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Natural Resource Stewardship and Science

Soundscape Social Science Survey for Air Tour Management and Soundscape Planning at Bandelier National Monument

Natural Resource Technical Report NPS/BAND/NRTR—2014/845

ON THIS PAGE
Tyuonyi Pueblo in Bandelier National Monument
Photograph by: David Weinzimmer

ON THE COVER
Visitors exploring cavates along Main Loop Trail in Bandelier National Monument
Photograph by: David Weinzimmer

Soundscape Social Science Survey for Air Tour Management and Soundscape Planning at Bandelier National Monument

Natural Resources Technical Report NPS/BAND/NRTR—2014/845

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Executive Summary

Colorado State University, in conjunction with Bandelier National Monument, conducted a visitor listening survey from May 27 to June 13, 2013. The survey consisted of a three-minute listening session followed by a series of questions about the Monument's soundscape and potential related management actions, as well as more general questions about the respondent's visit. A total of 649 completed surveys were obtained from three sites within the Monument – near the Visitor Center/Main Loop Trail (n = 335), on the Alcove House Trail (n = 287), and at wilderness sites on the Burnt Mesa Trail and near the Ponderosa Campground (n = 26). The sample size at the wilderness sites was low despite being highly representative of the level of visitation that was observed at those sites during the sampling period. However, because of the small sample size, comparisons and implications should be interpreted with caution.

Results across all sampling locations suggested that both natural and anthropogenic sounds are pervasive in the Monument. The five most frequently heard natural sounds in the Monument were bird song, wind, insects, running water, and small mammals (Table 3.1.1, Figure 3.1.1). The five most frequently heard anthropogenic sounds were small groups of visitors talking, children, large groups of visitors talking, rangers talking, and jets (Table 3.1.1, Figure 3.1.1). Overall, natural sounds were rated as more acceptable and very pleasing. Anthropogenic sounds were rated as much less acceptable, and annoying.

Motivations for experiencing natural quiet have been found to influence visitor perceptions and thresholds regarding anthropogenic noise (Marin et al., 2011). Therefore, various motivations for visiting and experiencing the Monument were evaluated, including motivations for experiencing the sounds of nature and cultural sounds (Table 3.1.5 and Figure 3.1.7). Averages across all sampling locations indicated that appreciating the scenic beauty, appreciating the archaeological and cultural sites, and experiencing a sense of connection with nature were the most important motivations for visiting the monument. While appreciating the archaeological and cultural sites were very important for Main Loop Trail and Alcove House Trail respondents, it was less important for Burnt Mesa and Ponderosa respondents. Similarly, experiencing cultural sounds was less important for Burnt Mesa and Ponderosa respondents that those surveyed on the Main Loop and Alcove House Trails. Interestingly, experiencing the sounds of nature was much more important for all samples than experiencing cultural sounds. The least important motivation for visiting was experiencing the Monument in an air-tour, and additional enquiry suggested that only 1% of the overall sample had taken an air tour over Bandelier National Monument (Table 3.1.5 and Figure 3.1.7).

Visitors also evaluated the acceptability of hypothetical management actions related to future soundscape management in Bandelier National Monument (Table 3.1.3 and Figure 3.1.5). On average across the samples, respondents were most supportive of potential management actions that would increase their opportunity to experience traditional cultural sounds and least supportive of having rangers quieting visitors along the Monument's trails. However, wilderness respondents were less supportive of potential management actions than respondents on the Visitor Center/Main Loop Trail or Alcove House Trail. Visitors also rated the extent to which the presence of cultural sounds

in the Monument would improve their experience and understanding of Bandelier National Monument (Table 3.1.4 and Figure 3.1.6). Results across all sampling locations suggested that cultural sounds would enhance visitor experiences, increase understanding of traditional Pueblo cultures, the Monument's significance and mission, and increase appreciation of the Monument generally. However, the majority of respondents on the Burnt Mesa and Ponderosa Trails indicated that the presence of cultural sounds would not improve their experiences or understanding of the Monument. A slightly larger percentage of Main Loop Trail respondents suggested that cultural sounds would enhance experiences and understanding than the Alcove House Trail respondents.

Visitors were also asked to compare their actual experiences in Bandelier National Monument to their expectations for their visit (Table 3.1.6 and Figure 3.1.8). On average, respondents indicated that they had more opportunities to experience the sounds of nature than they expected. With regard to hearing aircraft, on average respondents indicated hearing less than expected, although the majority indicated having no expectation for hearing aircraft while in Bandelier. Respondents reported hearing vehicles and other visitors less frequently than expected. Finally, visitors indicated experiencing cultural sounds less than expected. However, the majority of respondents indicated having no expectation for hearing cultural sounds while in Bandelier.

Responses indicated that the majority of visitors surveyed were visiting Bandelier National Monument for the first time (Table 3.1.7) and largest percentages of respondents indicated that their primary activities were archaeological/cultural interests or day hiking (Table 3.1.15). The majority of respondents indicated that the Visitor Center or Main Loop Trail was their primary destination, although a quarter of respondents listed the Alcove House as their primary destination (Table 3.1.16). The mean age of respondents was 50 years of age (Table 3.1.20), and 95% of the respondents were from the United States. The majority of respondents were from the Southwest (Table 3.1.21 and Figure 3.1.9), and in particular, respondents at the Burnt Mesa and Ponderosa sites lived within close proximity to the Monument (i.e., zip codes 83318 – 87544). Nearly three-quarters of the respondents reported having at least an undergraduate degree from a four-year college, and one-third had a postgraduate degree (Table 3.1.23). The majority of respondents indicated that they considered their race to be White (Table 3.1.25).

Overall, these results provide baseline data regarding the current types and amounts of natural and anthropogenic sounds present at the Monument, as well as motivations and expectations regarding these sounds. These results suggest that hearing natural sounds is a very important component of the visitor experience, and managers should strive to protect these sounds while decreasing existing noise and minimizing the intrusion of future noise. Experiencing archeological and cultural sites is extremely important for canyon visitors, but much less important for wilderness visitors. Similarly, experiencing cultural sounds is of importance for many of the Canyon visitors, but not for those that visit the Ponderosa and Burnt Mesa Trails. Authentic cultural sounds, such as live performances or demonstrations would likely enhance visitor experiences and increase understanding of traditional Pueblo cultures and the Monument's significance for Canyon visitors, but not for Ponderosa and Burnt Mesa Trail visitors. Finally, if noise increases in the Monument, indirect management (e.g., visitor education) would be preferred over direct management (e.g., enforcement).

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Chapter 1: Introduction

Background

Bandelier National Monument contains unique cultural and natural resources. As part of the Monument's mission, Bandelier National Monument has identified several key locations that should provide for quiet, solemn appreciation for the archaeological relics of past peoples in a setting with limited modern anthropogenic intrusions. However, anthropogenic noise is increasingly present in the Monument, reflecting changing usage patterns associated with commercial aviation, visitor activities and behavior, park maintenance and facilities, and development in and around the Monument. The changing environment requires greater understanding of the park "soundscape", from both a biophysical and social perspective. The National Park Service's Natural Sounds and Night Skies Division (NSNSD) defines "soundscape" as the human perception of physical sound resources, which can include both natural (i.e., wind, water, wildlife) and cultural/historic sounds (i.e., battle reenactments, tribal ceremonies).

The purpose of this study was to better understand social perspectives of the Monument's soundscape. This was accomplished by determining what sounds visitors heard, and subsequently investigating whether those sounds were evaluated positively or negatively (i.e., as noise). Therefore, this study investigated the positive and negative impacts of natural and anthropogenic sounds on visitor experiences at the Monument. This information will help develop an understanding of the character of the soundscape at Bandelier National Monument, as determined by visitor evaluations.

These data will inform Monument officials as they continue to develop air tour management plans, interpretive plans, and other planning efforts that protect both resource and social conditions in the future.

Justification

Bandelier National Monument, in collaboration with the NSNSD, recently collected acoustical monitoring data from four distinct sites over two seasons, but it has not previously examined how the sounds of the Monument – both natural and human-caused – may be evaluated by visitors (i.e., acceptability and personal interpretation of sounds heard). The integration of the previously-collected monitoring data with evaluative survey research provides a more comprehensive understanding of the current soundscape conditions in the Monument, as well as potential effects of those conditions on visitor experiences.

