Summer Replicate Ambient Sound Levels in Grand Canyon National Park

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Abstract

Summer natural ambient sound levels were measured in the four main vegetation types in Grand Canyon National Park in 2005 (Ambrose 2006). Acoustic conditions at replicate sites (same vegetation types, different locations) were not measured concurrently due to a lack of available acoustic equipment. During the summer of 2006, sound levels were measured at four replicate sites. Daytime sound pressure level (SPL) data from the summer months of 2005 and 2006 indicate that the sites in Pinyon-Juniper and Cold Desert Scrub vegetation types were good acoustic replicates. Using the original and replicate sites, the representative natural ambient levels for each vegetation type are 18.5 dBA for Cold Desert Scrub, 18.2 dBA for Warm Desert Scrub, 20.0 dBA for Pinyon-Juniper Woodland, and 22.8 dBA for Ponderosa Pine Forest.

Introduction

In 2005, the natural ambient sound conditions were measured in the four primary vegetation types of Grand Canyon National Park. Ideally, sound conditions would have been measured at several locations within the same vegetation types at the same time. However, limited acoustic equipment was available, making data collection at replicate sites at the same time impossible. In an effort to collect replicate sound data, acoustic systems were deployed at replicate sites in early summer 2006 in the same four vegetation types (but in different locations) as were measured in 2005. This report compares the natural ambient sound conditions at the original four sites in 2005 to the four replicate sites in 2006.

Study Area

The field sites used in this study represent the four acoustic zones defined by the major vegetation types in Grand Canyon National Park. These acoustic zones were developed for aircraft noise modeling at the Park. Together, these sites represent more than 83 percent of the Park's area (Falzarano 2006). Replicate sites were chosen on the same basis as the original sites, but an attempt was made to locate them in different geographic locations of the park (Table 1, Figure 1). According to Grand Canyon National Park's General Management Plan zones (NPS 1995) all of the sites were located in proposed wilderness except for the 2005 Ponderosa Pine and Pinyon-Juniper sites which were located in corridor areas.

Table 1. Locations of summer 2005 and summer 2006 field sites.

Site	**Year**	**Vegetation Type**	**Location**	**Elevation**
GRCA008	2005	Pinyon-Juniper Woodland	Pasture Wash	1929 m
GRCA009	2005	Warm Desert Scrub	Tuweep Area	1273 m
GRCA010	2005	Cold Desert Scrub	Tuweep Area	1400 m
GRCA011	2005	Ponderosa Pine Forest	South Rim	2151 m
GRCA015	2006	Ponderosa Pine Forest	Rainbow Plateau	2361 m
GRCA016	2006	Pinyon-Juniper Woodland	Hancock Knolls	1805 m
GRCA017	2006	Cold Desert Scrub	Kanab Point	1740 m
GRCA018	2006	Warm Desert Scrub	Separation Canyon	443 m

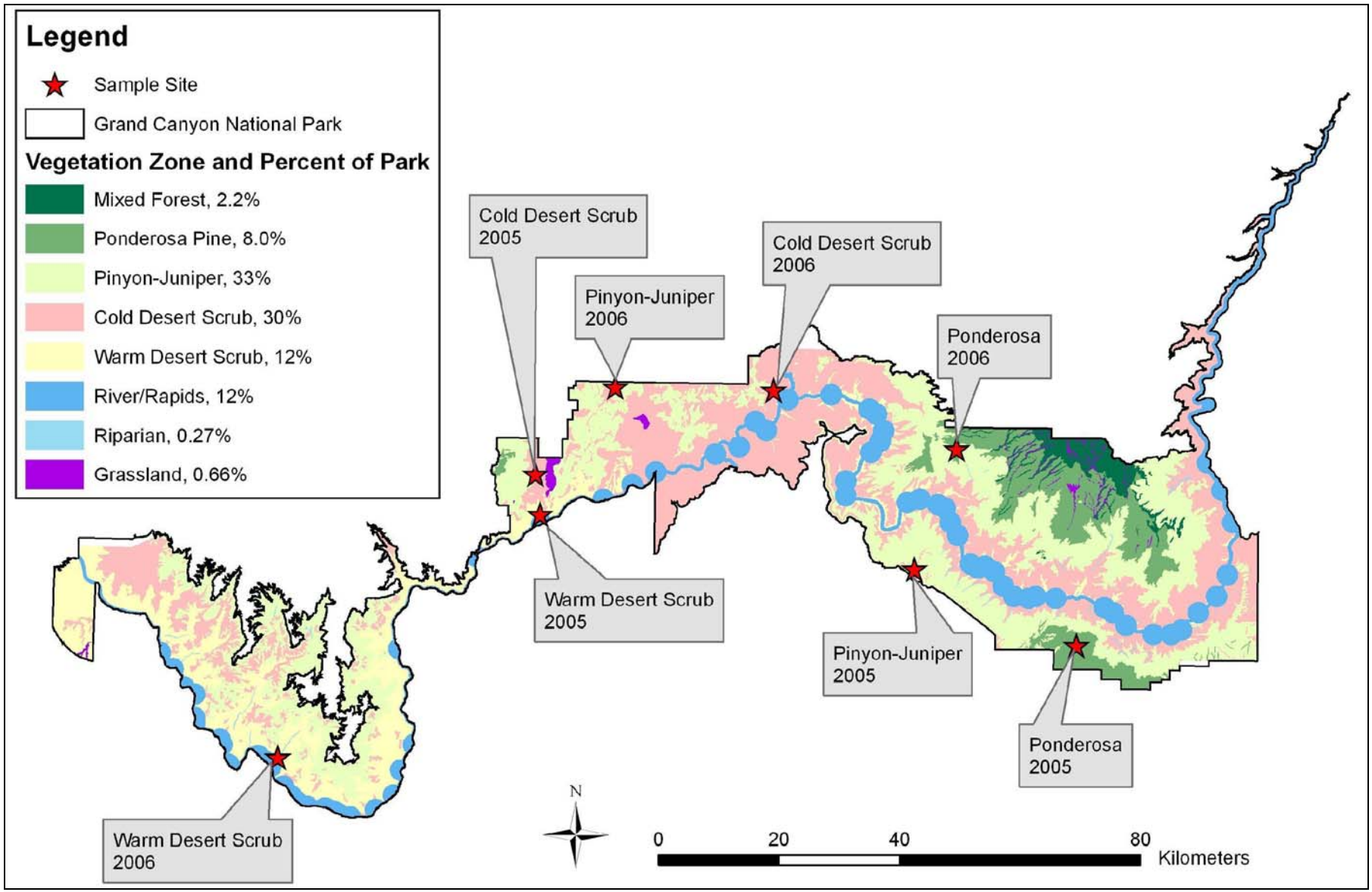

Figure 1. Locations of 2005 and 2006 field sites in Grand Canyon National Park.

Methods

Definitions (Courtesy of the Natural Sounds Program)

Audibility: 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.
Decibel (dB): A logarithmic measure 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-Weighted Decibel (dBA): 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.
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.
L_{max} and L_{min}: The maximum and minimum sound pressure level for a given period.
L_x (Exceedence Percentile): The sound pressure level, in decibels, exceeded x percent of the time.
L_{50}: The sound pressure level, in decibels, exceeded 50 percent of the time (the median).
L_{90}: The sound pressure level, in decibels, exceeded 90 percent of the time. This approximates the decibel level of the natural sounds in a non-natural environment.
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. The L_{nat} is the sound level associated with an exceedence value calculated by removing the percent time human-caused sounds are audible.
Noise Free Interval (NFI): The length of the continuous period of time during which there is silence or only natural sounds are audible.
Octave: The interval between two frequencies having a ratio of 2:1.
One-third octave band: A frequency band whose cutoff frequencies have a ratio of 2 to one-third (approximately 1.26). Humans have the ability to differentiate one-third octaves.
Sound Pressure: Fluctuations in air pressure caused by the presences 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.
Sound Pressure Level (SPL): The logarithmic form of sound pressure. In air, 20 times the logarithm of the ratio of the actual sound pressure to a reference sound (20 micropascals, the assumed threshold of human hearing).

Sound Equipment

The sound system at each of the sites consisted of a Panasonic CF-18 Toughbook laptop, an ANSI Type 1 Larson-Davis sound level meter (model 824), microphone (GRAS 40AE; protected by a Larson-Davis Environmental Shroud, including a foam windscreen and bird spike) and preamplifier (Larson-Davis 902; Figure 2). This system is known to be accurate within 1 dBA. An array of solar panels was used to recharge the 12-volt batteries which powered the system. Anemometers (Young Model 05103) were added to the systems in 2006 to acquire wind direction and wind speed data every second. SoundMonitor software versions SM030301, SM051210, SM060601 and SM060715 (© Far North Aquatics, Fairbanks, AK) were used.

Figure 2. Sound system consisting of microphone with windscreen on tripod on left, an array of solar panels, and wind gauge on tripod on right; laptop, sound level meter and 12V batteries are in pelican cases underneath solar panels.

Sound Recordings

Digital sound recordings were collected at all of the sites except for the 2006 Pinyon-Juniper Woodland because of technical problems with the microphone cord. Ten second recordings were collected every 2 minutes (720 recordings/24 hours = 2 hours of recordings) and sounds louder than 55 dBA occurring for at least 10 seconds or 75 dBA occurring for at least 1 second, termed *events*, were also recorded. In the office, the 720 daily recordings were logged for sound sources through listening. One week's worth (the first full week of recordings; 2 hours per day or 14 hours total) of sound recordings were logged from seven of the eight sites (Table 2). Events recorded at each site were also logged and sound sources identified. Percent time audible of sound sources was calculated from the office logging data. Comparison of sound source identification and computation of percent time audible using the 10-second/2-minute sample scheme and continuous logging in the field yields a good correlation (r^2 = 0.936, S. Ambrose, S. Burson, and S. Falzarano, unpublished data).

Table 2. Dates of office logging and analysis for original and replicate sites.

Site	**Sound Recordings: Office Logging Dates**	**Sound Pressure Levels: Dates Analyzed**
Ponderosa Pine 2005	7/1-7/7/05 & 8/13-8/15, 8/18, 8/25-8/27/05	7/1-7/17, 7/28-7/30, 8/13-8/15, 8/25-8/29/05
Ponderosa Pine 2006	7/8-7/14/06 & 8/2-8/8/06	7/1-7/19, 8/2-8/28/06
Pinyon-Juniper 2005	7/8-7/14/05 & 8/6-8/12/05	7/1-8/31/05
Pinyon-Juniper 2006	NA*	7/1-8/29/06
Cold desert 2005	7/1-7/7/05 & 8/1-8/7/05	7/1-8/27/05
Cold desert 2006	7/4-7/10/06 & 8/1-8/7/06	7/1-8/29/06
Warm desert 2005	7/1-7/7/05 & 8/1-8/7/05	7/1-8/12/05
Warm desert 2006	7/1-7/7/06 & 8/1-8/7/06	7/1-8/31/06

* No recordings available for the 2006 Pinyon-Juniper site due to microphone cord problems.

Observer Logging

Multiple times at each site, observers listened and logged what they heard for an hour in the field. Sounds were recorded on standardized logging sheets in 10 second intervals (not necessarily in order of loudness). Observers logged more than 25 m from the sound systems to avoid influencing the sound data, but close enough to hear the same sounds that the systems were recording. Thirteen hours of daytime observer logging were conducted in July and August 2005 at the original sites and 17 hours of daytime observer logging was completed in July and August 2006 at the replicate sites. The mean and maximum noise free intervals were calculated using these data.

Sound Pressure Levels

Sound pressure level (SPL) data over each of the one-third octave bands between 12.5 and 20,000 Hz were collected every second at each of the sites. In order to meet the minimum requirement of 25 days of data analyzed (NPS 2005), July 1 to August 31 were analyzed at all sites. Six of the eight natural ambient systems (original and replicate) did not run continuously from July 1 to August 31 due to power issues. Therefore all of the days with complete (24 hour) SPL data between July 1 and August 31 (2005 or 2006) were analyzed (Table 2).

Results

Percent Time Audible and Sound Source Identification

At all of the sites, the majority (if not all) of the non-natural sounds were caused by aircraft during daytime hours (Table 3). The 2005 Pinyon-Juniper had the highest percent time audible of non-natural sounds, aircraft, and in particular, jets. Conversely, the 2005 Warm Desert Scrub site had the lowest percent time audible of non-natural sounds and aircraft. Propeller planes and/or helicopters were heard most frequently at the 2005 Ponderosa Pine site which is not unexpected since it is close to an airport and air tour routes. At the 2006 Cold Desert Scrub site, propeller planes and/or helicopters were heard the least, 2.8% of the time. At all sites, natural sounds were heard a majority of the time (89.6% to 99.8% of daytime hours), despite non-natural sounds audible from 33.4% to 51.9% of daytime hours.

Table 3. Percent time audible for non-natural and natural sounds, daytime hours (0700 to 1900), for summer 2006 replicate sites and 2005 original sites (in parentheses).

Site	Non-natural sounds	All aircraft	Jets	Propeller and/or helicopter	Natural sounds
Ponderosa Pine	34.7 (47.7)	34.7 (36.7)	30.5 (21.8)	3.3 (11.9)	99.6 (99.8)
Pinyon-Juniper*	-- (51.9)	-- (49.4)	-- (43.0)	-- (4.9)	-- (95.1)
Cold Desert	43.2 (40.0)	43.0 (39.4)	39.2 (33.6)	2.8 (4.2)	89.6 (95.0)
Warm Desert	38.5 (33.4)	38.4 (33.1)	32.7 (22.2)	3.5 (9.7)	99.8 (92.9)

* No recordings available for the 2006 Pinyon-Juniper site due to microphone cord problems.

Aircraft (specifically, jets and propeller planes) were the only non-natural sounds that were heard at all of the sites (Table 4). Natural sounds were prevalent most of the time. Wind, water sounds, thunder, birds, insects and animal sounds were heard at all of the sites. Artifacts (sounds originating from the acoustic equipment) were also heard at all sites, most likely due to high winds blowing across the microphone. Percent time audible for all sound sources at all of the sites is presented in the Appendix.

Table 4. Average percent time audible of sound sources, daytime hours (0700 to 1900), for summer 2006 and summer 2005 (in parentheses).

Sound Source	Ponderosa Pine	Pinyon-Juniper*	Cold Desert	Warm Desert
No Sound Audible	0 (<0.1)	(0.7)	2.0 (0.8)	0 (1.1)
Aircraft, Unknown Type	1.1 (5.1)	(3.3)	1.2 (3.2)	2.2 (3.1)
Aircraft, Jet	30.5 (21.8)	(43.0)	39.2 (33.5)	32.7 (22.1)
Aircraft, Propeller	3.2 (4.5)	(2.4)	2.6 (2.5)	3.4 (7.7)
Aircraft, Helicopter	0.1 (5.5)	(0.9)	0.2 (0)	0.1 (0.2)
Vehicle	0 (3.3)	(0.5)	0 (0)	0 (0.1)
Train	0 (0.2)	(0)	0 (0)	0 (0)
Motor Sounds	0 (7.9)	(1.8)	0.2 (0.8)	0 (0.1)
People	0 (0.2)	(0.5)	0 (0)	0.1 (0)
Non-natural, Unknown	0 (0)	(0.1)	0 (0)	0 (0.2)
Non-natural, Other	0 (0)	(0.1)	0 (0)	0 (0)
Wind	59.1 (79.2)	(38.1)	41.0 (38.6)	21.7 (57.5)
Water sounds	4.0 (1.3)	(7.0)	3.9 (13.5)	4.0 (8.1)
Thunder	1.3 (4.3)	(4.6)	2.3 (8.8)	0.6 (5.0)
Mammal	0.5 (1.3)	(1.6)	0 (0.2)	0.1 (0.1)
Animal, Domestic	0 (0)	(0.1)	0 (0)	0 (0)
Bird	94.3 (85.7)	(68.1)	59.3 (49.9)	65.0 (26.1)
Amphibian	0 (0)	(0.1)	0 (0.1)	0 (0)
Insect	22.5 (6.8)	(45.3)	31.1 (62.5)	77.2 (50.9)
Animal sounds	0.4 (0.4)	(0.6)	0.2 (2.3)	0.5 (4.6)
Natural Other	0 (0.7)	(0.3)	0 (1.9)	0 (1.7)
Natural Unknown	0.5 (0.1)	(0.2)	0.2 (0.4)	1.0 (0.3)
Artifact	5.5 (0.1)	(1.2)	4.7 (5.0)	1.2 (2.1)
Unknown	0 (0)	(2.6)	0 (2.2)	0.1 (0.1)

* No recordings available for the 2006 Pinyon-Juniper site due to microphone cord problems.

