Time Audible Aircraft	6-20-02 % Time Audible Aircraft	6-21-02 % Time Audible Aircraft	Average % Time Audible Aircraft
0:00	0.0	16.7	0.0	16.7	16.7	8.3	25.0	**11.9**
1:00	16.7	0.0	8.3	8.3	0.0	8.3	0.0	**6.0**
2:00	16.7	8.3	8.3	8.3	0.0	0.0	16.7	**8.3**
3:00	8.3	0.0	16.7	16.7	0.0	8.3	0.0	**7.1**
4:00	8.3	0.0	0.0	8.3	0.0	0.0	8.3	**3.6**
5:00	0.0	0.0	0.0	0.0	0.0	16.7	0.0	**2.4**
6:00	8.3	0.0	0.0	8.3	0.0	8.3	0.0	**3.6**
7:00	0.0	8.3	16.7	0.0	8.3	25.0	25.0	**11.9**
8:00	33.3	50.0	33.3	16.7	66.7	0.0	8.3	**29.8**
9:00	50.0	50.0	50.0	33.3	25.0	50.0	16.7	**39.3**
10:00	66.7	41.7	58.3	33.3	58.3	83.3	41.7	**54.8**
11:00	66.7	58.3	25.0	33.3	58.3	33.3	16.7	**41.7**
12:00	8.3	50.0	41.7	75.0	25.0	16.7	41.7	**36.9**
13:00	8.3	16.7	16.7	41.7	58.3	16.7	25.0	**26.2**
14:00	8.3	33.3	16.7	25.0	50.0	16.7	16.7	**23.8**
15:00	8.3	25.0	0.0	0.0	50.0	25.0	8.3	**16.7**
16:00	8.3	16.7	8.3	16.7	8.3	8.3	16.7	**11.9**
17:00	25.0	25.0	25.0	8.3	16.7	16.7	33.3	**21.4**
18:00	50.0	25.0	33.3	25.0	41.7	25.0	58.3	**36.9**
19:00	41.7	8.3	25.0	25.0	33.3	0.0	0.0	**19.0**
20:00	16.7	25.0	25.0	33.3	8.3	8.3	8.3	**17.9**
21:00	50.0	25.0	41.7	25.0	8.3	33.3	33.3	**31.0**
22:00	58.3	25.0	16.7	16.7	8.3	25.0	33.3	**26.2**
23:00	25.0	8.3	8.3	8.3	8.3	8.3	25.0	**13.1**

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Table VIII-9. Percent Time All Sounds were Audible, Arches National Park, Salt Valley Road (ARCH002), 6-15-2002 to 6-21-2002.

Audible Sound Sources	6-15-02 % Time Audible	6-16-02 % Time Audible	6-17-02 % Time Audible	6-18-02 % Time Audible	6-19-02 % Time Audible	6-20-02 % Time Audible	6-21-02 % Time Audible	Average % Time Audible
No Sound Audible	8.0	12.8	15.6	9.0	14.2	3.1	0.7	**9.1**
Aircraft (unknown type)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
Aircraft, Jet	20.8	18.4	14.6	15.6	16.3	12.8	14.9	**16.2**
Aircraft, Propeller	3.5	3.1	5.6	4.9	6.6	5.6	3.8	**4.7**
Aircraft, Helicopter	0.0	0.0	0.0	0.0	0.0	0.0	0.3	**0.0**
Vehicle	5.6	1.7	0.3	2.8	4.2	2.8	1.0	**2.6**
Watercraft	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
Motor Sounds[1]	2.1	0.0	1.7	2.4	1.0	2.1	1.0	**1.5**
Grounds Care	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
People	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
Domestic Animal	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
Building Sounds	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
Construction	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
Non-natural Other	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
Non-natural Unknown	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
Wind	30.2	48.6	42.7	47.2	35.8	74.0	71.2	**50.0**
Water (rain, river, etc.)	0.0	0.0	0.0	0.0	0.0	0.0	1.7	**0.2**
Thunder	0.0	0.0	0.0	0.0	0.0	0.0	2.1	**0.3**
Mammal	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
Bird	0.0	0.7	0.3	0.7	1.0	0.7	1.7	**0.7**
Reptile	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
Amphibian	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
Insect	28.8	37.5	29.9	39.9	41.0	32.3	35.4	**35.0**
Animal (unknown type)	0.3	0.0	0.0	0.0	0.0	0.7	0.0	**0.1**
Natural Other	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
Natural Unknown	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
Unknown	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
Total Aircraft	**24.3**	**21.5**	**19.8**	**20.1**	**22.9**	**18.4**	**19.1**	**20.9**
Total Road Vehicles	**5.6**	**1.7**	**0.3**	**2.8**	**4.2**	**2.8**	**1.0**	**2.6**
Total Watercraft	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**
Total Non-natural	**31.9**	**23.3**	**21.9**	**25.3**	**28.1**	**23.3**	**21.5**	**25.0**
Total Natural	**57.3**	**74.0**	**70.5**	**77.8**	**69.4**	**89.2**	**93.8**	**76.0**

[1] Unable to distinguish between distant vehicle and distant aircraft, but most likely distant vehicle.

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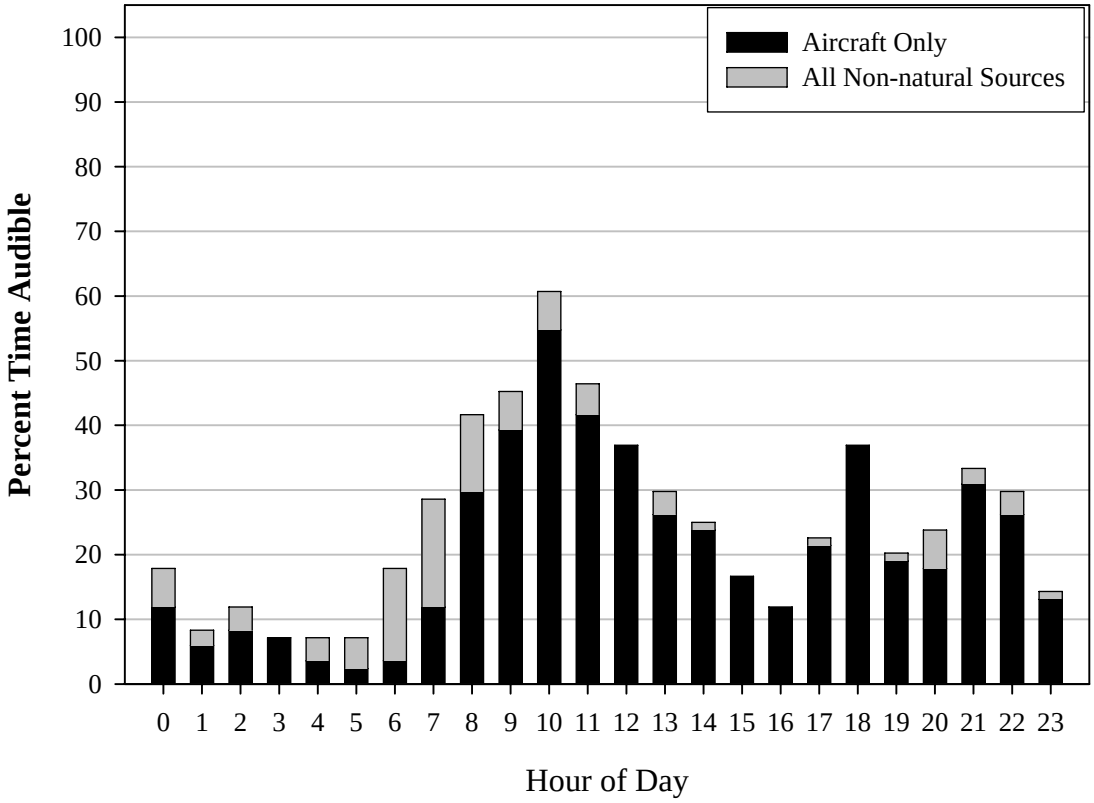


Figure VIII-3. Percent Time All Non-natural Sounds and Aircraft Sounds were Audible, Arches National Park, Salt Valley Road (ARCH002), 6-15-2002 to 6-21-2002.

Table VIII-10. Percent Time Non-natural Sounds were Audible, Arches National Park, Salt Valley Road (ARCH002), 1-15-2003 to 1-21-2003.

Hour of Day	1-15-03 % Time Audible Non-natural Sources	1-16-03 % Time Audible Non-natural Sources	1-17-03 % Time Audible Non-natural Sources	1-18-03 % Time Audible Non-natural Sources	1-19-03 % Time Audible Non-natural Sources	1-20-03 % Time Audible Non-natural Sources	1-21-03 % Time Audible Non-natural Sources	Average % Time Audible Non-Natural Sources
0:00	58.3	25.0	75.0	25.0	58.3	66.7	75.0	**54.8**
1:00	50.0	58.3	66.7	0.0	83.3	75.0	91.7	**60.7**
2:00	91.7	58.3	75.0	16.7	58.3	66.7	83.3	**64.3**
3:00	100.0	25.0	50.0	50.0	41.7	66.7	91.7	**60.7**
4:00	50.0	66.7	41.7	75.0	16.7	50.0	66.7	**52.4**
5:00	75.0	16.7	91.7	8.3	50.0	75.0	100.0	**59.5**
6:00	91.7	0.0	83.3	8.3	25.0	58.3	100.0	**52.4**
7:00	75.0	75.0	58.3	83.3	66.7	75.0	91.7	**75.0**
8:00	75.0	91.7	83.3	58.3	91.7	75.0	91.7	**81.0**
9:00	58.3	25.0	100.0	100.0	100.0	100.0	83.3	**81.0**
10:00	41.7	50.0	75.0	91.7	100.0	91.7	91.7	**77.4**
11:00	58.3	25.0	58.3	66.7	100.0	91.7	91.7	**70.2**
12:00	25.0	41.7	50.0	83.3	100.0	58.3	75.0	**61.9**
13:00	33.3	75.0	66.7	91.7	83.3	91.7	66.7	**72.6**
14:00	8.3	75.0	66.7	75.0	75.0	75.0	50.0	**60.7**
15:00	58.3	75.0	58.3	75.0	75.0	91.7	75.0	**72.6**
16:00	66.7	100.0	50.0	83.3	66.7	83.3	91.7	**77.4**
17:00	66.7	91.7	50.0	66.7	58.3	83.3	75.0	**70.2**
18:00	83.3	91.7	50.0	75.0	75.0	100.0	58.3	**76.2**
19:00	75.0	75.0	16.7	75.0	75.0	33.3	50.0	**57.1**
20:00	58.3	50.0	50.0	91.7	91.7	41.7	75.0	**65.5**
21:00	41.7	66.7	25.0	50.0	66.7	58.3	66.7	**53.6**
22:00	33.3	50.0	50.0	75.0	25.0	41.7	75.0	**50.0**
23:00	25.0	58.3	16.7	50.0	58.3	66.7	58.3	**47.6**

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Table VIII-11. Percent Time Aircraft were Audible, Arches National Park, Salt Valley Road (ARCH002), 1-15-2003 to 1-21-2003.

Hour of Day	1-15-03 % Time Audible Aircraft	1-16-03 % Time Audible Aircraft	1-17-03 % Time Audible Aircraft	1-18-03 % Time Audible Aircraft	1-19-03 % Time Audible Aircraft	1-20-03 % Time Audible Aircraft	1-21-03 % Time Audible Aircraft	Average % Time Audible Aircraft
0:00	0.0	0.0	8.3	0.0	16.7	0.0	8.3	**4.8**
1:00	0.0	8.3	8.3	0.0	8.3	16.7	0.0	**6.0**
2:00	0.0	16.7	8.3	0.0	0.0	16.7	25.0	**9.5**
3:00	0.0	8.3	25.0	8.3	0.0	0.0	8.3	**7.1**
4:00	0.0	0.0	8.3	8.3	0.0	8.3	33.3	**8.3**
5:00	0.0	0.0	0.0	0.0	16.7	16.7	25.0	**8.3**
6:00	8.3	0.0	8.3	0.0	0.0	8.3	16.7	**6.0**
7:00	25.0	33.3	8.3	25.0	25.0	33.3	25.0	**25.0**
8:00	25.0	41.7	16.7	8.3	16.7	8.3	0.0	**16.7**
9:00	41.7	25.0	25.0	33.3	58.3	66.7	50.0	**42.9**
10:00	25.0	33.3	33.3	41.7	66.7	41.7	83.3	**46.4**
11:00	41.7	16.7	50.0	50.0	75.0	58.3	33.3	**46.4**
12:00	16.7	25.0	41.7	58.3	75.0	33.3	33.3	**40.5**
13:00	16.7	41.7	25.0	41.7	33.3	50.0	58.3	**38.1**
14:00	8.3	41.7	50.0	58.3	25.0	16.7	8.3	**29.8**
15:00	16.7	50.0	33.3	66.7	58.3	75.0	50.0	**50.0**
16:00	33.3	58.3	41.7	50.0	25.0	58.3	16.7	**40.5**
17:00	33.3	66.7	16.7	16.7	41.7	58.3	66.7	**42.9**
18:00	25.0	50.0	33.3	25.0	25.0	50.0	33.3	**34.5**
19:00	50.0	25.0	16.7	25.0	8.3	33.3	16.7	**25.0**
20:00	33.3	41.7	25.0	33.3	33.3	33.3	50.0	**35.7**
21:00	41.7	8.3	25.0	8.3	8.3	25.0	41.7	**22.6**
22:00	33.3	16.7	50.0	16.7	8.3	25.0	41.7	**27.4**
23:00	0.0	0.0	8.3	8.3	0.0	16.7	25.0	**8.3**

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Table VIII-12. Percent Time All Sounds were Audible, Arches National Park, Salt Valley Road (ARCH002), 1-15-2003 to 1-21-2003.

Audible Sound Sources	1-15-03 % Time Audible	1-16-03 % Time Audible	1-17-03 % Time Audible	1-18-03 % Time Audible	1-19-03 % Time Audible	1-20-03 % Time Audible	1-21-03 % Time Audible	Average % Time Audible
No Sound Audible	13.9	19.4	34.7	25.7	19.4	17.0	15.6	**20.8**
Aircraft (unknown type)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
Aircraft, Jet	16.0	19.4	20.8	16.0	19.8	21.2	27.8	**20.1**
Aircraft, Propeller	3.8	5.9	2.8	9.0	6.3	10.8	3.5	**6.0**
Aircraft, Helicopter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
Vehicle	26.7	24.3	28.1	29.9	36.8	37.8	45.5	**32.7**
Watercraft	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
Motor Sounds[1]	11.8	7.6	6.9	8.7	6.9	3.8	3.1	**7.0**
Grounds Care	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
People	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
Domestic Animal	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
Building Sounds	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
Construction	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
Non-natural Other	0.3	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
Non-natural Unknown	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
Wind	39.9	33.0	7.6	20.8	22.6	24.3	14.9	**23.3**
Water (rain, river, etc.)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
Thunder	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
Mammal	0.0	0.0	0.0	0.0	0.3	0.0	0.0	**0.0**
Bird	3.1	1.4	1.0	0.0	1.0	1.0	1.7	**1.3**
Reptile	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
Amphibian	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
Insect	0.0	0.0	0.0	0.0	0.3	0.0	0.3	**0.1**
Animal (unknown type)	0.0	0.0	0.3	0.0	0.0	0.0	0.0	**0.0**
Natural Other	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
Natural Unknown	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
Unknown	0.0	0.0	0.3	0.0	0.0	0.0	0.0	**0.0**
Total Aircraft	**19.8**	**25.3**	**23.6**	**24.3**	**26.0**	**31.3**	**31.3**	**25.9**
Total Road Vehicles	**26.7**	**24.3**	**28.1**	**29.9**	**36.8**	**37.8**	**45.5**	**32.7**
Total Watercraft	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**
Total Non-natural	**58.3**	**56.9**	**58.7**	**61.5**	**68.4**	**71.5**	**78.1**	**64.8**
Total Natural	**42.7**	**34.4**	**9.0**	**20.8**	**24.3**	**24.7**	**16.7**	**24.7**

[1] Unable to distinguish between distant vehicle and distant aircraft, but most likely distant vehicle.

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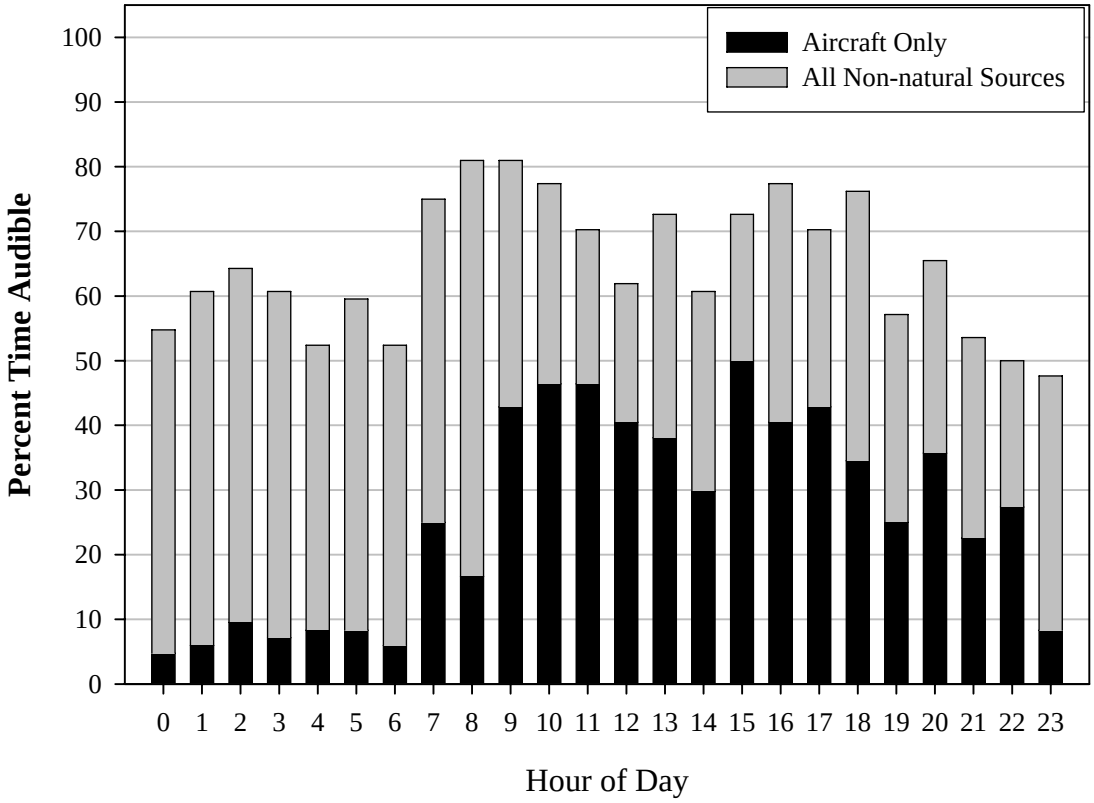


Figure VIII-4. Percent Time All Non-natural Sounds and Aircraft Sounds were Audible, Arches National Park, Salt Valley Road (ARCH002), 1-15-2003 to 1-21-2003.

Table VIII-13. Percent Time Non-natural Sounds were Audible, Canyonlands National Park, Murphy Trailhead (CANY001), 1-01-2006 to 1-07-2006.

Hour of Day	1-01-06 % Time Audible Non-natural Sources	1-02-06 % Time Audible Non-natural Sources	1-03-06 % Time Audible Non-natural Sources	1-04-06 % Time Audible Non-natural Sources	1-05-06 % Time Audible Non-natural Sources	1-06-06 % Time Audible Non-natural Sources	1-07-06 % Time Audible Non-natural Sources	Average % Time Audible Non-Natural Sources
0:00	0.0	3.3	0.0	6.7	10.0	0.0	3.3	**3.3**
1:00	0.0	13.3	0.0	10.0	10.0	16.7	10.0	**8.6**
2:00	0.0	6.7	0.0	10.0	3.3	0.0	3.3	**3.3**
3:00	0.0	0.0	0.0	13.3	3.3	0.0	0.0	**2.4**
4:00	0.0	3.3	0.0	6.7	0.0	0.0	0.0	**1.4**
5:00	3.3	6.7	10.0	6.7	0.0	0.0	6.7	**4.8**
6:00	0.0	6.7	0.0	0.0	13.3	10.0	0.0	**4.3**
7:00	0.0	10.0	6.7	30.0	16.7	40.0	13.3	**16.7**
8:00	13.3	13.3	23.3	33.3	66.7	60.0	50.0	**37.1**
9:00	40.0	26.7	43.3	43.3	50.0	56.7	23.3	**40.5**
10:00	36.7	20.0	43.3	33.3	60.0	30.0	43.3	**38.1**
11:00	46.7	10.0	63.3	33.3	56.7	30.0	46.7	**41.0**
12:00	26.7	26.7	26.7	40.0	43.3	50.0	46.7	**37.1**
13:00	10.0	3.3	36.7	33.3	50.0	46.7	16.7	**28.1**
14:00	60.0	40.0	23.3	43.3	23.3	33.3	20.0	**34.8**
15:00	66.7	33.3	53.3	30.0	33.3	33.3	30.0	**40.0**
16:00	36.7	30.0	56.7	16.7	33.3	53.3	36.7	**37.6**
17:00	36.7	33.3	43.3	26.7	43.3	43.3	23.3	**35.7**
18:00	30.0	20.0	20.0	16.7	40.0	46.7	26.7	**28.6**
19:00	13.3	6.7	30.0	16.7	23.3	43.3	36.7	**24.3**
20:00	30.0	13.3	36.7	53.3	26.7	20.0	43.3	**31.9**
21:00	16.7	3.3	33.3	23.3	40.0	53.3	26.7	**28.1**
22:00	10.0	6.7	36.7	16.7	33.3	23.3	20.0	**21.0**
23:00	33.3	6.7	30.0	10.0	6.7	30.0	30.0	**21.0**

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Table VIII-14. Percent Time Aircraft Sounds were Audible, Canyonlands National Park, Murphy Trailhead (CANY001), 1-01-2006 to 1-07-2006.

Hour of Day	1-01-06 % Time Audible Aircraft	1-02-06 % Time Audible Aircraft	1-03-06 % Time Audible Aircraft	1-04-06 % Time Audible Aircraft	1-05-06 % Time Audible Aircraft	1-06-06 % Time Audible Aircraft	1-07-06 % Time Audible Aircraft	Average % Time Audible Aircraft
0:00	0.0	3.3	0.0	6.7	10.0	0.0	3.3	**3.3**
1:00	0.0	13.3	0.0	10.0	10.0	16.7	10.0	**8.6**
2:00	0.0	6.7	0.0	10.0	3.3	0.0	3.3	**3.3**
3:00	0.0	0.0	0.0	6.7	3.3	0.0	0.0	**1.4**
4:00	0.0	3.3	0.0	6.7	0.0	0.0	0.0	**1.4**
5:00	3.3	6.7	10.0	6.7	0.0	0.0	6.7	**4.8**
6:00	0.0	6.7	0.0	0.0	10.0	3.3	0.0	**2.9**
7:00	0.0	10.0	6.7	30.0	13.3	10.0	13.3	**11.9**
8:00	13.3	13.3	23.3	33.3	46.7	43.3	33.3	**29.5**
9:00	36.7	20.0	43.3	43.3	43.3	50.0	13.3	**35.7**
10:00	36.7	20.0	43.3	33.3	46.7	30.0	30.0	**34.3**
11:00	46.7	10.0	63.3	33.3	46.7	26.7	40.0	**38.1**
12:00	26.7	23.3	26.7	40.0	33.3	50.0	40.0	**34.3**
13:00	10.0	0.0	33.3	33.3	40.0	46.7	16.7	**25.7**
14:00	46.7	26.7	23.3	43.3	23.3	33.3	20.0	**31.0**
15:00	63.3	30.0	53.3	30.0	23.3	33.3	26.7	**37.1**
16:00	36.7	26.7	56.7	16.7	23.3	46.7	36.7	**34.8**
17:00	30.0	33.3	43.3	23.3	26.7	40.0	23.3	**31.4**
18:00	30.0	16.7	20.0	13.3	36.7	46.7	26.7	**27.1**
19:00	13.3	6.7	30.0	16.7	23.3	43.3	36.7	**24.3**
20:00	30.0	13.3	36.7	40.0	26.7	20.0	40.0	**29.5**
21:00	16.7	3.3	33.3	23.3	40.0	53.3	26.7	**28.1**
22:00	10.0	6.7	36.7	16.7	33.3	23.3	20.0	**21.0**
23:00	33.3	6.7	30.0	6.7	6.7	30.0	30.0	**20.5**

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Table VIII-15. Percent Time All Sounds were Audible, Canyonlands National Park, Murphy Trailhead (CANY001), 1-01-2006 to 1-07-2006.

Audible Sound Sources	1-01-06 % Time Audible	1-02-06 % Time Audible	1-03-06 % Time Audible	1-04-06 % Time Audible	1-05-06 % Time Audible	1-06-06 % Time Audible	1-07-06 % Time Audible	Average % Time Audible
No Sound Audible	10.4	3.9	13.2	22.5	51.7	55.3	28.1	**26.4**
Aircraft (unknown type)	1.3	1.4	0.0	0.3	0.1	0.0	0.4	**0.5**
Aircraft, Jet	18.1	10.8	25.0	20.1	23.2	24.2	19.4	**20.1**
Aircraft, Propeller	0.8	0.6	0.6	1.9	0.4	1.3	0.6	**0.9**
Aircraft, Helicopter	0.0	0.0	0.0	0.0	0.0	1.5	0.3	**0.3**
Vehicle	0.0	1.3	0.0	0.3	3.1	2.2	1.9	**1.3**
Watercraft	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
Motor Sounds[1]	1.1	0.6	0.1	1.0	2.1	1.0	0.7	**0.9**
Grounds Care	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
People	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
Domestic Animal	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
Building Sounds	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
Construction	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
Non-natural Other	0.0	0.0	0.0	0.0	0.1	0.0	0.0	**0.0**
Non-natural Unknown	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
Wind	72.1	92.2	69.7	58.5	13.1	8.1	55.7	**52.8**
Water (rain, river, etc.)	0.0	0.7	0.4	0.0	0.0	0.0	0.0	**0.2**
Thunder	0.1	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
Mammal	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
Bird	8.5	8.2	16.1	11.4	9.3	7.6	5.6	**9.5**
Reptile	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
Amphibian	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
Insect	0.1	0.0	0.0	0.3	0.6	0.1	0.0	**0.2**
Animal (unknown type)	1.3	0.6	0.0	0.0	0.4	1.0	0.4	**0.5**
Natural Other	1.5	1.4	0.1	0.0	0.7	0.0	0.3	**0.6**
Natural Unknown	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
Unknown	2.2	1.5	1.3	1.8	4.2	1.7	0.8	**1.9**
Total Aircraft	**20.1**	**12.8**	**25.6**	**21.8**	**23.8**	**26.9**	**20.7**	**21.7**
Total Road Vehicles	**0.0**	**1.3**	**0.0**	**0.3**	**3.1**	**2.2**	**1.9**	**1.3**
Total Watercraft	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**
Total Non-natural	**21.3**	**14.3**	**25.7**	**23.1**	**28.6**	**30.0**	**23.2**	**23.7**
Total Natural	**77.5**	**93.1**	**73.3**	**65.3**	**22.4**	**16.5**	**59.4**	**58.2**

[1] Unable to distinguish between distant vehicle and distant aircraft.

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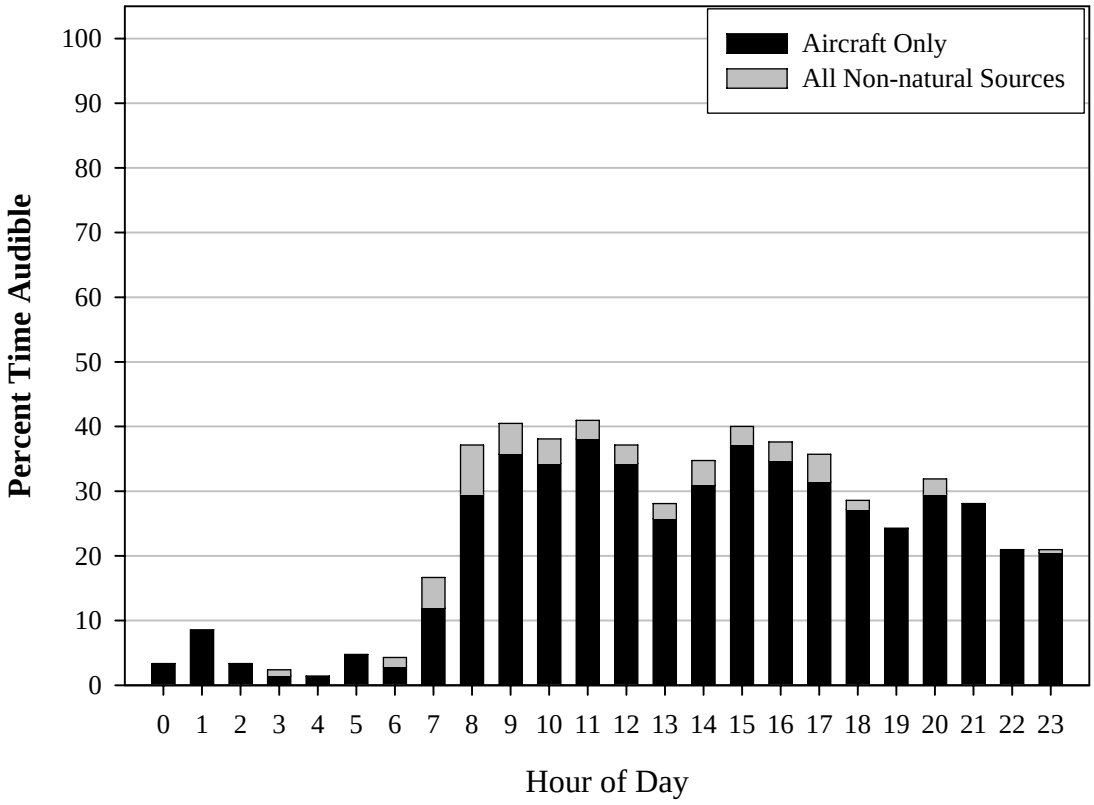


Figure VIII-5. Percent Time All Non-natural Sounds and Aircraft Sounds were Audible, Canyonlands National Park, Murphy Trailhead (CANY001), 1-01-2006 to 1-07-2006.