Managers at Bandelier National Monument are interested in whether anthropogenic sounds within the Frijoles Canyon visitor center area are adversely affecting the visitor experience. Managers are also interested in determining whether visitor experiences can be enhanced by introducing traditional cultural sounds characteristic of ancient Pueblo cultures, such as singing, drumming, poetry, and chanting. This study addressed visitor attitudes toward the idea of an "intentional soundscape," designed to re-create the natural and human sounds that were present in Frijoles Canyon during Ancestral Pueblo occupancy. Therefore, study results can be used to inform future soundscape interpretive programming at the Monument.

Informing Soundscape Management

This research examined the impacts of current soundscape conditions on visitor experiences by determining what sounds visitors heard and how they felt about those sounds, as well as their attitudes towards specific soundscape-related management strategies. Additionally, this study examined respondents' motivations and expectations for their visit to Bandelier National Monument, in terms of soundscape conditions and other aspects of their experience in the Monument. This information can be used to inform planning and soundscape management efforts by identifying potential social indicators of quality and visitor-based desired conditions for the soundscape in Bandelier. Furthermore, these results can assist Bandelier staff in their preparation of the Monument's Comprehensive Interpretive Plan update and Air Tour Management Plan.

Chapter 2: Methods

Survey Administration

Colorado State University, in conjunction with Bandelier National Monument, conducted a visitor listening survey May 27 – June 13, 2013. Sampling was conducted by trained technicians during 11 weekdays, four weekend days, and one holiday by trained field technicians. The visitor listening study consisted of a listening activity and questionnaire designed to gather visitor interpretations of the types of sounds being heard in the Monument, as well as visitor attitudes toward a number of management actions being considered by the Monument staff. Surveys were administered both electronically with iPads (n = 565) and printed versions (n = 84). Both survey formats required approximately 15-20 minutes to complete.

Because visitor motivations have been found to influence perceptions of sounds and visitors at the monument may seek contrasting experiences at different locations of the Monument (e.g., frontcountry vs. backcountry experience), surveys were conducted at three sites within the Monument: Main Loop Trail (n = 335; 59% response rate), Alcove House Trail (n = 287; 79% response rate), and at wilderness sites on the Burnt Mesa Trail and near the Ponderosa Campground (n = 26; 96% response rate) (Figure 2.1.1). The most common responses for not participating in the survey included "not wanting to miss the shuttle" or "not having enough time." Although the sample size at the wilderness sites was small, it was representative of the level of visitation that was observed at those sites during the sampling period. The Main Loop Trail site was selected for its proximity to the Visitor Center, (less than a quarter mile walk down the Main Loop Trail from the Visitor Center). The Alcove House Trail site was located further down the trail from the Visitor Center and was intended to capture visitors who were hiking a longer distance. The Burnt Mesa Trail and Ponderosa Campground sites were both located above the Frijoles Canyon and selected to intercept visitors interested in day hiking at a location outside of the main archaeological area. It should be noted that a major wildfire threatened the Bandelier backcountry during the sampling period. The decision to move from the Ponderosa Campground site to the Burnt Mesa Trail site was based partly on low visitation and partly on the fire danger.

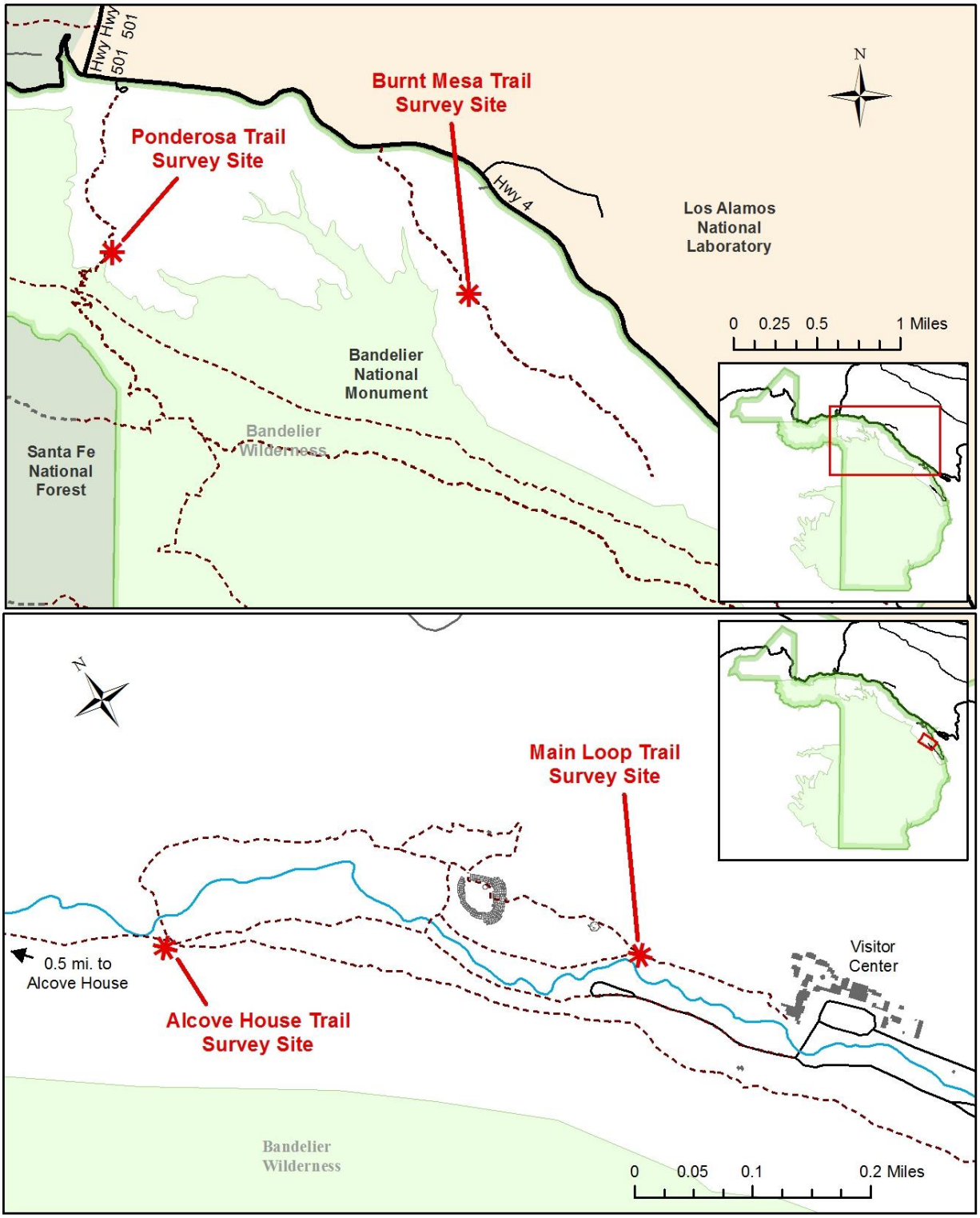

Figure 0.1.Locations of listening survey sampling sites

Survey Design and Variable Descriptions

After agreeing to participate in the study, participants were seated and asked to listen for all the sounds they could hear during a three-minute session. Sessions were timed using a digital timer. At the conclusion of the listening session, participants were given either an electronic or printed version of the questionnaire. Participants were encouraged to complete an electronic questionnaire, but printed versions were available for visitors who indicated a preference. All electronic responses were recorded on iPad 2nd Generation tablets programmed with iSURVEY software. Electronic and printed versions of the survey were designed to match in content, and align as closely as possible in terms of format (Appendix).

In the first section of the survey, participants were given a list of sounds, including both natural and anthropogenic sources. Participants identified which sounds they heard during the listening session and evaluated those sounds with respect to (1) their level of acceptability and (2) their personal interpretation. Response options for acceptability ranged from "Very Unacceptable" (-4) to Very Acceptable (+4). This question was intended to determine how appropriate or reasonable visitors felt a sound was for the given location and context. Response options for personal interpretation of sounds ranged from "Very Annoying" (-4) to "Very Pleasing" (+4). This question was intended to elicit the interpretive or emotional response visitors had to a particular sound. The sound of an insect, such as a mosquito, was used as a common example used to clarify distinction between the acceptability and personal interpretation scales. For example, some visitors may believe the sound of a mosquito is acceptable given the outdoor setting, though it can still be personally annoying to them.