Events

During July and August 2005 and 2006, loud events occurred at all sites (Table 5). Due to the different locations and vegetation types of the sites, the sources of the events varied, but only nine sound sources triggered events to be recorded. The 2006 Cold Desert Scrub site had the fewest loud events (49) and the 2006 Warm Desert Scrub site had the most with 7,128, comprised mostly by cicadas. Events caused by rain and thunder were heard at all of the sites. The 2005 Ponderosa site had the most aircraft related events (17.1%) and the 2006 Cold Desert Scrub site had no events caused by aircraft. Bugling elk triggered events only at the 2005 Ponderosa and Pinyon-Juniper sites. Loud events triggered by cicadas only occurred at the 2005 Cold Desert Scrub site and at the 2006 Warm Desert Scrub site. The 2006 Warm Desert Scrub site was the only site where events of flowing water were recorded. On August 11th, a flash flood flowed through Separation Canyon in the afternoon, triggering the sound system to collect events.

Table 5. Percentage of events caused by sound sources, summer 2006 and summer 2005 (in parentheses).

Sound Source	Ponderosa Pine	Pinyon-Juniper	Cold Desert	Warm Desert
Wind	0 (4.6)	* (0.8)	10.2 (0)	<0.1 (2.3)
Rain	3.8 (46.3)	(29.6)	26.5 (38.2)	0.2 (47.1)
Flowing Water	0 (0)	(0)	0 (0)	10.3 (0)
Thunder	91.1 (29.7)	(64.0)	63.3 (49.1)	1.4 (49.4)
Elk, bugling	0 (2.3)	(0.8)	0 (0)	0 (0)
Insect (cicadas)	0 (0)	(0)	0 (11.6)	87.4 (0)
Jet	3.8 (10.8)	(4)	0 (1.1)	0.6 (1.2)
Propeller Plane	1.3 (0.6)	(0)	0 (0)	<0.1 (0)
Helicopter	0 (5.7)	(0.8)	0 (0)	0 (0)
Total # Events	79 (175)	(125)	49 (285)	7128 (87)
%Total	100 (100)	(100)	100 (100)	100 (100)

* No recordings available for the 2006 Pinyon-Juniper site due to microphone cord problems.

Noise Free Interval

Three of the four replicate sites had higher mean and maximum NFIs than their original counterpart sites (Figure 3). The Cold Desert Scrub replicate site was the only replicate site that had higher mean and maximum NFIs in 2005 than in 2006. The Ponderosa sites had the shortest mean and maximum NFI and the Cold Desert Scrub sites had the highest mean and maximum NFI of all of the sites. Not surprisingly the shortest NFI occurred at the 2005 Ponderosa Pine site which was located close to an airport, air tour routes, and approximately one mile from the Desert View road.

Sound Pressure Levels

Sound pressure levels were calculated for daytime (0700-1900) and nighttime (1900-0700) hours as well as for all 24 hours (0000-2400). L_{nat} values were determined using the percent exceedence (L_x) level as described by Ambrose (2006; Table 6). L_{50} and L_{90} were also calculated for these timeframes (Table 7). The 2006 Warm Desert Scrub site had the highest daytime median (L_{50}) SPL values, likely due to the loud cicadas. The L_{nat} values ranged from 17.8 dBA to 31.9 dBA, all levels below a recording studio, and considered very quiet in an urban setting. Both the Pinyon-Juniper site and the Cold Desert Scrub site had similar daytime median SPL values between the original sites and the replicate sites. The Warm Desert Scrub sites had the largest discrepancy in daytime SPL data between the 2005 and 2006 sites with the 2006 site being considerably louder, most likely due to the loud cicadas that during daytime hours in Separation Canyon. The cicadas reached sound pressure levels of 70-75 dBA, slightly quieter than the sounds of heavy traffic (~80 dBA; Everest, 2001). The higher SPL values at the original Ponderosa Pine site (located near an airport and air tour routes) compared to the replicate is likely due to human noise.

The nighttime SPL values were lower than daytime SPL data at most of the sites except at the 2006 Ponderosa Pine site, the 2006 Cold Desert Scrub site and the 2005 Warm Desert Scrub site (Table 8). The original and replicate Pinyon-Juniper sites have similar nighttime SPL values as do the two Warm Desert Scrub sites. The nighttime L_{nat} values ranged from 16.7 dBA to 25.1 dBA. Most of the nighttime SPL values are close to the noisefloor of the instruments (~15 dBA), indicating that actual sound levels could be lower.

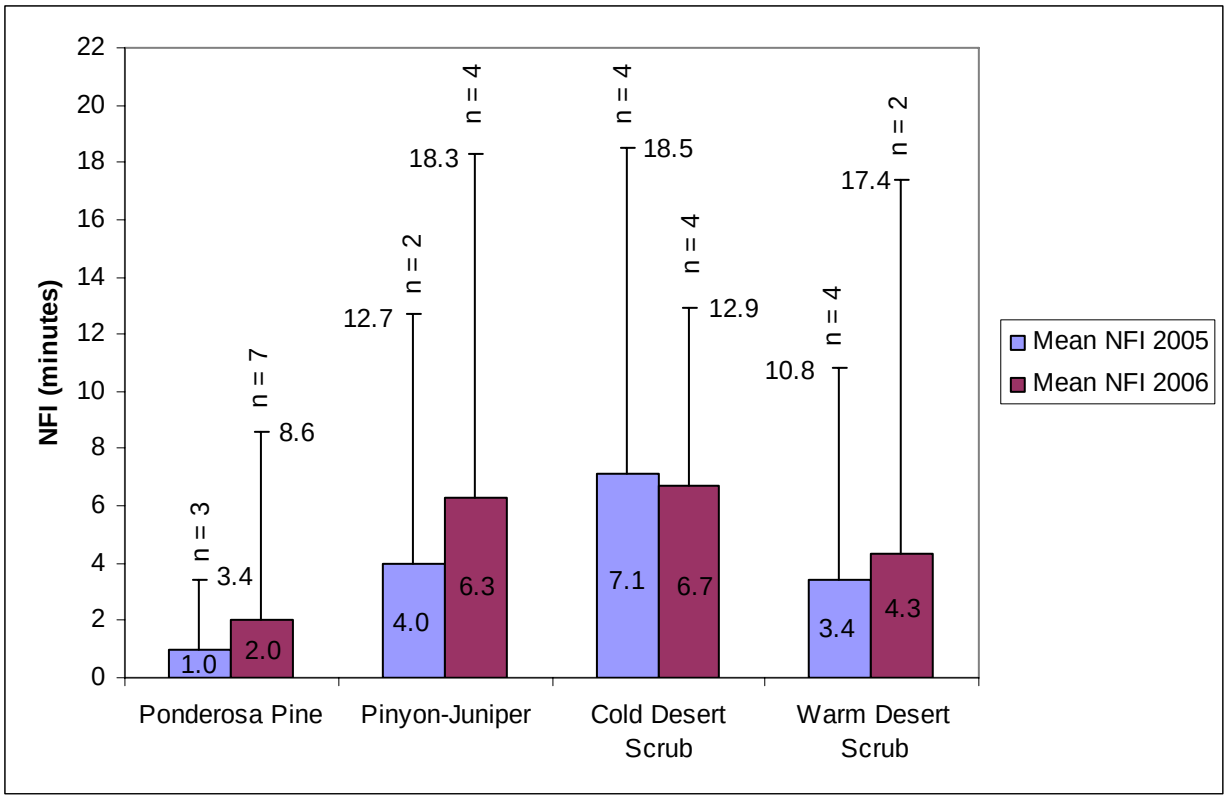

Figure 3. Mean and maximum Noise Free Interval (NFI) for the months of July and August 2005 and 2006. Mean NFI values are indicated by columns and maximum NFI values are signified by the bars and number of samples (n) are shown at the top of each data column.

The 24 hour SPL data show a slightly different trend (Table 9). The L_{50} values range from 19.0 dBA to 26.7 dBA. The Ponderosa Pine, Pinyon-Juniper and Cold Desert Scrub sites all have similar SPL values between the original and replicate sites. The median SPL data at the Warm Desert Scrub sites is ~7 dBA louder in 2006.

Table 6. Exceedence values (the *x* in L_x) for daytime (0700-1900) and nighttime hours (1900-0700) for July and August, summer 2006 and summer 2005 (in parentheses).

Site	**July Daytime**	**July Nighttime**	**August Daytime**	**August Nighttime**
Ponderosa Pine	64 (69)	56 (75)	70 (79)	58 (75)
Pinyon-Juniper*	(72)	(61)	(79)	(64)
Cold Desert	70 (64)	59 (57)	73 (75)	58 (63)
Warm Desert	70 (61)	59 (54)	68 (72)	59 (62)

* No recordings available for the 2006 Pinyon-Juniper site due to microphone cord problems, therefore Lx could not be calculated.

Table 7. SPL data for daytime hours (0700-1900), summer 2006 and summer 2005 (in parentheses).

Site	**L_{50} dBA**	**L_{90} dBA**	**L_{nat} dBA**
Ponderosa Pine	24.7 (31.3)	20.8 (25.3)	22.8 (28.3)
Pinyon-Juniper*	24.0 (22.5)	18.5 (19.0)	* (20.0)
Cold Desert	20.9 (19.7)	18.2 (16.6)	19.1 (17.8)
Warm Desert	37.7 (19.3)	24.0 (17.0)	31.9 (18.2)

* No recordings available for the 2006 Pinyon-Juniper site due to microphone cord problems, therefore L_{nat} could not be calculated.

Table 8. SPL data for nighttime hours (1900-0700), summer 2006 and summer 2005 (in parentheses).

Site	**L_{50} dBA**	**L_{90} dBA**	**L_{nat} dBA**
Ponderosa Pine	26.1 (19.2)	21.7 (17.4)	25.1 (17.9)
Pinyon-Juniper	18.0 (18.2)	16.1 (17.2)	* (17.7)
Cold Desert	21.5 (17.9)	19.0 (15.7)	21.0 (17.1)
Warm Desert	21.1 (21.5)	18.7 (18.3)	20.5 (21.1)

* No recordings available for the 2006 Pinyon-Juniper site due to microphone cord problems, therefore L_{nat} could not be calculated.

Table 9. SPL data for all hours (0000-2400), summer 2006 and summer 2005 (in parentheses).

Site	**L_{50} dBA**	**L_{90} dBA**
Ponderosa Pine	24.9 (25.0)	21.0 (20.9)
Pinyon-Juniper	21.2 (21.0)	17.4 (18.2)
Cold Desert	21.0 (19.0)	18.3 (16.3)
Warm Desert	26.7 (20.0)	20.3 (17.2)

The SPL data from the sites that best represent the vegetation type's natural ambient values show as much as a 10 dBA variation on an hourly basis. The replicate Ponderosa Pine site has the most hourly variability (Figure 4). The steady increase in sound levels starting at 4 am can be attributed to birds and other diurnal animals. These sound levels peak at 3 pm when monsoonal activity (thunder and heavy rain) is common during the summer. The large increase in sound levels at the 6 pm hour at this site can be attributed to crickets and other loud insects.

The Pinyon-Juniper site shows less hourly variability, but still shows the increase in sound levels starting in the early morning hours, peaking during the late afternoon hours during monsoonal activity (Figure 5). The peak sound levels at 8 pm are associated with thunderstorm activity.

The Cold Desert sound levels (averaged from the original and replicate sites; Figure 6) and those of the Warm Desert Scrub site (Figure 7) have less hour-to-hour variability than the other representative sites. There is still an increase in sound levels in the early morning hours due to bird and animal activity. This peaks in the afternoon when monsoonal activity occurs. After a decrease in sound levels during the early evening hours, they rise again between 7 pm and 8 pm due to cricket and nocturnal animal activity.

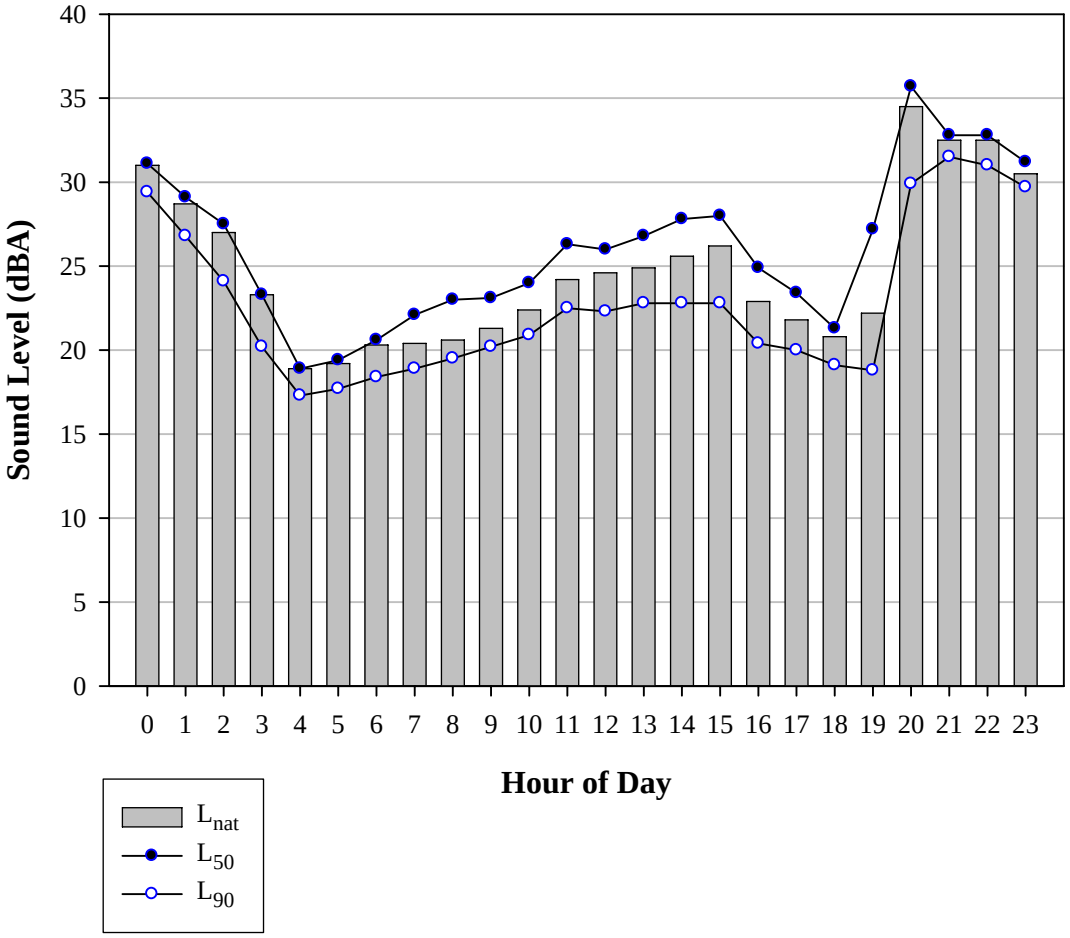

Figure 4. Hourly Sound Levels (dBA), Grand Canyon National Park, Ponderosa Pine (GRCA015), 7-01-2006 to 8-29-2006 (n=1077).