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Table VIII-16. Percent Time Non-natural Sounds were Audible, Canyonlands National Park, Murphy Trailhead (CANY001), 7-01-2006 to 7-07-2006.

Hour of Day	7-01-06 % Time Audible Non-natural Sources	7-02-06 % Time Audible Non-natural Sources	7-03-06 % Time Audible Non-natural Sources	7-04-06 % Time Audible Non-natural Sources	7-05-06 % Time Audible Non-natural Sources	7-06-06 % Time Audible Non-natural Sources	7-07-06 % Time Audible Non-natural Sources	Average % Time Audible Non-Natural Sources
0:00	13.3	6.7	30.0	26.7	16.7	6.7	10.0	**15.7**
1:00	16.7	6.7	13.3	26.7	23.3	13.3	30.0	**18.6**
2:00	6.7	0.0	20.0	13.3	10.0	10.0	10.0	**10.0**
3:00	0.0	10.0	0.0	6.7	3.3	0.0	3.3	**3.3**
4:00	0.0	10.0	3.3	6.7	6.7	3.3	6.7	**5.2**
5:00	3.3	0.0	0.0	10.0	3.3	0.0	0.0	**2.4**
6:00	3.3	0.0	10.0	10.0	6.7	13.3	0.0	**6.2**
7:00	10.0	3.3	30.0	6.7	23.3	33.3	20.0	**18.1**
8:00	46.7	53.3	86.7	53.3	53.3	50.0	76.7	**60.0**
9:00	53.3	76.7	73.3	66.7	63.3	40.0	80.0	**64.8**
10:00	36.7	63.3	76.7	60.0	56.7	66.7	76.7	**62.4**
11:00	43.3	63.3	53.3	66.7	36.7	60.0	73.3	**56.7**
12:00	43.3	43.3	50.0	53.3	36.7	43.3	73.3	**49.0**
13:00	30.0	36.7	66.7	36.7	16.7	53.3	63.3	**43.3**
14:00	20.0	46.7	36.7	20.0	40.0	60.0	86.7	**44.3**
15:00	36.7	46.7	40.0	40.0	30.0	46.7	66.7	**43.8**
16:00	23.3	40.0	43.3	53.3	40.0	50.0	30.0	**40.0**
17:00	16.7	56.7	33.3	46.7	3.3	63.3	13.3	**33.3**
18:00	40.0	13.3	33.3	13.3	30.0	36.7	3.3	**24.3**
19:00	33.3	23.3	36.7	16.7	46.7	63.3	26.7	**35.2**
20:00	20.0	36.7	33.3	13.3	26.7	40.0	36.7	**29.5**
21:00	23.3	13.3	53.3	6.7	16.7	26.7	66.7	**29.5**
22:00	26.7	50.0	46.7	6.7	16.7	6.7	16.7	**24.3**
23:00	23.3	40.0	23.3	10.0	6.7	13.3	23.3	**20.0**

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Table VIII-17. Percent Time Aircraft Sounds were Audible, Canyonlands National Park, Murphy Trailhead (CANY001), 7-01-2006 to 7-07-2006.

Hour of Day	7-01-06 % Time Audible Aircraft	7-02-06 % Time Audible Aircraft	7-03-06 % Time Audible Aircraft	7-04-06 % Time Audible Aircraft	7-05-06 % Time Audible Aircraft	7-06-06 % Time Audible Aircraft	7-07-06 % Time Audible Aircraft	Average % Time Audible Aircraft
0:00	13.3	6.7	30.0	26.7	16.7	6.7	10.0	**15.7**
1:00	16.7	6.7	10.0	26.7	23.3	13.3	30.0	**18.1**
2:00	6.7	0.0	20.0	13.3	10.0	10.0	10.0	**10.0**
3:00	0.0	6.7	0.0	6.7	3.3	0.0	3.3	**2.9**
4:00	0.0	6.7	0.0	6.7	6.7	3.3	6.7	**4.3**
5:00	3.3	0.0	0.0	6.7	3.3	0.0	0.0	**1.9**
6:00	3.3	0.0	6.7	6.7	6.7	13.3	0.0	**5.2**
7:00	10.0	3.3	13.3	6.7	6.7	33.3	16.7	**12.9**
8:00	46.7	43.3	76.7	40.0	36.7	46.7	73.3	**51.9**
9:00	46.7	60.0	66.7	56.7	40.0	26.7	70.0	**52.4**
10:00	33.3	63.3	70.0	50.0	53.3	56.7	70.0	**56.7**
11:00	40.0	63.3	53.3	53.3	33.3	40.0	60.0	**49.0**
12:00	33.3	43.3	36.7	26.7	33.3	33.3	33.3	**34.3**
13:00	30.0	30.0	36.7	36.7	3.3	46.7	40.0	**31.9**
14:00	16.7	40.0	33.3	16.7	36.7	40.0	63.3	**35.2**
15:00	26.7	46.7	30.0	33.3	20.0	36.7	43.3	**33.8**
16:00	20.0	36.7	36.7	50.0	30.0	43.3	23.3	**34.3**
17:00	13.3	53.3	26.7	30.0	0.0	56.7	13.3	**27.6**
18:00	23.3	10.0	23.3	13.3	13.3	13.3	3.3	**14.3**
19:00	33.3	13.3	26.7	16.7	23.3	50.0	13.3	**25.2**
20:00	16.7	23.3	26.7	10.0	23.3	16.7	23.3	**20.0**
21:00	23.3	13.3	50.0	3.3	13.3	23.3	66.7	**27.6**
22:00	20.0	50.0	43.3	6.7	16.7	6.7	16.7	**22.9**
23:00	23.3	40.0	23.3	10.0	6.7	13.3	23.3	**20.0**

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Table VIII-18. Percent Time All Sounds were Audible, Canyonlands National Park, Murphy Trailhead (CANY001), 7-01-2006 to 7-07-2006.

Audible Sound Sources	7-01-06 % Time Audible	7-02-06 % Time Audible	7-03-06 % Time Audible	7-04-06 % Time Audible	7-05-06 % Time Audible	7-06-06 % Time Audible	7-07-06 % Time Audible	Average % Time Audible
No Sound Audible	0.7	0.0	0.1	0.0	0.4	0.3	0.4	**0.3**
Aircraft (unknown type)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
Aircraft, Jet	18.1	24.0	26.9	20.0	15.0	22.1	26.7	**21.8**
Aircraft, Propeller	2.8	3.5	4.0	3.2	4.2	4.3	3.1	**3.6**
Aircraft, Helicopter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
Vehicle	1.7	2.8	3.3	4.0	5.1	5.8	9.2	**4.6**
Watercraft	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
Motor Sounds[1]	1.3	1.1	3.1	1.7	1.9	2.5	1.5	**1.9**
Grounds Care	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
People	0.0	0.0	0.0	0.1	0.0	0.0	0.0	**0.0**
Domestic Animal	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
Building Sounds	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
Construction	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
Non-natural Other	0.0	0.1	0.0	0.0	0.0	0.0	0.0	**0.0**
Non-natural Unknown	0.0	0.0	0.0	0.3	0.0	0.0	0.0	**0.0**
Wind	48.9	72.6	42.4	52.1	66.4	68.1	51.1	**57.4**
Water (rain, river, etc.)	0.0	3.3	0.0	0.4	5.6	18.3	8.8	**5.2**
Thunder	0.0	0.4	0.0	0.0	4.0	3.6	0.0	**1.2**
Mammal	0.3	1.7	1.0	0.4	0.7	0.8	1.9	**1.0**
Bird	36.1	41.4	45.3	38.6	39.9	43.8	45.3	**41.5**
Reptile	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
Amphibian	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
Insect	65.4	65.7	67.6	76.4	68.3	62.1	64.4	**67.1**
Animal (unknown type)	8.5	6.3	9.4	4.7	5.6	4.7	2.8	**6.0**
Natural Other	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
Natural Unknown	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
Unknown	0.1	1.4	0.3	0.4	1.1	0.0	1.1	**0.6**
Total Aircraft	**20.8**	**27.5**	**30.8**	**23.1**	**19.2**	**26.3**	**29.7**	**25.3**
Total Road Vehicles	**1.7**	**2.8**	**3.3**	**4.0**	**5.1**	**5.8**	**9.2**	**4.6**
Total Watercraft	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**
Total Non-natural	**23.8**	**30.8**	**37.2**	**27.9**	**25.6**	**33.3**	**37.2**	**30.8**
Total Natural	**97.8**	**99.4**	**99.2**	**99.3**	**98.6**	**98.6**	**97.1**	**98.6**

[1] Unable to distinguish between distant vehicle and distant aircraft.

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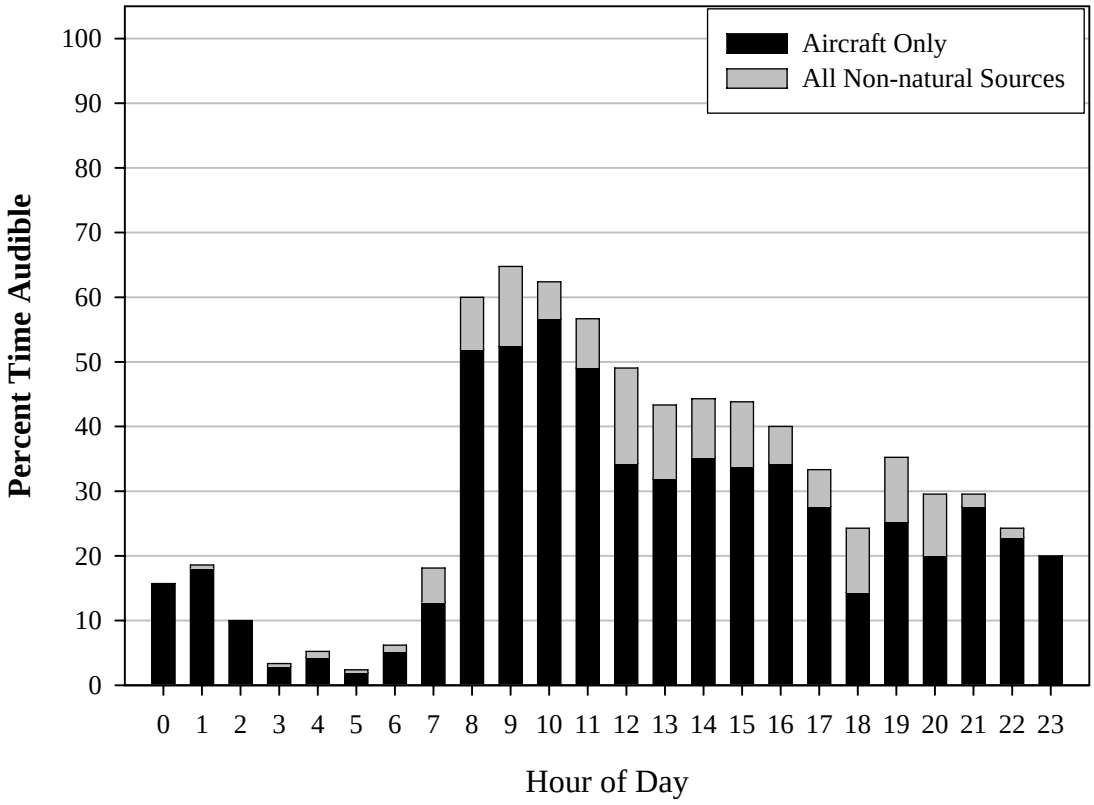


Figure VIII-6. Percent Time All Non-natural Sounds and Aircraft Sounds were Audible, Canyonlands National Park, Murphy Trailhead (CANY001), 7-01-2006 to 7-07-2006.

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Table VIII-19. Percent Time Non-natural Sounds were Audible, Canyonlands National Park, Lower Salt Creek (CANY004), 2-01-2006 to 2-07-2006.

Hour of Day	2-01-06 % Time Audible Non-natural Sources	2-02-06 % Time Audible Non-natural Sources	2-03-06 % Time Audible Non-natural Sources	2-04-06 % Time Audible Non-natural Sources	2-05-06 % Time Audible Non-natural Sources	2-06-06 % Time Audible Non-natural Sources	2-07-06 % Time Audible Non-natural Sources	Average % Time Audible Non-Natural Sources
0:00	10.0	16.7	13.3	6.7	0.0	30.0	26.7	**14.8**
1:00	3.3	13.3	16.7	3.3	20.0	56.7	3.3	**16.7**
2:00	0.0	0.0	0.0	6.7	3.3	26.7	10.0	**6.7**
3:00	0.0	23.3	6.7	3.3	46.7	10.0	0.0	**12.9**
4:00	0.0	30.0	0.0	0.0	23.3	10.0	0.0	**9.0**
5:00	3.3	23.3	6.7	0.0	3.3	0.0	3.3	**5.7**
6:00	0.0	26.7	0.0	3.3	0.0	6.7	10.0	**6.7**
7:00	13.3	13.3	6.7	16.7	20.0	26.7	6.7	**14.8**
8:00	3.3	6.7	13.3	6.7	23.3	6.7	13.3	**10.5**
9:00	46.7	16.7	30.0	26.7	10.0	16.7	30.0	**25.2**
10:00	50.0	26.7	16.7	26.7	13.3	40.0	26.7	**28.6**
11:00	33.3	3.3	40.0	20.0	3.3	36.7	33.3	**24.3**
12:00	20.0	23.3	10.0	16.7	0.0	16.7	10.0	**13.8**
13:00	46.7	16.7	16.7	16.7	10.0	3.3	3.3	**16.2**
14:00	33.3	16.7	10.0	13.3	3.3	10.0	20.0	**15.2**
15:00	30.0	16.7	10.0	0.0	10.0	10.0	13.3	**12.9**
16:00	10.0	16.7	10.0	26.7	20.0	13.3	6.7	**14.8**
17:00	23.3	26.7	6.7	23.3	36.7	6.7	16.7	**20.0**
18:00	13.3	13.3	16.7	0.0	26.7	10.0	3.3	**11.9**
19:00	33.3	36.7	20.0	43.3	33.3	13.3	13.3	**27.6**
20:00	10.0	30.0	36.7	0.0	53.3	6.7	16.7	**21.9**
21:00	16.7	30.0	26.7	0.0	60.0	6.7	30.0	**24.3**
22:00	23.3	13.3	23.3	6.7	33.3	16.7	13.3	**18.6**
23:00	26.7	6.7	3.3	6.7	20.0	13.3	13.3	**12.9**

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Table VIII-20. Percent Time Aircraft Sounds were Audible, Canyonlands National Park, Lower Salt Creek (CANY004), 2-01-2006 to 2-07-2006.

Hour of Day	2-01-06 % Time Audible Aircraft	2-02-06 % Time Audible Aircraft	2-03-06 % Time Audible Aircraft	2-04-06 % Time Audible Aircraft	2-05-06 % Time Audible Aircraft	2-06-06 % Time Audible Aircraft	2-07-06 % Time Audible Aircraft	Average % Time Audible Aircraft
0:00	6.7	16.7	0.0	6.7	0.0	20.0	6.7	**8.1**
1:00	3.3	13.3	6.7	3.3	3.3	16.7	3.3	**7.1**
2:00	0.0	0.0	0.0	3.3	3.3	13.3	0.0	**2.9**
3:00	0.0	0.0	3.3	3.3	16.7	10.0	0.0	**4.8**
4:00	0.0	3.3	0.0	0.0	0.0	6.7	0.0	**1.4**
5:00	0.0	3.3	0.0	0.0	0.0	0.0	0.0	**0.5**
6:00	0.0	10.0	0.0	3.3	0.0	6.7	3.3	**3.3**
7:00	13.3	10.0	6.7	3.3	10.0	0.0	0.0	**6.2**
8:00	3.3	6.7	10.0	0.0	23.3	3.3	6.7	**7.6**
9:00	46.7	10.0	30.0	13.3	10.0	16.7	26.7	**21.9**
10:00	50.0	26.7	16.7	23.3	13.3	33.3	20.0	**26.2**
11:00	33.3	3.3	40.0	16.7	3.3	30.0	30.0	**22.4**
12:00	20.0	23.3	10.0	13.3	0.0	16.7	10.0	**13.3**
13:00	40.0	16.7	16.7	16.7	10.0	0.0	3.3	**14.8**
14:00	33.3	10.0	10.0	13.3	3.3	10.0	13.3	**13.3**
15:00	23.3	16.7	10.0	0.0	10.0	10.0	13.3	**11.9**
16:00	10.0	16.7	10.0	20.0	20.0	13.3	6.7	**13.8**
17:00	23.3	26.7	6.7	16.7	36.7	6.7	10.0	**18.1**
18:00	10.0	13.3	16.7	0.0	10.0	3.3	3.3	**8.1**
19:00	30.0	33.3	20.0	20.0	10.0	13.3	13.3	**20.0**
20:00	10.0	10.0	36.7	0.0	50.0	6.7	16.7	**18.6**
21:00	16.7	16.7	26.7	0.0	43.3	6.7	30.0	**20.0**
22:00	6.7	13.3	23.3	6.7	33.3	13.3	13.3	**15.7**
23:00	13.3	0.0	3.3	6.7	20.0	13.3	3.3	**8.6**

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Table VIII-21. Percent Time All Sounds were Audible, Canyonlands National Park, Lower Salt Creek (CANY004), 2-01-2006 to 2-07-2006.

Audible Sound Sources	2-01-06 % Time Audible	2-02-06 % Time Audible	2-03-06 % Time Audible	2-04-06 % Time Audible	2-05-06 % Time Audible	2-06-06 % Time Audible	2-07-06 % Time Audible	Average % Time Audible
No Sound Audible	39.7	37.4	35.3	9.9	5.0	20.8	27.6	**25.1**
Aircraft (unknown type)	1.5	0.8	1.5	1.8	0.6	1.0	1.4	**1.2**
Aircraft, Jet	15.0	11.3	11.1	6.1	13.2	10.3	8.3	**10.8**
Aircraft, Propeller	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
Aircraft, Helicopter	0.0	0.4	0.0	0.0	0.0	0.0	0.0	**0.1**
Vehicle	0.0	0.3	0.0	0.0	0.0	0.0	0.0	**0.0**
Watercraft	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
Motor Sounds	2.2	6.0	1.7	4.0	6.0	5.1	3.9	**4.1**
Grounds Care	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
People	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
Domestic Animal	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
Building Sounds	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
Construction	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
Non-natural Other	0.3	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
Non-natural Unknown	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
Wind	1.1	12.4	4.3	17.5	53.6	4.3	1.7	**13.6**
Water (rain, river, etc.)	0.0	10.0	0.0	0.0	0.0	0.0	0.0	**1.4**
Thunder	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
Mammal	0.0	0.0	0.0	0.1	0.0	0.0	0.3	**0.1**
Bird	5.6	7.1	5.0	13.5	10.4	6.9	14.4	**9.0**
Reptile	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
Amphibian	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
Insect	7.6	4.7	6.4	2.8	0.1	1.9	2.5	**3.7**
Animal (unknown type)	6.9	1.9	3.5	1.0	0.8	2.2	5.0	**3.1**
Natural Other	11.0	5.1	4.4	17.1	54.7	20.3	22.6	**19.3**
Natural Unknown	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
Unknown	1.5	1.5	0.7	1.8	1.8	2.5	1.4	**1.6**
Total Aircraft	**16.4**	**12.5**	**12.6**	**7.9**	**13.8**	**11.3**	**9.7**	**12.0**
Total Road Vehicles	**0.0**	**0.3**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**
Total Watercraft	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**
Total Non-natural	**18.8**	**18.6**	**14.2**	**11.4**	**19.7**	**16.4**	**13.5**	**16.1**
Total Natural	**28.9**	**33.2**	**20.0**	**42.5**	**74.3**	**31.0**	**41.3**	**38.7**

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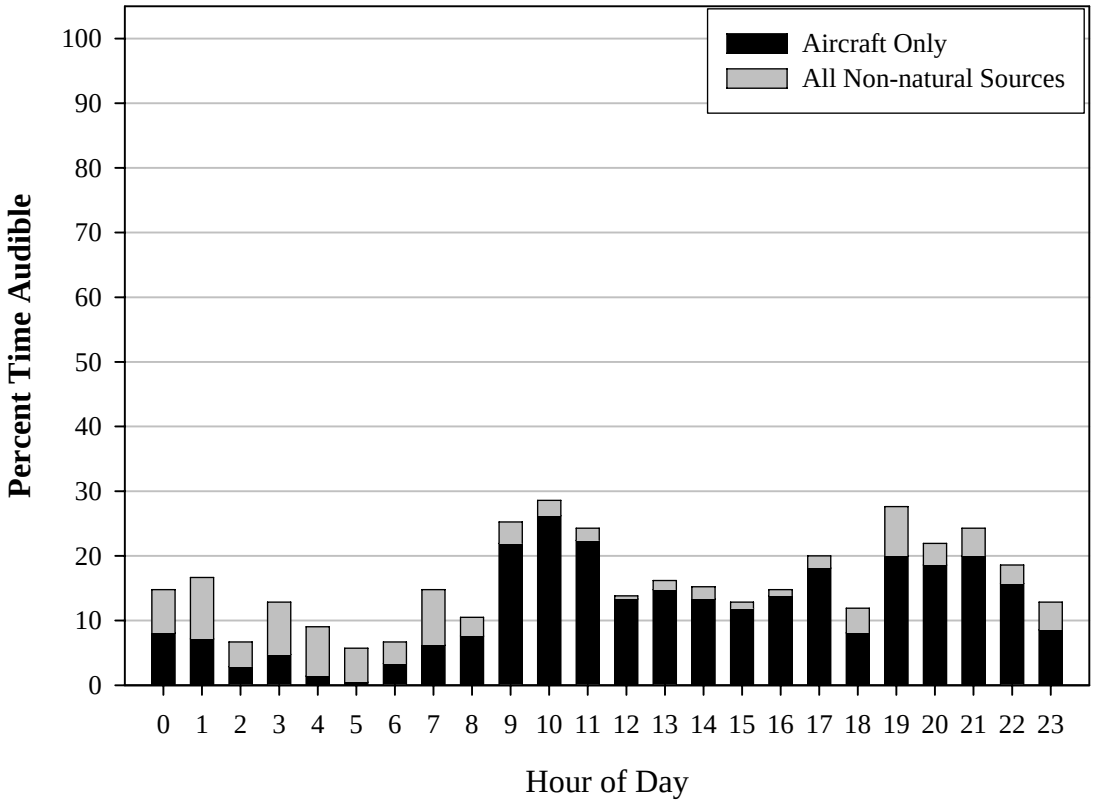


Figure VIII-7. Percent Time All Non-natural Sounds and Aircraft Sounds were Audible, Canyonlands National Park, Lower Salt Creek (CANY004), 2-01-2006 to 2-07-2006.

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Table VIII-22. Percent Time Non-natural Sounds were Audible, Canyonlands National Park, Lower Salt Creek (CANY004), 6-28-2006 to 7-04-2006.

Hour of Day	6-28-06 % Time Audible Non-natural Sources	6-29-06 % Time Audible Non-natural Sources	6-30-06 % Time Audible Non-natural Sources	7-01-06 % Time Audible Non-natural Sources	7-02-06 % Time Audible Non-natural Sources	7-03-06 % Time Audible Non-natural Sources	7-04-06 % Time Audible Non-natural Sources	Average % Time Audible Non-Natural Sources
0:00	16.7	23.3	30.0	30.0	16.7	23.3	13.3	**21.9**
1:00	3.3	20.0	10.0	10.0	16.7	23.3	16.7	**14.3**
2:00	3.3	13.3	13.3	16.7	10.0	13.3	16.7	**12.4**
3:00	0.0	16.7	0.0	3.3	3.3	0.0	10.0	**4.8**
4:00	6.7	0.0	0.0	0.0	3.3	0.0	40.0	**7.1**
5:00	0.0	0.0	0.0	0.0	3.3	0.0	26.7	**4.3**
6:00	0.0	0.0	10.0	10.0	3.3	13.3	0.0	**5.2**
7:00	3.3	16.7	20.0	10.0	16.7	3.3	0.0	**10.0**
8:00	43.3	33.3	3.3	30.0	40.0	40.0	13.3	**29.0**
9:00	50.0	43.3	30.0	36.7	43.3	53.3	43.3	**42.9**
10:00	53.3	36.7	30.0	36.7	50.0	40.0	50.0	**42.4**
11:00	43.3	46.7	16.7	50.0	53.3	23.3	53.3	**41.0**
12:00	30.0	16.7	10.0	23.3	46.7	26.7	26.7	**25.7**
13:00	20.0	36.7	20.0	40.0	46.7	50.0	13.3	**32.4**
14:00	30.0	36.7	30.0	23.3	36.7	33.3	26.7	**31.0**
15:00	16.7	33.3	30.0	20.0	20.0	23.3	26.7	**24.3**
16:00	26.7	23.3	20.0	40.0	46.7	16.7	30.0	**29.0**
17:00	33.3	13.3	33.3	33.3	53.3	23.3	13.3	**29.0**
18:00	23.3	20.0	10.0	16.7	50.0	20.0	13.3	**21.9**
19:00	3.3	30.0	50.0	13.3	13.3	13.3	20.0	**20.5**
20:00	20.0	13.3	13.3	16.7	26.7	30.0	10.0	**18.6**
21:00	30.0	23.3	26.7	30.0	16.7	33.3	36.7	**28.1**
22:00	40.0	20.0	20.0	3.3	36.7	36.7	13.3	**24.3**
23:00	0.0	0.0	6.7	0.0	23.3	16.7	26.7	**10.5**

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Table VIII-23. Percent Time Aircraft Sounds were Audible, Canyonlands National Park, Lower Salt Creek (CANY004), 6-28-2006 to 7-04-2006.

Hour of Day	6-28-06 % Time Audible Aircraft	6-29-06 % Time Audible Aircraft	6-30-06 % Time Audible Aircraft	7-01-06 % Time Audible Aircraft	7-02-06 % Time Audible Aircraft	7-03-06 % Time Audible Aircraft	7-04-06 % Time Audible Aircraft	Average % Time Audible Aircraft
0:00	16.7	23.3	30.0	30.0	16.7	23.3	13.3	**21.9**
1:00	3.3	20.0	10.0	10.0	16.7	23.3	16.7	**14.3**
2:00	3.3	10.0	13.3	16.7	10.0	13.3	16.7	**11.9**
3:00	0.0	6.7	0.0	3.3	3.3	0.0	10.0	**3.3**
4:00	6.7	0.0	0.0	0.0	3.3	0.0	13.3	**3.3**
5:00	0.0	0.0	0.0	0.0	3.3	0.0	0.0	**0.5**
6:00	0.0	0.0	10.0	10.0	3.3	13.3	0.0	**5.2**
7:00	3.3	16.7	20.0	10.0	16.7	0.0	0.0	**9.5**
8:00	43.3	33.3	3.3	30.0	40.0	40.0	13.3	**29.0**
9:00	40.0	43.3	30.0	36.7	36.7	53.3	43.3	**40.5**
10:00	53.3	33.3	26.7	36.7	46.7	36.7	46.7	**40.0**
11:00	43.3	46.7	16.7	46.7	53.3	23.3	50.0	**40.0**
12:00	23.3	16.7	10.0	23.3	46.7	26.7	26.7	**24.8**
13:00	20.0	36.7	20.0	40.0	46.7	50.0	13.3	**32.4**
14:00	26.7	33.3	30.0	23.3	33.3	23.3	26.7	**28.1**
15:00	13.3	33.3	30.0	16.7	20.0	23.3	26.7	**23.3**
16:00	20.0	23.3	20.0	33.3	46.7	16.7	30.0	**27.1**
17:00	30.0	10.0	33.3	23.3	40.0	20.0	13.3	**24.3**
18:00	23.3	20.0	10.0	10.0	33.3	20.0	13.3	**18.6**
19:00	3.3	23.3	20.0	13.3	0.0	10.0	16.7	**12.4**
20:00	13.3	10.0	10.0	16.7	26.7	26.7	10.0	**16.2**
21:00	30.0	23.3	26.7	30.0	16.7	33.3	36.7	**28.1**
22:00	20.0	20.0	20.0	3.3	36.7	30.0	10.0	**20.0**
23:00	0.0	0.0	6.7	0.0	23.3	16.7	26.7	**10.5**

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Table VIII-24. Percent Time All Sounds were Audible, Canyonlands National Park, Lower Salt Creek (CANY004), 6-28-2006 to 7-04-2006.