Participants were also asked a series of questions regarding their level of support or opposition for potential management actions the Monument was considering for soundscape planning and management. For example, participants were asked the acceptability of having park rangers stationed along the trail quieting visitors. These management action scenarios were rated from "Very Unacceptable" (-4) to "Very Acceptable" (+4). Additionally, participants were asked if the presence of cultural sounds, such as traditional drumming, singing, or chanting, would improve the quality of their experience in the Monument.

This study also evaluated visitor motivations to determine what benefits or experiences visitors were seeking from their visit to Bandelier National Monument. Motivations, such as the importance of experiencing solitude, were evaluated with response options ranging from "Not important at all" (1) to "Extremely important" (5). Additionally, information was also obtained regarding visitor expectations prior to their visit, and their actual experiences once arriving at the Monument. Expectations, such as the number of people seen while hiking, were evaluated with response options ranging from "A lot less than expected" (-2) to "A lot more than expected" (+2). The scales noted above differed from those used in the printed surveys, as they were re-coded during data entry to make the electronic and printed versions consistent.

A range of criteria regarding trip and visitation information was also obtained. These variables included the following: whether the current trip was the participant's first visit to the Monument, number of previous visits if not the first, personal group type and size, whether the participant was part of a larger school or commercial group, primary activity during visit, primary destination, and

whether the participant had taken a scenic air tour or over-flight of Bandelier or any other national park units. Basic demographic information was also collected, including gender, age, residency (zip code or country), community size, education, ethnicity, and race.

The data in this report are organized as frequencies, percentages, means, and standard deviations. Frequencies represent the number of respondents who gave a particular response, while percentages show the proportion of respondents (out of the total number of responses) who answered a question a certain way. Means (or averages) are equivalent to the sum of the individual values for each variable divided by the number of responses. The mean provides an estimate of the "typical" response from the entire survey sample for a variable. Standard deviation is closely related to the variance of the data, which is a measure of how closely the individual responses for a variable cluster around the mean. The standard deviation is calculated by taking the square root of the variance and has the advantage of being easier to interpret because it is in the same units as the original variable.

Chapter 3: Results

Descriptive Results – All Locations

Sounds: Acceptability

Visitors identified and evaluated the sounds they heard at various sites during three-minute listening sessions on two scales, acceptability (appropriateness for the setting) (Table 3.1.1) and personal interpretation (personal feeling or emotion toward the sound) (Table 3.1.2).

The five most frequently heard natural sounds in Bandelier were bird song (96% of visitors), wind (92%), insects (74%), running water (64%), and small mammals (29%) (Table 3.1.1). The five most frequently heard anthropogenic sounds were small groups of visitors talking (68%), children (36%), large groups of visitors talking (17%), rangers talking (16%), and jets (12%) (Table 3.1.1). Overall, natural sounds were rated as more highly acceptable (M = 3.16; SD = 1.65) than anthropogenic sounds (M = 0.26; SD = 2.16) (Table 3.1.1) and more pleasing (M = 2.62; SD = 1.50) than anthropogenic sounds (M = -0.82; SD = 1.84) (Table 3.1.2).

Table 0.1. Overall acceptability of sounds heard.

Sound			**Acceptability Percentage**				
	N	***% Heard***	***Unacceptable***	***Neutral***	***Acceptable***[1]	***Mean***[1]	***Std Dev.***
Natural						**3.16**	**1.65**
Wind	597	92	2.7	2.5	94.8	3.59	1.45
Running Water	412	64	1.7	2.7	95.6	3.67	1.24
Rain	11	2	0	36.4	63.6	2.55	2.02
Thunder	34	5	0	14.7	85.3	3.15	1.46
Small Mammal (e.g. Squirrel or Chipmunk)	189	29	4.2	4.8	91.0	3.28	1.74
Large Mammal (e.g. Deer or Coyote)	32	5	3.1	15.6	81.3	3.03	1.64
Bird Song/Chatter	625	96	2.2	0.8	97.0	3.75	1.25
Insects	483	74	13.3	13.0	73.7	2.23	2.38
Anthropogenic						**0.26**	**2.16**
Small Group Talking	442	68	19.5	29.6	50.9	1.07	2.16
Large Group Talking	109	17	33.9	23.9	42.2	0.31	2.34
Children	235	36	16.2	28.1	55.7	1.38	2.23
Ranger Talk	101	16	10.9	28.7	60.4	1.94	2.27
Cultural Sounds (e.g. Drumming, Singing, Poetry, etc.)	15	2	20.0	13.3	66.7	1.87	2.64
Electronic Devices (e.g. Cell Phone, Radio, Camera, etc.)	50	8	54.0	32.0	14.0	-1.04	2.26

Sound			**Acceptability Percentage**				
	N	***% Heard***	***Unacceptable***	***Neutral***	***Acceptable[1]***	***Mean[1]***	***Std Dev.***
Mechanical Noise (e.g. Compressor, Generator, Fan, etc.)	22	3	50.0	36.4	13.6	-1.18	1.79
Aircraft, Unknown	75	12	30.7	37.3	32.0	0.09	2.10
Aircraft, Jet	78	12	34.6	33.3	32.1	-0.04	2.07
Aircraft, Propeller	20	3	35.0	20.0	45.0	0.20	2.02
Aircraft, Helicopter	23	4	43.5	21.7	34.8	-0.09	2.39
Shuttle Bus	31	1	22.6	35.5	41.9	0.55	1.86
Passenger Vehicle	37	6	37.8	24.3	37.8	0.22	2.06
Motorcycle	9	1	22.2	33.3	44.4	1.00	2.60
Work Vehicle (e.g. Delivery Truck, etc.)	21	3	47.6	19.0	33.3	-0.38	2.20
Vehicle, Unknown	59	9	42.4	28.8	28.8	-0.07	2.27
Vehicle Horn or Alarm	7	1	85.7	14.3	0	-2.29	1.38
Park Maintenance (Trail Work, Repair etc.)	29	5	13.8	37.9	48.3	1.10	2.19
Explosion*	12	2	66.7	33.3	0	-	-

[1] Acceptability based on 9-point scale (-4 = Very Unacceptable to +4 = Very Acceptable); original scale was collapsed to a 3-point scale for reporting purposes.

*Bandelier National Monument is within hearing range of the Los Alamos National Laboratory (LANL) which conducts above ground explosives testing.