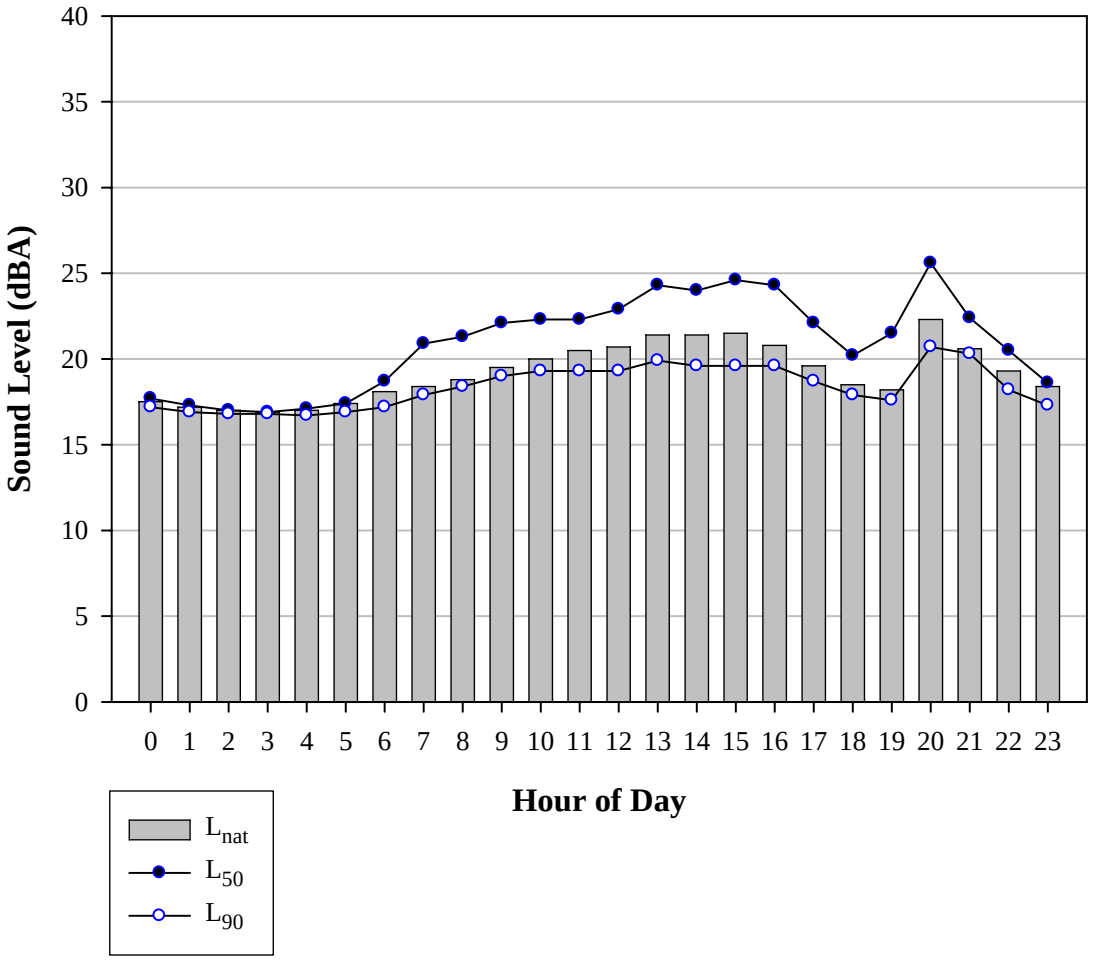

Figure 5. Hourly Sound Levels (dBA), Grand Canyon National Park, Pinyon-Juniper (GRCA008), 7-01-2005 to 8-31-2005 (n=1458).

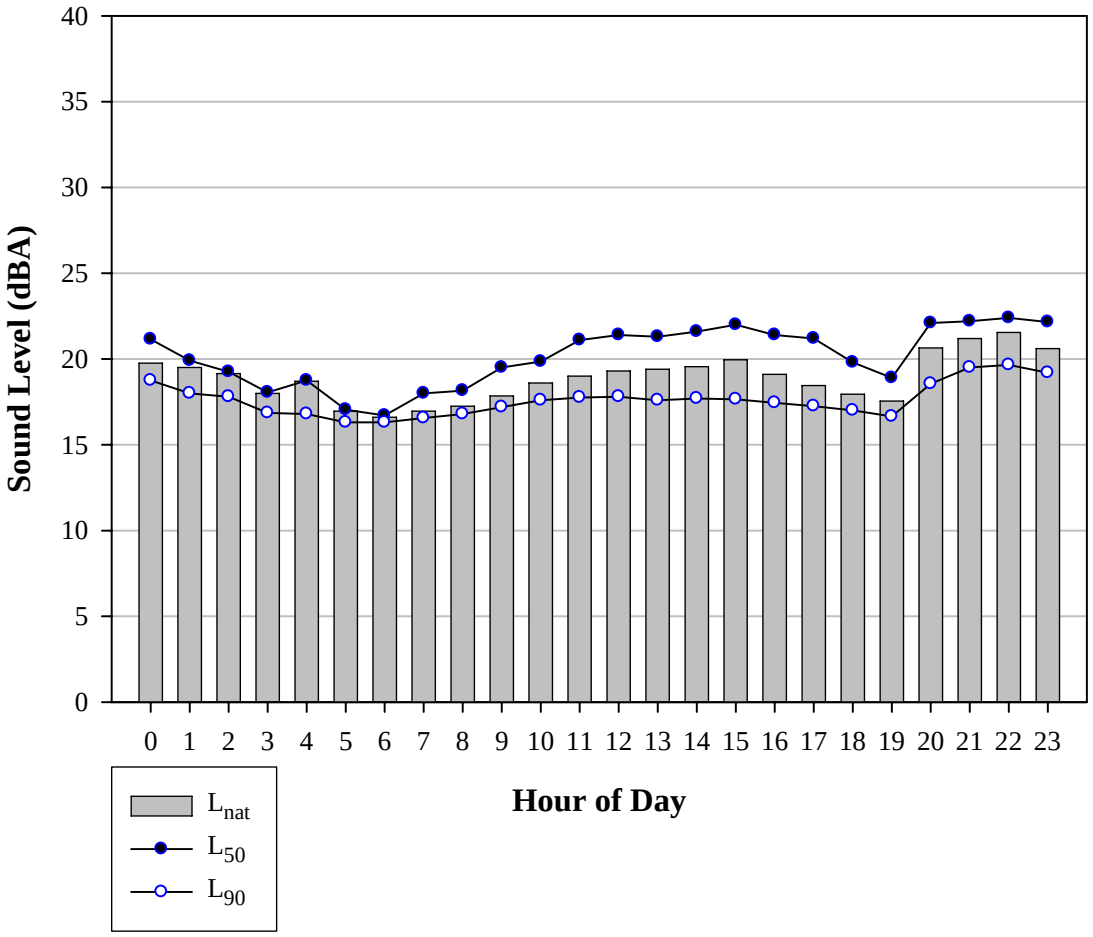

Figure 6. Hourly Sound Levels (dBA), Grand Canyon National Park, Cold Desert Scrub (GRCA010 and GRCA017), 7-01-2005 to 8-27-2005 and 7-01-2006 to 8-29-2006 (n=2804).

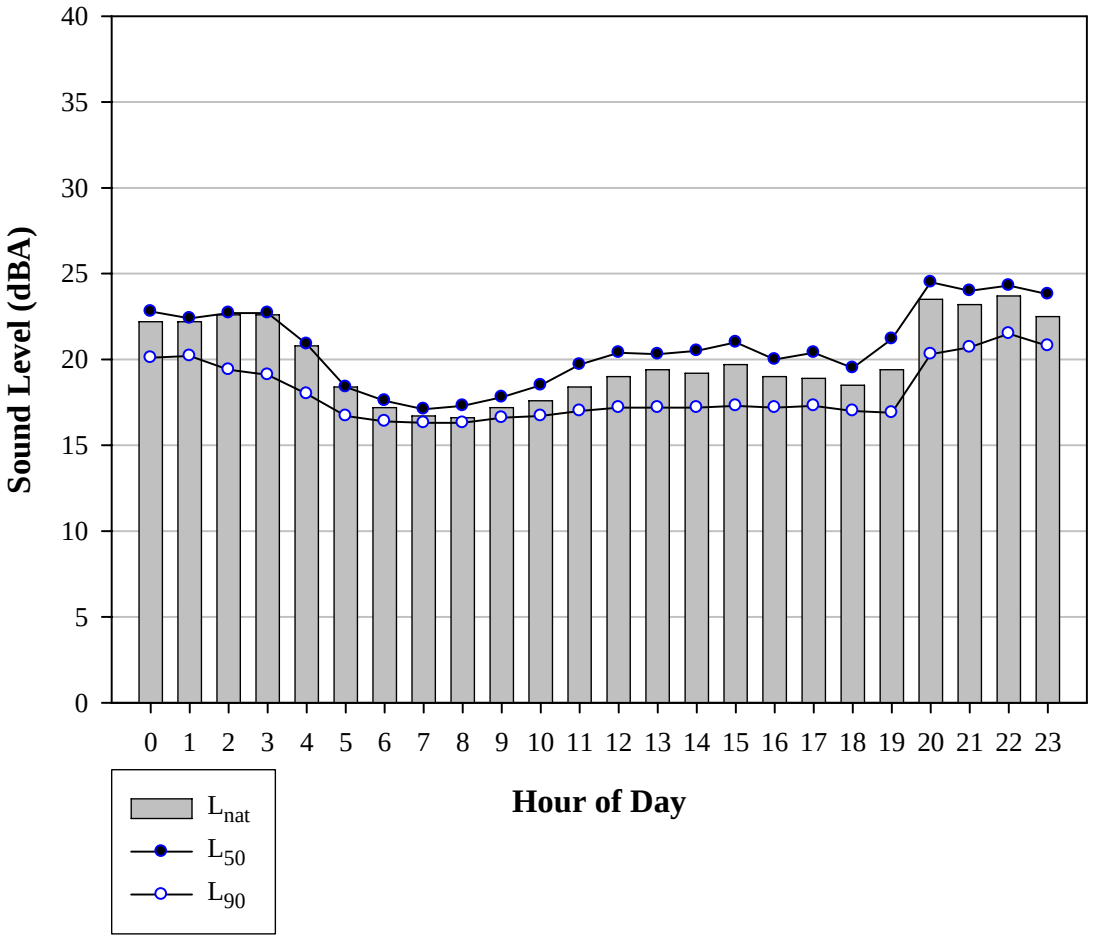

Figure 7. Hourly Sound Levels (dBA), Grand Canyon National Park, Warm Desert Scrub (GRCA009), 7-01-2005 to 8-31-2005 (n=1014).

Discussion

Non-natural sounds (propeller planes, helicopters, vehicles, trains, and motor sounds) were more prevalent at the 2005 Ponderosa Pine site than the 2006 site. The 2005 site was at least 5 dBA louder during daytime hours than the 2006 site. The discrepancy in SPL values between the two Ponderosa Pine sites is most likely due to the proximity of the 2005 site to the developed area of the South Rim. Despite every attempt to locate the site away from human noise, ponderosa pine on the South Rim occurs only near developed areas. The replicate site on the North Rim was located far from human development and air tour routes, and is probably a better site for capturing mostly natural sounds. Therefore the daytime L_{nat} of 22.8 dBA from the 2006 Ponderosa Pine site is most likely representative of the vegetation type than that of the original, 2005 site.

The Pinyon-Juniper sites had similar SPL values (L_{50} and L_{90}), although the L_{nat} could not be calculated for the 2006 site because there were no recordings. As a result the daytime natural ambient from the 2005 Pinyon-Juniper site of 20.0 dBA should be used.

The Cold Desert Scrub 2005 and 2006 sites were good replicates of each other. The daytime SPL values (L_{50}, L_{90}, L_{nat}) from 2005 to 2006 were all within 2 dBA of each other. The average of the two daytime Cold Desert Scrub L_{nat} values is 18.5 dBA.

The Warm Desert Scrub 2005 and 2006 sites had the largest difference between the daytime SPL values. The 2006 replicate site was considerably louder (7 to 18 dBA), most likely due to the cicadas and the August 11th flash flood in Separation Canyon. Because of these factors, the 2005 L_{nat} of 18.2 dBA should be used.

Of the four vegetation types, the Pinyon-Juniper and Cold Desert Scrub original and replicate sites had the most similar natural ambient sound levels. The proximity of the 2005 Ponderosa Pine site to the South Rim developed area made the 2006 site more representative of the sound levels in the Ponderosa Pine vegetation type. Conversely, the abundance of loud natural sounds (cicadas and a flash flood) at the 2006 Warm Desert Scrub site indicates that the original 2005 Warm Desert Scrub site has sound levels more characteristic of the vegetation type. The recommended natural ambient values to be used in future studies are listed in Table 10.

Table 10. Natural ambient (L_{nat}) sound pressure levels in dBA for the four main vegetation types.

Ponderosa Pine	Pinyon-Juniper	Cold Desert Scrub	Warm Desert Scrub
22.8	20.0	18.5	18.2

Ideally, natural ambient sound levels would be determined with data from several sites in each the four main vegetation types running concurrently. However, lack of equipment and personnel limited data collection to two different sites per vegetation type over a two year period. This introduces a temporal variation that makes comparison between the original and replicate sites difficult. The limited sample size per vegetation type makes characterization of the vegetation type difficult.

To pin down the causes of differences between the original and replicate sites, more natural ambient data collection would be helpful. In addition, low-noise microphones to capture the low sound levels in the backcountry would provide more accuracy and confidence in the measurements.

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Appendix.

Ponderosa Pine site, July 1-7, 2005 and August 13-15, 18, 25-27, 2005, 0700-1900, percent time all sounds audible.

	Date														
Sound Source	**7/1**	**7/2**	**7/3**	**7/4**	**7/5**	**7/6**	**7/7**	**8/13**	**8/14**	**8/15**	**8/18**	**8/25**	**8/26**	**8/27**	**Mean**
No Sound Audible	0	0	0	0.3	0	0	0	0	0	0	0	0	0	0	<0.1
Aircraft, Unknown Type	0	3.9	3.6	3.9	2.5	5.8	5.3	7.8	6.1	8.6	9.7	3.6	5.8	3.9	5.1
Aircraft, Jet	30.8	9.2	13.3	17.2	6.9	10.8	12.5	17.8	38.1	39.7	26.1	32.8	22.2	27.5	21.8
Aircraft, Propeller	3.9	3.6	2.8	1.9	1.1	1.1	1.1	8.1	10.6	8.3	5.6	7.8	4.7	3.1	4.5
Aircraft, Helicopter	1.9	0	3.3	1.1	0.6	0.8	1.4	16.7	5.3	23.3	8.3	6.9	5.0	2.2	5.5
Vehicle	2.2	1.7	0.8	0.8	0	0.8	0.8	6.9	3.1	1.1	3.6	8.9	5.0	10.6	3.3
Train	0	0	0	0	0	0	0	0	0	0.6	0	0	0.3	0.3	0.2
Motor Sounds	28.6	13.9	12.2	16.1	11.1	11.9	10.8	1.7	0.8	0.8	0.3	0	0.8	1.9	7.9
People	0	0	0.8	0	0	0	0	0.0	2.2	0	0	0	0	0	0.2
Non-natural Other	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
Wind	60.3	86.4	81.7	71.9	86.1	88.1	89.4	84.2	73.9	39.4	90.6	88.1	86.4	82.2	79.2
Water Sounds	0.3	0	0	0	0	0	0	13.3	1.9	0.6	1.7	0	0	0	1.3
Thunder	0	0	0	0	0	0	0	18.6	5.6	4.2	1.9	0	0	0	4.3
Mammal	0	0	0	0	0	0	0	0	0	0.3	0	2.5	1.1	5.0	1.3
Bird	81.4	73.6	88.6	86.9	66.7	73.3	74.2	92.5	92.5	92.5	92.5	92.5	94.4	86.1	0
Amphibian	0	0	0	0	0	0	0	0	0	0	0	0	0	0	85.7
Insect	7.8	1.9	3.3	3.9	6.4	1.4	1.7	1.9	12.8	2.2	1.9	12.5	17.2	19.7	0
Animal	0.3	0	1.1	0	0.3	0.6	1.4	0	0	0	0	0.6	0.3	0.8	6.8
Natural Other	0.6	0.8	0.3	0	0.6	1.9	0.6	0	0	0	0	0	0	0	0.4
Natural Unknown	0	0	0	0	0	0	0	0	0	0	0	0.3	0.3	0.3	0.7
Artifact	0	0.3	0	0	0	0	0	0	0	0	0	0.3	0.8	0	0.1
Unknown	0	0	0	0	0	0	0	0	0	0	0.3	0	0	0	0.1

Ponderosa Pine Replicate site, July 7-14 and August 2-8, 2006, 0700-1900, percent time all sounds audible.