Audible Sound Sources	6-28-06 % Time Audible	6-29-06 % Time Audible	6-30-06 % Time Audible	7-01-06 % Time Audible	7-02-06 % Time Audible	7-03-06 % Time Audible	7-04-06 % Time Audible	Average % Time Audible
No Sound Audible	0.0	0.0	0.0	0.0	0.0	0.0	0.1	**0.0**
Aircraft (unknown type)	0.1	0.0	0.0	0.0	0.0	0.0	0.1	**0.0**
Aircraft, Jet	14.7	16.1	14.4	14.7	23.1	16.7	17.1	**16.7**
Aircraft, Propeller	3.3	4.2	2.1	4.6	2.8	5.1	2.6	**3.5**
Aircraft, Helicopter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
Vehicle	0.6	1.0	0.0	0.0	0.1	0.0	0.1	**0.3**
Watercraft	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
Motor Sounds	0.0	0.0	0.1	0.6	0.3	0.7	2.5	**0.6**
Grounds Care	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
People	0.1	0.4	0.0	0.0	0.0	0.0	0.0	**0.1**
Domestic Animal	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
Building Sounds	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
Construction	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
Non-natural Other	1.9	0.4	1.4	0.8	2.4	0.8	0.1	**1.1**
Non-natural Unknown	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
Wind	53.8	29.0	23.5	43.5	28.1	34.2	27.2	**34.2**
Water (rain, river, etc.)	7.6	2.8	0.0	13.1	30.0	16.4	22.4	**13.2**
Thunder	0.1	0.3	0.0	0.1	0.1	0.0	1.1	**0.3**
Mammal	0.0	0.0	0.1	0.6	1.9	1.1	1.8	**0.8**
Bird	45.0	50.8	50.0	44.9	45.8	52.8	41.4	**47.2**
Reptile	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
Amphibian	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
Insect	76.4	81.1	85.1	80.3	78.2	81.1	81.9	**80.6**
Animal (unknown type)	20.0	26.1	52.5	40.1	43.9	43.9	44.6	**38.7**
Natural Other	0.8	0.0	0.0	0.0	0.0	0.0	0.0	**0.1**
Natural Unknown	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
Unknown	1.3	2.9	0.0	0.0	0.0	0.0	0.0	**0.6**
Total Aircraft	**18.2**	**20.1**	**16.5**	**19.3**	**25.8**	**21.8**	**19.7**	**20.2**
Total Road Vehicles	**0.6**	**1.0**	**0.0**	**0.0**	**0.1**	**0.0**	**0.1**	**0.3**
Total Watercraft	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**
Total Non-natural	**20.7**	**21.5**	**18.1**	**20.6**	**28.2**	**23.2**	**22.5**	**22.1**
Total Natural	**99.9**	**100.0**	**99.9**	**100.0**	**100.0**	**100.0**	**99.9**	**99.9**

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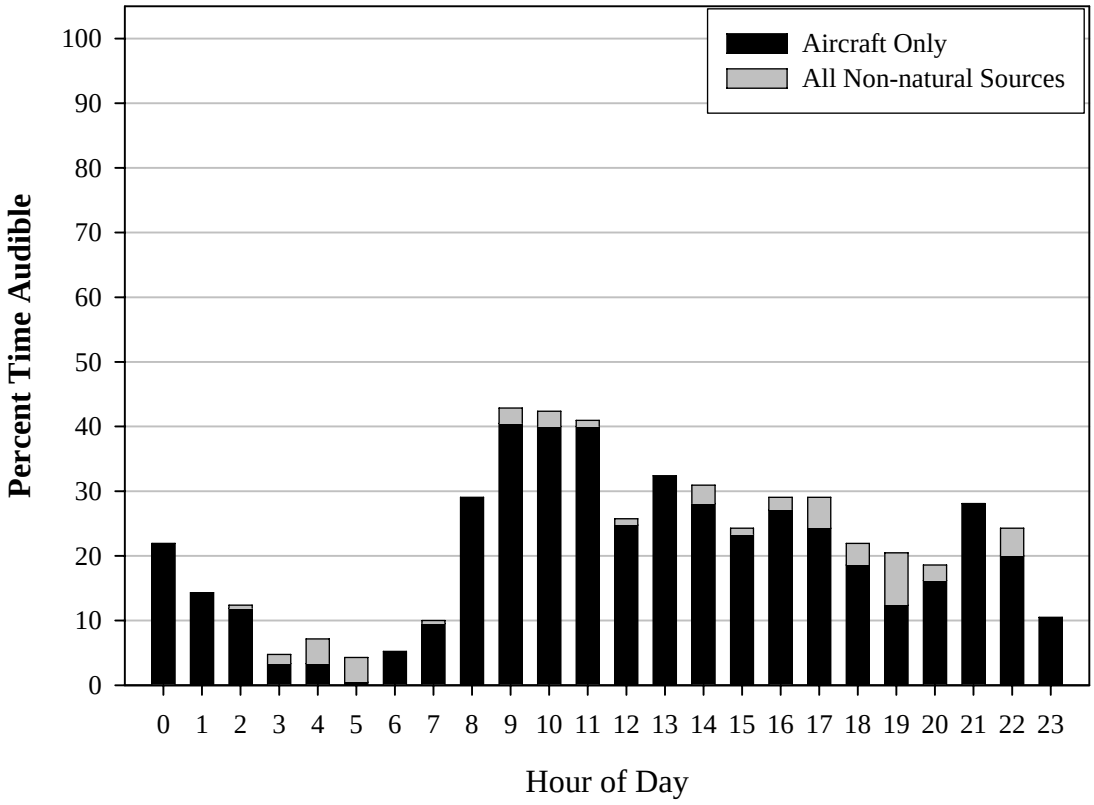


Figure VIII-8. Percent Time All Non-natural Sounds and Aircraft Sounds were Audible, Canyonlands National Park, Lower Salt Creek (CANY004), 6-28-2006 to 7-04-2006.

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Table VIII-25. Percent Time Non-natural Sounds were Audible, Canyonlands National Park, Horseshoe Canyon, Moonshine Spring, (CANY005), 2-04-2006 to 2-08-2006.

Hour of Day	2-04-06 % Time Audible Non-natural Sources	2-05-06 % Time Audible Non-natural Sources	2-06-06 % Time Audible Non-natural Sources	2-07-06 % Time Audible Non-natural Sources	2-08-06 % Time Audible Non-natural Sources	Average % Time Audible Non-Natural Sources
0:00	10.0	30.0	30.0	10.0	10.0	**18.0**
1:00	10.0	10.0	0.0	10.0	0.0	**6.0**
2:00	0.0	0.0	10.0	10.0	0.0	**4.0**
3:00	0.0	0.0	10.0	10.0	10.0	**6.0**
4:00	0.0	0.0	10.0	0.0	0.0	**2.0**
5:00	0.0	0.0	0.0	0.0	0.0	**0.0**
6:00	10.0	0.0	0.0	0.0	0.0	**2.0**
7:00	10.0	20.0	20.0	10.0	30.0	**18.0**
8:00	20.0	70.0	60.0	50.0	40.0	**48.0**
9:00	20.0	50.0	10.0	50.0	50.0	**36.0**
10:00	40.0	60.0	50.0	60.0	30.0	**48.0**
11:00	30.0	40.0	40.0	70.0	30.0	**42.0**
12:00	70.0	50.0	60.0	30.0	30.0	**48.0**
13:00	30.0	60.0	20.0	50.0	50.0	**42.0**
14:00	40.0	60.0	50.0	30.0	30.0	**42.0**
15:00	60.0	60.0	60.0	60.0	50.0	**58.0**
16:00	20.0	70.0	40.0	40.0	40.0	**42.0**
17:00	40.0	90.0	10.0	40.0	40.0	**44.0**
18:00	50.0	70.0	60.0	40.0	20.0	**48.0**
19:00	20.0	70.0	40.0	40.0	40.0	**42.0**
20:00	30.0	40.0	30.0	30.0	30.0	**32.0**
21:00	20.0	60.0	40.0	50.0	20.0	**38.0**
22:00	0.0	60.0	30.0	20.0	30.0	**28.0**
23:00	0.0	60.0	20.0	10.0	10.0	**20.0**

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Table VIII-26. Percent Time Aircraft Sounds were Audible, Canyonlands National Park, Horseshoe Canyon, Moonshine Spring, (CANY005), 2-04-2006 to 2-08-2006.

Hour of Day	2-04-06 % Time Audible Aircraft	2-05-06 % Time Audible Aircraft	2-06-06 % Time Audible Aircraft	2-07-06 % Time Audible Aircraft	2-08-06 % Time Audible Aircraft	Average % Time Audible Aircraft
0:00	10.0	30.0	30.0	10.0	10.0	**18.0**
1:00	10.0	10.0	0.0	10.0	0.0	**6.0**
2:00	0.0	0.0	10.0	10.0	0.0	**4.0**
3:00	0.0	0.0	10.0	10.0	10.0	**6.0**
4:00	0.0	0.0	10.0	0.0	0.0	**2.0**
5:00	0.0	0.0	0.0	0.0	0.0	**0.0**
6:00	10.0	0.0	0.0	0.0	0.0	**2.0**
7:00	10.0	20.0	20.0	10.0	30.0	**18.0**
8:00	20.0	70.0	60.0	50.0	40.0	**48.0**
9:00	20.0	50.0	10.0	50.0	40.0	**34.0**
10:00	40.0	60.0	50.0	60.0	30.0	**48.0**
11:00	20.0	40.0	40.0	60.0	30.0	**38.0**
12:00	70.0	50.0	60.0	30.0	30.0	**48.0**
13:00	20.0	60.0	20.0	50.0	50.0	**40.0**
14:00	20.0	60.0	50.0	30.0	30.0	**38.0**
15:00	40.0	60.0	60.0	60.0	50.0	**54.0**
16:00	20.0	70.0	40.0	40.0	40.0	**42.0**
17:00	40.0	90.0	10.0	40.0	40.0	**44.0**
18:00	50.0	70.0	60.0	40.0	20.0	**48.0**
19:00	10.0	70.0	40.0	40.0	40.0	**40.0**
20:00	30.0	40.0	30.0	30.0	30.0	**32.0**
21:00	20.0	60.0	40.0	50.0	20.0	**38.0**
22:00	0.0	60.0	30.0	20.0	30.0	**28.0**
23:00	0.0	60.0	20.0	10.0	10.0	**20.0**

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Table VIII-27. Percent Time All Sounds were Audible, Canyonlands National Park, Horseshoe Canyon, Moonshine Spring, (CANY005), 2-04-2006 to 2-08-2006.

Audible Sound Sources	2-04-06 % Time Audible	2-05-06 % Time Audible	2-06-06 % Time Audible	2-07-06 % Time Audible	2-08-06 % Time Audible	Average % Time Audible
No Sound Audible	0.0	0.0	0.0	0.0	0.0	**0.0**
Aircraft (unknown type)	0.4	0.8	0.8	1.3	1.3	**0.9**
Aircraft, Jet	18.3	42.1	28.3	27.9	22.5	**27.8**
Aircraft, Propeller	0.0	0.0	0.0	0.0	0.4	**0.1**
Aircraft, Helicopter	0.4	0.0	0.0	0.4	0.0	**0.2**
Vehicle	0.0	0.0	0.0	0.0	0.0	**0.0**
Watercraft	0.0	0.0	0.0	0.0	0.0	**0.0**
Motor Sounds	0.4	0.0	0.0	0.4	0.4	**0.3**
Grounds Care	0.0	0.0	0.0	0.0	0.0	**0.0**
People	2.9	0.0	0.0	0.0	0.0	**0.6**
Domestic Animal	0.0	0.0	0.0	0.0	0.0	**0.0**
Building Sounds	0.0	0.0	0.0	0.0	0.0	**0.0**
Construction	0.0	0.0	0.0	0.0	0.0	**0.0**
Non-natural Other	0.0	0.0	0.0	0.0	0.0	**0.0**
Non-natural Unknown	0.4	0.0	0.0	0.0	0.0	**0.1**
Wind	6.7	31.7	7.9	8.8	13.8	**13.8**
Water (rain, spring, etc.)	98.8	93.3	100.0	97.9	93.8	**96.8**
Thunder	0.0	0.0	0.0	0.0	0.0	**0.0**
Mammal	0.0	1.3	0.0	0.4	0.0	**0.3**
Bird	19.2	11.7	15.4	17.5	14.6	**15.7**
Reptile	0.0	0.0	0.0	0.0	0.0	**0.0**
Amphibian	0.0	0.0	0.0	0.0	0.0	**0.0**
Insect	0.0	0.0	0.0	0.0	0.0	**0.0**
Animal (unknown type)	0.0	0.4	0.0	1.3	2.5	**0.8**
Natural Other	5.8	0.8	7.5	5.4	4.6	**4.8**
Natural Unknown	0.0	3.8	2.5	10.8	7.5	**4.9**
Unknown	4.6	0.0	1.7	0.4	0.4	**1.4**
Total Aircraft	**19.2**	**42.9**	**29.2**	**29.6**	**24.2**	**29.0**
Total Road Vehicles	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**
Total Watercraft	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**
Total Non-natural	**22.1**	**42.9**	**29.2**	**30.0**	**24.6**	**29.8**
Total Natural	**99.6**	**99.6**	**100.0**	**100.0**	**100.0**	**99.8**

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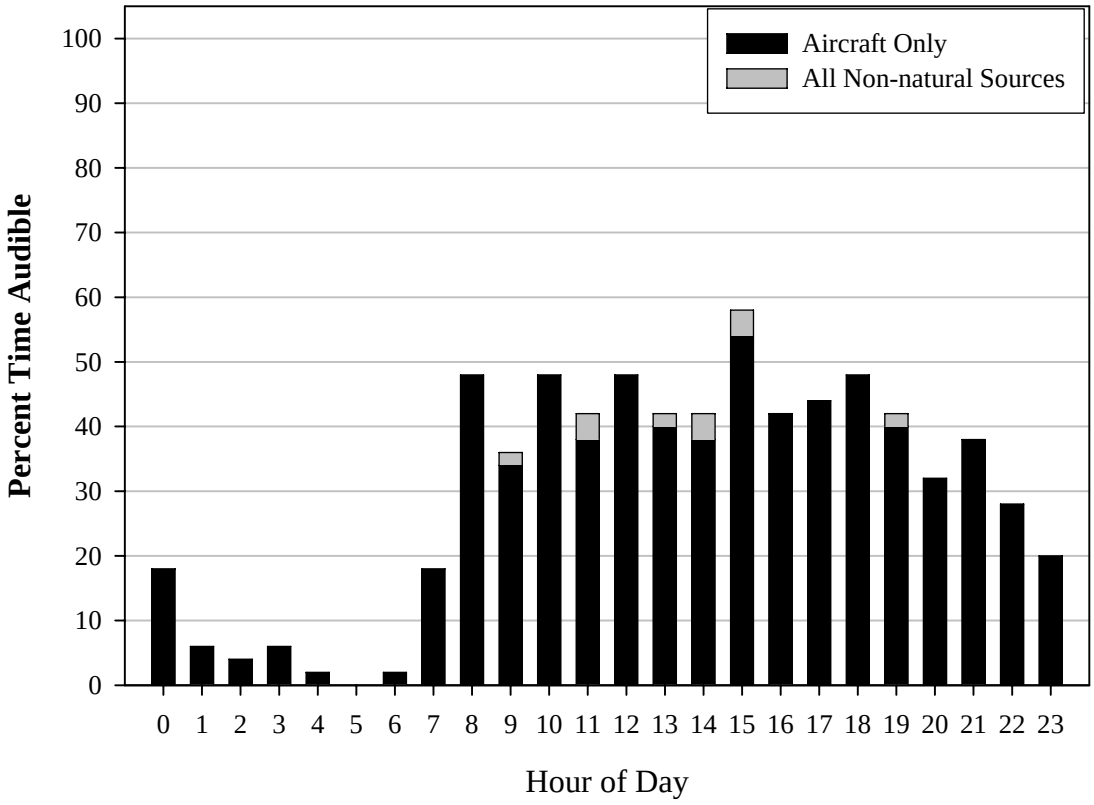


Figure VIII-9. Percent Time All Non-natural Sounds and Aircraft Sounds were Audible, Canyonlands National Park, Horseshoe Canyon, Moonshine Spring, (CANY005), 2-04-2006 to 2-08-2006.

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Table VIII-28. Percent Time Non-natural Sounds were Audible, Canyonlands National Park, Horseshoe Canyon, Moonshine Spring, (CANY005), 7-13-2006, 7-14-2006, and 7-22-2006 to 7-26-2006.

Hour of Day	7-13-06 % Time Audible Non-natural Sources	7-14-06 % Time Audible Non-natural Sources	7-22-06 % Time Audible Non-natural Sources	7-23-06 % Time Audible Non-natural Sources	7-24-06 % Time Audible Non-natural Sources	7-25-06 % Time Audible Non-natural Sources	7-26-06 % Time Audible Non-natural Sources	Average % Time Audible Non-Natural Sources
0:00	0.0	6.7	6.7	16.7	10.0	0.0	3.3	**6.2**
1:00	6.7	26.7	20.0	23.3	26.7	26.7	23.3	**21.9**
2:00	13.3	3.3	10.0	10.0	16.7	3.3	3.3	**8.6**
3:00	6.7	16.7	13.3	6.7	0.0	10.0	3.3	**8.1**
4:00	10.0	6.7	3.3	0.0	3.3	3.3	6.7	**4.8**
5:00	0.0	3.3	0.0	0.0	0.0	0.0	6.7	**1.4**
6:00	6.7	13.3	16.7	6.7	3.3	0.0	23.3	**10.0**
7:00	13.3	13.3	3.3	23.3	13.3	6.7	20.0	**13.3**
8:00	63.3	43.3	50.0	53.3	43.3	80.0	46.7	**54.3**
9:00	56.7	46.7	50.0	36.7	26.7	70.0	70.0	**51.0**
10:00	53.3	36.7	56.7	53.3	30.0	53.3	63.3	**49.5**
11:00	46.7	20.0	33.3	40.0	43.3	53.3	40.0	**39.5**
12:00	46.7	40.0	53.3	40.0	56.7	56.7	56.7	**50.0**
13:00	30.0	20.0	36.7	30.0	33.3	40.0	30.0	**31.4**
14:00	46.7	33.3	13.3	40.0	26.7	53.3	30.0	**34.8**
15:00	43.3	20.0	40.0	53.3	46.7	33.3	33.3	**38.6**
16:00	40.0	46.7	43.3	43.3	33.3	70.0	56.7	**47.6**
17:00	30.0	13.3	23.3	16.7	36.7	36.7	40.0	**28.1**
18:00	40.0	20.0	23.3	26.7	36.7	33.3	43.3	**31.9**
19:00	53.3	23.3	40.0	23.3	56.7	33.3	36.7	**38.1**
20:00	30.0	26.7	50.0	33.3	23.3	33.3	63.3	**37.1**
21:00	66.7	20.0	36.7	13.3	26.7	36.7	33.3	**33.3**
22:00	33.3	20.0	63.3	36.7	23.3	36.7	40.0	**36.2**
23:00	23.3	0.0	23.3	20.0	6.7	10.0	16.7	**14.3**

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Table VIII-29. Percent Time Aircraft Sounds were Audible, Canyonlands National Park, Horseshoe Canyon, Moonshine Spring, (CANY005), 7-13-2006, 7-14-2006, and 7-22-2006 to 7-26-2006.

Hour of Day	7-13-06 % Time Audible Aircraft	7-14-06 % Time Audible Aircraft	7-22-06 % Time Audible Aircraft	7-23-06 % Time Audible Aircraft	7-24-06 % Time Audible Aircraft	7-25-06 % Time Audible Aircraft	7-26-06 % Time Audible Aircraft	Average % Time Audible Aircraft
0:00	0.0	6.7	6.7	16.7	10.0	0.0	3.3	**6.2**
1:00	6.7	26.7	20.0	23.3	26.7	26.7	23.3	**21.9**
2:00	13.3	3.3	10.0	10.0	16.7	3.3	3.3	**8.6**
3:00	6.7	16.7	13.3	6.7	0.0	10.0	3.3	**8.1**
4:00	10.0	6.7	3.3	0.0	3.3	3.3	6.7	**4.8**
5:00	0.0	0.0	0.0	0.0	0.0	0.0	6.7	**1.0**
6:00	6.7	6.7	13.3	6.7	3.3	0.0	23.3	**8.6**
7:00	13.3	13.3	3.3	20.0	13.3	6.7	20.0	**12.9**
8:00	63.3	43.3	50.0	53.3	43.3	80.0	46.7	**54.3**
9:00	53.3	46.7	50.0	36.7	26.7	70.0	70.0	**50.5**
10:00	50.0	36.7	56.7	53.3	30.0	53.3	63.3	**49.0**
11:00	46.7	20.0	30.0	40.0	43.3	53.3	40.0	**39.0**
12:00	43.3	36.7	50.0	40.0	56.7	56.7	56.7	**48.6**
13:00	30.0	20.0	36.7	30.0	33.3	40.0	30.0	**31.4**
14:00	43.3	33.3	13.3	40.0	23.3	53.3	30.0	**33.8**
15:00	40.0	20.0	36.7	46.7	46.7	33.3	33.3	**36.7**
16:00	40.0	46.7	36.7	43.3	33.3	70.0	56.7	**46.7**
17:00	30.0	13.3	20.0	16.7	36.7	36.7	40.0	**27.6**
18:00	40.0	20.0	23.3	26.7	36.7	33.3	43.3	**31.9**
19:00	53.3	23.3	40.0	23.3	56.7	33.3	36.7	**38.1**
20:00	26.7	23.3	50.0	33.3	23.3	33.3	63.3	**36.2**
21:00	36.7	20.0	36.7	13.3	26.7	36.7	33.3	**29.0**
22:00	30.0	20.0	63.3	36.7	23.3	36.7	40.0	**35.7**
23:00	23.3	0.0	23.3	16.7	6.7	10.0	16.7	**13.8**

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Table VIII-30. Percent Time All Sounds were Audible, Canyonlands National Park, Horseshoe Canyon, Moonshine Spring, (CANY005), 7-13-2006, 7-14-2006, and 7-22-2006 to 7-26-2006.

Audible Sound Sources	7-13-06 % Time Audible	7-14-06 % Time Audible	7-22-06 % Time Audible	7-23-06 % Time Audible	7-24-06 % Time Audible	7-25-06 % Time Audible	7-26-06 % Time Audible	Average % Time Audible
No Sound Audible	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
Aircraft (unknown type)	0.1	0.0	0.0	0.0	0.0	0.4	0.3	**0.1**
Aircraft, Jet	26.4	19.4	26.1	23.2	22.9	28.9	30.0	**25.3**
Aircraft, Propeller	2.9	1.5	2.5	3.2	2.9	3.2	2.8	**2.7**
Aircraft, Helicopter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
Vehicle	0.0	0.0	0.1	0.1	0.0	0.0	0.0	**0.0**
Watercraft	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
Motor Sounds	1.7	0.7	0.1	0.0	0.1	0.0	0.0	**0.4**
Grounds Care	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
People	0.4	0.0	1.0	0.3	0.0	0.0	0.0	**0.2**
Domestic Animal	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
Building Sounds	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
Construction	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
Non-natural Other	0.3	0.0	0.0	0.1	0.0	0.0	0.0	**0.1**
Non-natural Unknown	0.3	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
Wind	9.2	16.1	17.2	9.6	13.9	14.4	18.8	**14.2**
Water (rain, spring, etc.)	42.5	37.4	89.7	74.9	69.3	76.3	61.4	**64.5**
Thunder	0.0	0.0	0.0	0.0	0.0	0.1	0.0	**0.0**
Mammal	3.3	2.6	6.9	7.1	7.8	9.4	12.4	**7.1**
Bird	56.4	54.0	50.0	55.1	53.3	49.7	53.8	**53.2**
Reptile	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
Amphibian	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
Insect	69.3	65.4	59.0	58.2	57.1	62.2	59.9	**61.6**
Animal (unknown type)	34.0	35.4	32.9	35.3	51.3	35.8	17.9	**34.7**
Natural Other	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
Natural Unknown	0.1	0.0	0.0	0.0	2.5	0.0	0.0	**0.4**
Unknown	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
Total Aircraft	**29.4**	**21.0**	**28.6**	**26.4**	**25.8**	**32.5**	**32.9**	**28.1**
Total Road Vehicles	**0.0**	**0.0**	**0.1**	**0.1**	**0.0**	**0.0**	**0.0**	**0.0**
Total Watercraft	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**
Total Non-natural	**31.7**	**21.7**	**29.6**	**26.9**	**26.0**	**32.5**	**32.9**	**28.8**
Total Natural	**99.6**	**99.7**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**99.9**

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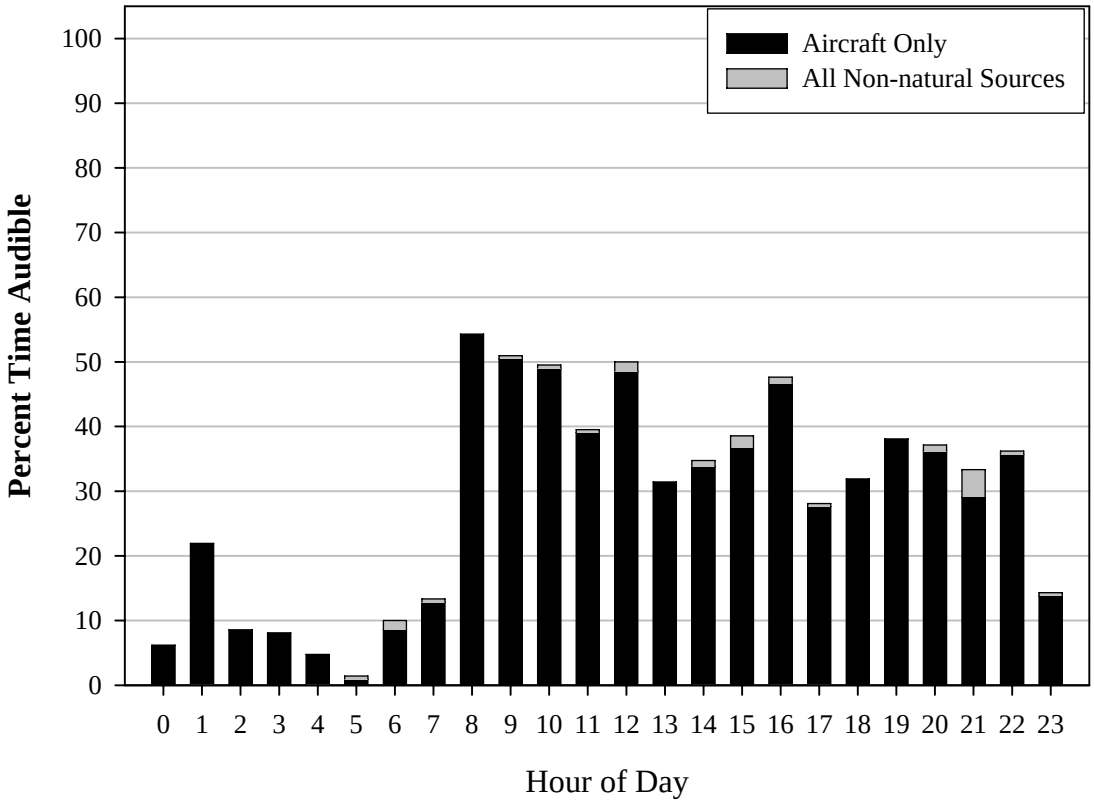


Figure VIII-10. Percent Time All Non-natural Sounds and Aircraft Sounds were Audible, Canyonlands National Park, Horseshoe Canyon, Moonshine Spring, (CANY005), 7-13-2006, 7-14-2006, and 7-22-2006 to 7-26-2006.

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Table VIII-31. Percent Time Non-natural Sounds were Audible, Canyonlands National Park, Colorado River, Little Bridge Canyon, (CANY006), 7-21-2006 to 7-27-2006.