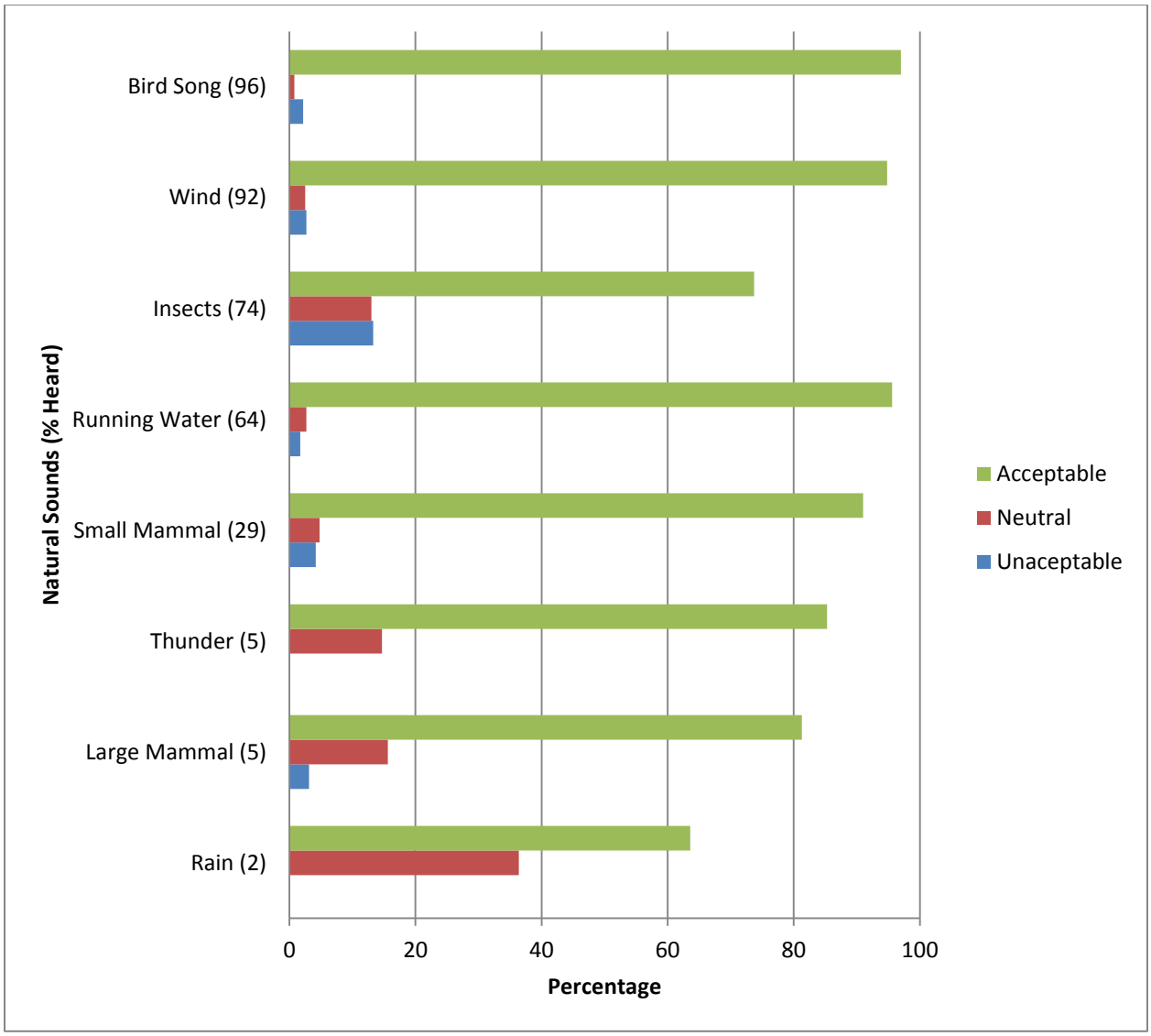

Figure 0.2. Overall acceptability (natural sounds).

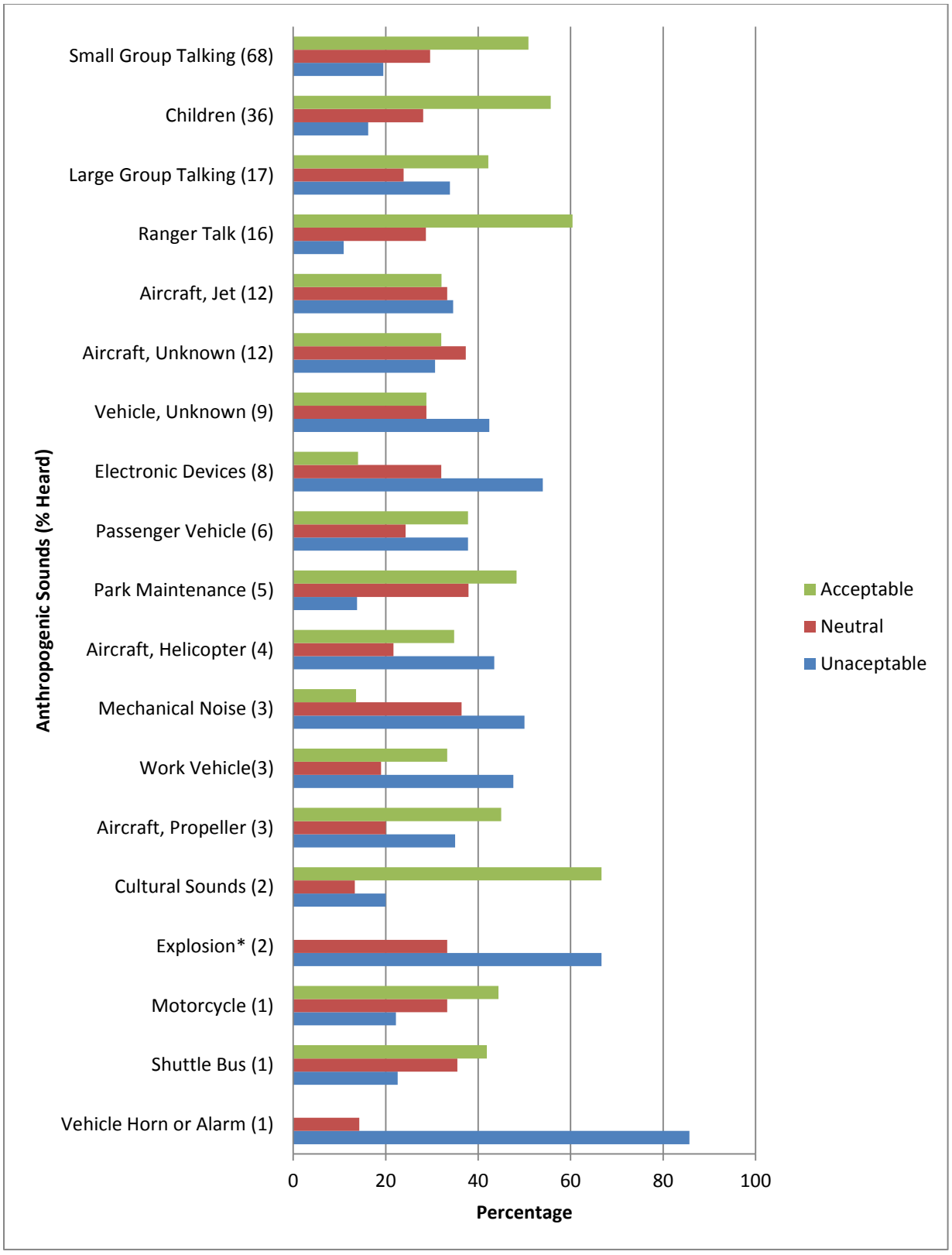

Figure 0.3. Overall acceptability (anthropogenic sounds).

Sounds: Personal Interpretation

Table 0.2. Overall personal interpretation of sounds heard.

Sound			**Personal Interpretation Percentage**				
	N	***% Heard***	***Very Annoying***	***Neutral***	***Very Pleasing[1]***	***Mean[1]***	***Std Dev.***
Natural						**2.62**	**1.50**
Wind	583	90	0.9	3.1	96.1	3.56	1.11
Running Water	404	62	0.2	2.7	97.0	3.78	0.80
Rain	6	1	33.3	33.3	33.3	0.33	2.34
Thunder	25	4	8.0	12.0	80.0	2.28	2.01
Small Mammal (e.g. Squirrel or Chipmunk)	167	26	0.6	6.0	93.4	3.32	1.28
Large Mammal (e.g. Deer or Coyote)	29	5	0	10.3	89.7	3.45	1.27
Bird Song/Chatter	521	80	0.2	0.4	99.4	3.87	0.58
Insects	408	63	39.2	20.1	40.7	0.33	2.61
Anthropogenic						**-0.82**	**1.84**
Small Group Talking	420	65	35.7	44.0	20.2	-0.28	1.76
Large Group Talking	111	17	50.5	33.3	16.2	-0.83	2.08
Children	226	35	28.3	34.5	37.2	0.43	2.11
Ranger Talk	98	15	14.3	41.8	43.9	1.11	2.08
Cultural Sounds (e.g. Drumming, Singing, Poetry, etc.)	14	2	7.1	28.6	64.3	1.43	2.24
Electronic Devices (e.g. Cell Phone, Radio, Camera, etc.)	41	6	70.7	24.4	4.9	-1.95	2.04
Mechanical Noise (e.g. Compressor, Generator, Fan, etc.)	12	3	66.7	33.3	0	-2.00	1.71
Aircraft, Unknown	46	12	39.1	52.2	8.7	-0.65	1.60
Aircraft, Jet	49	12	44.9	40.8	14.3	-0.65	1.80
Aircraft, Propeller	10	3	70.0	10.0	20.0	-0.70	2.50
Aircraft, Helicopter	12	4	58.3	33.3	8.3	-0.92	1.73
Shuttle Bus	17	5	41.2	35.3	23.5	-0.47	1.88
Passenger Vehicle	23	6	60.9	30.4	8.7	-1.17	1.37
Motorcycle	7	1	85.7	14.3	0	-2.29	1.11
Work Vehicle (e.g. Delivery Truck, etc.)	14	3	71.4	21.4	7.1	-1.57	1.79
Vehicle, Unknown	29	9	51.7	34.5	13.8	-0.79	1.78
Vehicle Horn or Alarm	2	1	100	0	0	-3.00	1.41
Park Maintenance (Trail Work, Repair etc.)	17	5	29.4	47.1	23.5	-0.47	2.10

Sound			Personal Interpretation Percentage				
	N	*% Heard*	*Very Annoying*	*Neutral*	*Very Pleasing*[1]	*Mean*[1]	*Std Dev.*
Explosion*	-	-	-	-	-	-	-

[1]Interpretation based on 9-point scale (-4 = Very Annoying to +4 = Very Pleasing); original scale was collapsed to a 3-point scale for reporting purposes.