	Date														
Sound Source	**7/8**	**7/9**	**7/10**	**7/11**	**7/12**	**7/13**	**7/14**	**8/2**	**8/3**	**8/4**	**8/5**	**8/6**	**8/7**	**8/8**	**Mean**
No Sound Audible	0	0.3	0	0	0	0	0	0	0	0	0	0	0	0	0
Aircraft, Unknown Type	1.7	0.8	0.8	0.6	0.0	0.8	2.8	2.5	0.3	1.1	0.6	1.4	1.4	0	1.1
Aircraft, Jet	27.2	34.7	25.3	23.9	9.7	21.4	31.1	33.9	31.4	38.1	41.1	33.9	41.7	33.1	30.5
Aircraft, Propeller	3.3	4.4	2.2	0.8	1.4	3.1	2.2	3.9	3.1	2.8	6.1	5.6	3.1	2.2	3.2
Aircraft, Helicopter	1.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1
Vehicle	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Train	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
People	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
Non-natural Unknown	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Wind	45.6	41.7	68.6	64.7	100.0	78.9	50.6	50.8	58.1	36.1	43.3	58.9	69.4	61.1	59.1
Water Sounds	9.2	13.3	1.7	2.8	0	0	0.3	0	0	27.8	0	0	0.6	0	4.0
Thunder	2.5	10.0	0.3	0	0	0	0	0	0	5.3	0	0	0	0	1.3
Mammal	3.1	1.4	0	0	0.8	1.1	0.6	0	0	0	0	0	0	0	0.5
Bird	96.4	89.7	92.2	94.7	79.7	94.7	96.1	98.6	96.9	97.8	96.1	97.5	97.5	91.9	94.3
Amphibian	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Insect	18.1	43.3	36.1	28.1	2.5	21.4	32.8	12.5	20.0	8.1	13.9	26.7	20.3	30.8	22.5
Animal	0	0.6	0.6	1.1	0	0.6	2.5	0	0	0.3	0	0	0	0.3	0.4
Natural Other	0	0	0	0	0	0	0	0	0	0	0	0.3	0	0	0
Natural Unknown	0.8	0.6	0.8	0.6	1.9	0	0.6	0.6	0.6	0	0.3	.0	0.3	0	0.5
Artifact	0.8	0.3	1.9	0	3.1	0.6	0	1.9	0.8	3.9	56.4	5.6	1.1	0.3	5.5
Unknown	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Pinyon-Juniper site, July 8-14 and August 6-12, 2005, 0700-1900, percent time all sounds audible.

	Date														
Sound Source	**7/8**	**7/9**	**7/10**	**7/11**	**7/12**	**7/13**	**7/14**	**8/6**	**8/7**	**8/8**	**8/9**	**8/10**	**8/11**	**8/12**	**Mean**
No Sound Audible	0.3	1.1	1.4	1.9	1.9	0.6	0.6	0	0	0	0	1.4	0.3	0	0.7
Aircraft, Unknown Type	2.5	3.1	4.2	2.8	2.2	3.1	5.3	2.5	1.4	1.7	5.0	6.1	5.8	1.1	3.3
Aircraft, Jet	35.0	28.9	30.8	33.6	34.2	43.1	46.1	48.6	49.4	55.3	45.8	58.3	46.4	45.8	43.0
Aircraft, Propeller	1.1	1.9	0.8	0.8	1.7	0.3	0.6	4.7	4.7	2.8	3.3	5.6	1.4	3.9	2.4
Aircraft, Helicopter	0	0	0.3	0	0	0.8	0	0	0	1.4	6.9	0.3	2.2	0	0.9
Vehicle	0.8	1.1	0	1.7	0.3	0	0	0.8	0.3	0	1.4	0	0	0	0.5
Train	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Motor Sounds	1.4	0.6	3.3	4.2	3.1	3.6	6.1	1.7	0	0	0.3	0.6	0	0	1.8
People	4.4	2.8	0	0	0	0	0	0	0	0	0	0	0	0	0.5
Non-natural Other	0	0.8	0	0	0	0	0	0	0	0	0	0	0	0	0.1
Non-natural Unknown	0	0	0	0	0	0	0	0	0	0	0	0.3	0	0.3	0.1
Wind	52.2	75.8	70.0	25.6	22.8	48.1	19.7	37.8	35.6	31.4	19.7	6.7	56.7	30.8	38.1
Water Sounds	0	0	0	0	0	0	0	0	0	4.2	0.8	30.3	0	13.9	7.0
Thunder	0	0	0	0	0	0	0	0	8.3	3.1	0	0.3	4.7	15.8	4.6
Mammal	1.1	0.8	3.1	5.3	4.4	0.6	6.9	0	0	0	0	0	0	0	1.6
Bird	65.8	58.1	55.0	61.9	63.3	70.0	64.7	83.6	73.3	71.4	77.5	64.4	76.4	68.1	68.1
Amphibian	0	0.8	0	0	0	0	0	0	0	0	0	0	0	0	0.1
Insect	32.2	14.2	19.7	58.1	54.4	47.8	69.4	59.7	64.7	45.8	45.0	18.9	42.2	61.1	45.3
Animal	0	1.9	0	0.6	1.9	1.9	1.1	0	0	0	0	1.1	0	0	0.6
Natural Other	0	0	0	0	0	0.8	1.1	0	0	0	0	0	0	0	0.3
Natural Unknown	0	0	0	0	0	0	0	0.3	0	0	0	0.3	0.6	0.3	0.2
Artifact	0.8	3.1	7.5	0.8	1.7	0.8	1.9	0	0	0	0	0	0	0	1.2
Unknown	1.9	5.3	3.3	4.7	5.6	9.4	6.4	0	0	0	0	0	0.3	0	2.6

Cold Desert Scrub site, July 1-7 and August 1-7, 2005, 0700-1900, percent time all sounds audible.

	Date														
Sound Source	**7/1**	**7/2**	**7/3**	**7/4**	**7/5**	**7/6**	**7/7**	**8/1**	**8/2**	**8/3**	**8/4**	**8/5**	**8/6**	**8/7**	**Mean**
No Sound Audible	1.1	0.6	0	0	0	0	0	0.8	0.6	2.5	0.6	0.6	3.3	1.4	0.8
Aircraft, Unknown Type	1.9	0	5.3	3.9	4.4	2.5	5.3	2.8	2.5	1.4	1.9	6.7	2.2	3.6	3.2
Aircraft, Jet	26.9	22.2	16.9	23.6	21.1	24.4	23.1	52.8	46.4	42.5	43.1	43.9	40.6	42.2	33.5
Aircraft, Propeller	3.9	1.1	0.8	0.3	0.8	0.3	1.1	5.6	4.7	2.8	4.4	3.1	1.9	3.6	2.5
Aircraft, Helicopter	0	0	0	0	0	0.3	0	0	0	0	0	0	0	0	0
Vehicle	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0
Train	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Motor Sounds	2.5	2.8	2.2	1.4	0.6	0.3	0.8	0	0	0	0	0	0	0	0.8
People	0	0	0	0	0	0	0	0.8	0.6	2.5	0.6	0.6	3.3	1.4	0
Non-natural Other	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
Wind	41.7	70.8	63.1	48.9	53.3	55.8	56.1	20.6	41.1	13.6	3.3	21.7	33.6	16.1	38.6
Water Sounds	0	0	0	0	0	0	0	4.7	26.1	17.2	22.5	23.1	0.0	0.8	13.5
Thunder	0	0	0	0	0	0	0	0	14.2	14.7	10.0	15.0	3.1	4.4	8.8
Mammal	0	0	0	0	0	0	0	0	0	0	0.3	0.8	0	0	0.2
Bird	50.3	54.7	55.6	56.7	54.7	53.9	41.9	47.5	52.8	40.3	53.1	50.6	49.4	37.8	49.9
Amphibian	0	0	0	0	0	0	0	0	0	0	0	0.6	0	0	0.1
Insect	86.1	57.5	76.7	90.3	84.2	84.4	82.5	46.1	28.9	42.5	41.9	40.0	55.8	58.6	62.5
Animal	2.2	1.7	3.3	3.3	6.7	7.5	3.6	0.6	0.3	0.8	0.3	0.0	0.8	0.8	2.3
Natural Other	1.4	2.8	1.7	1.1	1.7	1.7	3.1	0	0	0	0	0	0	0	1.9
Natural Unknown	0	0	0	0	0	0	0	0.8	0.3	1.1	0.3	0.3	0	0	0.4
Artifact	3.6	16.4	6.9	2.5	6.4	6.7	8.9	0	8.1	2.2	3.1	1.7	3.6	0.6	5.0
Unknown	5.8	2.8	4.4	3.9	2.5	7.2	3.3	0.3	0	0	0	0	0	0	2.2

Cold Desert Scrub Replicate site, July 4-10 and August 1-7, 2006, 0700-1900, percent time all sounds audible.

	Date														
Sound Source	**7/4**	**7/5**	**7/6**	**7/7**	**7/8**	**7/9**	**7/10**	**8/1**	**8/2**	**8/3**	**8/4**	**8/5**	**8/6**	**8/7**	**Mean**
No Sound Audible	0.0	0.6	0.0	0.3	0.0	0.3	0.8	1.9	5.8	4.4	3.3	4.2	3.9	2.8	2.0
Aircraft, Unknown Type	0.0	1.7	0.3	0.6	1.9	1.9	2.8	1.4	0.8	0.6	1.4	1.1	1.1	1.4	1.2
Aircraft, Jet	34.4	44.7	25.6	36.7	31.9	40.0	41.9	36.7	45.0	39.2	44.7	33.6	47.5	46.7	39.2
Aircraft, Propeller	1.4	2.2	3.6	1.4	3.1	2.2	4.7	1.7	2.8	1.4	1.9	4.2	3.6	1.7	2.6
Aircraft, Helicopter	0.8	0.0	0.0	1.1	0.0	0.0	0.3	0	0	0	0	0	0	0	0.2
Vehicle	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Train	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	0.8	0	0.6	0.3	0.6	0	0.2
People	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
Non-natural Unknown	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Wind	61.1	42.8	52.8	29.2	38.6	34.2	13.3	57.5	25.8	38.9	41.4	53.6	37.2	46.9	41.0
Water Sounds	5.0	0.0	16.1	7.2	0.6	4.4	4.7	7.2	0	0	9.7	0	0	0.3	3.9
Thunder	0.3	0.0	11.1	7.8	2.8	5.8	2.5	0.8	0	0	1.4	0	0	0	2.3
Mammal	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0	0	0	0	0	0	0	0
Bird	94.2	87.5	79.7	94.2	84.7	69.7	77.5	42.8	48.1	24.2	54.2	32.2	20.0	21.4	59.3
Amphibian	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Insect	25.3	28.9	23.6	17.8	37.8	45.0	29.4	18.6	45.6	46.9	5.6	36.4	38.1	36.4	31.1
Animal	0	0	0	0	0	0	0	0.3	1.1	0.0	0.0	0.3	0.6	1.1	0.2
Natural Other	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Natural Unknown	0.3	0.0	0.6	0.0	0.0	0.3	0.3	0	0	0	0	0.8	0.6	0	0.2
Artifact	1.4	4.7	6.4	2.5	2.5	3.6	0.8	15.6	2.2	3.9	4.7	10.6	3.1	3.3	4.7
Unknown	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0	0	0	0	0	0	0	0

Warm Desert Scrub site, July 1-7 and August 1-7, 2005, 0700-1900, percent time all sounds audible.

	Date														
Sound Source	**7/1**	**7/2**	**7/3**	**7/4**	**7/5**	**7/6**	**7/7**	**8/1**	**8/2**	**8/3**	**8/4**	**8/5**	**8/6**	**8/7**	**Mean**
No Sound Audible	1.1	0.3	0.8	1.7	0.3	1.1	0.8	3.1	1.1	2.5	1.4	0.8	0	0	1.1
Aircraft, Unknown Type	5.6	1.4	5.3	4.4	6.9	0.8	0.6	1.1	4.2	3.1	2.5	4.4	0.8	2.8	3.1
Aircraft, Jet	10.0	7.5	12.2	6.7	8.1	13.3	7.8	46.4	23.9	37.8	37.2	35.0	29.7	34.2	22.1
Aircraft, Propeller	7.8	3.9	9.7	9.2	10.0	7.8	14.2	6.4	5.3	3.9	6.1	6.4	11.1	5.8	7.7
Aircraft, Helicopter	1.1	0	0.3	0	1.1	0	0	0.6	0	0	0	0	0	0	0.2
Vehicle	0	0.3	0	0.3	0	0	0	0	0	0	0	0	0	0	0.1
Train	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Motor Sounds	0.8	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1
People	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	0.2
Non-natural Unknown	0	0	0	0	0	0	0	0	0	0.6	0	0	0	0.6	0
Wind	60.6	79.7	62.5	75.3	80.3	76.7	78.1	36.7	45.0	43.3	23.6	40.6	55.0	48.3	57.5
Water Sounds	0	0	0	0	0	0	0	0	19.2	5.8	20.8	10.3	0.3	0	8.1
Thunder	0	0	0	0	0	0	0	0.3	27.5	9.7	9.4	15.3	4.7	2.5	5.0
Mammal	0.3	0	0.3	0	0.3	0.6	0	0	0	0	0	0	0	0	0.1
Bird	11.9	25	29.4	18.3	33.9	31.1	16.7	21.9	32.2	27.5	25.3	32.8	27.8	31.7	26.1
Amphibian	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Insect	65.6	45.3	60.8	56.9	54.7	44.7	54.2	41.1	33.9	50.0	53.3	35.0	57.2	60.0	50.9
Animal	6.7	12.5	10.8	8.6	7.2	6.7	5.3	1.9	0.6	1.7	0.8	0	0.8	0.3	4.6
Natural Other	6.4	3.1	0.3	1.9	0	0	0	0	0	0	0	0	0	0	1.7
Natural Unknown	0	0	0	0	0	0	0	0.8	0	0	0.8	0.3	0	0	0.3
Artifact	0	3.6	0	0	1.4	0.8	1.1	0	4.4	5.3	3.3	5.3	3.3	0.6	2.1
Unknown	0.6	0	0	0	0.3	0	0	0	0	0	0	0	0	0	0.1

Warm Desert Scrub Replicate site, July 1-7 and August 1-7, 2006, 0700-1900, percent time all sounds audible.

	Date														
Sound Source	**7/1**	**7/2**	**7/3**	**7/4**	**7/5**	**7/6**	**7/7**	**8/1**	**8/2**	**8/3**	**8/4**	**8/5**	**8/6**	**8/7**	**Mean**
No Sound Audible	0	0	0	0	0	0	0.3	0	0	0	0	0	0	0	0
Aircraft, Unknown Type	2.5	3.3	3.3	1.4	2.2	1.9	1.4	1.4	1.7	3.3	4.7	1.7	1.1	0.6	2.2
Aircraft, Jet	35.6	36.4	35.0	33.6	32.8	37.2	30.8	33.6	33.3	26.7	35.0	24.4	35.6	27.5	32.7
Aircraft, Propeller	3.6	1.9	5.0	2.2	2.8	3.3	3.9	3.1	4.7	2.8	5.6	2.5	4.2	2.2	3.4
Aircraft, Helicopter	1.4	0	0	0	0.6	0	0	0	0	0	0	0	0	0	0.1
Vehicle	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Train	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
People	0	0	0	0	0	0	0	0	0	0	1.1	0	0	0	0.1
Non-natural Other	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
Wind	14.2	36.7	4.4	18.1	4.2	33.9	25.0	31.9	25.0	25.6	18.1	16.4	13.3	36.9	21.7
Water Sounds	2.5	1.1	0.8	26.4	0.3	5.0	0.3	0.3	0.3	4.2	11.1	0.8	3.1	0	4.0
Thunder	0.6	0.3	0	0.8	0	6.7	0.3	0	0	0	0	0	0	0	0.6
Mammal	0	1.7	0	0	0	0.3	0	0	0	0	0	0	0	0	0.1
Bird	83.6	58.9	88.9	85.3	96.9	89.4	83.9	65.3	50.0	32.8	75.0	39.2	30.3	30.3	65.0
Amphibian	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Insect	65.8	62.5	61.1	42.5	86.9	61.1	51.7	88.6	98.6	96.4	81.4	97.2	93.6	93.9	77.2
Animal	0	0	0	0	1.9	0	2.2	1.1	0.3	0	0.8	0.3	0.3	0.3	0.5
Natural Other	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Natural Unknown	1.4	1.1	0.8	2.5	2.5	0.8	0.8	0.8	0.6	1.1	0	0.3	1.1	0.6	1.0
Artifact	1.4	3.3	0	0.6	0.3	2.8	1.7	1.7	1.4	0.6	1.1	0	0.3	2.2	1.2
Unknown	0	0	0	0	0	0	0	0.6	0	0.3	0	0	0	0	0.1

Ponderosa Pine, July 1- 17, and 28-30, August 13-15, 18, 25-29, 2005, 0700-1900, median hourly dBA and one-third octave band dB (12.5-20,000 Hz; n = 344 hours).