Hour of Day	7-21-06 % Time Audible Non-natural Sources	7-22-06 % Time Audible Non-natural Sources	7-23-06 % Time Audible Non-natural Sources	7-24-06 % Time Audible Non-natural Sources	7-25-06 % Time Audible Non-natural Sources	7-26-06 % Time Audible Non-natural Sources	7-27-06 % Time Audible Non-natural Sources	Average % Time Audible Non-Natural Sources
0:00	33.3	30.0	26.7	20.0	20.0	23.3	30.0	**26.2**
1:00	53.3	50.0	30.0	33.3	16.7	20.0	33.3	**33.8**
2:00	0.0	23.3	16.7	16.7	6.7	20.0	6.7	**12.9**
3:00	3.3	26.7	6.7	3.3	6.7	16.7	3.3	**9.5**
4:00	6.7	3.3	0.0	10.0	6.7	6.7	0.0	**4.8**
5:00	3.3	6.7	0.0	0.0	0.0	10.0	0.0	**2.9**
6:00	13.3	3.3	6.7	6.7	6.7	13.3	3.3	**7.6**
7:00	16.7	26.7	16.7	30.0	13.3	26.7	26.7	**22.4**
8:00	36.7	76.7	80.0	56.7	73.3	80.0	66.7	**67.1**
9:00	83.3	63.3	53.3	66.7	76.7	66.7	86.7	**71.0**
10:00	76.7	80.0	70.0	63.3	60.0	50.0	70.0	**67.1**
11:00	73.3	46.7	86.7	76.7	83.3	56.7	66.7	**70.0**
12:00	60.0	66.7	50.0	70.0	66.7	63.3	33.3	**58.6**
13:00	63.3	46.7	83.3	60.0	80.0	53.3	33.3	**60.0**
14:00	80.0	43.3	83.3	80.0	50.0	63.3	36.7	**62.4**
15:00	66.7	76.7	73.3	50.0	66.7	40.0	53.3	**61.0**
16:00	60.0	60.0	60.0	56.7	56.7	63.3	50.0	**58.1**
17:00	56.7	50.0	46.7	43.3	43.3	50.0	30.0	**45.7**
18:00	40.0	70.0	43.3	53.3	53.3	33.3	46.7	**48.6**
19:00	53.3	46.7	53.3	16.7	36.7	56.7	33.3	**42.4**
20:00	60.0	70.0	63.3	0.0	33.3	66.7	50.0	**49.0**
21:00	83.3	33.3	43.3	3.3	53.3	56.7	43.3	**45.2**
22:00	20.0	53.3	66.7	36.7	53.3	0.0	33.3	**37.6**
23:00	6.7	23.3	26.7	33.3	43.3	10.0	30.0	**24.8**

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Table VIII-32. Percent Time Aircraft Sounds were Audible, Canyonlands National Park, Colorado River, Little Bridge Canyon, (CANY006), 7-21-2006 to 7-27-2006.

Hour of Day	7-21-06 % Time Audible Aircraft	7-22-06 % Time Audible Aircraft	7-23-06 % Time Audible Aircraft	7-24-06 % Time Audible Aircraft	7-25-06 % Time Audible Aircraft	7-26-06 % Time Audible Aircraft	7-27-06 % Time Audible Aircraft	Average % Time Audible Aircraft
0:00	33.3	30.0	26.7	20.0	16.7	23.3	30.0	**25.7**
1:00	53.3	50.0	30.0	33.3	16.7	20.0	33.3	**33.8**
2:00	0.0	23.3	16.7	16.7	6.7	20.0	6.7	**12.9**
3:00	3.3	26.7	6.7	3.3	6.7	16.7	3.3	**9.5**
4:00	6.7	3.3	0.0	10.0	6.7	6.7	0.0	**4.8**
5:00	3.3	6.7	0.0	0.0	0.0	10.0	0.0	**2.9**
6:00	13.3	3.3	6.7	6.7	6.7	13.3	3.3	**7.6**
7:00	16.7	13.3	16.7	26.7	13.3	26.7	26.7	**20.0**
8:00	36.7	60.0	76.7	43.3	73.3	63.3	66.7	**60.0**
9:00	46.7	46.7	53.3	40.0	63.3	66.7	70.0	**55.2**
10:00	76.7	80.0	70.0	63.3	53.3	50.0	40.0	**61.9**
11:00	50.0	33.3	56.7	36.7	70.0	40.0	53.3	**48.6**
12:00	26.7	40.0	43.3	43.3	50.0	56.7	13.3	**39.0**
13:00	63.3	30.0	50.0	60.0	40.0	53.3	33.3	**47.1**
14:00	56.7	40.0	60.0	43.3	26.7	36.7	26.7	**41.4**
15:00	50.0	76.7	46.7	40.0	56.7	33.3	53.3	**51.0**
16:00	53.3	53.3	60.0	26.7	53.3	63.3	26.7	**48.1**
17:00	26.7	50.0	40.0	33.3	26.7	50.0	30.0	**36.7**
18:00	40.0	66.7	40.0	40.0	53.3	33.3	46.7	**45.7**
19:00	53.3	46.7	43.3	16.7	36.7	56.7	33.3	**41.0**
20:00	60.0	70.0	60.0	0.0	33.3	66.7	50.0	**48.6**
21:00	83.3	33.3	40.0	3.3	53.3	56.7	43.3	**44.8**
22:00	20.0	53.3	66.7	36.7	36.7	0.0	33.3	**35.2**
23:00	6.7	23.3	26.7	33.3	43.3	10.0	30.0	**24.8**

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Table VIII-33. Percent Time All Sounds were Audible, Canyonlands National Park, Colorado River, Little Bridge Canyon, (CANY006), 7-21-2006 to 7-27-2006.

Audible Sound Sources	7-21-06 % Time Audible	7-22-06 % Time Audible	7-23-06 % Time Audible	7-24-06 % Time Audible	7-25-06 % Time Audible	7-26-06 % Time Audible	7-27-06 % Time Audible	Average % Time Audible
No Sound Audible	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
Aircraft (unknown type)	0.6	0.0	0.4	0.0	0.0	0.0	0.0	**0.1**
Aircraft, Jet	30.7	33.6	34.4	24.0	30.4	31.0	27.6	**30.3**
Aircraft, Propeller	5.4	6.4	4.2	4.2	4.7	5.7	3.8	**4.9**
Aircraft, Helicopter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
Vehicle	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
Watercraft	6.0	3.6	2.1	5.6	5.0	2.6	3.2	**4.0**
Motor Sounds	0.6	1.4	1.1	1.8	1.8	0.1	0.7	**1.1**
Grounds Care	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
People	1.3	0.3	6.5	1.8	1.0	0.6	1.4	**1.8**
Domestic Animal	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
Building Sounds	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
Construction	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
Non-natural Other	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
Non-natural Unknown	0.0	0.1	0.0	0.0	0.1	0.0	0.0	**0.0**
Wind	55.4	14.4	15.4	23.1	40.0	37.5	60.7	**35.2**
Water (rain, river, etc.)	24.0	59.3	64.6	59.2	51.9	44.4	37.1	**48.7**
Thunder	0.0	0.0	0.0	4.4	0.0	0.0	0.0	**0.6**
Mammal	3.2	4.0	2.2	3.1	4.0	4.7	7.6	**4.1**
Bird	57.4	55.4	48.3	44.9	48.9	47.6	37.1	**48.5**
Reptile	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
Amphibian	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
Insect	89.3	98.3	99.4	95.8	96.1	95.3	93.9	**95.5**
Animal (unknown type)	9.2	3.5	2.2	4.0	5.3	4.2	3.9	**4.6**
Natural Other	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
Natural Unknown	0.0	1.0	0.7	2.4	0.8	0.4	0.3	**0.8**
Unknown	0.0	0.0	0.0	0.1	0.0	0.0	0.0	**0.0**
Total Aircraft	**36.7**	**40.0**	**39.0**	**28.2**	**35.1**	**36.4**	**31.4**	**35.3**
Total Road Vehicles	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**
Total Watercraft	**6.0**	**3.6**	**2.1**	**5.6**	**5.0**	**2.6**	**3.2**	**4.0**
Total Non-natural	**43.8**	**44.9**	**45.3**	**36.9**	**41.9**	**39.4**	**36.1**	**41.2**
Total Natural	**99.7**	**99.9**	**99.9**	**99.9**	**99.6**	**99.7**	**99.7**	**99.8**

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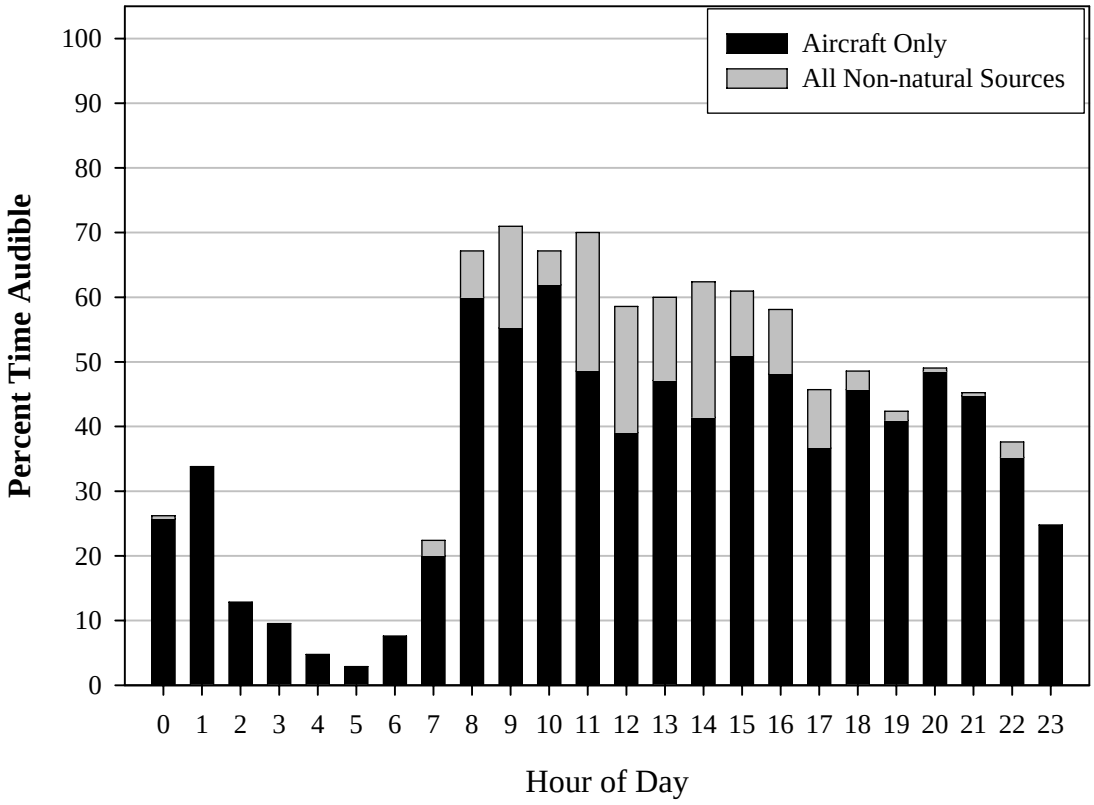


Figure VIII-11. Percent Time All Non-natural Sounds and Aircraft Sounds were Audible, Canyonlands National Park, Colorado River, Little Bridge Canyon, (CANY006), 7-21-2006 to 7-27-2006.

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Table VIII-34. Percent Time Non-natural Sounds were Audible, Canyonlands National Park, Colorado River, Little Bridge Canyon, (CANY006), 11-08-2006 to 11-14-2006.

Hour of Day	11-8-06 % Time Audible Non-natural Sources	11-9-06 % Time Audible Non-natural Sources	11-10-06 % Time Audible Non-natural Sources	11-11-06 % Time Audible Non-natural Sources	11-12-06 % Time Audible Non-natural Sources	11-13-06 % Time Audible Non-natural Sources	11-14-06 % Time Audible Non-natural Sources	Average % Time Audible Non-Natural Sources
0:00	3.3	0.0	13.3	10.0	0.0	3.3	13.3	**6.2**
1:00	10.0	10.0	10.0	0.0	6.7	6.7	10.0	**7.6**
2:00	10.0	6.7	0.0	0.0	0.0	13.3	3.3	**4.8**
3:00	0.0	0.0	0.0	0.0	6.7	3.3	3.3	**1.9**
4:00	0.0	6.7	6.7	3.3	0.0	3.3	0.0	**2.9**
5:00	3.3	0.0	0.0	0.0	3.3	0.0	0.0	**1.0**
6:00	3.3	0.0	0.0	6.7	3.3	3.3	3.3	**2.9**
7:00	20.0	16.7	23.3	6.7	20.0	16.7	3.3	**15.2**
8:00	20.0	30.0	36.7	10.0	43.3	56.7	36.7	**33.3**
9:00	40.0	40.0	50.0	43.3	66.7	60.0	46.7	**49.5**
10:00	10.0	20.0	46.7	50.0	56.7	60.0	76.7	**45.7**
11:00	26.7	26.7	33.3	33.3	63.3	53.3	16.7	**36.2**
12:00	30.0	23.3	46.7	43.3	40.0	53.3	6.7	**34.8**
13:00	46.7	30.0	33.3	26.7	33.3	46.7	23.3	**34.3**
14:00	46.7	30.0	20.0	36.7	46.7	33.3	20.0	**33.3**
15:00	30.0	43.3	26.7	50.0	63.3	43.3	10.0	**38.1**
16:00	46.7	43.3	36.7	36.7	40.0	50.0	26.7	**40.0**
17:00	23.3	23.3	13.3	20.0	30.0	43.3	20.0	**24.8**
18:00	50.0	26.7	16.7	30.0	40.0	36.7	23.3	**31.9**
19:00	20.0	26.7	33.3	26.7	26.7	20.0	30.0	**26.2**
20:00	16.7	30.0	16.7	30.0	43.3	33.3	13.3	**26.2**
21:00	26.7	46.7	30.0	20.0	16.7	10.0	43.3	**27.6**
22:00	26.7	36.7	16.7	6.7	13.3	33.3	13.3	**21.0**
23:00	20.0	26.7	6.7	23.3	30.0	20.0	6.7	**19.0**

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Table VIII-35. Percent Time Aircraft Sounds were Audible, Canyonlands National Park, Colorado River, Little Bridge Canyon, (CANY006), 11-08-2006 to 11-14-2006.

Hour of Day	11-8-06 % Time Audible Aircraft	11-9-06 % Time Audible Aircraft	11-10-06 % Time Audible Aircraft	11-11-06 % Time Audible Aircraft	11-12-06 % Time Audible Aircraft	11-13-06 % Time Audible Aircraft	11-14-06 % Time Audible Aircraft	Average % Time Audible Aircraft
0:00	3.3	0.0	13.3	10.0	0.0	3.3	13.3	**6.2**
1:00	10.0	10.0	10.0	0.0	6.7	6.7	10.0	**7.6**
2:00	10.0	6.7	0.0	0.0	0.0	13.3	3.3	**4.8**
3:00	0.0	0.0	0.0	0.0	6.7	3.3	3.3	**1.9**
4:00	0.0	6.7	6.7	3.3	0.0	3.3	0.0	**2.9**
5:00	3.3	0.0	0.0	0.0	3.3	0.0	0.0	**1.0**
6:00	3.3	0.0	0.0	6.7	3.3	3.3	3.3	**2.9**
7:00	20.0	16.7	23.3	6.7	20.0	16.7	3.3	**15.2**
8:00	20.0	30.0	36.7	10.0	43.3	56.7	36.7	**33.3**
9:00	40.0	40.0	50.0	43.3	66.7	60.0	46.7	**49.5**
10:00	10.0	20.0	46.7	50.0	56.7	60.0	76.7	**45.7**
11:00	26.7	26.7	33.3	33.3	63.3	53.3	16.7	**36.2**
12:00	30.0	23.3	46.7	43.3	40.0	53.3	6.7	**34.8**
13:00	46.7	30.0	33.3	26.7	33.3	46.7	23.3	**34.3**
14:00	46.7	30.0	20.0	36.7	46.7	33.3	20.0	**33.3**
15:00	30.0	43.3	26.7	50.0	63.3	43.3	10.0	**38.1**
16:00	46.7	43.3	36.7	36.7	40.0	50.0	26.7	**40.0**
17:00	23.3	23.3	13.3	20.0	30.0	43.3	20.0	**24.8**
18:00	50.0	26.7	16.7	30.0	40.0	36.7	23.3	**31.9**
19:00	20.0	26.7	33.3	26.7	26.7	20.0	30.0	**26.2**
20:00	16.7	30.0	16.7	30.0	43.3	33.3	13.3	**26.2**
21:00	26.7	46.7	30.0	20.0	16.7	10.0	43.3	**27.6**
22:00	26.7	36.7	16.7	6.7	13.3	33.3	13.3	**21.0**
23:00	20.0	26.7	6.7	23.3	30.0	20.0	6.7	**19.0**

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Table VIII-36. Percent Time All Sounds were Audible, Canyonlands National Park, Colorado River, Little Bridge Canyon, (CANY006), 11-08-2006 to 11-14-2006.

Audible Sound Sources	11-8-06 % Time Audible	11-9-06 % Time Audible	11-10-06 % Time Audible	11-11-06 % Time Audible	11-12-06 % Time Audible	11-13-06 % Time Audible	11-14-06 % Time Audible	Average % Time Audible
No Sound Audible	0.0	0.0	0.8	0.1	0.3	0.1	0.1	**0.2**
Aircraft (unknown type)	0.0	0.1	0.3	0.7	0.0	0.7	1.1	**0.4**
Aircraft, Jet	17.5	20.4	18.3	18.1	26.0	26.1	16.7	**20.4**
Aircraft, Propeller	4.2	2.1	2.9	2.6	2.9	1.9	0.8	**2.5**
Aircraft, Helicopter	0.4	0.0	0.0	0.0	0.0	0.6	0.1	**0.2**
Vehicle	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
Watercraft	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
Motor Sounds	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
Grounds Care	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
People	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
Domestic Animal	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
Building Sounds	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
Construction	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
Non-natural Other	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
Non-natural Unknown	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
Wind	0.0	46.0	16.4	4.2	7.9	18.6	72.2	**23.6**
Water (rain, river, etc.)	96.1	77.1	79.3	92.8	80.3	77.6	47.8	**78.7**
Thunder	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
Mammal	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
Bird	26.4	20.1	21.9	23.3	21.5	18.6	10.3	**20.3**
Reptile	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
Amphibian	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
Insect	5.7	1.7	2.4	0.0	0.1	0.3	0.3	**1.5**
Animal (unknown type)	1.1	6.4	2.1	1.9	4.2	3.3	0.8	**2.8**
Natural Other	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
Natural Unknown	0.0	0.0	0.4	0.7	0.3	0.3	0.1	**0.3**
Unknown	0.0	0.0	0.3	0.0	0.0	0.0	0.0	**0.0**
Total Aircraft	**22.1**	**22.6**	**21.5**	**21.4**	**28.9**	**29.3**	**18.8**	**23.5**
Total Road Vehicles	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**
Total Watercraft	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**
Total Non-natural	**22.1**	**22.6**	**21.5**	**21.4**	**28.9**	**29.3**	**18.8**	**23.5**
Total Natural	**98.9**	**98.8**	**95.1**	**97.8**	**93.3**	**96.1**	**96.9**	**96.7**

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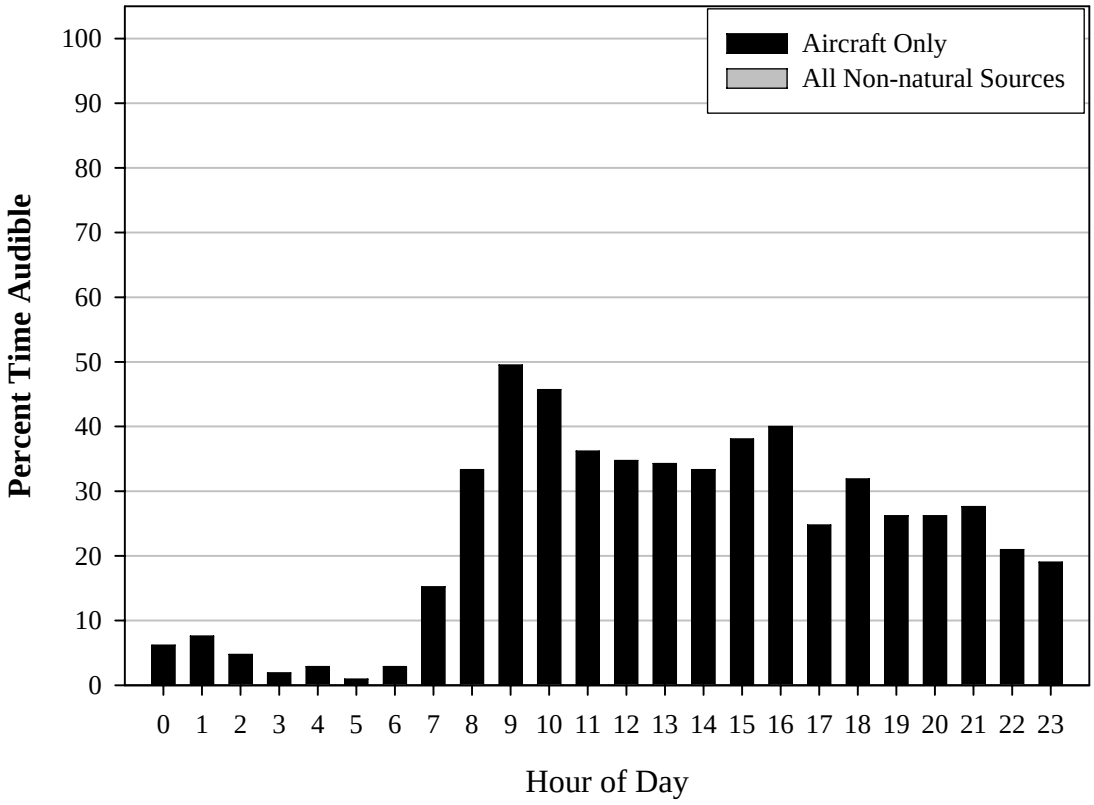


Figure VIII-12. Percent Time All Non-natural Sounds and Aircraft Sounds were Audible, Canyonlands National Park, Colorado River, Little Bridge Canyon, (CANY006), 11-08-2006 to 11-14-2006.

Table VIII-37. Percent Time Non-natural Sounds were Audible, Canyonlands National Park, Green River, Upheaval Bottom, (CANY007), 6-27-2006, 7-12-2006, 7-13-2006, and 7-24-2006 to 7-26-2006.

Hour of Day	6-27-06 % Time Audible Non-natural Sources	7-12-06 % Time Audible Non-natural Sources	7-13-06 % Time Audible Non-natural Sources	7-14-06 % Time Audible Non-natural Sources	7-24-06 % Time Audible Non-natural Sources	7-25-06 % Time Audible Non-natural Sources	7-26-06 % Time Audible Non-natural Sources	Average % Time Audible Non-Natural Sources
0:00	23.3	13.3	10.0	13.3	6.7	10.0	10.0	**12.4**
1:00	13.3	6.7	10.0	26.7	10.0	3.3	13.3	**11.9**
2:00	13.3	3.3	20.0	6.7	10.0	10.0	3.3	**9.5**
3:00	10.0	10.0	6.7	13.3	6.7	3.3	6.7	**8.1**
4:00	3.3	3.3	13.3	6.7	6.7	6.7	0.0	**5.7**
5:00	0.0	0.0	0.0	0.0	13.3	6.7	3.3	**3.3**
6:00	6.7	6.7	6.7	10.0	36.7	43.3	43.3	**21.9**
7:00	43.3	16.7	13.3	20.0	33.3	46.7	43.3	**31.0**
8:00	60.0	73.3	70.0	46.7	63.3	73.3	66.7	**64.8**
9:00	63.3	70.0	76.7	60.0	50.0	56.7	60.0	**62.4**
10:00	56.7	56.7	70.0	70.0	43.3	53.3	46.7	**56.7**
11:00	46.7	33.3	43.3	43.3	46.7	63.3	50.0	**46.7**
12:00	63.3	53.3	50.0	53.3	20.0	53.3	43.3	**48.1**
13:00	43.3	40.0	50.0	53.3	60.0	43.3	10.0	**42.9**
14:00	53.3	33.3	63.3	50.0	56.7	53.3	6.7	**45.2**
15:00	20.0	33.3	30.0	23.3	36.7	33.3	13.3	**27.1**
16:00	36.7	30.0	50.0	50.0	33.3	20.0	46.7	**38.1**
17:00	23.3	23.3	40.0	33.3	23.3	33.3	33.3	**30.0**
18:00	50.0	6.7	43.3	40.0	20.0	16.7	43.3	**31.4**
19:00	30.0	26.7	33.3	26.7	30.0	40.0	36.7	**31.9**
20:00	50.0	50.0	33.3	46.7	43.3	66.7	40.0	**47.1**
21:00	60.0	36.7	43.3	26.7	23.3	43.3	43.3	**39.5**
22:00	80.0	46.7	43.3	30.0	10.0	30.0	0.0	**34.3**
23:00	26.7	26.7	30.0	20.0	3.3	6.7	6.7	**17.1**

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Table VIII-38. Percent Time Aircraft Sounds were Audible, Canyonlands National Park, Green River, Upheaval Bottom, (CANY007), 6-27-2006, 7-12-2006, 7-13-2006, and 7-24-2006 to 7-26-2006.

Hour of Day	6-27-06 % Time Audible Aircraft	7-12-06 % Time Audible Aircraft	7-13-06 % Time Audible Aircraft	7-14-06 % Time Audible Aircraft	7-24-06 % Time Audible Aircraft	7-25-06 % Time Audible Aircraft	7-26-06 % Time Audible Aircraft	Average % Time Audible Aircraft
0:00	23.3	13.3	10.0	13.3	6.7	10.0	10.0	**12.4**
1:00	13.3	6.7	10.0	23.3	10.0	3.3	13.3	**11.4**
2:00	13.3	3.3	20.0	6.7	10.0	10.0	3.3	**9.5**
3:00	10.0	10.0	6.7	13.3	6.7	3.3	6.7	**8.1**
4:00	3.3	3.3	13.3	6.7	6.7	6.7	0.0	**5.7**
5:00	0.0	0.0	0.0	0.0	10.0	6.7	3.3	**2.9**
6:00	6.7	6.7	6.7	6.7	30.0	36.7	36.7	**18.6**
7:00	30.0	16.7	13.3	16.7	30.0	40.0	33.3	**25.7**
8:00	40.0	60.0	63.3	43.3	36.7	50.0	43.3	**48.1**
9:00	36.7	53.3	66.7	50.0	33.3	43.3	46.7	**47.1**
10:00	46.7	43.3	50.0	33.3	30.0	40.0	30.0	**39.0**
11:00	30.0	23.3	33.3	33.3	36.7	60.0	40.0	**36.7**
12:00	46.7	36.7	43.3	36.7	13.3	36.7	20.0	**33.3**
13:00	30.0	33.3	46.7	43.3	33.3	36.7	10.0	**33.3**
14:00	23.3	30.0	36.7	36.7	40.0	36.7	0.0	**29.0**
15:00	13.3	33.3	26.7	23.3	26.7	23.3	13.3	**22.9**
16:00	30.0	30.0	43.3	33.3	26.7	20.0	30.0	**30.5**
17:00	20.0	23.3	23.3	23.3	16.7	30.0	13.3	**21.4**
18:00	43.3	6.7	30.0	33.3	13.3	13.3	36.7	**25.2**
19:00	26.7	26.7	23.3	20.0	20.0	40.0	16.7	**24.8**
20:00	36.7	46.7	26.7	30.0	33.3	60.0	36.7	**38.6**
21:00	50.0	36.7	43.3	26.7	20.0	40.0	43.3	**37.1**
22:00	76.7	46.7	43.3	30.0	10.0	26.7	0.0	**33.3**
23:00	26.7	26.7	30.0	16.7	3.3	6.7	6.7	**16.7**

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Table VIII-39. Percent Time All Sounds were Audible, Canyonlands National Park, Green River, Upheaval Bottom, (CANY007), 6-27-2006, 7-12-2006, 7-13-2006, and 7-24-2006 to 7-26-2006.