*Bandelier National Monument is within hearing range of the Los Alamos National Laboratory (LANL) which conducts above ground explosives testing.

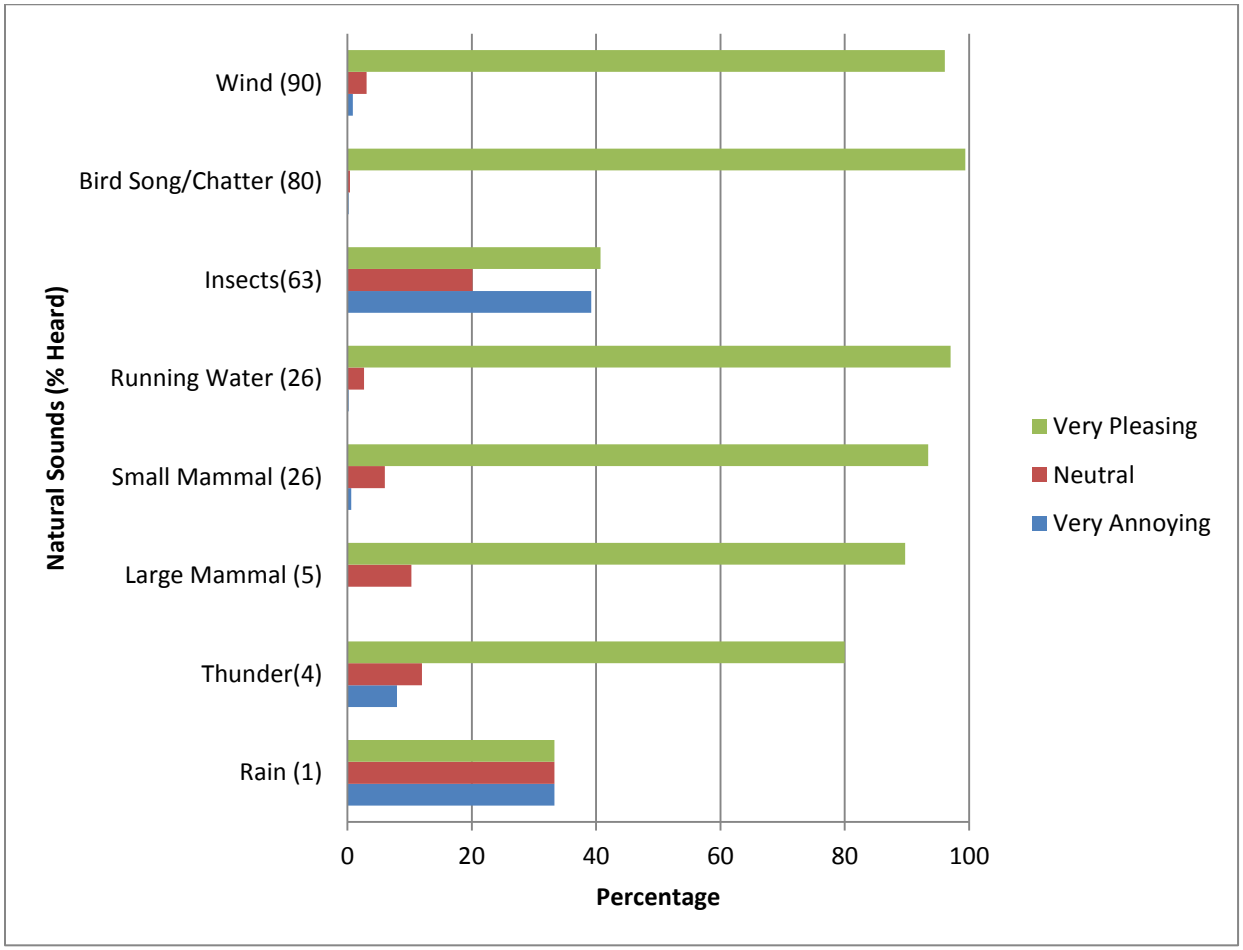

Figure 0.4. Overall personal interpretation (natural sounds).

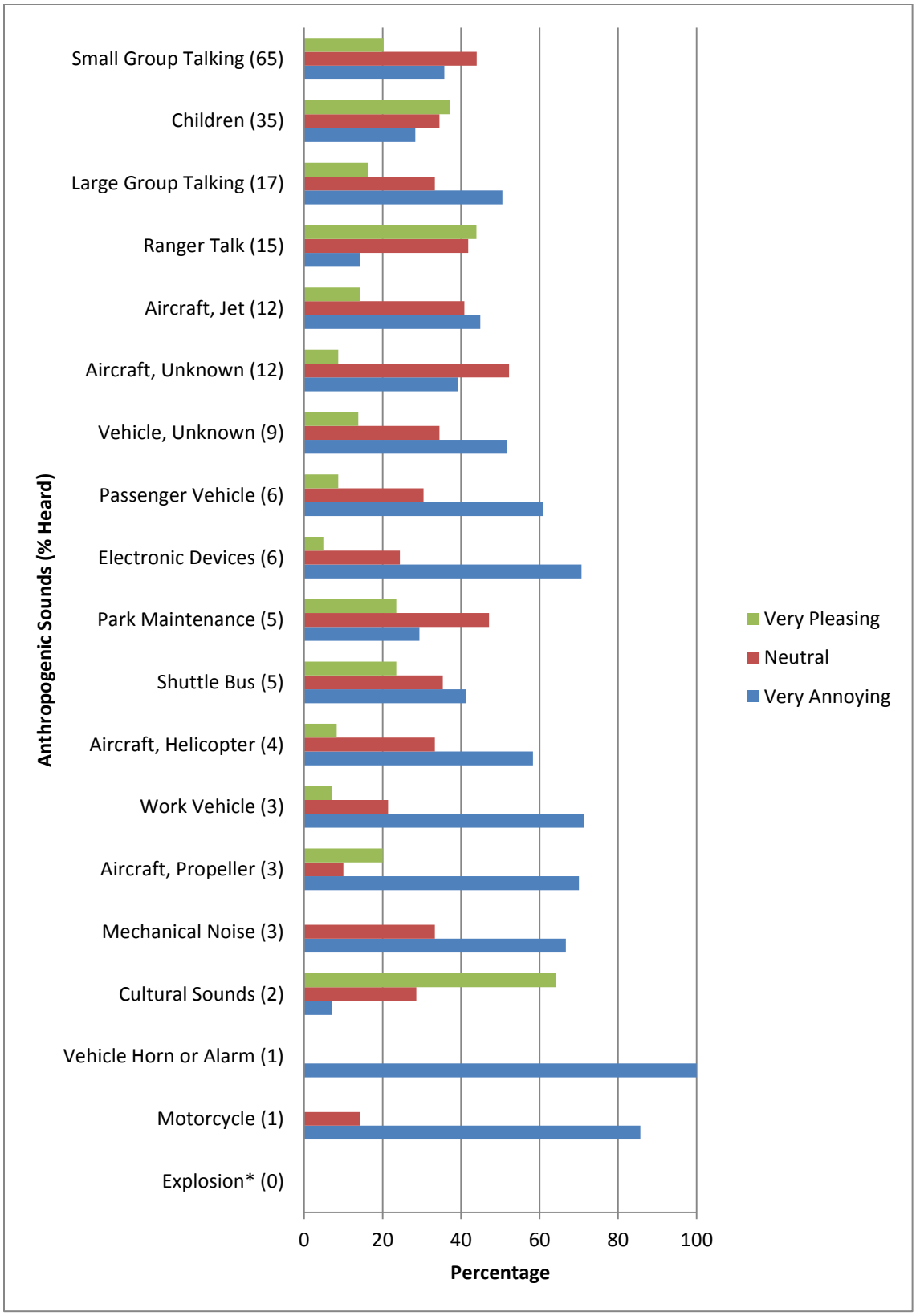

Figure 0.5. Overall personal interpretation (anthropogenic sounds).