Frequency	L_{min}	L_{max}	L_{eq}	L_{10}	L_{50}	L_{90}	L_{Nat}
dBA	16.8	92.1	35.5	38.2	31.5	25.3	28.5
12.5	5.6	80.3	43.5	45.8	37.1	32.2	35.1
16	8.9	80.6	40.5	42.6	35.4	31.1	33.6
20	10.1	80.0	40.0	41.8	34.8	30.7	33.0
25	10.3	81.6	37.8	40.0	34.0	29.7	32.1
31.5	10.7	84.6	36.9	39.5	33.3	28.4	31.1
40	9.5	83.3	36.2	38.9	32.7	27.7	30.3
50	7.7	84.6	35.6	38.5	32.1	26.5	29.3
63	7.9	83.8	34.9	37.5	31.5	26.5	29.0
80	6.3	84.1	34.0	36.1	30.4	25.8	28.2
100	1.4	84.0	33.6	35.3	28.5	23.2	25.6
125	1.6	83.1	33.7	35.9	26.5	21.1	23.7
160	0.1	82.2	32.0	34.9	24.1	18.8	21.2
200	-0.9	83.2	29.3	32.4	23.5	17.6	20.8
250	-0.6	84.1	29.3	31.4	24.9	18.5	21.9
315	0.0	84.3	29.4	31.8	25.9	19.4	23.0
400	1.9	85.4	30.4	32.9	26.7	19.8	23.7
500	2.0	85.2	30.1	33.1	26.7	19.1	23.3
630	1.7	84.4	29.3	32.7	25.2	17.5	21.7
800	1.5	84.0	27.7	31.1	22.8	15.0	18.9
1000	1.4	83.3	25.3	28.2	19.1	11.6	15.2
1250	2.1	81.5	21.9	24.4	14.9	8.2	11.3
1600	2.7	81.0	17.9	20.1	11.0	5.9	8.1
2000	3.2	79.7	14.5	17.0	8.6	5.2	6.6
2500	3.6	77.2	14.6	16.3	8.3	5.4	6.4
3150	4.3	75.3	13.2	15.1	7.8	5.7	6.3
4000	4.9	73.0	14.3	15.3	7.6	6.0	6.5
5000	5.3	71.3	11.9	12.1	6.8	6.2	6.4
6300	5.4	68.9	8.3	8.6	6.7	6.3	6.5
8000	5.5	66.5	7.7	7.9	6.8	6.5	6.6
10000	4.9	64.2	6.8	7.0	6.5	6.3	6.4
12500	3.4	61.8	6.1	6.2	5.8	5.7	5.8
16000	2.1	59.0	5.3	5.4	4.9	4.8	4.8
20000	1.3	56.3	3.7	3.8	3.6	3.4	3.5

Ponderosa Pine, July 1- 17, and 28-30, August 13-15, 18, 25-29, 2005, 1900-0700, median hourly dBA and one-third octave band dB (12.5-20,000 Hz; n = 348 hours).

Frequency	L_{min}	L_{max}	L_{eq}	L_{10}	L_{50}	L_{90}	L_{Nat}
dBA	15.5	77.5	24.4	25.0	19.2	17.4	17.9
12.5	2.1	71.5	31.7	34.1	30.4	26.8	28.6
16	2.8	72.7	30.3	32.7	28.2	24.8	26.5
20	0.6	72.8	29.7	32.0	27.4	24.0	25.4
25	1.0	74.9	29.2	31.8	25.9	22.1	23.7
31.5	0.1	75.7	29.7	32.9	26.1	21.5	23.3
40	-2.7	75.8	31.2	34.5	27.0	20.7	23.0
50	-1.7	79.2	29.4	32.9	25.0	19.6	21.8
63	-1.5	78.4	28.5	31.8	24.5	18.9	20.8
80	-2.3	81.5	27.0	30.2	23.5	18.5	20.1
100	-3.7	79.8	25.6	27.1	18.5	13.5	15.2
125	-3.6	81.0	26.4	25.9	17.3	12.6	14.6
160	-4.6	78.5	25.0	23.8	12.2	8.2	9.7
200	-4.7	74.4	21.5	21.2	10.3	5.9	7.3
250	-4.2	78.2	21.5	20.0	10.9	6.2	7.8
315	-3.6	73.1	19.8	18.8	10.6	6.0	7.5
400	-3.0	74.7	18.5	17.4	9.8	5.5	7.0
500	-2.8	71.8	15.0	15.3	8.4	4.4	5.7
630	-2.2	70.1	11.5	12.5	6.5	3.2	4.4
800	-1.4	67.5	8.1	9.8	4.7	2.1	3.0
1000	-0.5	64.4	5.4	6.4	3.2	1.6	2.1
1250	0.4	58.2	4.1	4.9	2.6	1.9	2.2
1600	1.3	68.4	4.1	4.7	3.2	2.6	2.8
2000	2.4	71.2	4.9	5.0	3.8	3.4	3.5
2500	3.0	65.1	4.6	4.7	4.3	4.0	4.1
3150	3.9	55.6	5.0	5.2	5.0	4.7	4.8
4000	4.7	53.7	5.6	5.7	5.5	5.3	5.4
5000	5.0	57.5	6.0	6.1	5.9	5.7	5.8
6300	5.3	58.3	6.3	6.4	6.2	6.1	6.1
8000	5.5	54.4	6.7	6.8	6.4	6.3	6.3
10000	4.9	54.5	6.5	6.5	6.2	6.1	6.2
12500	3.4	55.0	5.7	5.7	5.6	5.5	5.5
16000	2.0	64.1	4.9	5.0	4.6	4.5	4.6
20000	1.2	61.3	3.5	3.5	3.3	3.2	3.3

Ponderosa Pine, July 1- 17, and 28-30, August 13-15, 18, 25-29, 2005, 0000-2400, median hourly dBA and one-third octave band dB (12.5-20,000 Hz; n = 692 hours).

Frequency	L_{min}	L_{max}	L_{eq}	L_{10}	L_{50}	L_{90}
dBA	15.5	92.1	30.4	32.9	25.0	20.9
12.5	2.1	80.3	35.8	38.0	32.6	28.2
16	2.8	80.6	34.6	36.9	31.2	27.1
20	0.6	80.0	34.5	36.7	31.0	26.9
25	1.0	81.6	34.0	36.7	30.9	26.2
31.5	0.1	84.6	34.0	37.0	30.9	25.9
40	-2.7	83.3	34.2	37.3	30.7	25.3
50	-1.7	84.6	33.1	36.2	29.7	24.1
63	-1.5	83.8	32.5	35.5	29.4	24.0
80	-2.3	84.1	31.3	33.9	28.2	23.4
100	-3.7	84.0	30.4	32.9	25.3	20.0
125	-3.6	83.1	30.7	33.1	23.3	17.9
160	-4.6	82.2	29.3	32.3	20.3	14.4
200	-4.7	83.2	26.5	29.3	19.4	12.6
250	-4.2	84.1	27.0	28.9	19.6	12.7
315	-3.6	84.3	26.4	28.8	19.5	12.7
400	-3.0	85.4	26.1	27.7	18.8	12.3
500	-2.8	85.2	24.0	25.4	17.2	11.3
630	-2.2	84.4	21.1	22.7	15.0	9.8
800	-1.4	84.0	17.9	19.3	12.3	8.3
1000	-0.5	83.3	14.1	15.1	9.5	6.0
1250	0.4	81.5	10.8	11.5	6.8	4.5
1600	1.3	81.0	8.6	9.7	5.6	4.2
2000	2.4	79.7	9.7	11.0	5.8	4.4
2500	3.0	77.2	11.0	12.1	6.1	4.8
3150	3.9	75.3	9.9	11.2	6.2	5.3
4000	4.7	73.0	10.5	11.1	6.5	5.7
5000	5.0	71.3	8.8	9.0	6.3	5.9
6300	5.3	68.9	7.3	7.1	6.4	6.2
8000	5.5	66.5	7.1	7.1	6.6	6.4
10000	4.9	64.2	6.6	6.6	6.4	6.2
12500	3.4	61.8	5.8	5.8	5.6	5.5
16000	2.0	64.1	5.0	5.1	4.8	4.7
20000	1.2	61.3	3.5	3.5	3.3	3.3

Ponderosa Pine Replicate, July 1-18, August 2-28, 2006, 0700-1900, median hourly dBA and one-third octave band dB (12.5-20,000 Hz; n = 537 hours).

Frequency	L_{min}	L_{max}	L_{eq}	L_{10}	L_{50}	L_{90}	L_{Nat}
dBA	17.1	92.7	30.9	32.8	24.7	20.8	22.8
12.5	12.5	83.1	40.8	42.7	33.3	28.2	31.2
16	10.0	84.9	38.6	40.0	31.9	26.7	29.7
20	9.6	82.3	36.0	38.0	30.8	25.6	28.6
25	9.6	85.7	34.4	37.3	29.9	24.6	27.5
31.5	6.1	87.5	33.8	36.8	29.0	23.0	26.4
40	5.5	86.0	32.8	35.9	27.5	21.0	24.7
50	2.2	87.6	31.9	35.2	26.3	19.4	23.2
63	2.8	88.5	30.3	33.4	24.7	17.5	21.5
80	1.7	87.9	29.2	32.3	23.7	16.6	20.6
100	-0.4	87.8	29.2	31.0	21.4	14.5	18.3
125	-1.1	88.1	30.1	31.4	18.8	12.9	16.1
160	-2.1	87.5	29.7	31.4	17.8	11.9	14.9
200	-2.2	88.3	26.6	29.0	17.5	11.2	14.7
250	-1.9	87.9	27.3	28.3	18.4	11.1	15.3
315	-1.7	87.8	26.4	27.9	18.2	11.1	15.1
400	-1.3	87.1	26.6	27.2	17.5	11.3	14.7
500	-0.4	86.2	24.9	25.8	16.4	10.7	13.9
630	0.4	85.4	21.5	23.0	14.6	9.5	12.4
800	0.9	84.5	17.9	19.3	12.2	8.1	10.3
1000	2.0	83.7	13.7	16.0	10.1	7.3	8.8
1250	2.6	83.1	11.8	13.9	9.1	6.8	8.1
1600	3.4	82.3	10.3	11.9	7.9	6.2	7.1
2000	4.1	80.5	10.5	11.7	7.4	6.1	6.8
2500	4.6	78.3	11.9	13.0	7.8	6.4	7.0
3150	5.5	75.6	12.9	14.1	8.2	6.7	7.4
4000	5.9	73.1	13.9	15.7	8.3	6.9	7.4
5000	6.2	70.8	12.3	13.5	7.6	7.0	7.3
6300	6.4	68.5	9.3	9.5	7.3	7.0	7.2
8000	6.5	65.5	8.2	8.3	7.3	7.1	7.2
10000	6.4	63.0	7.6	7.7	7.2	7.0	7.1
12500	6.2	60.6	7.0	7.1	6.8	6.7	6.8
16000	5.8	57.7	6.6	6.7	6.5	6.3	6.4
20000	5.0	55.7	5.7	5.8	5.6	5.5	5.6

Ponderosa Pine Replicate, July 1-18, August 2-28, 2006, 1900-0700, median hourly dBA and one-third octave band dB (12.5-20,000 Hz; n = 540 hours).

Frequency	L_{min}	L_{max}	L_{eq}	L_{10}	L_{50}	L_{90}	L_{Nat}
dBA	16.7	72.7	29.5	31.2	26.1	21.7	25.1
12.5	5.3	82.0	29.6	31.8	27.6	23.8	27.1
16	5.5	83.5	27.9	30.2	25.2	21.4	24.5
20	3.9	84.1	27.0	30.0	23.6	19.8	23.0
25	4.0	86.7	26.9	29.7	22.1	17.9	21.3
31.5	2.4	87.0	26.7	29.8	20.3	15.5	19.1
40	1.2	83.7	26.4	29.0	18.3	13.3	17.1
50	-0.4	87.4	25.4	27.9	16.2	10.9	15.2
63	-1.5	87.4	23.5	26.4	14.2	8.8	12.8
80	-1.7	82.0	22.1	25.0	12.8	7.6	11.3
100	-2.8	79.7	21.6	22.3	11.2	5.6	9.6
125	-2.9	77.3	22.9	19.8	10.7	4.8	8.9
160	-3.9	73.2	22.5	19.3	10.1	4.1	8.4
200	-3.8	73.4	20.6	19.7	9.2	2.8	7.1
250	-3.4	71.8	21.6	20.4	9.5	2.2	6.9
315	-3.0	72.2	20.4	20.6	8.6	2.2	6.8
400	-2.4	70.4	19.9	18.8	7.2	2.2	5.8
500	-1.7	69.0	17.0	16.2	5.3	2.1	4.6
630	-0.7	66.5	12.9	12.7	4.0	2.2	3.6
800	0.2	63.2	8.7	9.1	3.6	2.3	3.3
1000	0.9	60.4	6.8	7.6	3.6	2.6	3.3
1250	2.0	57.2	6.1	7.1	3.8	3.2	3.7
1600	3.0	54.6	6.6	7.5	5.2	4.4	5.0
2000	3.8	53.2	13.6	16.6	10.2	6.1	8.7
2500	4.5	62.5	11.5	13.2	7.6	5.9	7.0
3150	5.2	54.7	7.3	7.6	6.4	6.0	6.3
4000	5.7	50.7	7.7	8.0	7.0	6.5	6.8
5000	6.0	51.0	7.8	8.1	7.0	6.7	6.9
6300	6.3	50.5	7.5	7.4	7.0	6.8	7.0
8000	6.4	47.7	7.8	7.4	7.1	6.9	7.0
10000	6.3	43.9	7.5	7.2	7.1	6.9	7.0
12500	6.2	44.6	6.9	6.8	6.6	6.5	6.6
16000	5.7	42.9	6.3	6.3	6.2	6.2	6.2
20000	5.0	43.7	5.7	5.5	5.4	5.3	5.4

Ponderosa Pine Replicate, July 1-18, August 2-28, 2006, 0000-2400, median hourly dBA and one-third octave band dB (12.5-20,000 Hz; n = 1077 hours).

Frequency	L_{min}	L_{max}	L_{eq}	L_{10}	L_{50}	L_{90}
dBA	16.7	92.7	30.4	32.3	24.9	21.0
12.5	5.3	83.1	34.4	36.3	30.3	25.9
16	5.5	84.9	32.5	34.7	28.8	24.3
20	3.9	84.1	31.6	34.3	27.7	23.1
25	4.0	86.7	31.2	34.5	26.9	21.8
31.5	2.4	87.5	31.0	34.4	26.0	19.9
40	1.2	86.0	30.4	33.9	24.4	18.0
50	-0.4	87.6	29.6	33.1	23.4	16.2
63	-1.5	88.5	27.8	31.2	21.8	14.0
80	-1.7	87.9	26.4	29.8	20.7	12.5
100	-2.8	87.8	26.6	28.3	18.3	10.7
125	-2.9	88.1	27.5	27.4	15.9	9.8
160	-3.9	87.5	26.8	27.5	14.8	9.1
200	-3.8	88.3	24.3	26.2	14.4	8.3
250	-3.4	87.9	25.3	25.9	15.5	8.2
315	-3.0	87.8	24.1	25.4	15.0	8.0
400	-2.4	87.1	24.0	24.1	14.2	7.9
500	-1.7	86.2	21.7	22.2	12.8	7.0
630	-0.7	85.4	18.1	19.0	10.7	6.2
800	0.2	84.5	14.1	15.5	8.7	5.4
1000	0.9	83.7	10.9	12.8	7.5	5.2
1250	2.0	83.1	9.8	11.8	7.3	5.2
1600	3.0	82.3	8.9	10.3	6.9	5.4
2000	3.8	80.5	11.2	12.9	7.6	6.1
2500	4.5	78.3	11.8	13.1	7.8	6.3
3150	5.2	75.6	10.8	11.7	7.5	6.5
4000	5.7	73.1	10.9	12.2	7.6	6.8
5000	6.0	70.8	10.3	10.7	7.4	6.9
6300	6.3	68.5	8.4	8.2	7.2	6.9
8000	6.4	65.5	8.0	7.8	7.2	7.0
10000	6.3	63.0	7.5	7.4	7.1	7.0
12500	6.2	60.6	7.0	6.9	6.7	6.6
16000	5.7	57.7	6.5	6.5	6.3	6.2
20000	5.0	55.7	5.7	5.7	5.5	5.4

Pinyon-Juniper, July 1- August 31, 2005, 0700-1900, median hourly dBA and one-third octave band dB (12.5-20,000 Hz; n = 726 hours).