Audible Sound Sources	6-27-06 % Time Audible	7-12-06 % Time Audible	7-13-06 % Time Audible	7-14-06 % Time Audible	7-24-06 % Time Audible	7-25-06 % Time Audible	7-26-06 % Time Audible	Average % Time Audible
No Sound Audible	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
Aircraft (unknown type)	0.1	0.3	0.3	0.3	0.3	0.0	0.0	**0.2**
Aircraft, Jet	24.9	20.4	24.4	21.1	19.4	25.0	17.9	**21.9**
Aircraft, Propeller	2.9	5.0	5.0	3.6	1.3	3.3	2.6	**3.4**
Aircraft, Helicopter	0.3	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
Vehicle	1.9	0.6	0.1	2.1	1.0	0.8	0.1	**1.0**
Watercraft	0.1	0.0	0.0	0.0	0.3	0.3	0.7	**0.2**
Motor Sounds	6.4	2.9	5.6	5.0	6.0	4.6	6.5	**5.3**
Grounds Care	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
People	0.1	0.0	0.3	0.0	1.0	0.0	0.1	**0.2**
Domestic Animal	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
Building Sounds	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
Construction	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
Non-natural Other	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
Non-natural Unknown	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
Wind	9.0	34.7	9.4	5.1	16.9	14.7	11.3	**14.5**
Water (rain, river, etc.)	18.8	10.7	18.9	12.8	4.3	4.0	4.7	**10.6**
Thunder	0.0	1.0	0.0	0.0	0.0	0.0	3.6	**0.7**
Mammal	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
Bird	72.1	65.7	66.1	62.2	37.6	44.2	36.4	**54.9**
Reptile	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
Amphibian	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
Insect	98.3	85.7	98.2	97.9	92.8	89.2	89.3	**93.1**
Animal (unknown type)	11.5	1.5	13.6	9.6	0.6	1.0	0.1	**5.4**
Natural Other	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
Natural Unknown	1.1	1.4	1.3	1.1	0.3	0.4	0.4	**0.9**
Unknown	1.5	0.1	0.7	0.6	0.1	0.4	1.4	**0.7**
Total Aircraft	**28.2**	**25.7**	**29.6**	**25.0**	**21.0**	**28.3**	**20.6**	**25.5**
Total Road Vehicles	**1.9**	**0.6**	**0.1**	**2.1**	**1.0**	**0.8**	**0.1**	**1.0**
Total Watercraft	**0.1**	**0.0**	**0.0**	**0.0**	**0.3**	**0.3**	**0.7**	**0.2**
Total Non-natural	**36.5**	**29.2**	**35.4**	**32.1**	**28.6**	**34.0**	**27.9**	**32.0**
Total Natural	**100.0**	**99.9**	**100.0**	**100.0**	**97.2**	**93.8**	**95.7**	**98.1**

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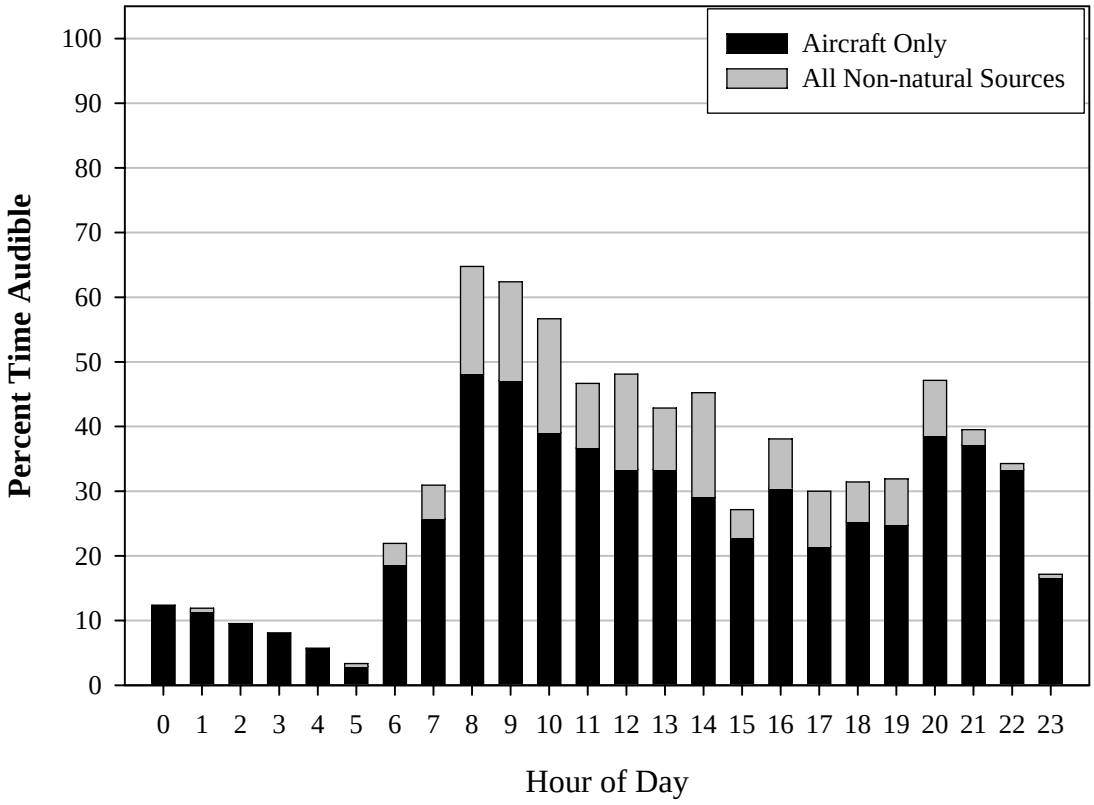


Figure VIII-13. Percent Time All Non-natural Sounds and Aircraft Sounds were Audible, Canyonlands National Park, Green River, Upheaval Bottom, (CANY007), 6-27-2006, 7-12-2006, 7-13-2006, and 7-24-2006 to 7-26-2006.

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Table VIII-40. Percent Time Non-natural Sounds were Audible, Canyonlands National Park, Green River, Upheaval Bottom, (CANY007), 11-02-2006, 11-03-2006, 11-13-2006, and 11-15-2006 to 11-18-2006.

Hour of Day	11-02-06 % Time Audible Non-natural Sources	11-03-06 % Time Audible Non-natural Sources	11-13-06 % Time Audible Non-natural Sources	11-15-06 % Time Audible Non-natural Sources	11-16-06 % Time Audible Non-natural Sources	11-17-06 % Time Audible Non-natural Sources	11-18-06 % Time Audible Non-natural Sources	Average % Time Audible Non-Natural Sources
0:00	0.0	13.3	10.0	0.0	10.0	10.0	13.3	**8.1**
1:00	3.3	13.3	13.3	20.0	36.7	13.3	23.3	**17.6**
2:00	3.3	10.0	13.3	16.7	36.7	10.0	36.7	**18.1**
3:00	10.0	13.3	3.3	6.7	10.0	6.7	6.7	**8.1**
4:00	0.0	0.0	3.3	0.0	0.0	0.0	0.0	**0.5**
5:00	0.0	10.0	0.0	3.3	10.0	10.0	13.3	**6.7**
6:00	6.7	23.3	10.0	10.0	13.3	0.0	0.0	**9.0**
7:00	50.0	26.7	10.0	23.3	30.0	26.7	20.0	**26.7**
8:00	83.3	53.3	46.7	73.3	83.3	46.7	53.3	**62.9**
9:00	90.0	60.0	40.0	66.7	76.7	63.3	76.7	**67.6**
10:00	100.0	63.3	66.7	83.3	83.3	56.7	63.3	**73.8**
11:00	76.7	46.7	56.7	33.3	70.0	63.3	73.3	**60.0**
12:00	83.3	73.3	53.3	40.0	73.3	66.7	66.7	**65.2**
13:00	56.7	30.0	40.0	40.0	73.3	53.3	60.0	**50.5**
14:00	56.7	73.3	40.0	56.7	63.3	70.0	56.7	**59.5**
15:00	63.3	50.0	30.0	73.3	60.0	73.3	70.0	**60.0**
16:00	60.0	83.3	56.7	70.0	73.3	60.0	76.7	**68.6**
17:00	50.0	70.0	60.0	60.0	70.0	56.7	53.3	**60.0**
18:00	80.0	66.7	50.0	56.7	53.3	46.7	56.7	**58.6**
19:00	70.0	40.0	50.0	46.7	60.0	53.3	80.0	**57.1**
20:00	63.3	70.0	46.7	50.0	50.0	36.7	46.7	**51.9**
21:00	73.3	63.3	33.3	43.3	40.0	30.0	36.7	**45.7**
22:00	93.3	83.3	66.7	46.7	40.0	53.3	43.3	**61.0**
23:00	73.3	46.7	23.3	23.3	13.3	16.7	23.3	**31.4**

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Table VIII-41. Percent Time Aircraft Sounds were Audible, Canyonlands National Park, Green River, Upheaval Bottom, (CANY007), 11-02-2006, 11-03-2006, 11-13-2006, and 11-15-2006 to 11-18-2006.

Hour of Day	11-02-06 % Time Audible Aircraft	11-03-06 % Time Audible Aircraft	11-13-06 % Time Audible Aircraft	11-15-06 % Time Audible Aircraft	11-16-06 % Time Audible Aircraft	11-17-06 % Time Audible Aircraft	11-18-06 % Time Audible Aircraft	Average % Time Audible Aircraft
0:00	0.0	13.3	6.7	0.0	10.0	10.0	13.3	**7.6**
1:00	3.3	10.0	10.0	20.0	36.7	13.3	16.7	**15.7**
2:00	3.3	10.0	13.3	16.7	36.7	10.0	33.3	**17.6**
3:00	10.0	13.3	3.3	6.7	10.0	6.7	6.7	**8.1**
4:00	0.0	0.0	3.3	0.0	0.0	0.0	0.0	**0.5**
5:00	0.0	10.0	0.0	3.3	10.0	6.7	10.0	**5.7**
6:00	6.7	20.0	6.7	0.0	13.3	0.0	0.0	**6.7**
7:00	43.3	23.3	10.0	23.3	26.7	23.3	20.0	**24.3**
8:00	60.0	50.0	43.3	53.3	60.0	46.7	43.3	**51.0**
9:00	30.0	50.0	40.0	53.3	56.7	53.3	70.0	**50.5**
10:00	43.3	40.0	56.7	56.7	76.7	40.0	53.3	**52.4**
11:00	43.3	46.7	46.7	26.7	70.0	50.0	70.0	**50.5**
12:00	43.3	53.3	36.7	23.3	70.0	46.7	53.3	**46.7**
13:00	23.3	20.0	33.3	40.0	30.0	40.0	50.0	**33.8**
14:00	20.0	60.0	33.3	36.7	40.0	56.7	46.7	**41.9**
15:00	33.3	50.0	23.3	46.7	46.7	60.0	50.0	**44.3**
16:00	43.3	70.0	43.3	53.3	53.3	46.7	50.0	**51.4**
17:00	43.3	60.0	43.3	43.3	36.7	53.3	30.0	**44.3**
18:00	63.3	53.3	50.0	40.0	36.7	43.3	53.3	**48.6**
19:00	46.7	36.7	36.7	33.3	46.7	40.0	76.7	**45.2**
20:00	56.7	56.7	33.3	40.0	36.7	30.0	36.7	**41.4**
21:00	73.3	60.0	30.0	43.3	33.3	20.0	30.0	**41.4**
22:00	93.3	70.0	56.7	36.7	40.0	40.0	40.0	**53.8**
23:00	73.3	46.7	23.3	23.3	13.3	16.7	23.3	**31.4**

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Table VIII-42. Percent Time All Sounds were Audible, Canyonlands National Park, Green River, Upheaval Bottom, (CANY007), 11-02-2006, 11-03-2006, 11-13-2006, and 11-15-2006 to 11-18-2006.

Audible Sound Sources	11-02-06 % Time Audible	11-03-06 % Time Audible	11-13-06 % Time Audible	11-15-06 % Time Audible	11-16-06 % Time Audible	11-17-06 % Time Audible	11-18-06 % Time Audible	Average % Time Audible
No Sound Audible	26.0	24.9	30.8	38.9	33.6	37.1	29.0	**31.5**
Aircraft (unknown type)	0.1	0.3	0.1	0.1	2.4	0.7	0.6	**0.6**
Aircraft, Jet	33.1	34.9	26.0	26.9	28.2	28.3	34.0	**30.2**
Aircraft, Propeller	2.6	3.5	2.5	3.2	3.3	2.4	2.2	**2.8**
Aircraft, Helicopter	0.0	0.0	0.0	0.1	3.5	0.0	0.0	**0.5**
Vehicle	9.0	0.8	0.6	1.3	1.4	0.0	0.6	**1.9**
Watercraft	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
Motor Sounds	9.0	6.0	5.3	8.1	9.0	7.2	6.7	**7.3**
Grounds Care	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
People	0.0	0.1	0.0	0.0	0.3	0.1	0.7	**0.2**
Domestic Animal	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
Building Sounds	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
Construction	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
Non-natural Other	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
Non-natural Unknown	0.3	0.1	0.0	0.0	0.1	0.0	0.1	**0.1**
Wind	2.8	0.0	23.3	13.6	6.7	0.6	0.0	**6.7**
Water (rain, river, etc.)	10.4	10.6	12.9	6.4	8.5	8.9	12.1	**10.0**
Thunder	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
Mammal	0.0	0.0	0.0	0.0	0.0	0.0	0.3	**0.0**
Bird	12.4	22.1	13.8	14.2	15.3	15.1	14.6	**15.3**
Reptile	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
Amphibian	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
Insect	18.2	16.5	2.4	2.2	3.2	7.8	10.6	**8.7**
Animal (unknown type)	9.6	14.9	2.6	3.9	1.5	7.6	9.9	**7.1**
Natural Other	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
Natural Unknown	4.6	2.1	2.9	2.6	4.7	3.6	5.0	**3.7**
Unknown	0.1	0.8	0.8	0.3	0.4	0.4	0.8	**0.5**
Total Aircraft	**35.7**	**38.5**	**28.5**	**30.0**	**37.1**	**31.4**	**36.5**	**33.9**
Total Road Vehicles	**9.0**	**0.8**	**0.6**	**1.3**	**1.4**	**0.0**	**0.6**	**1.9**
Total Watercraft	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**
Total Non-natural	**51.9**	**45.1**	**34.3**	**39.3**	**47.1**	**38.5**	**43.8**	**42.9**
Total Natural	**49.6**	**55.8**	**51.5**	**38.3**	**37.8**	**40.6**	**46.5**	**45.7**

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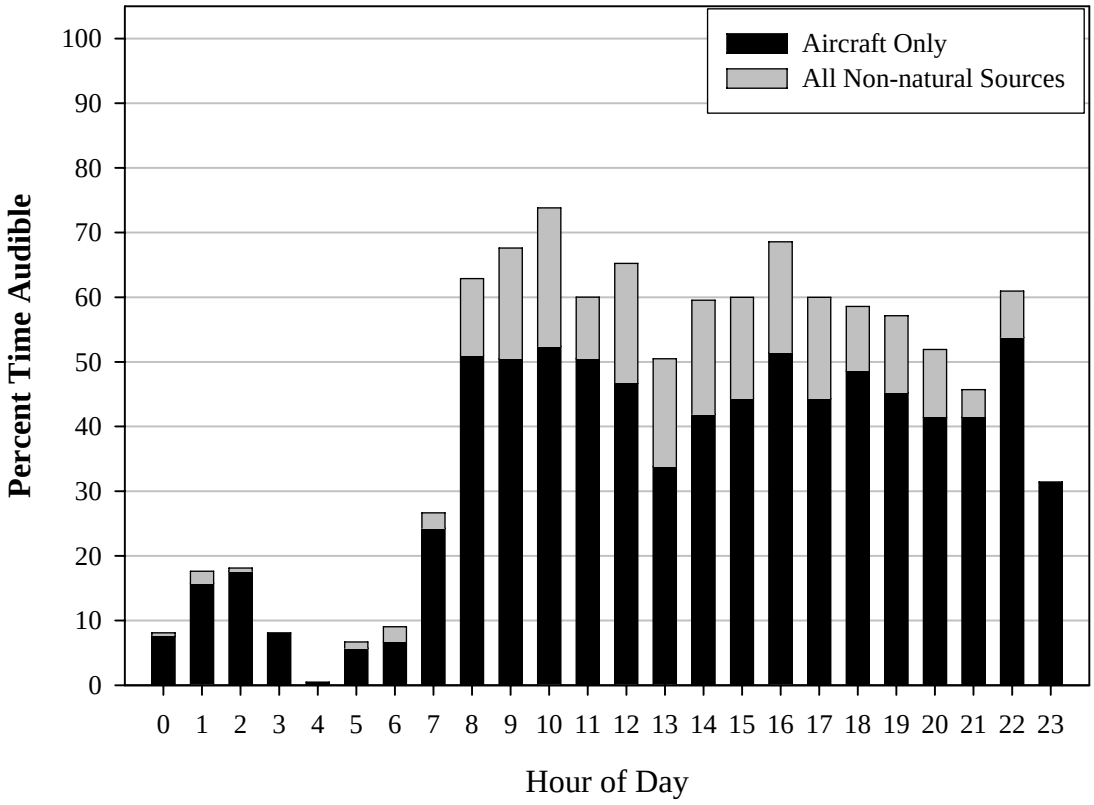


Figure VIII-14. Percent Time All Non-natural Sounds and Aircraft Sounds were Audible, Canyonlands National Park, Green River, Upheaval Bottom, (CANY007), 11-02-2006, 11-03-2006, 11-13-2006, and 11-15-2006 to 11-18-2006.

Table VIII-43. Percent Time Non-natural Sounds were Audible, Canyonlands National Park, Gray's Pasture, (CANY009), 7-24-2006 to 7-31-2006.

Hour of Day	7-24-06 % Time Audible Non-natural Sources	7-25-06 % Time Audible Non-natural Sources	7-26-06 % Time Audible Non-natural Sources	7-27-06 % Time Audible Non-natural Sources	7-28-06 % Time Audible Non-natural Sources	7-29-06 % Time Audible Non-natural Sources	7-31-06 % Time Audible Non-natural Sources	Average % Time Audible Non-Natural Sources
0:00	20.0	10.0	6.7	13.3	36.7	10.0	20.0	**16.7**
1:00	36.7	16.7	23.3	26.7	30.0	3.3	23.3	**22.9**
2:00	13.3	10.0	6.7	6.7	26.7	3.3	6.7	**10.5**
3:00	0.0	6.7	13.3	0.0	13.3	16.7	3.3	**7.6**
4:00	16.7	6.7	3.3	0.0	0.0	0.0	6.7	**4.8**
5:00	13.3	3.3	6.7	3.3	10.0	3.3	0.0	**5.7**
6:00	30.0	10.0	23.3	13.3	16.7	16.7	13.3	**17.6**
7:00	36.7	40.0	36.7	53.3	50.0	13.3	33.3	**37.6**
8:00	66.7	80.0	76.7	73.3	86.7	63.3	73.3	**74.3**
9:00	60.0	90.0	86.7	83.3	70.0	70.0	73.3	**76.2**
10:00	66.7	80.0	80.0	66.7	76.7	73.3	93.3	**76.7**
11:00	43.3	73.3	73.3	66.7	70.0	53.3	76.7	**65.2**
12:00	46.7	73.3	50.0	53.3	73.3	56.7	63.3	**59.5**
13:00	43.3	63.3	46.7	50.0	40.0	63.3	46.7	**50.5**
14:00	53.3	33.3	20.0	43.3	56.7	76.7	56.7	**48.6**
15:00	43.3	40.0	23.3	56.7	60.0	43.3	73.3	**48.6**
16:00	46.7	30.0	70.0	43.3	80.0	63.3	56.7	**55.7**
17:00	43.3	46.7	33.3	63.3	70.0	60.0	53.3	**52.9**
18:00	10.0	36.7	43.3	73.3	53.3	50.0	43.3	**44.3**
19:00	3.3	13.3	50.0	46.7	76.7	56.7	70.0	**45.2**
20:00	3.3	46.7	70.0	56.7	43.3	26.7	53.3	**42.9**
21:00	30.0	63.3	56.7	56.7	56.7	40.0	26.7	**47.1**
22:00	33.3	30.0	3.3	33.3	20.0	23.3	0.0	**20.5**
23:00	33.3	26.7	6.7	20.0	3.3	20.0	0.0	**15.7**

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Table VIII-44. Percent Time Aircraft Sounds were Audible, Canyonlands National Park, Gray's Pasture, (CANY009), 7-24-2006 to 7-31-2006.

Hour of Day	7-24-06 % Time Audible Aircraft	7-25-06 % Time Audible Aircraft	7-26-06 % Time Audible Aircraft	7-27-06 % Time Audible Aircraft	7-28-06 % Time Audible Aircraft	7-29-06 % Time Audible Aircraft	7-31-06 % Time Audible Aircraft	Average % Time Audible Aircraft
0:00	20.0	10.0	6.7	13.3	36.7	10.0	20.0	**16.7**
1:00	33.3	16.7	23.3	26.7	30.0	3.3	23.3	**22.4**
2:00	13.3	6.7	6.7	6.7	26.7	3.3	6.7	**10.0**
3:00	0.0	6.7	13.3	0.0	13.3	16.7	3.3	**7.6**
4:00	16.7	6.7	3.3	0.0	0.0	0.0	6.7	**4.8**
5:00	6.7	0.0	3.3	0.0	6.7	3.3	0.0	**2.9**
6:00	23.3	6.7	13.3	3.3	3.3	10.0	10.0	**10.0**
7:00	23.3	10.0	20.0	20.0	16.7	3.3	26.7	**17.1**
8:00	50.0	70.0	50.0	63.3	53.3	53.3	66.7	**58.1**
9:00	33.3	56.7	53.3	50.0	50.0	33.3	50.0	**46.7**
10:00	26.7	43.3	46.7	16.7	23.3	43.3	70.0	**38.6**
11:00	26.7	56.7	40.0	33.3	50.0	36.7	36.7	**40.0**
12:00	36.7	36.7	36.7	20.0	46.7	30.0	40.0	**35.2**
13:00	20.0	43.3	30.0	13.3	33.3	30.0	16.7	**26.7**
14:00	23.3	23.3	16.7	16.7	43.3	50.0	23.3	**28.1**
15:00	26.7	30.0	16.7	16.7	26.7	23.3	50.0	**27.1**
16:00	13.3	26.7	56.7	16.7	43.3	30.0	43.3	**32.9**
17:00	16.7	30.0	30.0	26.7	33.3	33.3	43.3	**30.5**
18:00	6.7	23.3	23.3	30.0	20.0	26.7	20.0	**21.4**
19:00	3.3	10.0	40.0	23.3	60.0	40.0	33.3	**30.0**
20:00	3.3	33.3	63.3	26.7	20.0	23.3	20.0	**27.1**
21:00	26.7	43.3	30.0	40.0	43.3	23.3	3.3	**30.0**
22:00	33.3	26.7	3.3	16.7	16.7	23.3	0.0	**17.1**
23:00	33.3	23.3	6.7	20.0	3.3	16.7	0.0	**14.8**

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Table VIII-45. Percent Time All Sounds were Audible, Canyonlands National Park, Gray's Pasture, (CANY009), 7-24-2006 to 7-31-2006.

Audible Sound Sources	7-24-06 % Time Audible	7-25-06 % Time Audible	7-26-06 % Time Audible	7-27-06 % Time Audible	7-28-06 % Time Audible	7-29-06 % Time Audible	7-31-06 % Time Audible	Average % Time Audible
No Sound Audible	6.3	0.3	0.4	0.0	1.1	0.0	0.0	**1.2**
Aircraft (unknown type)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
Aircraft, Jet	17.5	22.6	23.5	17.9	26.0	20.3	22.6	**21.5**
Aircraft, Propeller	4.0	4.2	2.9	2.9	3.2	3.3	2.9	**3.4**
Aircraft, Helicopter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
Vehicle	11.0	12.8	11.3	22.5	19.4	15.1	17.6	**15.7**
Watercraft	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
Motor Sounds	1.5	0.7	1.0	0.3	1.4	1.0	0.1	**0.9**
Grounds Care	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
People	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
Domestic Animal	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
Building Sounds	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
Construction	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
Non-natural Other	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
Non-natural Unknown	0.0	0.0	0.0	0.0	0.1	0.0	0.0	**0.0**
Wind	37.1	43.2	46.9	48.6	51.3	80.1	39.3	**49.5**
Water (rain, river, etc.)	3.9	3.3	0.0	0.0	0.0	1.3	7.1	**2.2**
Thunder	2.1	0.0	0.0	0.0	0.0	0.3	6.3	**1.2**
Mammal	0.0	0.1	0.0	0.0	0.0	0.6	3.2	**0.6**
Bird	37.5	46.1	44.9	46.9	47.8	45.1	58.6	**46.7**
Reptile	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
Amphibian	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
Insect	54.2	55.8	57.4	48.2	48.9	51.9	51.0	**52.5**
Animal (unknown type)	1.4	1.4	4.9	3.9	11.8	2.1	12.4	**5.4**
Natural Other	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
Natural Unknown	1.8	3.8	1.7	1.1	1.3	0.7	0.3	**1.5**
Unknown	0.4	0.0	0.0	0.0	0.3	0.0	0.0	**0.1**
Total Aircraft	**21.5**	**26.7**	**26.4**	**20.8**	**29.2**	**23.6**	**25.6**	**24.8**
Total Road Vehicles	**11.0**	**12.8**	**11.3**	**22.5**	**19.4**	**15.1**	**17.6**	**15.7**
Total Watercraft	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**
Total Non-natural	**33.1**	**38.8**	**37.9**	**41.8**	**46.7**	**37.8**	**40.3**	**39.5**
Total Natural	**91.7**	**97.2**	**97.2**	**96.5**	**94.4**	**98.9**	**99.6**	**96.5**

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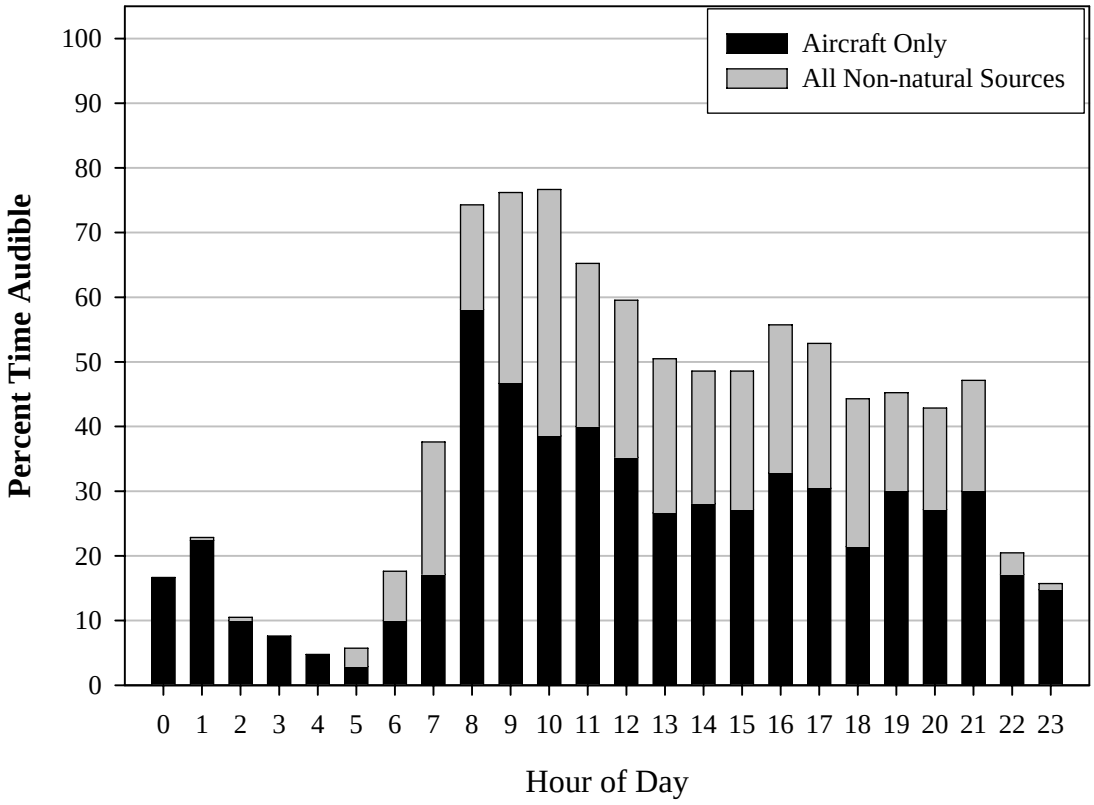


Figure VIII-15. Percent Time All Non-natural Sounds and Aircraft Sounds were Audible, Canyonlands National Park, Gray's Pasture, (CANY009), 7-24-2006 to 7-31-2006.

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Table VIII-46. Percent Time Non-natural Sounds were Audible, Canyonlands National Park, Gray's Pasture, (CANY009), 11-6-2006 to 11-08-2006, 11-10-2006, 12-25-2006, and 12-26-2006.

Hour of Day	11-06-06 % Time Audible Non-natural Sources	11-07-06 % Time Audible Non-natural Sources	11-08-06 % Time Audible Non-natural Sources	11-10-06 % Time Audible Non-natural Sources	11-11-06 % Time Audible Non-natural Sources	12-25-06 % Time Audible Non-natural Sources	12-26-06 % Time Audible Non-natural Sources	Average % Time Audible Non-Natural Sources
0:00	23.3	13.3	10.0	10.0	16.7	6.7	30.0	**15.7**
1:00	20.0	16.7	13.3	6.7	3.3	3.3	33.3	**13.8**
2:00	23.3	3.3	13.3	0.0	0.0	0.0	0.0	**5.7**
3:00	3.3	20.0	6.7	0.0	0.0	3.3	3.3	**5.2**
4:00	10.0	3.3	6.7	0.0	6.7	0.0	10.0	**5.2**
5:00	23.3	30.0	16.7	10.0	0.0	0.0	6.7	**12.4**
6:00	50.0	30.0	30.0	13.3	3.3	20.0	36.7	**26.2**
7:00	63.3	60.0	56.7	60.0	33.3	33.3	36.7	**49.0**
8:00	93.3	76.7	66.7	53.3	46.7	56.7	73.3	**66.7**
9:00	93.3	70.0	86.7	46.7	63.3	40.0	60.0	**65.7**
10:00	80.0	70.0	86.7	73.3	80.0	46.7	73.3	**72.9**
11:00	86.7	60.0	56.7	53.3	73.3	73.3	66.7	**67.1**
12:00	70.0	73.3	43.3	50.0	86.7	53.3	66.7	**63.3**
13:00	80.0	60.0	70.0	63.3	76.7	60.0	43.3	**64.8**
14:00	83.3	86.7	73.3	66.7	86.7	50.0	70.0	**73.8**
15:00	86.7	80.0	86.7	60.0	83.3	80.0	90.0	**81.0**
16:00	90.0	60.0	46.7	50.0	73.3	60.0	90.0	**67.1**
17:00	70.0	80.0	26.7	63.3	23.3	60.0	76.7	**57.1**
18:00	80.0	60.0	23.3	46.7	20.0	63.3	56.7	**50.0**
19:00	50.0	50.0	13.3	53.3	26.7	13.3	43.3	**35.7**
20:00	66.7	36.7	16.7	30.0	40.0	30.0	40.0	**37.1**
21:00	56.7	16.7	13.3	36.7	36.7	30.0	40.0	**32.9**
22:00	56.7	16.7	20.0	20.0	23.3	46.7	50.0	**33.3**
23:00	26.7	16.7	6.7	13.3	23.3	30.0	16.7	**19.0**

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Table VIII-47. Percent Time Aircraft Sounds were Audible, Canyonlands National Park, Gray's Pasture, (CANY009), 11-6-2006 to 11-08-2006, 11-10-2006, 12-25-2006, and 12-26-2006.