Management Actions

Visitors were asked to rate the acceptability of certain management actions (Table 3.1.3). Respondents were most supportive (*M* = 2.25; *SD* = 2.31) of potential management actions that would increase their opportunity to experience traditional cultural sounds and least supportive (*M* = 0.24; *SD* = 2.77) of having rangers quieting visitors along the Monument's trails. Survey respondents found management actions that employed signage intended to educate visitors about soundscape management (*M* = 1.50; *SD* = 2.45) and cultural sounds (*M* = 2.22; *SD* = 2.60) to be acceptable, on average.

Table 0.3. Overall evaluations of potential management actions.

		Percentage				
Potential Management Action	***N***	***Unacceptable***	***Neutral***	***Acceptable*[1]**	***Mean*[1]**	***Std. Dev.***
See: Sign(s) informing you about the park's concerns with human-caused noise	641	16.2	21.7	62.1	1.50	2.45
See: Sign(s) informing you that you may hear traditional cultural sounds (e.g. drumming, singing, chanting).	642	9.8	14.5	75.7	2.22	2.60
Experience: Traditional cultural sounds (e.g. drumming, singing, chanting).	641	11.7	11.2	77.1	2.25	2.31
Experience: Park rangers stationed along the trail quieting visitors.	641	40.8	17.1	42.1	0.24	2.77

[1] Acceptability based on 9-point scale (-4 = Very Unacceptable to +4 = Very Acceptable); original scale was collapsed to a 3-point scale for reporting purposes.

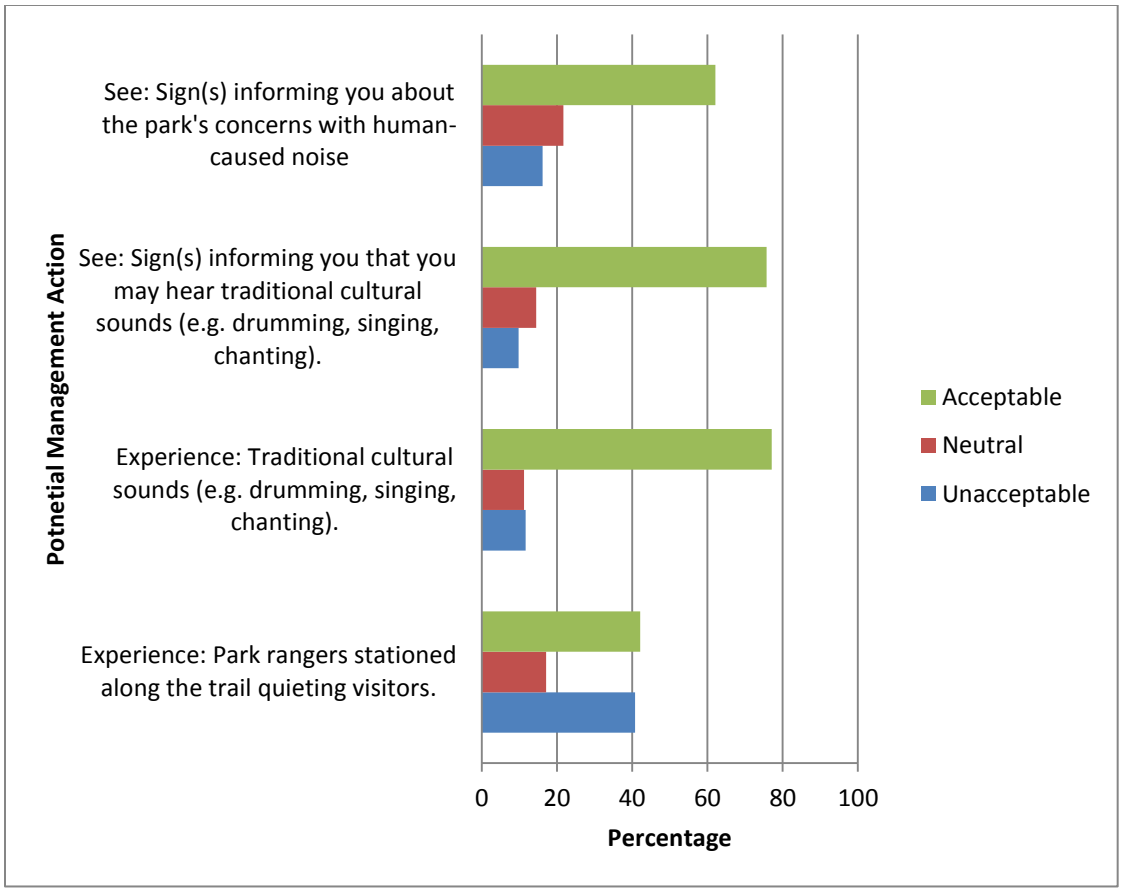

Figure 0.6. Overall potential management actions.

Visitors were also asked to rate the extent to which the presence of cultural sounds in the Monument would improve their experience and understanding (based on a 5-point scale ranging from 1 = "Not at All" to 5 = "Very Much") (Table 3.1.4). Responses suggested that cultural sounds would enhance visitor experiences (*M* = 3.61; *SD* = 1.36), understanding of traditional Pueblo cultures (*M* = 3.78; *SD* = 1.27), understanding of Bandelier's significance (*M* = 3.65; *SD* = 1.38), understanding of the Monument's mission (*M* = 3.54; *SD* = 1.40), and appreciation of Bandelier National Monument (*M* = 3.63; *SD* = 1.40).

Table 0.4. Overall degree to which cultural sounds would improve visitor experiences and understanding.

		Percentage				
Potential Management Action	***N***	***Not At All***	***Somewhat***	***Very Much***[1]	***Mean***[1]	***Std. Dev.***
Enhance your visitor experience	642	23.7	18.5	57.8	3.61	1.36
Increase your understanding of traditional Pueblo cultures	644	21.6	15.6	62.8	3.78	1.27
Increase your understanding of Bandelier's significance	644	22.2	17.2	60.6	3.65	1.38
Increase your understanding of Bandelier's mission	643	24.5	19.2	56.3	3.54	1.40
Increase your appreciation of Bandelier	642	24.0	16.1	59.9	3.63	1.40

[1]Degree of importance based on 5-point scale (1 = Not at All to 5 = Very Much); original scale was collapsed to a 3-point scale for reporting purposes.