Frequency	L_{min}	L_{max}	L_{eq}	L_{10}	L_{50}	L_{90}	L_{Nat}
dBA	16.7	89.6	29.1	31.4	22.5	19.0	20.0
12.5	11.0	84.6	40.8	41.6	33.9	29.4	31.3
15.8	10.6	84.1	38.4	39.2	31.9	27.6	29.4
20	11.8	84.6	36.5	37.8	31.2	26.7	28.5
25	8.4	87.6	35.5	37.5	30.6	25.6	27.6
31.5	4.9	88.6	34.7	37.2	29.9	24.1	26.3
40	2.1	88.4	33.6	36.4	29.0	22.4	25.1
50	2.6	88.2	33.2	36.1	28.1	20.7	23.8
63	0.1	86.5	31.8	34.6	26.5	18.8	22.1
80	-0.7	84.9	30.1	32.4	24.5	16.8	20.2
100	-2.2	84.5	29.3	31.5	22.5	14.9	18.1
125	-2.5	84.3	30.0	32.1	19.8	12.2	15.4
160	-2.7	87.5	29.7	32.4	17.2	9.3	12.4
200	-2.8	86.9	27.1	30.2	15.6	8.2	11.0
250	-3.3	84.5	26.4	28.3	14.9	6.8	9.8
315	-2.7	84.8	24.7	26.6	14.1	6.6	9.6
400	-1.9	83.9	23.6	24.9	14.1	7.5	9.9
500	-1.4	84.2	21.2	22.8	13.1	6.9	9.2
630	-0.6	81.9	18.2	20.5	11.4	6.5	8.1
800	0.4	81.9	15.4	17.7	9.7	6.0	7.2
1000	1.2	80.7	12.9	14.7	8.3	5.7	6.6
1250	2.0	79.2	10.9	12.5	7.4	5.4	6.0
1600	2.9	76.9	9.4	10.5	6.6	5.3	5.8
2000	3.7	74.2	9.1	9.9	6.3	5.5	5.7
2500	4.5	70.5	9.2	9.6	6.3	5.7	5.9
3150	5.1	68.4	9.1	9.1	6.6	6.1	6.3
4000	5.7	65.6	9.2	8.8	6.8	6.5	6.6
5000	6.1	61.4	9.2	8.6	7.0	6.7	6.8
6300	6.2	59.1	9.6	8.7	7.1	6.8	6.9
8000	6.4	60.5	8.9	8.3	7.2	7.0	7.1
10000	6.3	58.0	7.4	7.4	6.9	6.8	6.8
12500	6.1	57.0	6.8	7.0	6.6	6.5	6.5
16000	5.7	55.2	6.5	6.6	6.3	6.2	6.2
20000	4.6	53.5	5.6	5.7	5.4	5.3	5.3

Pinyon-Juniper, July 1- August 31, 2005, 1900-0700, median hourly dBA and one-third octave band dB (12.5-20,000 Hz; n = 732 hours).

Frequency	L_{min}	L_{max}	L_{eq}	L_{10}	L_{50}	L_{90}	L_{Nat}
dBA	16.4	89.3	24.5	24.3	18.2	17.2	17.7
12.5	6.8	82.1	29.9	32.1	28.3	24.6	27.4
16	4.4	83.2	27.7	30.0	25.3	21.6	24.3
20	3.4	85.4	27.4	30.0	23.9	20.1	22.8
25	4.4	83.9	27.2	30.2	21.9	18.0	20.8
31.5	2.1	86.9	27.2	30.4	19.2	14.9	17.9
40	0.4	86.3	26.9	30.4	16.8	12.0	15.0
50	-1.3	85.7	26.2	29.7	14.2	9.2	12.3
63	-2.9	89.2	24.1	27.6	11.1	6.6	9.3
80	-3.3	83.6	21.1	24.6	8.7	4.3	7.0
100	-4.7	85.4	20.8	21.9	5.7	2.0	4.2
125	-4.3	82.7	22.9	19.5	3.5	0.6	2.6
160	-4.2	84.0	23.2	17.3	2.0	-0.3	1.2
200	-4.0	82.7	20.3	16.6	1.0	-0.8	0.4
250	-4.0	82.6	18.8	14.9	0.8	-0.9	0.2
315	-3.2	82.7	16.8	11.7	0.9	-0.8	0.2
400	-2.7	82.6	14.9	8.6	1.0	-0.4	0.4
500	-2.0	82.1	11.2	6.5	1.0	0.0	0.7
630	-1.4	81.5	7.5	4.6	1.3	0.6	1.1
800	-0.3	80.5	4.5	3.4	1.7	1.2	1.5
1000	0.6	80.8	3.6	3.2	2.3	1.8	2.1
1250	1.5	79.4	4.1	4.2	3.1	2.6	2.9
1600	2.5	79.5	4.5	4.7	3.8	3.5	3.7
2000	3.2	78.1	6.0	6.2	4.8	4.4	4.7
2500	4.1	75.3	8.1	8.8	6.0	5.3	5.7
3150	4.8	73.3	6.4	6.6	5.9	5.6	5.8
4000	5.5	69.7	6.5	6.6	6.3	6.1	6.2
5000	5.9	66.5	6.7	6.8	6.6	6.4	6.5
6300	6.1	63.6	7.1	7.0	6.8	6.6	6.7
8000	6.2	61.8	7.4	7.1	6.9	6.7	6.8
10000	6.2	61.6	7.2	6.9	6.8	6.6	6.7
12500	5.9	60.8	6.8	6.6	6.4	6.3	6.4
16000	5.5	60.0	6.3	6.2	6.0	5.9	6.0
20000	4.4	62.7	6.8	5.3	5.0	4.9	5.0

Pinyon-Juniper, July 1- August 31, 2005, 0000-2400, median hourly dBA and one-third octave band dB (12.5-20,000 Hz; n = 1458 hours).

Frequency	L_{min}	L_{max}	L_{eq}	L_{10}	L_{50}	L_{90}
dBA	16.4	89.6	27.2	29.6	21.0	18.2
12.5	6.8	84.6	34.6	36.3	31.0	26.8
16	4.4	84.1	32.9	34.7	29.2	25.0
20	3.4	85.4	32.0	34.4	28.5	24.1
25	4.4	87.6	31.8	34.7	27.8	22.6
31.5	2.1	88.6	31.4	34.8	26.9	20.6
40	0.4	88.4	31.0	34.4	25.9	18.2
50	-1.3	88.2	30.4	33.9	25.0	15.8
63	-2.9	89.2	28.7	32.0	23.2	13.3
80	-3.3	84.9	26.5	29.6	20.8	10.9
100	-4.7	85.4	26.3	28.5	18.4	8.2
125	-4.3	84.3	27.6	28.9	15.8	5.5
160	-4.2	87.5	27.4	29.4	12.1	3.6
200	-4.0	86.9	24.4	27.1	10.0	2.5
250	-4.0	84.5	23.7	24.9	9.0	1.8
315	-3.2	84.8	22.2	22.9	7.7	1.6
400	-2.7	83.9	20.9	21.4	6.6	2.3
500	-2.0	84.2	17.8	18.1	5.5	2.3
630	-1.4	81.9	13.7	13.7	4.7	2.4
800	-0.3	81.9	10.2	10.2	4.3	2.6
1000	0.6	80.8	8.0	8.3	4.3	2.9
1250	1.5	79.4	7.4	8.0	4.6	3.5
1600	2.5	79.5	6.9	7.6	4.8	4.0
2000	3.2	78.1	7.9	8.4	5.8	5.0
2500	4.1	75.3	9.0	9.3	6.3	5.6
3150	4.8	73.3	8.0	8.3	6.4	6.0
4000	5.5	69.7	7.7	7.8	6.6	6.3
5000	5.9	66.5	7.8	7.8	6.8	6.6
6300	6.1	63.6	8.1	7.8	6.9	6.7
8000	6.2	61.8	8.2	7.7	7.1	6.8
10000	6.2	61.6	7.3	7.2	6.9	6.7
12500	5.9	60.8	6.8	6.8	6.6	6.4
16000	5.5	60.0	6.5	6.5	6.2	6.1
20000	4.4	62.7	5.7	5.6	5.3	5.1

Pinyon-Juniper Replicate, July 1- August 29, 2006, 0700-1900, median hourly dBA and one-third octave band dB (12.5-20,000 Hz; n = 715 hours).

Frequency	L_{min}	L_{max}	L_{eq}	L_{10}	L_{50}	L_{90}	L_{Nat}*
dBA	14.9	94.1	33.8	35.9	24.0	18.5	
12.5	7.6	85.5	47.1	48.2	35.8	29.2	
16	6.3	86.1	44.5	44.9	34.3	27.9	
20	7.2	87.8	41.7	42.3	32.8	26.3	
25	4.9	87.5	39.3	41.1	31.7	24.8	
31.5	3.5	87.5	37.9	40.7	30.3	22.7	
40	1.2	87.9	37.0	40.1	29.2	20.5	
50	-0.1	87.7	36.1	39.4	28.2	18.3	
63	0.6	87.8	34.8	38.0	26.8	16.5	
80	-0.9	85.4	32.9	36.0	25.0	15.0	
100	-3.6	86.2	31.8	34.5	23.2	13.3	
125	-3.9	87.7	33.1	35.1	21.4	11.7	
160	-4.5	86.3	33.5	35.8	19.6	10.3	
200	-3.8	86.1	31.5	34.3	17.9	9.6	
250	-4.1	86.8	31.0	32.5	16.7	8.1	
315	-4.0	85.5	32.5	32.2	15.7	7.0	
400	-4.2	84.3	30.3	29.4	15.5	7.6	
500	-3.5	84.5	27.1	27.5	14.4	6.8	
630	-2.9	84.4	24.0	24.8	12.6	6.1	
800	-2.1	84.4	20.9	21.9	11.0	5.8	
1000	-1.2	94.0	17.0	18.5	9.3	5.4	
1250	-0.5	84.4	14.2	15.3	7.8	5.0	
1600	0.3	84.6	12.2	12.8	6.6	4.5	
2000	1.1	83.1	11.1	11.9	5.7	4.0	
2500	2.0	81.3	12.2	12.7	5.4	3.8	
3150	2.7	79.6	13.1	12.7	5.4	4.1	
4000	3.4	77.7	11.9	10.6	5.3	4.4	
5000	4.3	75.6	10.3	9.2	5.5	5.1	
6300	4.9	73.1	10.8	9.4	6.2	5.7	
8000	4.7	69.8	8.8	8.4	6.2	5.9	
10000	4.4	66.7	7.5	7.8	6.6	6.4	
12500	4.3	65.8	7.4	7.7	6.8	6.6	
16000	2.5	64.9	5.9	6.2	5.5	5.3	
20000	-0.9	65.1	3.7	3.9	3.5	3.3	

* L_{nat} was not calculated because there were no recordings collected at this site.

Pinyon-Juniper Replicate, July 1- August 29, 2006, 1900-0700, median hourly dBA and one-third octave band dB (12.5-20,000 Hz; n = 720 hours).

Frequency	L_{min}	L_{max}	L_{eq}	L_{10}	L_{50}	L_{90}	L_{Nat}*
dBA	14.5	85.0	26.6	26.0	18.0	16.1	
12.5	5.1	82.2	30.2	32.0	27.1	23.0	
16	1.9	82.4	29.2	31.2	25.2	21.2	
20	-1.4	82.7	28.6	31.2	23.3	19.1	
25	-2.7	82.2	28.5	31.1	21.4	17.1	
31.5	-2.4	82.4	28.4	31.2	18.7	13.9	
40	-3.2	82.0	28.1	30.9	16.1	11.2	
50	-4.0	82.5	27.7	30.4	13.2	7.9	
63	-4.2	85.0	26.4	28.9	11.3	6.3	
80	-3.8	83.6	24.0	26.5	9.2	5.1	
100	-5.5	81.2	22.4	23.9	6.2	0.7	
125	-6.4	83.0	24.2	20.9	4.0	-0.6	
160	-9.8	85.1	24.9	18.6	2.1	-1.3	
200	-12.4	83.2	22.1	15.9	0.6	-1.9	
250	-11.0	83.1	20.3	14.8	-0.7	-2.4	
315	-10.1	82.8	20.1	13.0	-1.1	-2.6	
400	-9.7	79.6	17.6	10.1	-1.0	-2.4	
500	-8.8	79.1	15.1	8.1	-0.7	-1.9	
630	-8.5	78.0	11.1	5.7	-0.6	-1.6	
800	-7.1	77.2	6.6	4.1	-0.5	-1.2	
1000	-7.0	75.1	3.7	2.3	-0.1	-0.6	
1250	-6.4	73.0	2.2	1.9	0.5	0.0	
1600	-6.1	69.3	1.9	2.0	1.1	0.8	
2000	-6.0	64.8	3.1	3.6	2.1	1.7	
2500	-5.9	63.6	6.8	7.5	3.4	2.6	
3150	-5.6	62.2	6.0	6.5	4.1	3.5	
4000	-4.8	61.7	7.9	8.0	5.1	4.3	
5000	-0.9	60.9	5.3	5.5	5.0	4.7	
6300	3.2	60.2	5.9	5.9	5.6	5.3	
8000	-3.7	60.2	6.1	6.0	5.8	5.6	
10000	-1.9	59.3	6.6	6.6	6.4	6.2	
12500	1.0	59.4	6.8	6.7	6.5	6.4	
16000	-2.9	59.6	5.2	5.2	5.0	4.8	
20000	-4.4	58.6	5.1	3.2	3.0	2.9	

Pinyon-Juniper Replicate, July 1- August 29, 2006, 0000-2400, median hourly dBA and one-third octave band dB (12.5-20,000 Hz; n = 1435 hours).

Frequency	L_{min}	L_{max}	L_{eq}	L_{10}	L_{50}	L_{90}
dBA	14.5	94.1	31.4	32.3	21.2	17.4
12.5	5.1	85.5	38.3	39.2	31.5	26.2
16	1.9	86.1	36.4	37.9	30.2	24.7
20	-1.4	87.8	35.0	37.5	28.9	23.1
25	-2.7	87.5	34.5	37.6	27.8	21.3
31.5	-2.4	87.5	34.2	37.5	26.3	19.0
40	-3.2	87.9	34.0	37.4	24.9	16.7
50	-4.0	87.7	33.4	36.7	23.2	14.0
63	-4.2	87.8	32.1	35.2	21.7	12.0
80	-3.8	85.4	30.1	33.0	20.0	9.9
100	-5.5	86.2	28.6	31.3	18.0	7.2
125	-6.4	87.7	30.3	30.7	15.7	5.1
160	-9.8	86.3	30.9	30.9	13.0	4.1
200	-12.4	86.1	28.3	30.5	10.4	3.4
250	-11.0	86.8	27.5	28.1	8.7	2.2
315	-10.1	85.5	28.9	26.1	7.6	1.5
400	-9.7	84.3	26.7	24.2	7.1	1.6
500	-8.8	84.5	23.4	21.4	6.3	1.8
630	-8.5	84.4	19.3	17.9	5.3	1.8
800	-7.1	84.4	14.8	13.9	4.7	1.8
1000	-7.0	94.0	10.7	10.2	4.2	2.0
1250	-6.4	84.4	8.1	8.6	4.1	2.2
1600	-6.1	84.6	7.5	8.0	3.9	2.3
2000	-6.0	83.1	8.1	8.7	4.4	3.0
2500	-5.9	81.3	10.1	10.8	5.0	3.5
3150	-5.6	79.6	10.8	10.7	4.9	3.9
4000	-4.8	77.7	10.1	9.6	5.2	4.4
5000	-0.9	75.6	8.0	7.4	5.3	5.0
6300	3.2	73.1	8.0	7.5	5.9	5.6
8000	-3.7	69.8	7.5	7.2	6.0	5.7
10000	-1.9	66.7	7.1	7.1	6.5	6.3
12500	1.0	65.8	7.2	7.2	6.7	6.5
16000	-2.9	64.9	5.8	5.9	5.3	5.1
20000	-4.4	65.1	3.8	3.7	3.3	3.1

Cold Desert Scrub, July 1- August 27, 2005, 0700-1900, median hourly dBA and one-third octave band dB (12.5-20,000 Hz; n = 689 hours).