Hour of Day	11-06-06 % Time Audible Aircraft	11-07-06 % Time Audible Aircraft	11-08-06 % Time Audible Aircraft	11-10-06 % Time Audible Aircraft	11-11-06 % Time Audible Aircraft	12-25-06 % Time Audible Aircraft	12-26-06 % Time Audible Aircraft	Average % Time Audible Aircraft
0:00	16.7	13.3	10.0	10.0	13.3	6.7	30.0	**14.3**
1:00	20.0	16.7	3.3	6.7	0.0	3.3	33.3	**11.9**
2:00	16.7	3.3	13.3	0.0	0.0	0.0	0.0	**4.8**
3:00	3.3	6.7	6.7	0.0	0.0	3.3	3.3	**3.3**
4:00	0.0	0.0	3.3	0.0	6.7	0.0	0.0	**1.4**
5:00	0.0	13.3	6.7	0.0	0.0	0.0	3.3	**3.3**
6:00	6.7	0.0	6.7	3.3	3.3	0.0	10.0	**4.3**
7:00	26.7	36.7	16.7	20.0	13.3	10.0	13.3	**19.5**
8:00	56.7	36.7	36.7	43.3	3.3	36.7	50.0	**37.6**
9:00	53.3	36.7	33.3	36.7	30.0	16.7	40.0	**35.2**
10:00	40.0	36.7	20.0	50.0	46.7	30.0	43.3	**38.1**
11:00	50.0	20.0	26.7	26.7	20.0	40.0	40.0	**31.9**
12:00	46.7	46.7	23.3	33.3	26.7	33.3	46.7	**36.7**
13:00	56.7	16.7	33.3	26.7	16.7	6.7	36.7	**27.6**
14:00	53.3	33.3	40.0	23.3	26.7	23.3	40.0	**34.3**
15:00	50.0	30.0	23.3	20.0	23.3	43.3	40.0	**32.9**
16:00	30.0	36.7	20.0	23.3	23.3	23.3	40.0	**28.1**
17:00	26.7	40.0	10.0	36.7	13.3	23.3	56.7	**29.5**
18:00	46.7	36.7	20.0	40.0	20.0	40.0	46.7	**35.7**
19:00	40.0	43.3	13.3	46.7	26.7	13.3	40.0	**31.9**
20:00	56.7	30.0	16.7	26.7	40.0	30.0	36.7	**33.8**
21:00	53.3	16.7	13.3	33.3	33.3	30.0	40.0	**31.4**
22:00	53.3	13.3	16.7	20.0	20.0	33.3	50.0	**29.5**
23:00	26.7	6.7	6.7	13.3	23.3	30.0	16.7	**17.6**

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Table VIII-48. Percent Time All Sounds were Audible, Canyonlands National Park, Gray's Pasture, (CANY009), 11-6-2006 to 11-08-2006, 11-10-2006, 12-25-2006, and 12-26-2006.

Audible Sound Sources	11-06-06 % Time Audible	11-07-06 % Time Audible	11-08-06 % Time Audible	11-10-06 % Time Audible	11-11-06 % Time Audible	12-25-06 % Time Audible	12-26-06 % Time Audible	Average % Time Audible
No Sound Audible	25.3	22.2	10.8	13.5	13.1	16.3	19.2	**17.2**
Aircraft (unknown type)	0.7	0.8	0.3	0.0	0.4	0.0	0.1	**0.3**
Aircraft, Jet	28.5	20.1	13.6	19.0	15.8	19.2	27.5	**20.5**
Aircraft, Propeller	4.9	2.8	3.8	3.6	1.7	0.7	4.0	**3.1**
Aircraft, Helicopter	0.7	0.0	0.0	0.0	0.0	0.0	0.0	**0.1**
Vehicle	20.0	20.4	17.8	9.3	21.3	15.4	16.8	**17.3**
Watercraft	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
Motor Sounds	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
Grounds Care	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
People	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
Domestic Animal	0.0	0.0	0.0	0.1	0.0	0.0	0.0	**0.0**
Building Sounds	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
Construction	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
Non-natural Other	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
Non-natural Unknown	0.0	0.0	0.0	0.0	0.1	0.0	0.0	**0.0**
Wind	18.2	32.6	65.7	56.8	54.9	54.9	39.0	**46.0**
Water (rain, river, etc.)	0.0	0.0	0.0	0.0	12.5	0.0	0.0	**1.8**
Thunder	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
Mammal	0.8	0.3	0.0	4.0	2.4	0.4	0.0	**1.1**
Bird	2.6	10.4	12.8	2.9	5.6	10.1	13.5	**8.3**
Reptile	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
Amphibian	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
Insect	0.1	0.6	0.6	0.4	0.0	0.0	0.0	**0.2**
Animal (unknown type)	1.0	0.6	0.1	0.7	0.4	0.4	0.0	**0.5**
Natural Other	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
Natural Unknown	0.6	2.2	1.5	1.4	0.6	1.3	1.9	**1.3**
Unknown	1.5	2.4	1.0	0.3	1.0	0.8	1.5	**1.2**
Total Aircraft	**34.6**	**23.8**	**17.5**	**22.5**	**17.9**	**19.9**	**31.5**	**23.9**
Total Road Vehicles	**20.0**	**20.4**	**17.8**	**9.3**	**21.3**	**15.4**	**16.8**	**17.3**
Total Watercraft	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**
Total Non-natural	**57.8**	**45.4**	**37.1**	**36.7**	**38.6**	**35.8**	**46.4**	**42.5**
Total Natural	**22.6**	**43.3**	**73.5**	**62.4**	**67.1**	**59.7**	**49.2**	**54.0**

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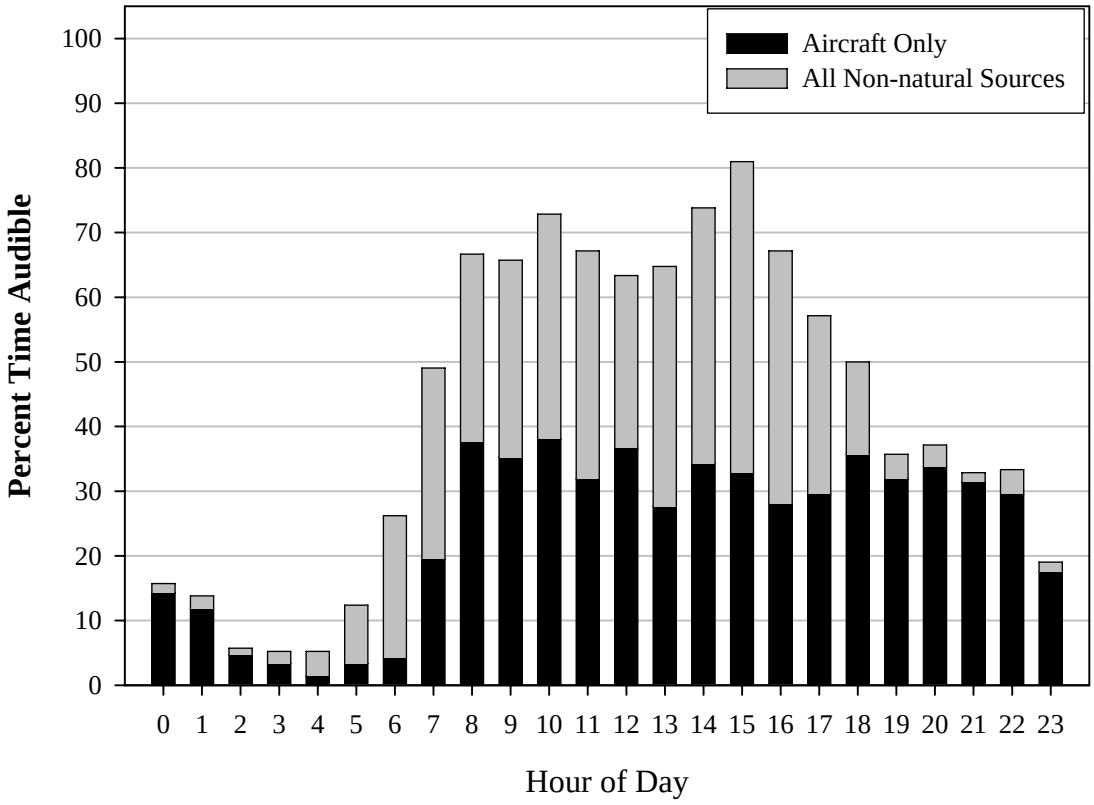


Figure VIII-16. Percent Time All Non-natural Sounds and Aircraft Sounds were Audible, Canyonlands National Park, Gray's Pasture, (CANY009), 11-6-2006 to 11-08-2006, 11-10-2006, 12-25-2006, and 12-26-2006.

Table VIII-49. Percent Time Non-natural Sounds were Audible, Hovenweep National Monument, Hackberry Unit, (HOVE001), 1-10-2006 to 1-16-2006.

Hour of Day	1-10-06 % Time Audible Non-natural Sources	1-11-06 % Time Audible Non-natural Sources	1-12-06 % Time Audible Non-natural Sources	1-13-06 % Time Audible Non-natural Sources	1-14-06 % Time Audible Non-natural Sources	1-15-06 % Time Audible Non-natural Sources	1-16-06 % Time Audible Non-natural Sources	Average % Time Audible Non-Natural Sources
0:00	20.0	16.7	20.0	46.7	10.0	20.0	0.0	**19.0**
1:00	20.0	13.3	43.3	23.3	10.0	3.3	3.3	**16.7**
2:00	6.7	3.3	0.0	13.3	3.3	3.3	10.0	**5.7**
3:00	0.0	0.0	6.7	6.7	3.3	3.3	6.7	**3.8**
4:00	3.3	10.0	0.0	3.3	0.0	0.0	10.0	**3.8**
5:00	3.3	56.7	23.3	6.7	0.0	13.3	10.0	**16.2**
6:00	13.3	16.7	16.7	30.0	6.7	16.7	6.7	**15.2**
7:00	30.0	6.7	10.0	10.0	13.3	6.7	0.0	**11.0**
8:00	16.7	46.7	3.3	20.0	20.0	16.7	26.7	**21.4**
9:00	30.0	16.7	16.7	40.0	26.7	16.7	26.7	**24.8**
10:00	23.3	50.0	3.3	23.3	70.0	36.7	33.3	**34.3**
11:00	53.3	16.7	23.3	33.3	26.7	10.0	36.7	**28.6**
12:00	33.3	26.7	16.7	36.7	40.0	20.0	46.7	**31.4**
13:00	16.7	40.0	20.0	46.7	46.7	36.7	36.7	**34.8**
14:00	16.7	40.0	20.0	36.7	30.0	33.3	43.3	**31.4**
15:00	20.0	26.7	13.3	40.0	23.3	26.7	16.7	**23.8**
16:00	23.3	26.7	13.3	26.7	16.7	30.0	30.0	**23.8**
17:00	13.3	20.0	16.7	30.0	16.7	33.3	36.7	**23.8**
18:00	20.0	13.3	30.0	16.7	23.3	20.0	20.0	**20.5**
19:00	23.3	20.0	30.0	33.3	20.0	33.3	30.0	**27.1**
20:00	23.3	10.0	20.0	16.7	6.7	20.0	33.3	**18.6**
21:00	10.0	40.0	10.0	3.3	20.0	20.0	23.3	**18.1**
22:00	10.0	13.3	16.7	0.0	10.0	50.0	16.7	**16.7**
23:00	3.3	3.3	56.7	3.3	3.3	10.0	6.7	**12.4**

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Table VIII-50. Percent Time Aircraft Sounds were Audible, Hovenweep National Monument, Hackberry Unit, (HOVE001), 1-10-2006 to 1-16-2006.

Hour of Day	1-10-06 % Time Audible Aircraft	1-11-06 % Time Audible Aircraft	1-12-06 % Time Audible Aircraft	1-13-06 % Time Audible Aircraft	1-14-06 % Time Audible Aircraft	1-15-06 % Time Audible Aircraft	1-16-06 % Time Audible Aircraft	Average % Time Audible Aircraft
0:00	16.7	3.3	10.0	10.0	10.0	20.0	0.0	**10.0**
1:00	20.0	3.3	23.3	3.3	10.0	3.3	3.3	**9.5**
2:00	6.7	3.3	0.0	6.7	3.3	3.3	0.0	**3.3**
3:00	0.0	0.0	6.7	0.0	0.0	3.3	0.0	**1.4**
4:00	3.3	0.0	0.0	0.0	0.0	0.0	0.0	**0.5**
5:00	3.3	3.3	20.0	3.3	0.0	0.0	0.0	**4.3**
6:00	0.0	16.7	10.0	13.3	0.0	3.3	0.0	**6.2**
7:00	0.0	3.3	6.7	6.7	13.3	6.7	0.0	**5.2**
8:00	6.7	10.0	3.3	13.3	10.0	6.7	16.7	**9.5**
9:00	26.7	16.7	13.3	40.0	16.7	6.7	20.0	**20.0**
10:00	23.3	43.3	3.3	23.3	66.7	36.7	33.3	**32.9**
11:00	30.0	13.3	16.7	23.3	26.7	10.0	30.0	**21.4**
12:00	6.7	26.7	10.0	26.7	40.0	20.0	40.0	**24.3**
13:00	3.3	26.7	13.3	30.0	36.7	26.7	26.7	**23.3**
14:00	13.3	36.7	20.0	23.3	20.0	33.3	36.7	**26.2**
15:00	16.7	26.7	13.3	33.3	23.3	20.0	16.7	**21.4**
16:00	23.3	26.7	13.3	26.7	13.3	30.0	26.7	**22.9**
17:00	13.3	16.7	6.7	30.0	16.7	33.3	36.7	**21.9**
18:00	20.0	10.0	30.0	16.7	20.0	16.7	20.0	**19.0**
19:00	23.3	16.7	30.0	33.3	16.7	33.3	26.7	**25.7**
20:00	20.0	10.0	16.7	16.7	6.7	20.0	30.0	**17.1**
21:00	10.0	23.3	3.3	3.3	20.0	20.0	23.3	**14.8**
22:00	10.0	10.0	13.3	0.0	10.0	50.0	16.7	**15.7**
23:00	0.0	3.3	13.3	3.3	3.3	10.0	0.0	**4.8**

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Table VIII-51. Percent Time All Sounds were Audible, Hovenweep National Monument, Hackberry Unit, (HOVE001), 1-10-2006 to 1-16-2006.

Audible Sound Sources	1-10-06 % Time Audible	1-11-06 % Time Audible	1-12-06 % Time Audible	1-13-06 % Time Audible	1-14-06 % Time Audible	1-15-06 % Time Audible	1-16-06 % Time Audible	Average % Time Audible
No Sound Audible	71.4	70.3	37.6	68.1	73.6	55.3	16.4	**56.1**
Aircraft (unknown type)	0.0	0.0	0.0	0.0	0.0	0.0	0.3	**0.0**
Aircraft, Jet	11.5	12.6	12.2	15.0	14.2	16.4	16.4	**14.0**
Aircraft, Propeller	0.8	1.9	0.1	1.1	2.1	0.8	0.1	**1.0**
Aircraft, Helicopter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
Vehicle	1.1	2.2	1.0	2.4	1.5	0.8	0.3	**1.3**
Watercraft	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
Motor Sounds	4.6	5.7	4.7	3.8	1.3	1.4	3.2	**3.5**
Grounds Care	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
People	0.0	0.0	0.0	0.0	0.0	0.0	0.4	**0.1**
Domestic Animal	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
Building Sounds	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
Construction	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
Non-natural Other	0.0	0.0	0.0	0.6	0.0	0.7	0.7	**0.3**
Non-natural Unknown	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
Wind	5.8	1.7	48.8	1.7	1.1	26.7	77.4	**23.3**
Water (rain, river, etc.)	0.0	0.0	0.0	0.0	0.0	0.6	0.0	**0.1**
Thunder	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
Mammal	0.0	0.0	0.0	0.0	0.0	0.3	0.6	**0.1**
Bird	8.2	8.3	5.3	10.6	7.1	7.2	4.7	**7.3**
Reptile	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
Amphibian	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
Insect	0.0	0.0	0.0	0.0	0.0	0.0	0.1	**0.0**
Animal (unknown type)	0.0	0.0	1.7	1.5	0.6	0.6	1.5	**0.8**
Natural Other	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
Natural Unknown	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
Unknown	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
Total Aircraft	**12.4**	**14.6**	**12.4**	**16.1**	**16.0**	**17.2**	**16.8**	**15.1**
Total Road Vehicles	**1.1**	**2.2**	**1.0**	**2.4**	**1.5**	**0.8**	**0.3**	**1.3**
Total Watercraft	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**
Total Non-natural	**18.1**	**22.2**	**17.9**	**22.8**	**18.6**	**20.0**	**21.3**	**20.1**
Total Natural	**13.8**	**10.0**	**50.3**	**13.5**	**8.5**	**31.1**	**77.9**	**29.3**

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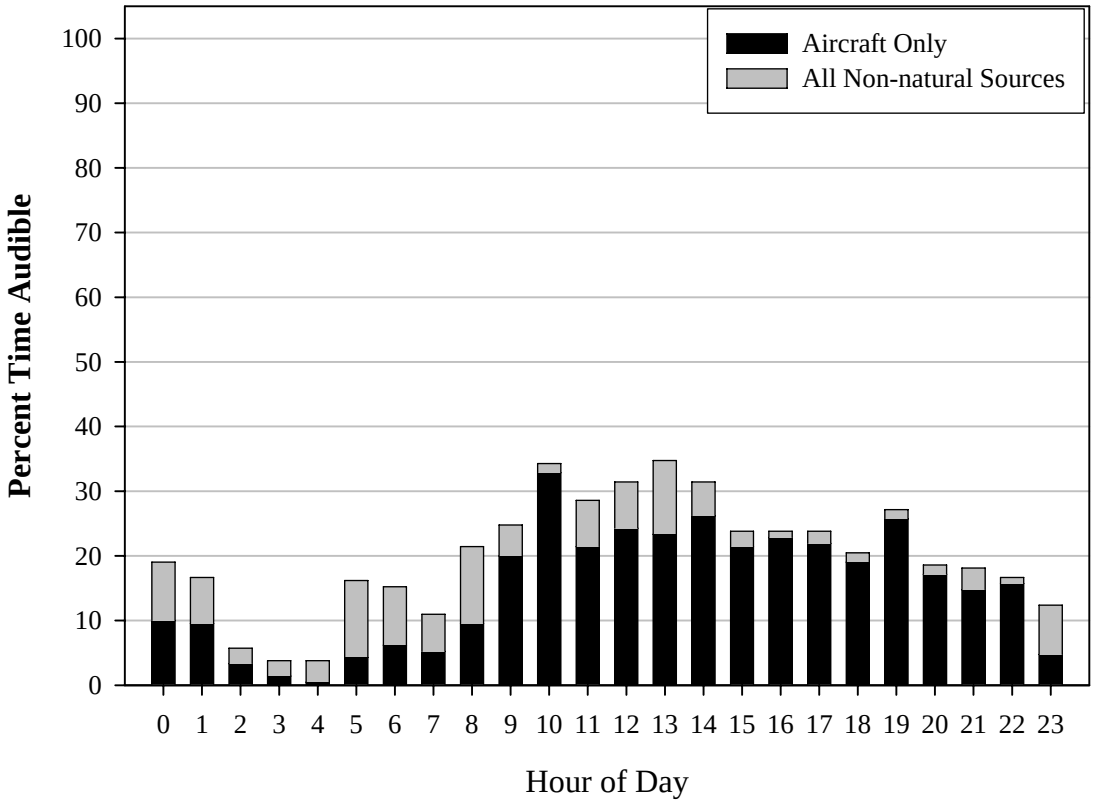


Figure VIII-17. Percent Time All Non-natural Sounds and Aircraft Sounds were Audible, Hovenweep National Monument, Hackberry Unit, (HOVE001), 1-10-2006 to 1-16-2006.

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Table VIII-52. Percent Time Non-natural Sounds were Audible, Hovenweep National Monument, Hackberry Unit, (HOVE001), 7-28-2006 to 8-03-2006.

Hour of Day	7-28-06 % Time Audible Non-natural Sources	7-29-06 % Time Audible Non-natural Sources	7-30-06 % Time Audible Non-natural Sources	7-31-06 % Time Audible Non-natural Sources	8-01-06 % Time Audible Non-natural Sources	8-02-06 % Time Audible Non-natural Sources	8-03-06 % Time Audible Non-natural Sources	Average % Time Audible Non-Natural Sources
0:00	6.7	23.3	30.0	23.3	53.3	50.0	70.0	**36.7**
1:00	10.0	36.7	40.0	30.0	76.7	46.7	80.0	**45.7**
2:00	30.0	16.7	23.3	30.0	16.7	63.3	83.3	**37.6**
3:00	20.0	0.0	6.7	6.7	66.7	6.7	66.7	**24.8**
4:00	13.3	16.7	3.3	16.7	23.3	46.7	33.3	**21.9**
5:00	16.7	0.0	20.0	13.3	30.0	23.3	20.0	**17.6**
6:00	33.3	0.0	40.0	40.0	43.3	43.3	33.3	**33.3**
7:00	33.3	13.3	60.0	83.3	46.7	33.3	13.3	**40.5**
8:00	46.7	40.0	50.0	96.7	76.7	53.3	76.7	**62.9**
9:00	63.3	100.0	80.0	90.0	83.3	76.7	63.3	**79.5**
10:00	60.0	86.7	53.3	70.0	70.0	80.0	53.3	**67.6**
11:00	66.7	76.7	76.7	56.7	70.0	80.0	36.7	**66.2**
12:00	53.3	63.3	43.3	46.7	50.0	56.7	60.0	**53.3**
13:00	36.7	56.7	40.0	56.7	53.3	23.3	43.3	**44.3**
14:00	46.7	46.7	63.3	56.7	76.7	36.7	40.0	**52.4**
15:00	23.3	43.3	60.0	16.7	83.3	36.7	40.0	**43.3**
16:00	23.3	20.0	63.3	33.3	50.0	43.3	56.7	**41.4**
17:00	46.7	56.7	30.0	36.7	73.3	36.7	56.7	**48.1**
18:00	30.0	10.0	20.0	43.3	50.0	56.7	23.3	**33.3**
19:00	26.7	50.0	40.0	40.0	60.0	63.3	26.7	**43.8**
20:00	16.7	30.0	3.3	16.7	53.3	53.3	53.3	**32.4**
21:00	36.7	43.3	0.0	26.7	30.0	60.0	43.3	**34.3**
22:00	16.7	53.3	13.3	40.0	40.0	63.3	36.7	**37.6**
23:00	20.0	66.7	20.0	13.3	20.0	36.7	16.7	**27.6**

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Table VIII-53. Percent Time Aircraft Sounds were Audible, Hovenweep National Monument, Hackberry Unit, (HOVE001), 7-28-2006 to 8-03-2006.

Hour of Day	7-28-06 % Time Audible Aircraft	7-29-06 % Time Audible Aircraft	7-30-06 % Time Audible Aircraft	7-31-06 % Time Audible Aircraft	8-01-06 % Time Audible Aircraft	8-02-06 % Time Audible Aircraft	8-03-06 % Time Audible Aircraft	Average % Time Audible Aircraft
0:00	6.7	23.3	3.3	23.3	53.3	40.0	33.3	**26.2**
1:00	10.0	36.7	40.0	13.3	50.0	43.3	16.7	**30.0**
2:00	23.3	16.7	23.3	26.7	10.0	26.7	36.7	**23.3**
3:00	20.0	0.0	6.7	6.7	0.0	3.3	30.0	**9.5**
4:00	13.3	13.3	0.0	13.3	10.0	23.3	13.3	**12.4**
5:00	13.3	0.0	0.0	3.3	6.7	0.0	16.7	**5.7**
6:00	20.0	0.0	10.0	6.7	6.7	6.7	13.3	**9.0**
7:00	10.0	10.0	26.7	20.0	26.7	16.7	6.7	**16.7**
8:00	30.0	26.7	46.7	40.0	43.3	46.7	50.0	**40.5**
9:00	46.7	83.3	80.0	63.3	76.7	66.7	30.0	**63.8**
10:00	60.0	86.7	53.3	66.7	70.0	50.0	50.0	**62.4**
11:00	56.7	76.7	66.7	53.3	70.0	63.3	36.7	**60.5**
12:00	40.0	63.3	43.3	46.7	30.0	46.7	60.0	**47.1**
13:00	33.3	56.7	40.0	50.0	43.3	20.0	30.0	**39.0**
14:00	40.0	36.7	63.3	43.3	63.3	36.7	33.3	**45.2**
15:00	16.7	40.0	60.0	16.7	83.3	33.3	40.0	**41.4**
16:00	23.3	20.0	63.3	23.3	43.3	40.0	56.7	**38.6**
17:00	46.7	56.7	30.0	36.7	73.3	30.0	56.7	**47.1**
18:00	20.0	10.0	16.7	43.3	50.0	53.3	16.7	**30.0**
19:00	20.0	50.0	40.0	40.0	56.7	50.0	23.3	**40.0**
20:00	16.7	30.0	3.3	16.7	46.7	50.0	46.7	**30.0**
21:00	36.7	43.3	0.0	26.7	20.0	60.0	40.0	**32.4**
22:00	16.7	50.0	13.3	36.7	40.0	63.3	33.3	**36.2**
23:00	16.7	16.7	20.0	13.3	16.7	33.3	16.7	**19.0**

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Table VIII-54. Percent Time All Sounds were Audible, Hovenweep National Monument, Hackberry Unit, (HOVE001), 7-28-2006 to 8-03-2006.

Audible Sound Sources	7-28-06 % Time Audible	7-29-06 % Time Audible	7-30-06 % Time Audible	7-31-06 % Time Audible	8-01-06 % Time Audible	8-02-06 % Time Audible	8-03-06 % Time Audible	Average % Time Audible
No Sound Audible	1.7	2.1	1.1	1.0	0.1	1.7	1.9	**1.4**
Aircraft (unknown type)	0.0	0.0	0.0	0.4	0.0	0.0	0.0	**0.1**
Aircraft, Jet	21.4	28.8	25.7	26.5	38.3	33.5	30.0	**29.2**
Aircraft, Propeller	5.1	7.1	6.1	4.2	3.1	5.0	2.9	**4.8**
Aircraft, Helicopter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
Vehicle	6.1	1.9	0.7	7.2	9.7	13.6	6.7	**6.6**
Watercraft	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
Motor Sounds	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
Grounds Care	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
People	0.3	0.1	1.1	0.1	0.4	0.4	0.0	**0.4**
Domestic Animal	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
Building Sounds	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
Construction	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
Non-natural Other	0.0	2.5	4.4	6.0	4.4	0.0	8.9	**3.8**
Non-natural Unknown	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
Wind	64.4	49.2	50.0	42.5	61.4	33.1	48.2	**49.8**
Water (rain, river, etc.)	2.5	1.1	3.5	3.3	0.0	0.7	2.6	**2.0**
Thunder	0.8	0.3	3.9	1.7	0.0	0.0	0.0	**1.0**
Mammal	1.7	1.4	1.0	0.8	1.8	1.7	1.0	**1.3**
Bird	47.2	46.0	46.9	57.2	51.7	37.5	46.8	**47.6**
Reptile	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
Amphibian	0.8	3.3	2.1	3.1	4.0	4.0	4.0	**3.1**
Insect	40.1	53.9	53.3	52.5	47.8	53.2	56.1	**51.0**
Animal (unknown type)	3.2	2.5	1.5	2.8	4.3	2.2	1.8	**2.6**
Natural Other	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
Natural Unknown	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
Unknown	2.2	3.6	1.3	0.1	11.4	8.1	2.6	**4.2**
Total Aircraft	**26.5**	**35.3**	**31.3**	**30.4**	**41.3**	**37.6**	**32.8**	**33.6**
Total Road Vehicles	**6.1**	**1.9**	**0.7**	**7.2**	**9.7**	**13.6**	**6.7**	**6.6**
Total Watercraft	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**
Total Non-natural	**32.4**	**39.6**	**36.7**	**41.0**	**54.0**	**48.8**	**46.9**	**42.8**
Total Natural	**96.7**	**95.7**	**96.4**	**95.0**	**98.1**	**92.4**	**96.1**	**95.8**

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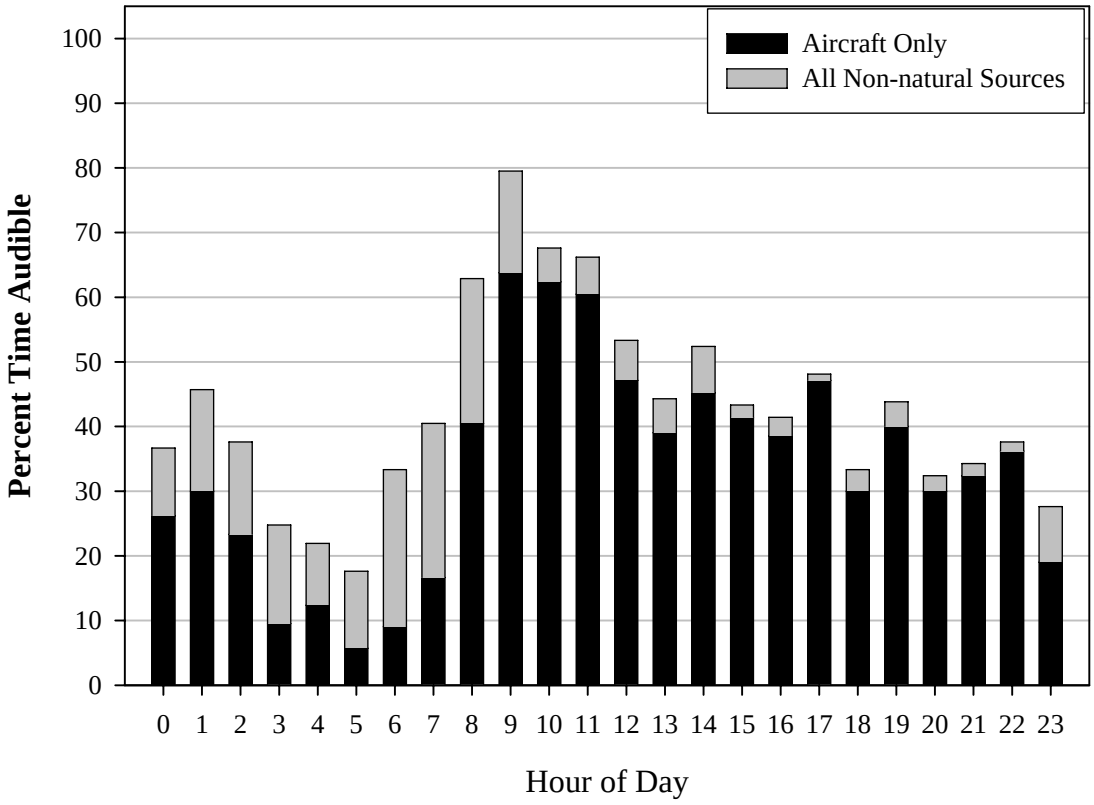


Figure VIII-18. Percent Time All Non-natural Sounds and Aircraft Sounds were Audible, Hovenweep National Monument, Hackberry Unit, (HOVE001), 7-28-2006 to 8-03-2006.