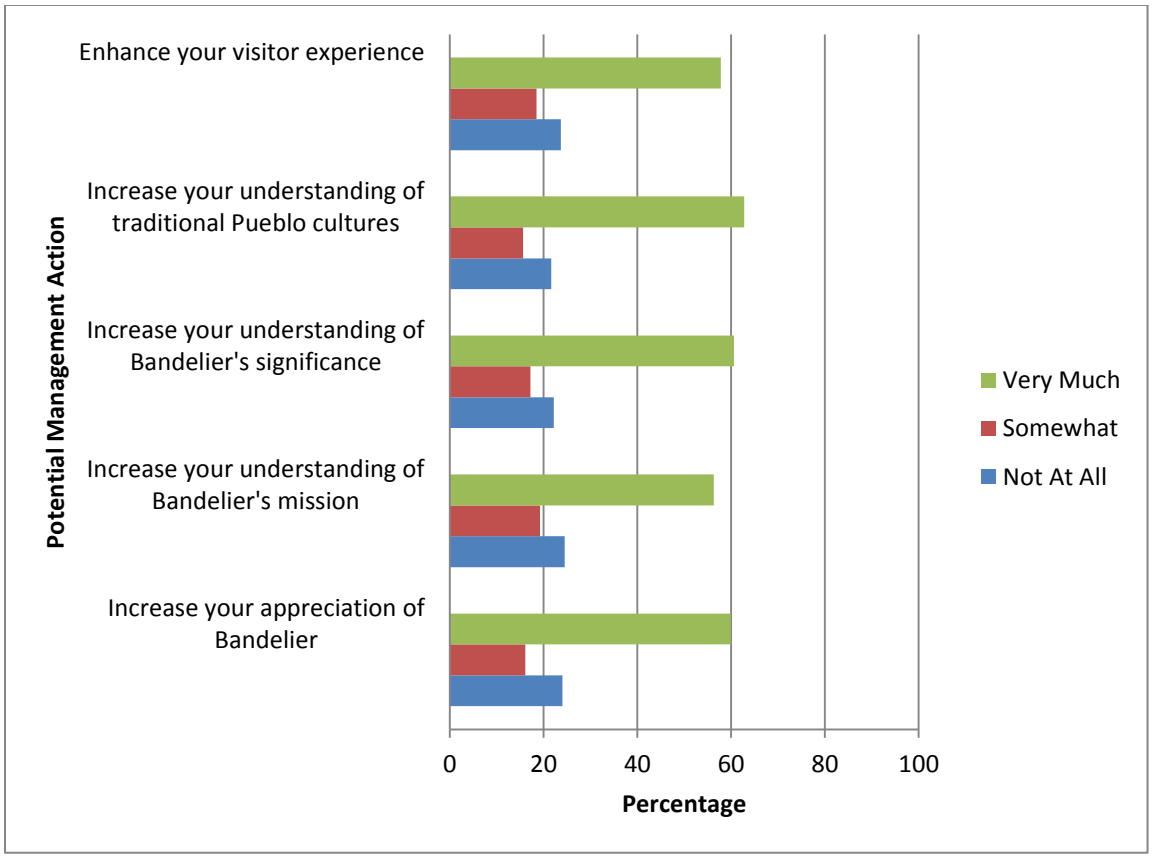

Figure 0.7. Overall degree to which cultural sounds would improve visitor experiences and understanding.

Motivations for Visiting

Visitors' top reported motivations for visiting Bandelier National Monument (based on a 5-point scale ranging from 1 = "Not Important at All" to 5 = "Extremely Important") (Table 3.1.5) were appreciating the scenic beauty (M = 4.57; SD = 0.66), appreciating the archaeological and cultural sites (M = 4.52; SD = 0.76), experiencing a sense of connection with nature (M = 4.17; SD = 0.98), experiencing the sounds of nature (M = 4.07; SD = 0.98), and spending time with family and friends (M = 3.95; SD = 1.19). The least important motivations for visiting the Monument were experiencing cultural sounds (M = 2.65; SD = 1.43) and experiencing Bandelier National Monument in an air-tour overflight (M = 1.50; SD = 1.10).

Soundscape-related motivations did not differ dramatically between early morning visitors and mid-day visitors. Respondents who were surveyed before 10 a.m. demonstrated similar motivations as respondents who were surveyed after 10 am for experiencing the sounds of nature (M_{early} = 4.06 vs. M_{late} = 4.07), cultural sounds (M_{early} = 2.65 vs. M_{late} = 2.65), and peace and quiet (M_{early} = 3.64 vs. M_{late} = 3.84).

Table 0.5. Overall importance of motivations for visiting Bandelier National Monument.

		Percentage				
Motivations[2]	***N***	***Not Important At All***	***Moderately Important***	***Extremely Important***	***Mean[1]***	***Std. Dev.***
Appreciate the scenic beauty	646	1.1	5.0	94.0	4.57	0.66
Experience solitude	643	24.4	26.7	48.8	3.37	1.29
Spend time with family/friends	641	13.1	14.8	72.1	3.95	1.19
Get some exercise	634	16.1	25.2	58.7	3.69	1.17
Experience the sounds of nature	640	6.9	19.7	73.4	4.07	0.98
Experience cultural sounds	622	49.0	21.1	29.9	2.65	1.43
Experience a sense of connection with nature	646	7.3	15.0	77.7	4.17	0.98
Experience peace and quiet	642	12.9	22.3	64.8	3.81	1.10
Experience a sense of challenge	627	33.2	28.4	38.4	3.09	1.29
Appreciate the archaeological and cultural sites	639	2.5	7.0	90.5	4.52	0.76
Experience Bandelier in an air-tour overflight	575	85.0	6.4	8.5	1.50	1.10

[1]Degree of importance based on 5-point scale (1 = Not Important At All to 5 = Extremely Important); original scale was collapsed to a 3-point scale for reporting purposes.

[2]Respondents may interpret the meaning of these motivational statements differently. They were not provided additional context for these items during survey administration.

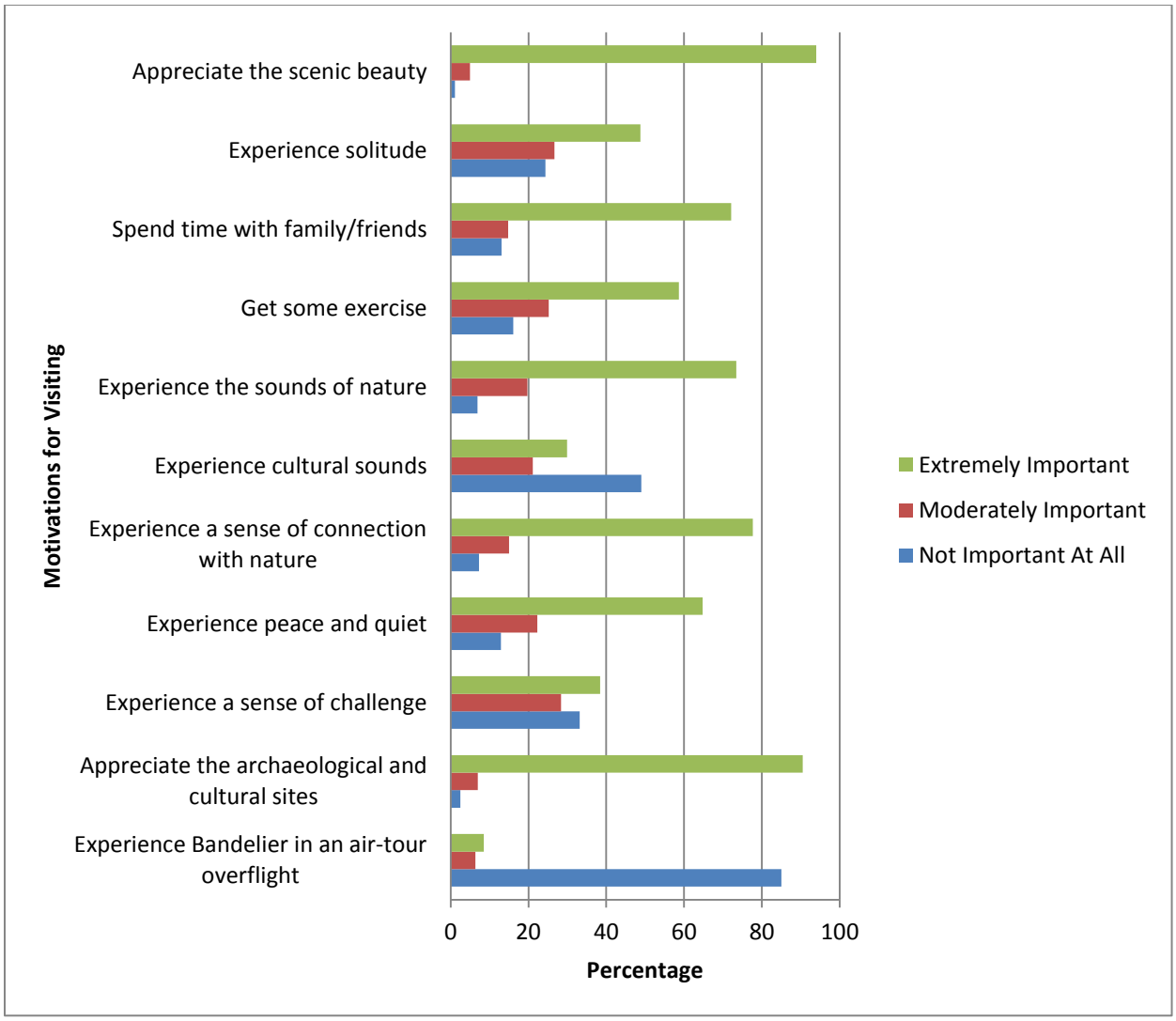

Figure 0.8. Overall importance of motivations for visiting Bandelier National Monument.