Frequency	L_{min}	L_{max}	L_{eq}	L_{10}	L_{50}	L_{90}	L_{Nat}
dBA	14.8	94.2	28.2	29.9	19.7	16.6	17.8
12.5	10.1	85.8	52.6	54.7	37.5	29.2	33.5
16	10.1	85.5	49.8	51.3	35.5	28.3	32.3
20	8.7	85.2	46.7	47.1	33.8	27.0	30.8
25	9.1	85.6	43.3	43.8	32.0	25.0	28.9
31.5	5.6	88.7	40.1	41.5	30.7	22.9	27.2
40	4.8	85.6	38.2	40.4	29.3	20.9	25.6
50	2.9	87.3	36.9	39.7	28.0	18.5	23.4
63	0.9	87.1	35.3	38.5	26.3	16.2	21.5
80	-0.6	87.8	33.6	36.5	24.4	14.2	19.8
100	-1.7	84.6	31.5	33.6	22.3	12.5	17.8
125	-3.3	84.7	28.6	30.4	19.4	10.2	15.1
160	-3.3	87.6	26.4	28.3	16.6	8.5	12.8
200	-3.9	86.8	26.6	28.2	14.6	7.6	11.2
250	-4.4	87.8	26.3	27.5	12.2	4.1	7.9
315	-4.4	87.6	24.7	24.8	9.7	2.7	5.7
400	-3.7	85.5	21.5	21.8	8.3	3.0	5.6
500	-3.2	85.5	18.2	19.3	6.9	2.7	4.8
630	-2.7	85.1	14.7	16.1	6.0	2.6	4.3
800	-2.0	84.3	12.0	13.7	5.3	2.6	4.0
1000	-1.1	94.1	9.8	11.3	4.8	2.5	3.7
1250	-0.4	83.6	8.2	9.1	4.0	2.3	3.2
1600	0.3	83.0	6.6	7.4	3.4	2.3	2.8
2000	1.1	81.8	6.1	6.1	3.3	2.6	3.0
2500	2.0	80.5	5.7	5.6	3.5	3.0	3.3
3150	2.7	79.6	5.8	5.5	4.0	3.6	3.8
4000	3.3	80.6	5.9	5.9	4.6	4.3	4.5
5000	2.9	75.6	6.2	6.4	5.2	4.9	5.1
6300	3.2	73.8	7.8	7.0	5.7	5.4	5.5
8000	3.5	72.5	8.2	7.4	6.2	6.0	6.1
10000	3.7	71.8	7.2	7.3	6.7	6.5	6.6
12500	3.5	70.1	7.2	7.4	6.8	6.7	6.8
16000	1.8	68.3	6.4	6.5	6.2	6.0	6.1
20000	-0.5	69.8	4.0	4.0	3.8	3.6	3.7

Cold Desert Scrub, July 1- August 27, 2005, 1900-0700, median hourly dBA and one-third octave band dB (12.5-20,000 Hz; n = 696 hours).

Frequency	L_{min}	L_{max}	L_{eq}	L_{10}	L_{50}	L_{90}	L_{Nat}
dBA	14.7	87.0	24.7	25.5	17.9	15.7	17.1
12.5	5.7	85.3	30.8	32.2	26.6	22.6	25.9
16	6.5	83.0	29.4	31.7	25.6	21.5	24.7
20	4.8	84.4	29.1	32.0	25.1	20.6	24.2
25	3.8	85.9	27.9	30.6	21.8	17.8	20.9
31.5	0.2	87.6	28.0	30.7	18.9	14.9	17.9
40	0.0	84.7	28.3	30.7	17.0	12.6	15.8
50	-1.1	86.6	28.1	30.3	13.2	8.9	11.7
63	-2.1	85.5	26.7	29.2	10.2	6.2	8.8
80	-3.5	85.0	24.7	27.0	7.9	4.1	6.6
100	-4.4	82.6	21.0	23.6	5.7	2.0	4.2
125	-4.8	80.8	18.4	19.7	3.9	0.7	2.7
160	-5.3	83.6	18.4	15.5	1.7	-0.5	0.9
200	-5.1	81.0	19.5	11.4	0.1	-1.6	-0.5
250	-5.3	83.0	17.4	9.3	-1.2	-2.4	-1.5
315	-4.9	83.4	14.7	8.3	-1.5	-2.5	-1.8
400	-4.7	83.0	11.1	5.4	-1.2	-2.1	-1.5
500	-4.0	79.8	8.1	3.2	-0.9	-1.8	-1.2
630	-3.3	80.7	3.6	1.8	-0.7	-1.4	-0.8
800	-2.6	78.6	1.6	1.1	-0.5	-1.0	-0.6
1000	-1.9	76.3	1.1	1.0	0.0	-0.5	-0.1
1250	-0.9	74.7	1.7	1.7	0.6	0.2	0.6
1600	-0.1	72.0	1.9	2.0	1.3	0.9	1.2
2000	0.8	69.5	2.3	2.4	2.0	1.7	1.9
2500	1.7	65.4	3.2	3.2	2.7	2.4	2.6
3150	2.5	64.0	3.9	3.8	3.4	3.2	3.4
4000	3.4	67.6	10.4	11.7	6.0	4.4	5.5
5000	4.0	59.7	12.1	14.1	8.6	5.3	7.6
6300	4.6	58.3	6.1	6.0	5.3	5.1	5.3
8000	5.0	57.3	6.7	6.2	5.9	5.8	5.9
10000	5.2	63.2	7.1	6.7	6.5	6.4	6.5
12500	5.4	60.6	7.0	6.7	6.6	6.5	6.6
16000	4.0	58.1	5.9	5.8	5.7	5.6	5.6
20000	-0.1	54.8	4.0	3.5	3.3	3.2	3.2

Cold Desert Scrub, July 1- August 27, 2005, 0000-2400, median hourly dBA and one-third octave band dB (12.5-20,000 Hz; n = 696 hours).

Frequency	L_{min}	L_{max}	L_{eq}	L_{10}	L_{50}	L_{90}
dBA	14.7	94.2	26.6	28.3	19.0	16.3
12.5	5.7	85.8	38.1	39.0	30.7	25.8
16	6.5	85.5	36.1	37.4	29.9	24.9
20	4.8	85.2	34.3	36.8	29.1	23.9
25	3.8	85.9	33.9	36.8	27.7	21.9
31.5	0.2	88.7	33.7	37.0	26.3	19.5
40	0.0	85.6	33.8	37.2	24.9	17.2
50	-1.1	87.3	33.5	37.0	23.6	14.0
63	-2.1	87.1	32.3	35.9	21.9	11.0
80	-3.5	87.8	30.3	33.7	20.0	8.6
100	-4.4	84.6	27.6	30.4	17.6	6.2
125	-4.8	84.7	24.7	27.0	14.2	3.9
160	-5.3	87.6	23.5	24.9	10.3	2.8
200	-5.1	86.8	23.9	24.5	7.3	1.8
250	-5.3	87.8	23.4	23.4	3.9	-0.2
315	-4.9	87.6	21.4	20.6	2.5	-0.7
400	-4.7	85.5	18.2	16.8	2.3	-0.5
500	-4.0	85.5	14.9	13.4	2.0	-0.1
630	-3.3	85.1	9.6	9.4	1.8	0.1
800	-2.6	84.3	6.2	6.5	1.8	0.3
1000	-1.9	94.1	4.9	5.3	2.0	0.7
1250	-0.9	83.6	4.7	5.1	2.3	1.2
1600	-0.1	83.0	4.0	4.3	2.2	1.5
2000	0.8	81.8	4.1	4.3	2.6	2.1
2500	1.7	80.5	4.8	4.7	3.1	2.7
3150	2.5	79.6	5.2	5.0	3.8	3.4
4000	3.3	80.6	7.2	6.8	4.7	4.3
5000	2.9	75.6	7.3	7.7	5.4	4.9
6300	3.2	73.8	6.9	6.5	5.5	5.3
8000	3.5	72.5	7.4	6.7	6.0	5.8
10000	3.7	71.8	7.1	7.0	6.6	6.5
12500	3.5	70.1	7.1	7.0	6.7	6.6
16000	1.8	68.3	6.2	6.2	6.0	5.9
20000	-0.5	69.8	4.0	3.8	3.6	3.4

Cold Desert Scrub Replicate, July 1- August 29, 2006, 0700-1900, median hourly dBA and one-third octave band dB (12.5-20,000 Hz; n = 704 hours).

Frequency	L_{min}	L_{max}	L_{eq}	L_{10}	L_{50}	L_{90}	L_{Nat}
dBA	17.2	93.9	28.1	30.1	20.9	18.2	19.1
12.5	7.7	86.9	53.6	57.2	44.6	32.7	38.6
16	7.2	84.0	51.3	54.7	41.3	30.8	35.7
20	5.3	84.7	48.6	51.2	38.4	29.1	33.5
25	2.6	86.1	45.3	47.5	36.0	27.5	31.7
31.5	2.3	84.9	42.2	44.3	34.0	25.5	30.0
40	0.0	87.0	39.3	41.8	32.2	23.2	28.1
50	-1.3	86.9	37.3	39.8	30.6	20.5	26.2
63	-1.5	86.5	35.2	38.1	28.7	17.9	23.9
80	-2.6	84.9	33.2	36.2	26.4	15.3	21.5
100	-3.2	86.3	31.5	34.0	23.9	12.8	18.9
125	-4.2	87.3	30.5	31.9	21.0	10.1	15.9
160	-3.8	86.8	29.2	30.8	18.1	8.4	13.2
200	-4.0	87.5	27.3	29.6	16.3	6.4	12.0
250	-3.8	87.1	26.1	28.1	15.5	4.2	9.0
315	-2.8	86.6	25.7	26.9	12.0	3.1	6.4
400	-2.0	86.9	23.7	24.5	9.4	3.1	5.5
500	-1.1	85.8	20.1	20.1	7.6	2.8	4.7
630	-0.4	85.8	15.9	16.3	6.2	2.9	4.2
800	0.7	85.8	11.3	13.0	5.3	3.2	4.1
1000	1.6	84.8	8.6	9.8	4.9	3.7	4.2
1250	2.5	84.7	7.1	7.9	5.0	4.2	4.6
1600	3.5	83.5	6.9	7.2	5.4	4.9	5.1
2000	4.3	82.5	6.9	6.9	5.8	5.5	5.6
2500	4.8	80.4	7.3	7.2	6.3	6.0	6.2
3150	5.6	77.7	7.8	7.5	6.8	6.5	6.7
4000	6.0	74.8	7.9	7.6	7.1	6.9	7.0
5000	6.0	72.5	7.8	7.6	7.3	7.1	7.2
6300	5.6	70.7	7.9	7.7	7.3	7.2	7.3
8000	5.2	68.1	7.6	7.6	7.4	7.3	7.3
10000	5.2	65.7	7.4	7.6	7.4	7.3	7.3
12500	4.7	63.3	7.3	7.3	7.2	7.1	7.2
16000	4.5	60.4	7.2	7.3	7.2	7.1	7.1
20000	3.7	58.0	6.8	6.9	6.7	6.7	6.7

Cold Desert Scrub Replicate, July 1- August 29, 2006, 1900-0700, median hourly dBA and one-third octave band dB (12.5-20,000 Hz; n = 715 hours).

Frequency	L_{min}	L_{max}	L_{eq}	L_{10}	L_{50}	L_{90}	L_{Nat}
dBA	17.0	82.9	25.1	26.0	21.5	19.0	21.0
12.5	7.2	84.2	38.2	40.0	31.0	25.8	29.8
16	3.6	83.7	35.5	37.4	28.6	23.8	27.6
20	1.7	84.2	33.1	35.0	27.0	21.8	25.6
25	-0.1	82.4	31.4	34.1	25.5	19.9	23.9
31.5	-1.1	82.6	30.4	33.5	23.7	17.0	21.6
40	-2.8	84.2	29.6	32.8	21.3	14.0	19.1
50	-3.8	84.6	28.5	31.9	18.5	10.1	15.9
63	-3.8	84.2	26.9	30.4	15.8	6.6	12.8
80	-5.0	84.2	24.6	27.8	12.8	3.9	9.8
100	-5.3	83.3	22.3	25.1	9.6	1.5	6.2
125	-5.5	82.5	21.6	22.1	6.9	-0.3	4.2
160	-5.6	82.7	21.2	18.9	3.9	-1.2	1.6
200	-4.8	83.0	19.2	17.7	1.2	-1.5	0.0
250	-4.3	83.6	17.5	17.0	0.1	-1.4	-0.4
315	-3.6	81.0	16.3	14.0	0.0	-1.1	-0.4
400	-2.7	78.1	13.8	9.9	0.4	-0.5	0.2
500	-1.9	76.4	10.0	6.4	0.9	0.1	0.7
630	-0.9	75.4	6.3	4.1	1.5	0.8	1.3
800	0.4	74.7	3.8	3.2	2.1	1.7	2.0
1000	1.3	73.2	3.4	3.5	2.9	2.5	2.8
1250	2.2	71.7	3.9	4.1	3.7	3.3	3.6
1600	3.2	70.0	4.6	4.8	4.5	4.2	4.4
2000	4.0	66.7	5.3	5.5	5.2	4.9	5.1
2500	4.8	62.2	6.2	6.3	5.9	5.6	5.9
3150	5.5	57.7	7.2	7.3	6.6	6.3	6.5
4000	5.1	52.2	13.2	15.0	9.8	7.5	9.3
5000	5.4	54.9	9.5	10.2	7.7	7.1	7.6
6300	4.7	52.3	7.4	7.4	7.2	7.1	7.2
8000	4.8	54.8	7.4	7.4	7.3	7.1	7.2
10000	5.3	52.0	7.4	7.4	7.3	7.2	7.3
12500	4.2	53.7	7.2	7.3	7.2	7.0	7.1
16000	3.6	51.9	7.2	7.2	7.1	7.0	7.1
20000	2.2	61.9	7.9	6.8	6.6	6.5	6.6

Cold Desert Scrub Replicate, July 1- August 29, 2006, 0000-2400, median hourly dBA and one-third octave band dB (12.5-20,000 Hz; n = 715 hours).

Frequency	L_{min}	L_{max}	L_{eq}	L_{10}	L_{50}	L_{90}
dBA	17.0	93.9	27.0	28.4	21.0	18.3
12.5	7.2	86.9	48.4	51.7	39.0	30.0
16	3.6	84.0	45.7	48.4	36.0	28.0
20	1.7	84.7	42.6	44.6	33.8	26.3
25	-0.1	86.1	39.2	41.4	32.0	24.7
31.5	-1.1	84.9	36.4	39.2	30.4	22.6
40	-2.8	87.0	34.7	37.6	28.9	20.2
50	-3.8	86.9	33.5	36.7	27.4	17.2
63	-3.8	86.5	31.9	35.3	25.6	14.2
80	-5.0	84.9	30.1	33.3	23.0	11.4
100	-5.3	86.3	28.0	30.9	20.4	8.8
125	-5.5	87.3	27.1	29.0	17.1	6.4
160	-5.6	86.8	26.4	27.5	13.9	4.2
200	-4.8	87.5	24.7	26.5	12.4	2.2
250	-4.3	87.1	23.5	24.8	9.3	1.1
315	-3.6	86.6	22.6	23.0	5.9	0.6
400	-2.7	86.9	20.5	20.1	4.6	0.9
500	-1.9	85.8	16.6	15.3	3.9	1.2
630	-0.9	85.8	12.2	11.7	3.3	1.7
800	0.4	85.8	8.1	8.4	3.4	2.3
1000	1.3	84.8	5.8	6.3	3.7	3.0
1250	2.2	84.7	5.2	5.7	4.2	3.7
1600	3.2	83.5	5.6	5.8	4.9	4.5
2000	4.0	82.5	6.1	6.3	5.5	5.2
2500	4.8	80.4	6.8	6.9	6.2	5.8
3150	5.5	77.7	7.5	7.5	6.7	6.5
4000	5.1	74.8	8.6	8.4	7.2	6.9
5000	5.4	72.5	8.1	7.8	7.3	7.1
6300	4.7	70.7	7.7	7.6	7.3	7.1
8000	4.8	68.1	7.6	7.5	7.3	7.2
10000	5.2	65.7	7.4	7.5	7.3	7.2
12500	4.2	63.3	7.3	7.3	7.2	7.1
16000	3.6	60.4	7.2	7.3	7.1	7.0
20000	2.2	61.9	6.9	6.9	6.7	6.6

Warm Desert Scrub, July 1- August 12, 2005, 0700-1900, median hourly dBA and one-third octave band dB (12.5-20,000 Hz; n = 510 hours).