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Table VIII-55. Percent Time Non-natural Sounds were Audible, Hovenweep National Monument, Visitor Center, (HOVE002), 2-02-2006 to 2-03-2006.

Hour of Day	2-2-06 % Time Audible Non-natural Sources	2-3-06 % Time Audible Non-natural Sources	Average % Time Audible Non-Natural Sources
0:00	100.0	100.0	**100.0**
1:00	100.0	96.7	**98.3**
2:00	100.0	100.0	**100.0**
3:00	100.0	100.0	**100.0**
4:00	100.0	100.0	**100.0**
5:00	100.0	100.0	**100.0**
6:00	100.0	100.0	**100.0**
7:00	100.0	100.0	**100.0**
8:00	100.0	100.0	**100.0**
9:00	100.0	100.0	**100.0**
10:00	100.0	100.0	**100.0**
11:00	100.0	100.0	**100.0**
12:00	100.0	100.0	**100.0**
13:00	96.7	93.3	**95.0**
14:00	80.0	86.7	**83.3**
15:00	30.0	96.7	**63.3**
16:00	66.7	100.0	**83.3**
17:00	83.3	100.0	**91.7**
18:00	100.0	100.0	**100.0**
19:00	100.0	100.0	**100.0**
20:00	100.0	100.0	**100.0**
21:00	100.0	100.0	**100.0**
22:00	100.0	100.0	**100.0**
23:00	100.0	100.0	**100.0**

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Table VIII-56. Percent Time Aircraft Sounds were Audible, Hovenweep National Monument, Visitor Center, (HOVE002), 2-02-2006 to 2-03-2006.

Hour of Day	2-2-06 % Time Audible Aircraft	2-3-06 % Time Audible Aircraft	Average % Time Audible Aircraft
0:00	0.0	10.0	**5.0**
1:00	16.7	16.7	**16.7**
2:00	10.0	0.0	**5.0**
3:00	3.3	0.0	**1.7**
4:00	0.0	3.3	**1.7**
5:00	0.0	3.3	**1.7**
6:00	20.0	3.3	**11.7**
7:00	13.3	10.0	**11.7**
8:00	26.7	36.7	**31.7**
9:00	33.3	40.0	**36.7**
10:00	30.0	36.7	**33.3**
11:00	23.3	66.7	**45.0**
12:00	23.3	33.3	**28.3**
13:00	26.7	33.3	**30.0**
14:00	20.0	30.0	**25.0**
15:00	0.0	26.7	**13.3**
16:00	16.7	36.7	**26.7**
17:00	10.0	16.7	**13.3**
18:00	23.3	53.3	**38.3**
19:00	33.3	23.3	**28.3**
20:00	43.3	20.0	**31.7**
21:00	23.3	30.0	**26.7**
22:00	16.7	16.7	**16.7**
23:00	3.3	23.3	**13.3**

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Table VIII-57. Percent Time All Sounds were Audible, Hovenweep National Monument, Visitor Center, (HOVE002), 2-02-2006 to 2-03-2006.

Audible Sound Sources	2-2-06 % Time Audible	2-3-06 % Time Audible	Average % Time Audible
No Sound Audible	0.0	0.0	**0.0**
Aircraft (unknown type)	0.1	0.1	**0.1**
Aircraft, Jet	15.4	21.9	**18.7**
Aircraft, Propeller	1.8	1.7	**1.7**
Aircraft, Helicopter	0.0	0.0	**0.0**
Vehicle	17.9	13.6	**15.8**
Watercraft	0.0	0.0	**0.0**
Motor Sounds[1]	69.0	63.5	**66.3**
Grounds Care	0.0	0.0	**0.0**
People	1.3	2.6	**1.9**
Domestic Animal	7.9	1.8	**4.9**
Building Sounds	41.5	62.2	**51.9**
Construction	0.0	0.0	**0.0**
Non-natural Other[2]	4.4	0.1	**2.3**
Non-natural Unknown	1.8	4.6	**3.2**
Wind	31.7	46.8	**39.2**
Water (rain, river, etc.)	7.5	0.0	**3.8**
Thunder	0.0	0.0	**0.0**
Mammal	1.9	2.4	**2.2**
Bird	15.8	16.7	**16.3**
Reptile	0.0	0.0	**0.0**
Amphibian	0.0	0.0	**0.0**
Insect	1.5	1.4	**1.5**
Animal (unknown type)	3.6	3.9	**3.8**
Natural Other	0.0	0.0	**0.0**
Natural Unknown	0.1	0.0	**0.1**
Unknown	0.1	0.0	**0.1**
Total Aircraft	**17.4**	**23.8**	**20.6**
Total Road Vehicles	**17.9**	**13.6**	**15.8**
Total Watercraft	**0.0**	**0.0**	**0.0**
Total Non-natural	**94.0**	**98.9**	**96.5**
Total Natural	**48.8**	**63.2**	**56.0**

[1] Oil well pump
[2] Flag pole related sounds

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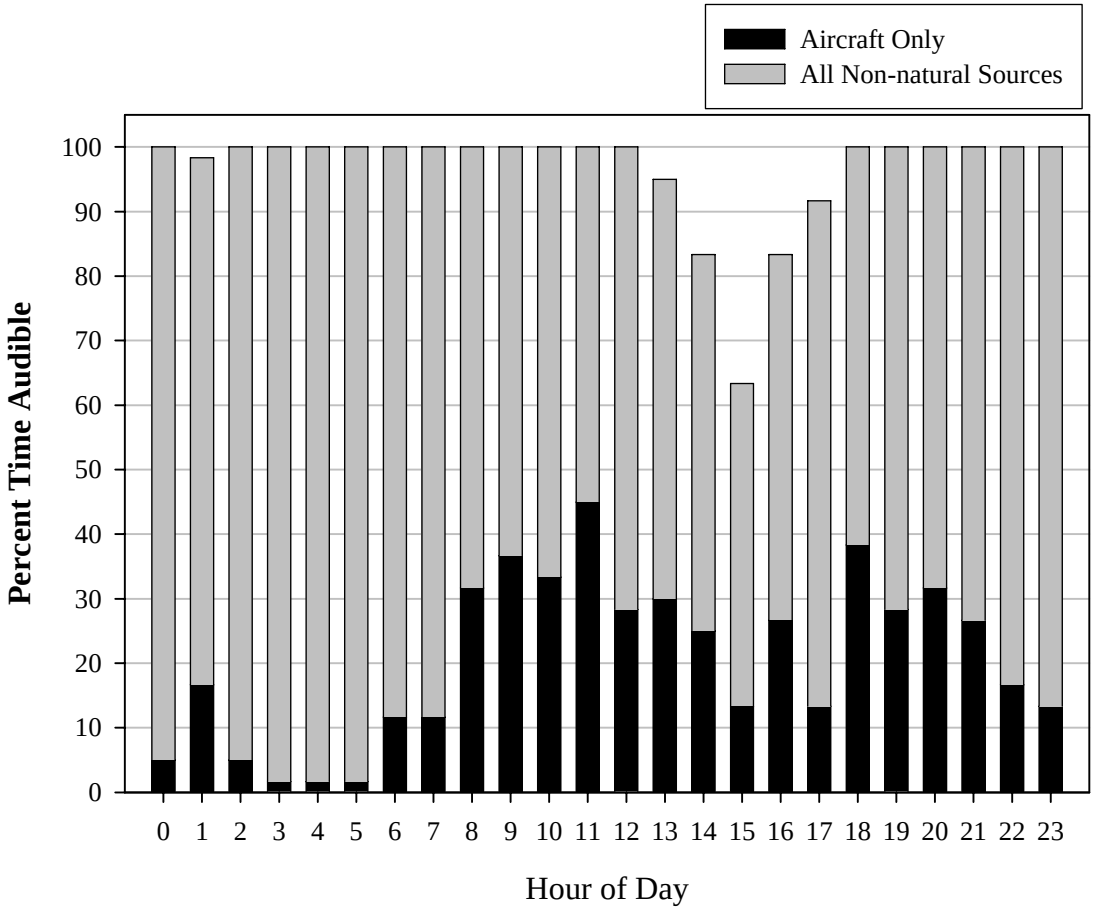


Figure VIII-19. Percent Time All Non-natural Sounds and Aircraft Sounds were Audible, Hovenweep National Monument, Visitor Center, (HOVE002), 2-02-2006 to 2-03-2006.

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Table VIII-58. Percent Time Non-natural Sounds were Audible, Hovenweep National Monument, Visitor Center, (HOVE002), 8-12-2006 to 8-13-2006.

Hour of Day	8-12-06 % Time Audible Non-natural Sources	8-13-06 % Time Audible Non-natural Sources	Average % Time Audible Non-Natural Sources
0:00	83.3	93.3	**88.3**
1:00	96.7	83.3	**90.0**
2:00	100.0	93.3	**96.7**
3:00	100.0	100.0	**100.0**
4:00	46.7	100.0	**73.3**
5:00	73.3	100.0	**86.7**
6:00	80.0	100.0	**90.0**
7:00	76.7	96.7	**86.7**
8:00	80.0	93.3	**86.7**
9:00	86.7	96.7	**91.7**
10:00	100.0	100.0	**100.0**
11:00	100.0	96.7	**98.3**
12:00	86.7	100.0	**93.3**
13:00	93.3	93.3	**93.3**
14:00	100.0	93.3	**96.7**
15:00	93.3	93.3	**93.3**
16:00	90.0	93.3	**91.7**
17:00	100.0	86.7	**93.3**
18:00	86.7	100.0	**93.3**
19:00	93.3	90.0	**91.7**
20:00	83.3	96.7	**90.0**
21:00	96.7	83.3	**90.0**
22:00	93.3	93.3	**93.3**
23:00	100.0	100.0	**100.0**

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Table VIII-59. Percent Time Aircraft Sounds were Audible, Hovenweep National Monument, Visitor Center, (HOVE002), 8-12-2006 to 8-13-2006.

Hour of Day	08-12-06 % Time Audible Aircraft	8-13-06 % Time Audible Aircraft	Average % Time Audible Aircraft
0:00	3.3	23.3	**13.3**
1:00	13.3	10.0	**11.7**
2:00	36.7	13.3	**25.0**
3:00	6.7	6.7	**6.7**
4:00	20.0	0.0	**10.0**
5:00	36.7	0.0	**18.3**
6:00	0.0	0.0	**0.0**
7:00	0.0	0.0	**0.0**
8:00	26.7	23.3	**25.0**
9:00	26.7	23.3	**25.0**
10:00	36.7	50.0	**43.3**
11:00	13.3	23.3	**18.3**
12:00	16.7	23.3	**20.0**
13:00	6.7	13.3	**10.0**
14:00	6.7	6.7	**6.7**
15:00	23.3	23.3	**23.3**
16:00	13.3	20.0	**16.7**
17:00	13.3	6.7	**10.0**
18:00	23.3	43.3	**33.3**
19:00	16.7	53.3	**35.0**
20:00	6.7	36.7	**21.7**
21:00	13.3	16.7	**15.0**
22:00	30.0	53.3	**41.7**
23:00	6.7	20.0	**13.3**

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Table VIII-60. Percent Time All Sounds were Audible, Hovenweep National Monument, Visitor Center, (HOVE002), 8-12-2006 to 8-13-2006.

Audible Sound Sources	8-12-06 % Time Audible	8-13-06 % Time Audible	Average % Time Audible
No Sound Audible	1.3	0.3	**0.8**
Aircraft (unknown type)	0.0	0.0	**0.0**
Aircraft, Jet	16.1	18.5	**17.3**
Aircraft, Propeller	0.6	1.9	**1.3**
Aircraft, Helicopter	0.0	0.0	**0.0**
Vehicle	9.4	16.7	**13.1**
Watercraft	0.0	0.0	**0.0**
Motor Sounds[1]	6.1	3.3	**4.7**
Grounds Care	0.0	0.0	**0.0**
People	20.0	13.1	**16.5**
Domestic Animal	0.0	1.3	**0.6**
Building Sounds	66.5	71.0	**68.8**
Construction	0.0	0.0	**0.0**
Non-natural Other[2]	2.1	0.1	**1.1**
Non-natural Unknown	0.0	0.7	**0.3**
Wind	34.9	18.1	**26.5**
Water (rain, river, etc.)	6.4	0.0	**3.2**
Thunder	0.0	0.0	**0.0**
Mammal	1.4	3.1	**2.2**
Bird	15.6	9.7	**12.6**
Reptile	0.0	0.0	**0.0**
Amphibian	6.8	1.8	**4.3**
Insect	48.3	50.8	**49.6**
Animal (unknown type)	0.7	2.8	**1.7**
Natural Other	0.0	0.0	**0.0**
Natural Unknown	0.0	1.5	**0.8**
Unknown	0.0	0.3	**0.1**
Total Aircraft	**16.5**	**20.4**	**18.5**
Total Road Vehicles	**9.4**	**16.7**	**13.1**
Total Watercraft	**0.0**	**0.0**	**0.0**
Total Non-natural	**89.2**	**94.9**	**92.0**
Total Natural	**82.1**	**70.8**	**76.5**

[1] Oil well pump
[2] Flag pole related sounds

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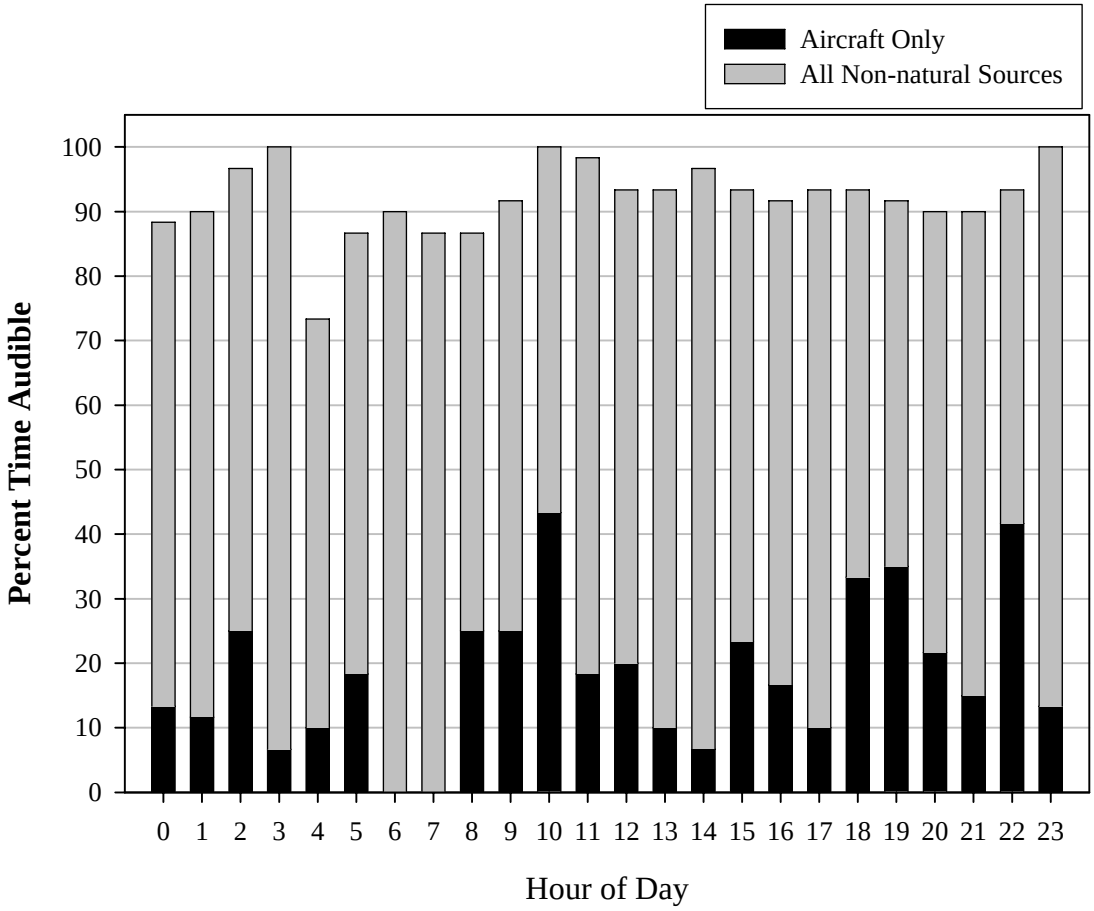


Figure VIII-20. Percent Time All Non-natural Sounds and Aircraft Sounds were Audible, Hovenweep National Monument, Visitor Center, (HOVE002), 8-12-2006 to 8-13-2006.

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Table VIII-61. Percent Time Non-natural Sounds were Audible, Natural Bridges National Monument, Owachomo Bridge, (NABR001), 7-27-2006 to 8-02-2006.

Hour of Day	7-27-06 % Time Audible Non-natural Sources	7-28-06 % Time Audible Non-natural Sources	7-29-06 % Time Audible Non-natural Sources	7-30-06 % Time Audible Non-natural Sources	7-31-06 % Time Audible Non-natural Sources	8-01-06 % Time Audible Non-natural Sources	8-02-06 % Time Audible Non-natural Sources	Average % Time Audible Non-Natural Sources
0:00	20.0	26.7	50.0	66.7	40.0	30.0	26.7	**37.1**
1:00	50.0	53.3	26.7	80.0	76.7	46.7	50.0	**54.8**
2:00	26.7	33.3	20.0	20.0	36.7	20.0	26.7	**26.2**
3:00	10.0	10.0	50.0	33.3	0.0	6.7	10.0	**17.1**
4:00	16.7	36.7	26.7	10.0	10.0	20.0	16.7	**19.5**
5:00	13.3	40.0	30.0	10.0	33.3	13.3	20.0	**22.9**
6:00	36.7	40.0	70.0	16.7	46.7	46.7	13.3	**38.6**
7:00	36.7	46.7	73.3	30.0	56.7	80.0	43.3	**52.4**
8:00	60.0	70.0	53.3	80.0	76.7	70.0	63.3	**67.6**
9:00	40.0	53.3	73.3	90.0	90.0	60.0	80.0	**69.5**
10:00	46.7	66.7	53.3	93.3	90.0	60.0	90.0	**71.4**
11:00	53.3	76.7	70.0	90.0	83.3	56.7	76.7	**72.4**
12:00	43.3	73.3	76.7	93.3	63.3	73.3	66.7	**70.0**
13:00	60.0	66.7	60.0	63.3	83.3	63.3	53.3	**64.3**
14:00	43.3	63.3	63.3	56.7	80.0	56.7	56.7	**60.0**
15:00	26.7	76.7	76.7	33.3	56.7	56.7	60.0	**55.2**
16:00	46.7	76.7	60.0	86.7	66.7	33.3	60.0	**61.4**
17:00	56.7	43.3	80.0	90.0	56.7	66.7	100.0	**70.5**
18:00	56.7	66.7	50.0	66.7	66.7	40.0	80.0	**61.0**
19:00	73.3	33.3	26.7	76.7	63.3	60.0	70.0	**57.6**
20:00	66.7	76.7	70.0	70.0	30.0	50.0	33.3	**56.7**
21:00	56.7	60.0	56.7	66.7	33.3	50.0	46.7	**52.9**
22:00	63.3	53.3	33.3	50.0	76.7	66.7	46.7	**55.7**
23:00	33.3	16.7	43.3	23.3	30.0	36.7	20.0	**29.0**

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Table VIII-62. Percent Time Aircraft Sounds were Audible, Natural Bridges National Monument, Owachomo Bridge, (NABR001), 7-27-2006 to 8-02-2006.

Hour of Day	7-27-06 % Time Audible Aircraft	7-28-06 % Time Audible Aircraft	7-29-06 % Time Audible Aircraft	7-30-06 % Time Audible Aircraft	7-31-06 % Time Audible Aircraft	8-01-06 % Time Audible Aircraft	8-02-06 % Time Audible Aircraft	Average % Time Audible Aircraft
0:00	16.7	20.0	50.0	66.7	33.3	20.0	20.0	**32.4**
1:00	40.0	53.3	20.0	80.0	76.7	46.7	46.7	**51.9**
2:00	26.7	30.0	10.0	20.0	36.7	20.0	10.0	**21.9**
3:00	10.0	6.7	50.0	30.0	0.0	6.7	10.0	**16.2**
4:00	13.3	20.0	13.3	0.0	0.0	10.0	13.3	**10.0**
5:00	10.0	6.7	10.0	0.0	6.7	10.0	13.3	**8.1**
6:00	10.0	20.0	6.7	3.3	6.7	13.3	13.3	**10.5**
7:00	23.3	13.3	13.3	13.3	16.7	16.7	26.7	**17.6**
8:00	53.3	56.7	30.0	76.7	73.3	36.7	53.3	**54.3**
9:00	36.7	33.3	60.0	70.0	70.0	23.3	66.7	**51.4**
10:00	40.0	36.7	46.7	80.0	56.7	36.7	63.3	**51.4**
11:00	43.3	50.0	46.7	46.7	60.0	33.3	43.3	**46.2**
12:00	23.3	50.0	40.0	60.0	46.7	30.0	40.0	**41.4**
13:00	36.7	46.7	50.0	33.3	60.0	30.0	30.0	**41.0**
14:00	16.7	26.7	43.3	3.3	56.7	23.3	16.7	**26.7**
15:00	6.7	66.7	53.3	6.7	30.0	30.0	16.7	**30.0**
16:00	30.0	46.7	33.3	26.7	36.7	26.7	30.0	**32.9**
17:00	30.0	26.7	60.0	80.0	43.3	36.7	70.0	**49.5**
18:00	46.7	26.7	26.7	53.3	36.7	16.7	66.7	**39.0**
19:00	46.7	13.3	20.0	66.7	43.3	30.0	50.0	**38.6**
20:00	26.7	46.7	20.0	26.7	30.0	26.7	26.7	**29.0**
21:00	46.7	56.7	36.7	50.0	33.3	46.7	36.7	**43.8**
22:00	63.3	50.0	33.3	50.0	63.3	53.3	46.7	**51.4**
23:00	26.7	16.7	26.7	23.3	26.7	26.7	20.0	**23.8**

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Table VIII-63. Percent Time All Sounds were Audible, Natural Bridges National Monument, Owachomo Bridge, (NABR001), 7-27-2006 to 8-02-2006.

Audible Sound Sources	7-27-06 % Time Audible	7-28-06 % Time Audible	7-29-06 % Time Audible	7-30-06 % Time Audible	7-31-06 % Time Audible	8-01-06 % Time Audible	8-02-06 % Time Audible	Average % Time Audible
No Sound Audible	0.3	0.0	0.0	0.0	0.0	0.0	2.1	**0.3**
Aircraft (unknown type)	0.4	0.0	0.0	0.0	0.0	0.0	0.0	**0.1**
Aircraft, Jet	28.3	32.4	31.8	36.9	37.6	26.7	33.9	**32.5**
Aircraft, Propeller	1.4	1.9	1.5	3.5	1.8	0.4	0.7	**1.6**
Aircraft, Helicopter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
Vehicle	12.1	19.0	21.0	20.0	18.9	20.0	15.4	**18.1**
Watercraft	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
Motor Sounds[1]	2.4	1.3	1.1	1.3	1.8	1.8	1.4	**1.6**
Grounds Care	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
People	0.7	4.0	0.7	1.1	0.6	0.0	1.8	**1.3**
Domestic Animal	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
Building Sounds	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
Construction	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
Non-natural Other	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
Non-natural Unknown	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
Wind	52.8	72.4	62.1	19.2	31.1	47.5	22.2	**43.9**
Water (rain, river, etc.)	0.0	0.0	13.1	7.5	0.0	0.0	0.6	**3.0**
Thunder	0.0	0.0	2.2	4.0	0.4	0.0	0.0	**1.0**
Mammal	0.1	0.3	3.6	1.4	1.1	1.3	0.7	**1.2**
Bird	27.6	27.8	37.8	56.3	53.8	55.4	43.3	**43.1**
Reptile	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
Amphibian	0.0	0.0	5.6	3.1	0.0	0.0	0.0	**1.2**
Insect	40.3	40.4	43.5	44.0	45.0	44.3	42.2	**42.8**
Animal (unknown type)	1.0	0.3	1.5	0.6	0.3	0.7	0.7	**0.7**
Natural Other	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
Natural Unknown	0.3	0.0	0.0	0.7	0.3	0.4	0.3	**0.3**
Unknown	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
Total Aircraft	**30.1**	**34.2**	**33.3**	**40.3**	**39.3**	**27.1**	**34.6**	**34.1**
Total Road Vehicles	**12.1**	**19.0**	**21.0**	**20.0**	**18.9**	**20.0**	**15.4**	**18.1**
Total Watercraft	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**
Total Non-natural	**43.2**	**52.5**	**53.9**	**58.2**	**56.1**	**48.5**	**50.4**	**51.8**
Total Natural	**96.7**	**96.4**	**96.9**	**98.1**	**97.4**	**99.0**	**89.0**	**96.2**

[1] Unable to distinguish between distant vehicle and distant aircraft.

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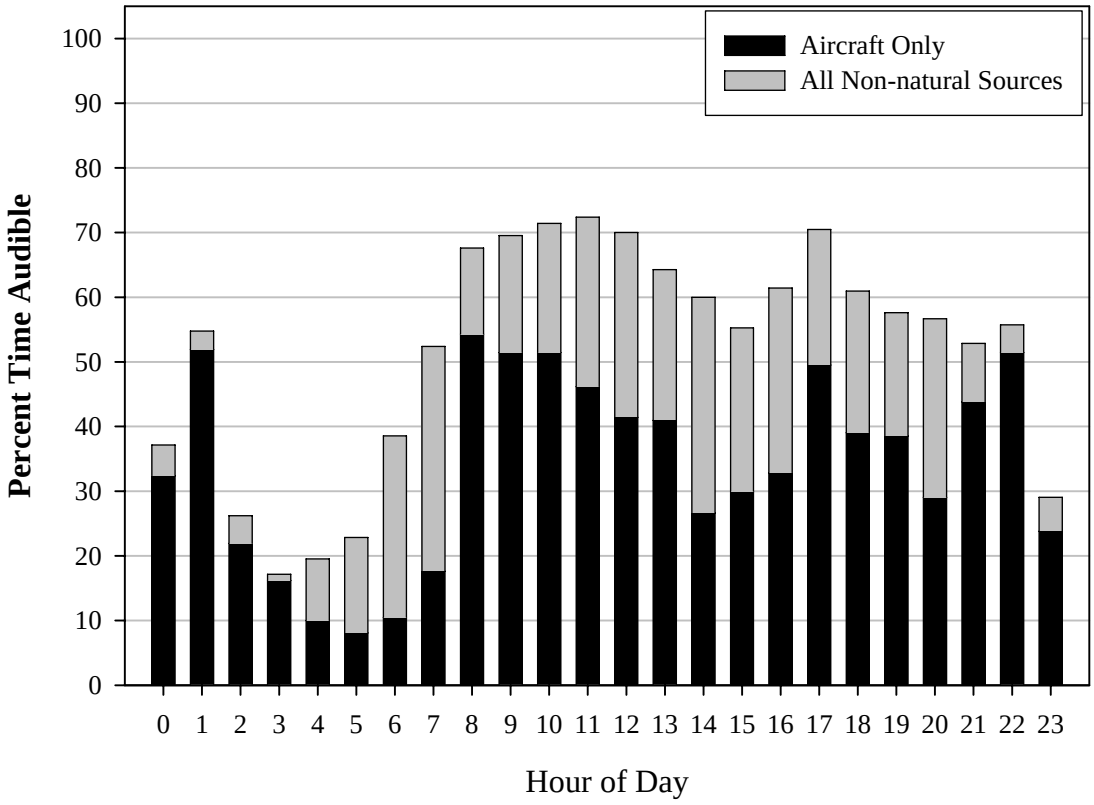


Figure VIII-21. Percent Time All Non-natural Sounds and Aircraft Sounds were Audible, Natural Bridges National Monument, Owachomo Bridge, (NABR001), 7-27-2006 to
8-02-2006.