Frequency	L_{min}	L_{max}	L_{eq}	L_{10}	L_{50}	L_{90}	L_{Nat}
dBA	15.8	85.8	26.4	27.4	19.3	17.0	18.2
12.5	11.9	87.5	52.6	55.4	40.5	28.6	36.0
16	12.3	88.2	49.9	52.0	36.9	27.5	33.5
20	11.2	87.2	46.6	48.1	34.0	26.1	31.3
25	10.6	87.5	43.3	44.4	31.6	23.9	29.1
31.5	8.8	88.4	39.9	40.8	29.5	21.9	27.1
40	7.1	88.2	37.0	38.6	28.3	20.6	25.9
50	7.9	87.4	35.1	37.2	27.0	18.8	24.0
63	6.7	87.0	33.6	35.8	25.2	17.1	22.1
80	3.9	85.6	32.0	34.1	23.2	15.0	20.1
100	3.6	86.2	31.1	32.3	21.2	13.5	18.3
125	0.5	84.1	29.0	29.8	18.4	10.9	16.0
160	-1.1	83.7	26.1	26.7	15.7	8.0	13.5
200	-2.2	84.2	25.2	25.0	14.8	6.3	12.1
250	-2.8	83.2	23.7	23.6	12.7	4.5	9.8
315	-2.6	82.4	21.7	23.0	10.6	2.6	7.7
400	-2.4	82.1	20.5	20.8	8.8	2.5	6.3
500	-1.7	81.6	17.2	17.2	6.4	2.0	4.5
630	-1.3	80.0	14.0	13.5	4.6	1.8	3.4
800	-0.4	76.4	11.1	11.2	4.0	1.9	3.1
1000	0.4	74.4	8.6	9.0	3.6	2.1	3.0
1250	1.1	72.7	6.9	7.4	3.6	2.6	3.2
1600	1.9	69.4	5.9	6.3	3.8	3.1	3.5
2000	2.6	66.1	5.5	5.9	4.2	3.7	4.0
2500	3.4	61.4	5.8	6.0	4.7	4.3	4.6
3150	4.1	59.2	6.6	6.5	5.3	4.9	5.1
4000	4.6	60.8	7.3	7.0	5.7	5.4	5.6
5000	4.9	57.1	7.1	7.3	6.1	5.8	6.0
6300	5.3	58.5	7.9	8.2	6.9	6.5	6.8
8000	5.6	57.0	7.6	8.0	6.8	6.4	6.6
10000	5.2	55.6	6.7	7.4	6.2	5.9	6.1
12500	5.2	55.3	6.8	7.4	6.4	6.1	6.3
16000	4.9	54.3	6.4	7.0	5.9	5.6	5.8
20000	3.8	53.6	5.3	5.7	4.9	4.6	4.8

Warm Desert Scrub, July 1- August 12, 2005, 1900-0700, median hourly dBA and one-third octave band dB (12.5-20,000 Hz; n = 504 hours).

Frequency	L_{min}	L_{max}	L_{eq}	L_{10}	L_{50}	L_{90}	L_{Nat}
dBA	15.8	89.1	24.3	26.5	21.5	18.3	21.1
12.5	9.8	86.5	48.0	51.0	36.7	26.6	34.7
16	10.5	84.5	44.7	47.0	33.3	25.1	31.7
20	10.4	86.0	40.7	42.4	31.0	24.1	29.8
25	8.4	86.5	36.4	38.5	28.4	21.8	27.2
31.5	9.0	88.4	33.4	35.8	26.4	20.1	25.2
40	7.6	87.3	31.4	34.3	24.7	19.0	23.6
50	8.7	86.9	30.0	33.3	23.1	17.9	21.9
63	6.7	85.8	28.3	31.4	21.2	16.5	20.1
80	5.3	84.5	26.2	29.0	19.1	14.8	18.1
100	4.2	83.8	23.6	26.0	16.8	12.8	16.2
125	0.7	82.9	21.5	23.6	14.8	10.2	13.9
160	-0.8	82.1	19.7	20.9	12.3	7.1	11.5
200	-1.9	85.7	18.7	19.1	10.7	5.1	9.6
250	-2.8	86.5	18.0	18.0	9.1	3.5	8.0
315	-2.9	82.7	16.3	17.1	7.8	2.7	7.0
400	-2.4	84.6	14.4	15.1	6.8	2.4	5.9
500	-1.8	81.2	11.1	11.6	4.8	1.7	4.1
630	-1.5	81.1	8.3	9.4	3.5	1.5	3.1
800	-0.6	79.8	5.8	7.3	2.8	1.4	2.5
1000	-0.1	78.9	4.2	5.6	2.6	1.7	2.4
1250	0.8	77.9	3.6	4.5	2.7	2.1	2.6
1600	1.7	77.3	3.7	4.3	3.1	2.7	3.1
2000	2.6	76.2	4.2	4.6	3.8	3.4	3.7
2500	3.3	73.1	4.7	5.1	4.4	4.1	4.3
3150	4.0	70.8	5.4	5.7	5.0	4.7	4.9
4000	4.5	66.7	7.3	8.0	6.1	5.4	6.0
5000	4.9	63.2	14.3	17.7	10.3	6.7	9.9
6300	5.2	60.7	8.9	9.7	7.2	6.4	7.1
8000	5.7	56.1	7.6	7.4	6.5	6.2	6.5
10000	5.2	54.2	6.9	7.1	6.1	5.8	6.1
12500	5.2	54.7	6.8	6.8	6.1	5.8	6.0
16000	4.9	55.8	6.1	6.3	5.6	5.4	5.6
20000	3.4	57.7	5.3	5.0	4.4	4.3	4.4

Warm Desert Scrub, July 1- August 12, 2005, 0000-2400, median hourly dBA and one-third octave band dB (12.5-20,000 Hz; n = 1014 hours).

Frequency	L_{min}	L_{max}	L_{eq}	L_{10}	L_{50}	L_{90}
dBA	15.8	89.1	25.5	26.8	20.0	17.2
12.5	9.8	87.5	50.3	53.1	38.9	27.8
16	10.5	88.2	47.1	49.3	35.4	26.5
20	10.4	87.2	43.6	45.0	32.6	25.3
25	8.4	87.5	40.0	41.3	30.2	23.2
31.5	8.8	88.4	36.4	38.5	28.2	21.2
40	7.1	88.2	34.0	36.7	26.8	19.9
50	7.9	87.4	32.4	35.5	25.2	18.4
63	6.7	87.0	30.8	34.0	23.2	16.7
80	3.9	85.6	29.1	31.9	21.2	14.9
100	3.6	86.2	27.4	29.6	19.4	13.1
125	0.5	84.1	24.8	26.8	16.7	10.6
160	-1.1	83.7	22.7	23.9	14.2	7.5
200	-2.2	85.7	21.7	22.2	13.2	5.8
250	-2.8	86.5	20.5	21.1	11.3	4.1
315	-2.9	82.7	19.2	20.5	9.4	2.7
400	-2.4	84.6	18.1	18.6	7.9	2.5
500	-1.8	81.6	14.4	14.8	5.8	1.9
630	-1.5	81.1	11.1	11.8	4.2	1.7
800	-0.6	79.8	8.2	9.3	3.5	1.7
1000	-0.1	78.9	6.3	7.4	3.2	2.0
1250	0.8	77.9	5.2	6.1	3.2	2.4
1600	1.7	77.3	4.8	5.4	3.5	2.9
2000	2.6	76.2	4.8	5.3	4.0	3.6
2500	3.3	73.1	5.2	5.5	4.6	4.2
3150	4.0	70.8	5.9	6.1	5.2	4.8
4000	4.5	66.7	7.3	7.4	5.8	5.4
5000	4.9	63.2	8.5	8.6	6.4	5.8
6300	5.2	60.7	8.2	8.6	7.0	6.5
8000	5.6	57.0	7.6	7.7	6.6	6.3
10000	5.2	55.6	6.8	7.2	6.2	5.8
12500	5.2	55.3	6.8	7.1	6.2	5.9
16000	4.9	55.8	6.2	6.6	5.8	5.5
20000	3.4	57.7	5.3	5.3	4.6	4.4

Warm Desert Scrub Replicate, July 1- August 31, 2006, 0700-1900, median hourly dBA and one-third octave band dB (12.5-20,000 Hz; n = 741 hours).

Frequency	L_{min}	L_{max}	L_{eq}	L_{10}	L_{50}	L_{90}	L_{Nat}
dBA	16.5	90.8	47.1	51.1	37.7	24.0	31.9
12.5	1.7	87.2	40.0	40.5	29.0	21.4	25.1
16	1.1	89.0	37.3	38.7	28.1	20.8	24.3
20	1.4	86.8	35.4	38.6	27.3	19.9	23.4
25	0.9	88.0	35.7	39.2	26.7	18.4	22.2
31.5	0.7	86.8	35.9	39.6	26.1	16.7	21.0
40	0.9	87.4	36.1	40.0	25.9	15.9	20.6
50	0.1	88.2	36.4	40.1	25.7	15.2	20.3
63	-2.4	87.8	35.4	39.1	23.9	13.0	18.3
80	-1.8	85.3	33.5	36.8	21.8	11.0	16.2
100	-3.0	83.9	32.9	35.7	19.7	8.9	14.0
125	-3.2	87.0	33.9	35.9	16.7	6.4	11.0
160	-3.2	87.1	33.6	35.7	14.2	5.5	9.1
200	-2.6	85.8	30.7	33.4	12.7	5.9	8.5
250	-2.8	86.1	28.4	30.1	10.2	4.2	6.5
315	-1.8	85.4	28.3	28.0	9.0	4.4	6.0
400	-0.3	86.0	25.5	25.2	8.1	4.9	6.1
500	0.5	84.5	22.4	22.1	7.2	4.6	5.8
630	1.5	84.1	18.4	18.3	7.3	5.4	6.3
800	1.9	82.5	13.9	14.0	7.1	5.5	6.3
1000	2.1	81.6	10.5	11.2	7.2	5.8	6.5
1250	2.7	80.6	8.9	9.7	7.1	5.8	6.5
1600	2.9	78.9	8.6	9.8	7.0	5.7	6.4
2000	3.3	76.7	8.9	10.2	6.8	5.4	6.1
2500	3.7	73.9	10.1	11.5	7.0	5.4	6.1
3150	4.1	69.9	12.3	12.6	7.5	5.6	6.4
4000	4.6	64.8	14.6	15.9	9.2	6.0	7.3
5000	5.1	60.3	21.2	24.8	15.2	6.8	10.4
6300	5.6	67.3	36.5	40.9	28.3	9.7	20.3
8000	5.4	75.5	44.7	49.0	33.5	9.6	24.0
10000	5.2	76.3	44.9	48.8	31.9	8.4	21.1
12500	5.2	67.8	34.2	37.7	19.4	6.3	10.6
16000	4.7	63.9	25.7	28.4	9.0	5.6	6.1
20000	3.5	63.4	23.8	25.6	6.4	4.7	5.0

Warm Desert Scrub Replicate, July 1- August 31, 2006, 1900-0700, median hourly dBA and one-third octave band dB (12.5-20,000 Hz; n = 741 hours).

Frequency	L_{min}	L_{max}	L_{eq}	L_{10}	L_{50}	L_{90}	L_{Nat}
dBA	16.1	77.1	28.5	29.6	21.1	18.7	20.5
12.5	-2.9	83.4	28.7	30.2	19.5	14.8	18.4
16	-1.4	82.5	29.0	31.1	19.0	14.2	17.7
20	-1.4	81.5	29.3	31.5	17.8	13.1	16.7
25	-2.5	82.1	29.9	32.0	16.0	10.8	14.3
31.5	-3.1	83.2	30.2	32.5	14.3	8.9	12.5
40	-3.1	86.4	30.9	32.8	13.7	7.7	11.3
50	-4.1	85.7	31.2	32.8	12.9	6.5	10.3
63	-3.3	85.6	29.8	31.2	10.8	5.2	8.3
80	-3.3	83.8	27.3	28.6	8.9	4.4	7.0
100	-3.9	80.6	26.4	26.5	6.4	2.0	4.6
125	-4.5	79.4	27.9	24.0	4.0	0.5	2.5
160	-4.1	81.4	27.9	22.4	3.2	0.4	2.3
200	-4.1	79.5	25.0	21.1	3.2	0.2	2.0
250	-3.6	78.3	22.1	17.7	2.4	0.3	1.8
315	-2.5	76.4	21.2	15.4	3.8	2.3	3.4
400	-1.6	72.8	17.7	12.4	3.8	2.3	3.4
500	-0.3	70.7	14.2	10.3	5.1	3.6	4.7
630	0.7	68.0	10.5	9.1	6.0	4.8	5.8
800	1.2	64.5	8.0	8.6	6.3	5.1	6.1
1000	1.9	61.4	7.4	8.4	6.5	5.5	6.3
1250	2.2	55.6	7.0	8.2	6.4	5.4	6.2
1600	2.4	50.5	6.9	8.0	6.1	5.2	5.9
2000	2.9	51.9	8.6	10.2	6.1	5.1	5.9
2500	3.4	54.3	10.7	12.5	6.7	5.2	6.2
3150	4.1	53.1	10.0	11.3	7.9	5.9	7.4
4000	4.6	55.1	6.3	6.9	5.8	5.4	5.7
5000	5.0	52.9	11.9	13.4	8.4	6.4	7.9
6300	5.6	63.5	12.6	13.5	8.7	6.9	8.4
8000	5.4	72.4	9.0	8.7	6.6	6.2	6.5
10000	5.1	74.0	6.7	6.1	5.8	5.7	5.8
12500	5.2	66.5	6.1	6.0	5.8	5.6	5.7
16000	4.6	60.6	5.5	5.5	5.3	5.2	5.3
20000	3.7	63.2	7.2	4.7	4.4	4.3	4.4

Warm Desert Scrub Replicate, July 1- August 31, 2006, 0000-2400, median hourly dBA and one-third octave band dB (12.5-20,000 Hz; n = 1481 hours).

Frequency	L_{min}	L_{max}	L_{eq}	L_{10}	L_{50}	L_{90}
dBA	16.1	90.8	35.6	38.0	26.7	20.3
12.5	-2.9	87.2	33.5	34.8	24.4	18.4
16	-1.4	89.0	32.6	35.2	23.7	17.7
20	-1.4	86.8	32.6	36.0	23.2	16.9
25	-2.5	88.0	33.2	37.0	22.5	15.2
31.5	-3.1	86.8	33.6	37.4	21.8	13.3
40	-3.1	87.4	34.1	37.8	21.7	12.5
50	-4.1	88.2	34.5	38.0	21.5	11.7
63	-3.3	87.8	33.4	36.8	19.5	9.5
80	-3.3	85.3	31.2	34.4	17.3	7.7
100	-3.9	83.9	30.5	33.0	14.9	5.7
125	-4.5	87.0	31.7	32.7	11.5	3.5
160	-4.1	87.1	31.6	32.2	9.3	3.1
200	-4.1	85.8	28.7	30.3	8.3	4.0
250	-3.6	86.1	26.2	26.8	6.4	2.5
315	-2.5	85.4	25.9	24.3	5.8	3.3
400	-1.6	86.0	22.8	20.8	5.9	3.8
500	-0.3	84.5	19.1	17.5	6.0	4.1
630	0.7	84.1	14.5	13.1	6.6	5.1
800	1.2	82.5	10.3	10.6	6.7	5.3
1000	1.9	81.6	8.6	9.5	6.8	5.7
1250	2.2	80.6	7.8	9.0	6.7	5.6
1600	2.4	78.9	7.7	8.9	6.6	5.4
2000	2.9	76.7	8.8	10.2	6.5	5.3
2500	3.4	73.9	10.2	11.7	6.9	5.3
3150	4.1	69.9	11.2	12.1	7.7	5.7
4000	4.6	64.8	11.8	12.0	6.5	5.6
5000	5.0	60.3	16.5	18.4	10.4	6.6
6300	5.6	67.3	23.6	25.5	12.6	7.4
8000	5.4	75.5	26.4	26.4	8.8	6.6
10000	5.1	76.3	24.8	25.2	6.3	5.8
12500	5.2	67.8	16.1	16.4	6.0	5.7
16000	4.6	63.9	9.6	9.5	5.5	5.3
20000	3.5	63.4	12.3	9.0	4.6	4.4