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Table VIII-64. Percent Time Non-natural Sounds were Audible, Natural Bridges National Monument, Owachomo Bridge, (NABR001), 11-22-2006 to 11-28-2006.

Hour of Day	11-22-06 % Time Audible Non-natural Sources	11-23-06 % Time Audible Non-natural Sources	11-24-06 % Time Audible Non-natural Sources	11-25-06 % Time Audible Non-natural Sources	11-26-06 % Time Audible Non-natural Sources	11-27-06 % Time Audible Non-natural Sources	11-28-06 % Time Audible Non-natural Sources	Average % Time Audible Non-Natural Sources
0:00	30.0	56.7	36.7	43.3	33.3	40.0	6.7	**35.2**
1:00	43.3	46.7	30.0	50.0	63.3	70.0	6.7	**44.3**
2:00	53.3	20.0	36.7	36.7	23.3	46.7	3.3	**31.4**
3:00	20.0	6.7	10.0	3.3	0.0	0.0	0.0	**5.7**
4:00	10.0	30.0	10.0	23.3	23.3	0.0	0.0	**13.8**
5:00	30.0	10.0	16.7	3.3	13.3	6.7	0.0	**11.4**
6:00	10.0	10.0	53.3	10.0	6.7	10.0	20.0	**17.1**
7:00	53.3	23.3	40.0	36.7	43.3	53.3	33.3	**40.5**
8:00	90.0	63.3	76.7	80.0	56.7	63.3	56.7	**69.5**
9:00	86.7	90.0	90.0	76.7	80.0	86.7	33.3	**77.6**
10:00	83.3	96.7	96.7	56.7	80.0	43.3	50.0	**72.4**
11:00	80.0	80.0	63.3	76.7	63.3	43.3	46.7	**64.8**
12:00	70.0	83.3	73.3	76.7	46.7	36.7	56.7	**63.3**
13:00	93.3	90.0	100.0	80.0	70.0	46.7	63.3	**77.6**
14:00	86.7	86.7	93.3	76.7	66.7	50.0	50.0	**72.9**
15:00	73.3	80.0	90.0	80.0	76.7	66.7	60.0	**75.2**
16:00	93.3	90.0	96.7	93.3	66.7	40.0	33.3	**73.3**
17:00	90.0	83.3	83.3	90.0	93.3	23.3	26.7	**70.0**
18:00	86.7	50.0	86.7	80.0	80.0	20.0	26.7	**61.4**
19:00	76.7	56.7	66.7	73.3	73.3	36.7	40.0	**60.5**
20:00	83.3	63.3	56.7	73.3	66.7	33.3	53.3	**61.4**
21:00	86.7	43.3	66.7	46.7	70.0	26.7	60.0	**57.1**
22:00	63.3	26.7	60.0	50.0	70.0	33.3	56.7	**51.4**
23:00	60.0	10.0	26.7	30.0	36.7	13.3	46.7	**31.9**

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Table VIII-65. Percent Time Aircraft Sounds were Audible, Natural Bridges National Monument, Owachomo Bridge, (NABR001), 11-22-2006 to 11-28-2006.

Hour of Day	11-22-06 % Time Audible Aircraft	11-23-06 % Time Audible Aircraft	11-24-06 % Time Audible Aircraft	11-25-06 % Time Audible Aircraft	11-26-06 % Time Audible Aircraft	11-27-06 % Time Audible Aircraft	11-28-06 % Time Audible Aircraft	Average % Time Audible Aircraft
0:00	30.0	43.3	16.7	33.3	26.7	40.0	6.7	**28.1**
1:00	30.0	33.3	30.0	50.0	60.0	60.0	3.3	**38.1**
2:00	26.7	13.3	26.7	20.0	16.7	36.7	0.0	**20.0**
3:00	16.7	0.0	0.0	0.0	0.0	0.0	0.0	**2.4**
4:00	6.7	6.7	0.0	16.7	0.0	0.0	0.0	**4.3**
5:00	30.0	10.0	13.3	3.3	6.7	0.0	0.0	**9.0**
6:00	0.0	0.0	33.3	10.0	3.3	0.0	16.7	**9.0**
7:00	30.0	13.3	16.7	20.0	36.7	30.0	26.7	**24.8**
8:00	63.3	43.3	70.0	63.3	43.3	53.3	33.3	**52.9**
9:00	63.3	73.3	66.7	46.7	63.3	63.3	26.7	**57.6**
10:00	63.3	90.0	76.7	36.7	56.7	33.3	50.0	**58.1**
11:00	56.7	66.7	43.3	43.3	50.0	40.0	40.0	**48.6**
12:00	43.3	66.7	46.7	46.7	40.0	30.0	36.7	**44.3**
13:00	73.3	80.0	70.0	53.3	40.0	43.3	43.3	**57.6**
14:00	40.0	50.0	53.3	43.3	40.0	33.3	20.0	**40.0**
15:00	36.7	50.0	66.7	53.3	60.0	30.0	33.3	**47.1**
16:00	36.7	26.7	56.7	60.0	50.0	23.3	30.0	**40.5**
17:00	53.3	46.7	46.7	36.7	53.3	13.3	26.7	**39.5**
18:00	30.0	43.3	60.0	60.0	73.3	20.0	26.7	**44.8**
19:00	56.7	26.7	60.0	43.3	56.7	30.0	30.0	**43.3**
20:00	56.7	36.7	46.7	73.3	56.7	30.0	40.0	**48.6**
21:00	63.3	36.7	46.7	26.7	56.7	20.0	53.3	**43.3**
22:00	60.0	20.0	56.7	43.3	53.3	30.0	50.0	**44.8**
23:00	26.7	10.0	23.3	30.0	30.0	13.3	40.0	**24.8**

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Table X VIII-66. Percent Time All Sounds were Audible, Natural Bridges National Monument, Owachomo Bridge, (NABR001), 11-22-2006 to 11-28-2006.

Audible Sound Sources	11-22-06 % Time Audible	11-23-06 % Time Audible	11-24-06 % Time Audible	11-25-06 % Time Audible	11-26-06 % Time Audible	11-27-06 % Time Audible	11-28-06 % Time Audible	Average % Time Audible
No Sound Audible	26.0	39.6	34.2	15.6	31.3	17.9	2.1	**23.8**
Aircraft (unknown type)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
Aircraft, Jet	39.0	36.8	42.4	37.2	39.6	27.6	25.8	**35.5**
Aircraft, Propeller	2.5	0.1	0.4	1.0	1.1	0.4	0.6	**0.9**
Aircraft, Helicopter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
Vehicle	30.6	21.5	22.8	19.2	16.9	9.3	6.7	**18.1**
Watercraft	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
Motor Sounds[1]	1.7	1.3	1.8	1.1	1.3	1.8	2.1	**1.6**
Grounds Care	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
People	1.9	1.4	4.6	3.9	0.7	0.1	0.0	**1.8**
Domestic Animal	0.0	0.3	0.1	0.0	0.0	0.0	0.0	**0.1**
Building Sounds	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
Construction	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
Non-natural Other	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
Non-natural Unknown	0.0	0.0	0.1	0.1	0.1	0.0	0.0	**0.1**
Wind	11.9	7.4	11.4	36.1	30.0	67.4	79.3	**34.8**
Water (rain, river, etc.)	0.0	0.0	0.0	2.6	0.0	0.0	42.6	**6.5**
Thunder	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
Mammal	0.1	1.0	0.6	0.1	0.4	0.3	0.0	**0.4**
Bird	9.9	6.0	3.8	4.7	7.9	5.7	3.1	**5.9**
Reptile	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
Amphibian	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
Insect	0.7	0.1	0.0	0.1	0.0	0.4	0.0	**0.2**
Animal (unknown type)	0.4	0.1	0.1	0.1	0.3	0.1	0.0	**0.2**
Natural Other	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
Natural Unknown	0.6	0.0	0.0	0.6	0.0	0.3	0.0	**0.2**
Unknown	0.0	0.0	0.0	0.1	0.0	0.0	0.0	**0.0**
Total Aircraft	**41.4**	**36.9**	**42.8**	**38.1**	**40.6**	**28.1**	**26.4**	**36.3**
Total Road Vehicles	**30.6**	**21.5**	**22.8**	**19.2**	**16.9**	**9.3**	**6.7**	**18.1**
Total Watercraft	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**
Total Non-natural	**64.7**	**54.0**	**60.8**	**56.1**	**54.3**	**37.1**	**34.6**	**51.7**
Total Natural	**21.9**	**13.8**	**15.3**	**41.1**	**34.2**	**69.2**	**91.7**	**41.0**

[1] Unable to distinguish between distant vehicle and distant aircraft.

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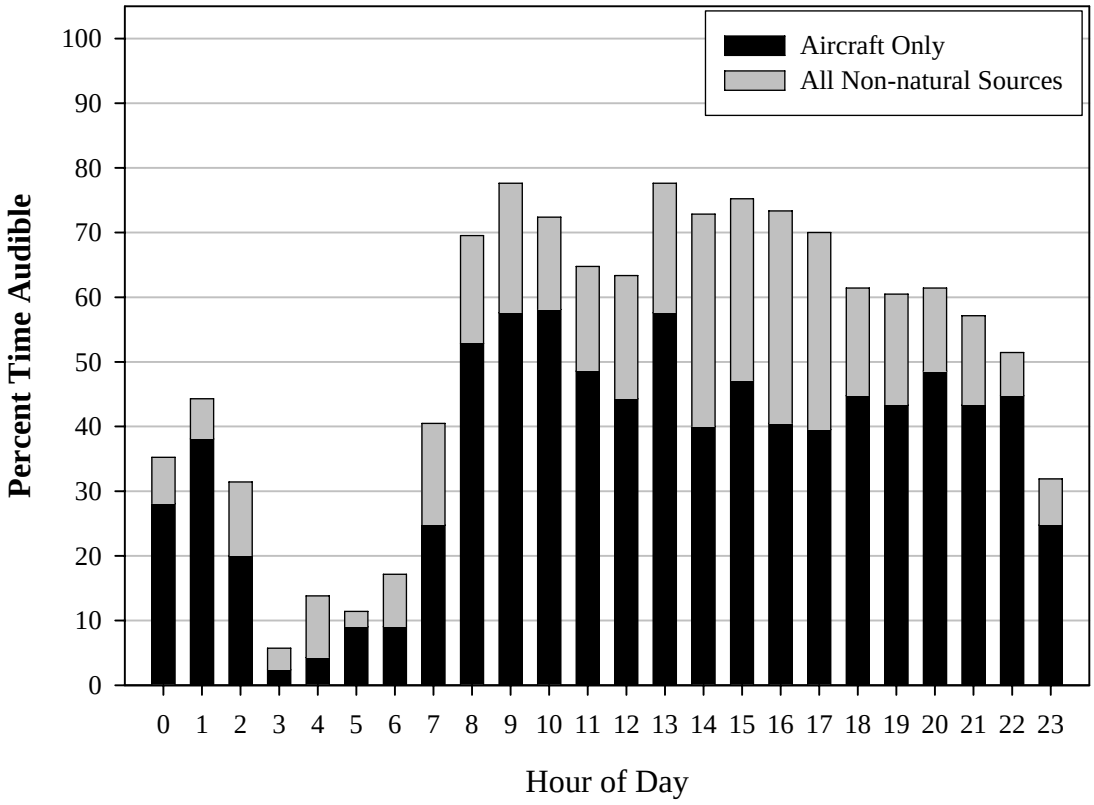


Figure VIII-22. Percent Time All Non-natural Sounds and Aircraft Sounds were Audible, Natural Bridges National Monument, Owachomo Bridge, (NABR001), 11-22-2006 to
11-28-2006.

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Table VIII-67. Percent Time Non-natural Sounds were Audible, Natural Bridges National Monument, Visitor Center, (NABR002), 1-18-2006 to 1-19-2006.

Hour of Day	1-18-06 % Time Audible Non-natural Sources	1-19-06 % Time Audible Non-natural Sources	Average % Time Audible Non-Natural Sources
0:00	100.0	96.7	**98.3**
1:00	100.0	60.0	**80.0**
2:00	100.0	56.7	**78.3**
3:00	100.0	100.0	**100.0**
4:00	100.0	100.0	**100.0**
5:00	100.0	100.0	**100.0**
6:00	100.0	100.0	**100.0**
7:00	100.0	100.0	**100.0**
8:00	96.7	100.0	**98.3**
9:00	100.0	100.0	**100.0**
10:00	100.0	100.0	**100.0**
11:00	100.0	100.0	**100.0**
12:00	100.0	100.0	**100.0**
13:00	100.0	100.0	**100.0**
14:00	100.0	96.7	**98.3**
15:00	100.0	100.0	**100.0**
16:00	100.0	96.7	**98.3**
17:00	100.0	90.0	**95.0**
18:00	100.0	96.7	**98.3**
19:00	100.0	100.0	**100.0**
20:00	100.0	100.0	**100.0**
21:00	100.0	100.0	**100.0**
22:00	96.7	96.7	**96.7**
23:00	100.0	100.0	**100.0**

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Table VIII-68. Percent Time Aircraft Sounds were Audible, Natural Bridges National Monument, Visitor Center, (NABR002), 1-18-2006 to 1-19-2006.

Hour of Day	1-18-06 % Time Audible Aircraft	1-19-06 % Time Audible Aircraft	Average % Time Audible Aircraft
0:00	53.3	13.3	**33.3**
1:00	36.7	6.7	**21.7**
2:00	6.7	0.0	**3.3**
3:00	0.0	0.0	**0.0**
4:00	3.3	6.7	**5.0**
5:00	40.0	30.0	**35.0**
6:00	20.0	13.3	**16.7**
7:00	6.7	20.0	**13.3**
8:00	43.3	50.0	**46.7**
9:00	33.3	43.3	**38.3**
10:00	46.7	60.0	**53.3**
11:00	33.3	60.0	**46.7**
12:00	36.7	50.0	**43.3**
13:00	46.7	63.3	**55.0**
14:00	40.0	43.3	**41.7**
15:00	30.0	20.0	**25.0**
16:00	46.7	50.0	**48.3**
17:00	66.7	46.7	**56.7**
18:00	53.3	53.3	**53.3**
19:00	50.0	46.7	**48.3**
20:00	40.0	30.0	**35.0**
21:00	30.0	13.3	**21.7**
22:00	63.3	26.7	**45.0**
23:00	23.3	33.3	**28.3**

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Table VIII-69. Percent Time All Sounds were Audible, Natural Bridges National Monument, Visitor Center, (NABR002), 1-18-2006 to 1-19-2006.

Audible Sound Sources	1-18-06 % Time Audible	1-19-06 % Time Audible	Average % Time Audible
No Sound Audible	0.0	0.0	**0.0**
Aircraft (unknown type)	0.0	0.0	**0.0**
Aircraft, Jet	34.6	31.9	**33.3**
Aircraft, Propeller	0.8	0.6	**0.7**
Aircraft, Helicopter	0.0	0.0	**0.0**
Vehicle	9.3	5.8	**7.6**
Watercraft	0.0	0.0	**0.0**
Motor Sounds	0.7	1.3	**1.0**
Grounds Care	0.0	0.0	**0.0**
People	7.8	5.4	**6.6**
Domestic Animal	0.0	0.0	**0.0**
Building Sounds	83.8	76.7	**80.2**
Construction	0.0	0.0	**0.0**
Non-natural Other[1]	29.6	27.2	**28.4**
Non-natural Unknown	0.6	0.6	**0.6**
Wind	26.3	46.7	**36.5**
Water (rain, river, etc.)	0.0	1.5	**0.8**
Thunder	0.0	0.0	**0.0**
Mammal	0.0	0.1	**0.1**
Bird	19.0	16.9	**18.0**
Reptile	0.0	0.0	**0.0**
Amphibian	0.0	0.0	**0.0**
Insect	0.0	0.0	**0.0**
Animal (unknown type)	3.2	0.1	**1.7**
Natural Other	0.0	0.0	**0.0**
Natural Unknown	0.0	0.0	**0.0**
Unknown	0.0	0.0	**0.0**
Total Aircraft	**35.4**	**32.5**	**34.0**
Total Road Vehicles	**9.3**	**5.8**	**7.6**
Total Watercraft	**0.0**	**0.0**	**0.0**
Total Non-natural	**99.7**	**95.4**	**97.6**
Total Natural	**45.1**	**62.1**	**53.6**

[1] Flag pole related sounds

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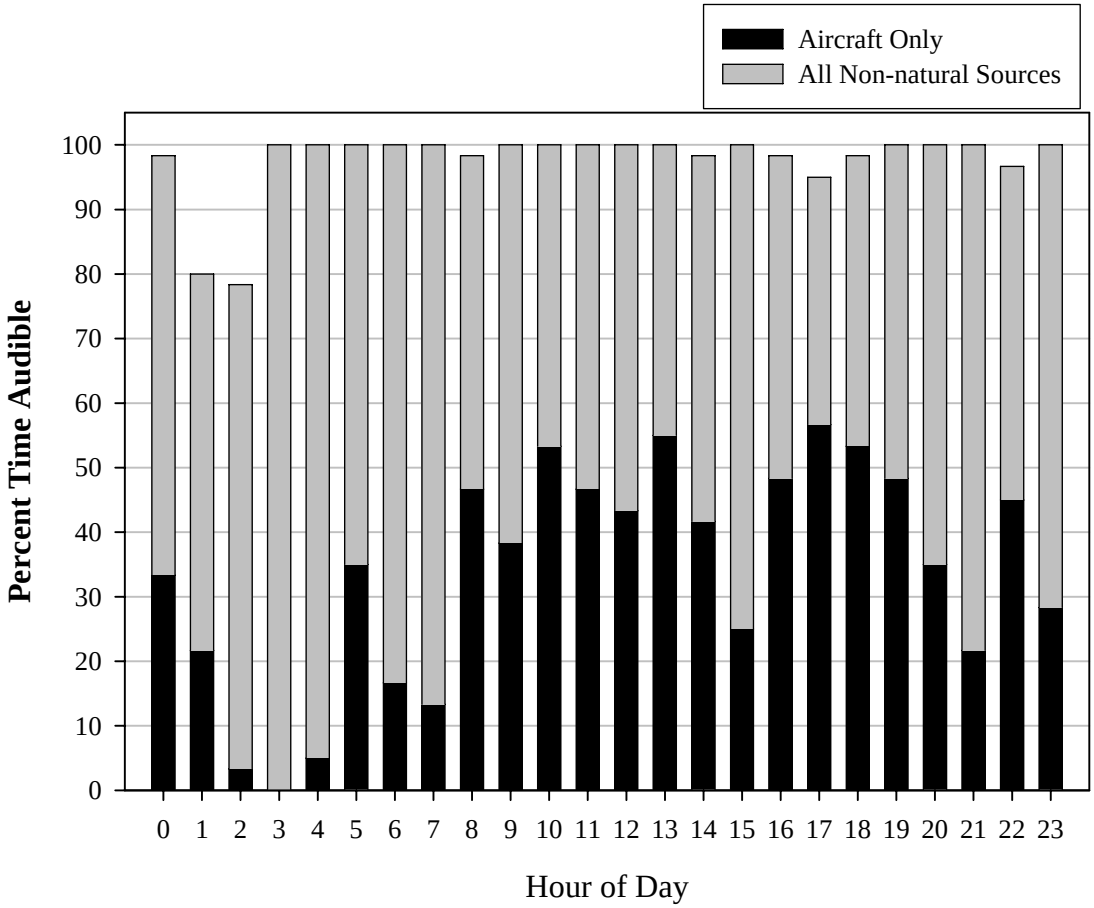


Figure VIII-23. Percent Time All Non-natural Sounds and Aircraft Sounds were Audible, Natural Bridges National Monument, Visitor Center, (NABR002), 1-18-2006 to 1-19-2006.

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Table VIII-70. Percent Time Non-natural Sounds were Audible, Natural Bridges National Monument, Visitor Center, (NABR002), 8-12-2006 to 8-13-2006.

Hour of Day	8-12-06 % Time Audible Non-natural Sources	8-13-06 % Time Audible Non-natural Sources	Average % Time Audible Non-Natural Sources
0:00	93.3	100.0	**96.7**
1:00	93.3	100.0	**96.7**
2:00	70.0	96.7	**83.3**
3:00	66.7	100.0	**83.3**
4:00	86.7	100.0	**93.3**
5:00	96.7	100.0	**98.3**
6:00	83.3	100.0	**91.7**
7:00	100.0	100.0	**100.0**
8:00	100.0	100.0	**100.0**
9:00	100.0	100.0	**100.0**
10:00	100.0	100.0	**100.0**
11:00	100.0	100.0	**100.0**
12:00	100.0	100.0	**100.0**
13:00	100.0	100.0	**100.0**
14:00	93.3	100.0	**96.7**
15:00	96.7	93.3	**95.0**
16:00	96.7	100.0	**98.3**
17:00	100.0	100.0	**100.0**
18:00	73.3	93.3	**83.3**
19:00	100.0	93.3	**96.7**
20:00	96.7	100.0	**98.3**
21:00	100.0	100.0	**100.0**
22:00	100.0	100.0	**100.0**
23:00	100.0	100.0	**100.0**

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Table VIII-71. Percent Time Aircraft Sounds were Audible, Natural Bridges National Monument, Visitor Center, (NABR002), 8-12-2006 to 8-13-2006.

Hour of Day	08-12-06 % Time Audible Aircraft	8-13-06 % Time Audible Aircraft	Average % Time Audible Aircraft
0:00	36.7	20.0	**28.3**
1:00	40.0	36.7	**38.3**
2:00	33.3	13.3	**23.3**
3:00	10.0	3.3	**6.7**
4:00	13.3	0.0	**6.7**
5:00	36.7	0.0	**18.3**
6:00	3.3	0.0	**1.7**
7:00	0.0	13.3	**6.7**
8:00	30.0	40.0	**35.0**
9:00	43.3	43.3	**43.3**
10:00	30.0	36.7	**33.3**
11:00	33.3	40.0	**36.7**
12:00	10.0	26.7	**18.3**
13:00	23.3	20.0	**21.7**
14:00	23.3	23.3	**23.3**
15:00	0.0	26.7	**13.3**
16:00	16.7	26.7	**21.7**
17:00	16.7	40.0	**28.3**
18:00	3.3	23.3	**13.3**
19:00	26.7	23.3	**25.0**
20:00	23.3	33.3	**28.3**
21:00	43.3	23.3	**33.3**
22:00	76.7	36.7	**56.7**
23:00	20.0	30.0	**25.0**

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Table VIII-72. Percent Time All Sounds were Audible, Natural Bridges National Monument, Visitor Center, (NABR002), 8-12-2006 to 8-13-2006.

Audible Sound Sources	8-12-06 % Time Audible	8-13-06 % Time Audible	Average % Time Audible
No Sound Audible	0.0	0.0	**0.0**
Aircraft (unknown type)	0.0	0.0	**0.0**
Aircraft, Jet	23.9	23.3	**23.6**
Aircraft, Propeller	0.8	0.8	**0.8**
Aircraft, Helicopter	0.0	0.0	**0.0**
Vehicle	32.5	25.6	**29.0**
Watercraft	0.0	0.0	**0.0**
Motor Sounds	1.3	0.3	**0.8**
Grounds Care	0.3	1.0	**0.6**
People	21.9	26.4	**24.2**
Domestic Animal	0.0	0.0	**0.0**
Building Sounds	56.4	69.6	**63.0**
Construction	0.0	0.0	**0.0**
Non-natural Other[1]	8.5	8.3	**8.4**
Non-natural Unknown	0.6	2.2	**1.4**
Wind	23.2	12.8	**18.0**
Water (rain, river, etc.)	0.1	0.0	**0.1**
Thunder	0.1	0.0	**0.1**
Mammal	3.2	1.0	**2.1**
Bird	23.3	28.3	**25.8**
Reptile	0.0	0.0	**0.0**
Amphibian	0.0	0.0	**0.0**
Insect	40.6	42.1	**41.3**
Animal (unknown type)	2.1	0.8	**1.5**
Natural Other	0.0	0.0	**0.0**
Natural Unknown	0.1	0.1	**0.1**
Unknown	0.1	0.0	**0.1**
Total Aircraft	**24.7**	**24.2**	**24.4**
Total Road Vehicles	**32.5**	**25.6**	**29.0**
Total Watercraft	**0.0**	**0.0**	**0.0**
Total Non-natural	**93.6**	**99.0**	**96.3**
Total Natural	**74.6**	**74.3**	**74.4**

[1] Flag pole related sounds

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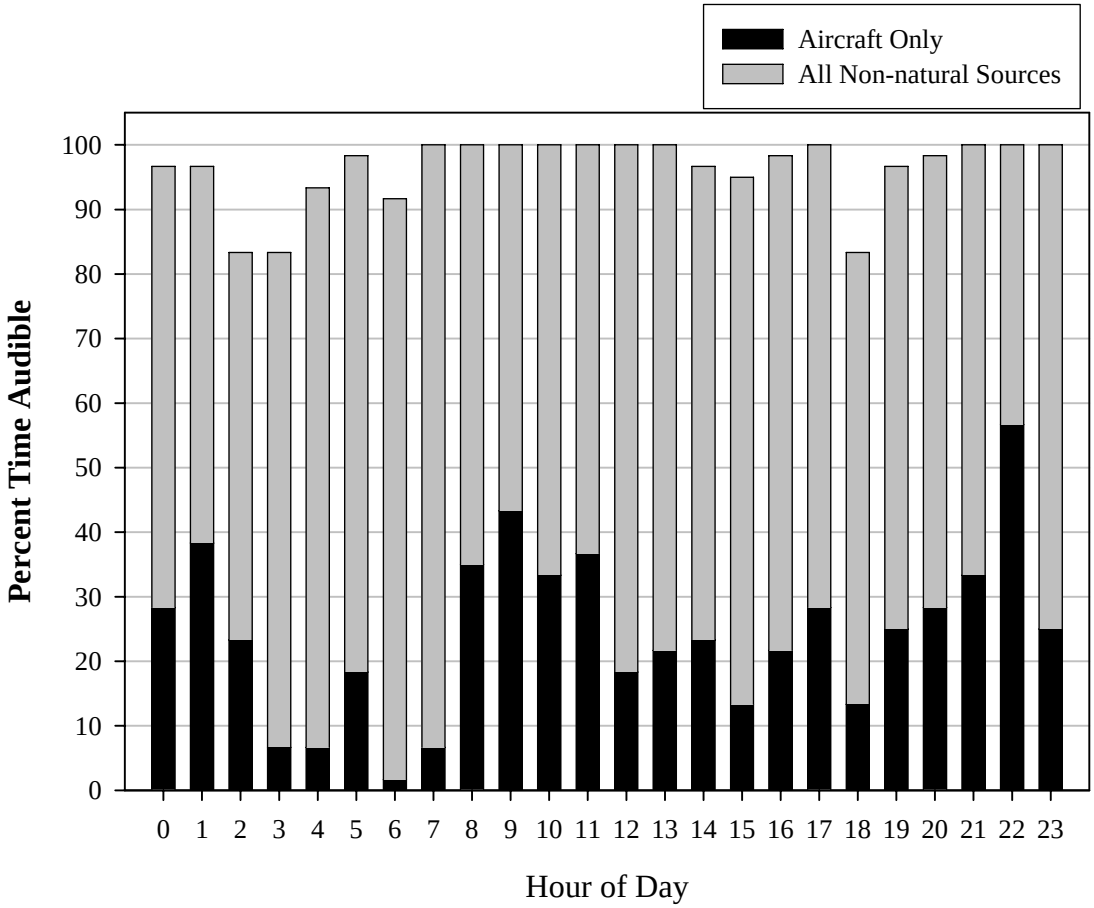


Figure VIII-24. Percent Time All Non-natural Sounds and Aircraft Sounds were Audible, Natural Bridges National Monument, Visitor Center, (NABR002), 8-12-2006 to 8-13-2006.

Appendix IX. SEUG Data DVDs.

DVDS WILL BE ADDED AFTER COMPLETION OF REPORT.

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