Expectations for Visit

Visitors were asked to compare their actual experiences in Bandelier National Monument to their expectations for their visit (based on a 5-point scale ranging from 1 = "A Lot Less than Expected" to 5 = "A Lot More than Expected") (Table 3.1.6). On average, respondents indicated that they had more opportunities to experience the sounds of nature than they expected (*M* = 3.30; *SD* = 0.72). With regard to hearing aircraft, respondents indicated hearing less than expected (*M* = 2.44; *SD* = 1.10), although the majority (59%) indicated having no expectation for hearing aircraft while in the Monument. Visitors reported hearing vehicles (*M* = 2.23; *SD* = 1.02), and other visitors (*M* = 2.57; *SD* = 0.87) less frequently than expected. Respondents also reported seeing fewer people while hiking than expected (*M* = 2.43; *SD* = 0.84). With regard to viewing wildlife, respondents indicated having slightly less opportunities for viewing than expected (*M* = 2.89; *SD* = 0.85). Finally, visitors indicated experiencing cultural sounds less than expected (*M* = 2.48; *SD* = 0.99). However, the majority of respondents (52%) indicated having no expectation for hearing cultural sounds while in Bandelier National Monument.

Table 0.6. Overall conditions experienced compared to expectations.

		Percentage							
Expectation	***N***	***No Expectation***	***A Lot Less Than Expected***	***Less Than Expected***	***About as Expected***	***More Than Expected***	***A Lot More Than Expected***	***Mean[1]***	***Std. Dev.***
Number of people you saw while hiking	642	18	12.9	25.4	38.1	3.7	0.6	2.43	0.84
Amount of time you heard aircraft	638	58	10.5	9.6	13.7	5.7	1.1	2.44	1.10
Opportunity to view wildlife	636	16	5.7	14.0	49.8	9.1	3.7	2.89	0.85
Opportunity to experience sounds of nature	640	9	0.9	4.0	59.3	19.1	6.8	3.30	0.72
Amount of time you heard vehicles	636	35	19.1	16.8	20.8	4.9	0.9	2.23	1.02
Amount of time you heard other visitors	642	16	11.7	20.3	43.0	6.8	0.8	2.57	0.87
Opportunity to experience cultural sounds	638	52	8.9	12.6	20.8	2.6	1.8	2.48	0.99

[1]Conditions compared to expectations based on 5-point scale (1 = A Lot Less than Expected to 5 = A Lot More than Expected). Respondents that indicated having no expectation were not considered within the mean value.

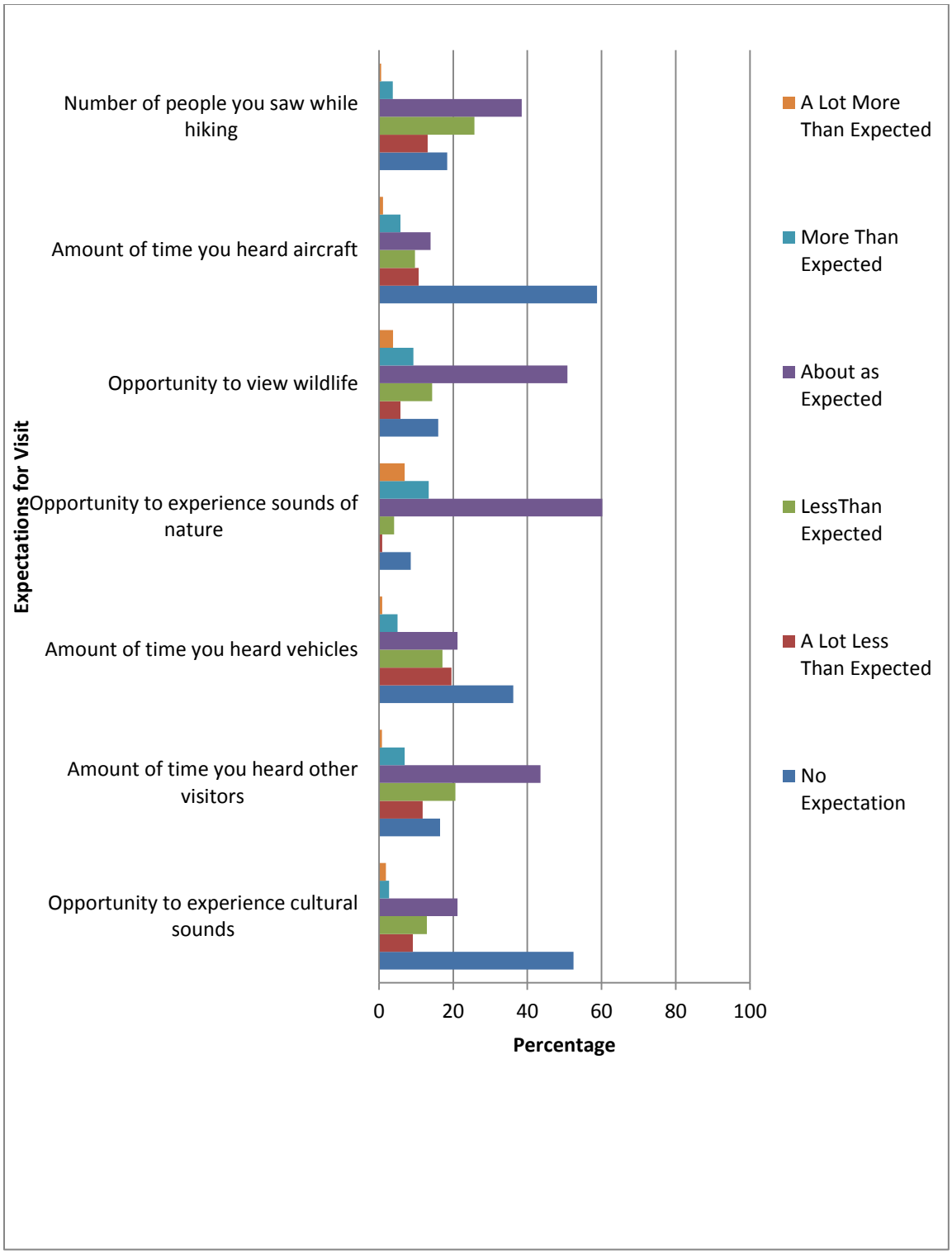

Figure 0.9. Overall conditions experienced compared to expectations.

Overall Visitation and Demographic Results

Visitation and demographic results from all sites (*N* = 649) are listed below in Tables 3.1.7-3.1.25.

Visit Length and Group Type

Sixty-nine percent of respondents indicated that it was their first visit to Bandelier National Monument (Table 3.1.7).

Table 0.7. Overall first-time visitors to Bandelier National Monument.

First Visit	*N*	*Percent*
Yes	444	69
No	198	31

Of those visitors who had previously visited the Monument, the highest percentage (41%) was visiting for the second time (Table 3.1.8).

Table 0.8. Overall repeat visitor number of total visits.

Times Visited	*N*	*Percent*
2	82	41
3 - 5	55	24
6 - 10	21	14
More than 10	43	21

The majority of respondents (91%) were day visitors to the Monument (Table 3.1.9).

Table 0.9. Overall length of current visit.

Visit Length	*N*	*Percent*
Today Only	584	91
2 - 3 Days	42	7
4 - 7 Days	9	1
8 or More Days	8	1

Most visitors (67%) were with their families (Table 3.1.10).

Table 0.10. Overall type of personal group.

Personal Group Type	*N*	*Percent*
Alone	23	4
Friends	141	22
Family	425	67
Friends and Family	50	8

The majority of visitors (55%) had two to three people in their group (Table 3.1.11).

Table 0.11. Overall number of people in personal group.

Personal Group Size	*N*	*Percent*
Just Myself	45	7
2 - 3	347	55
4 - 7	203	32
8 - 12	26	4
13 or More	14	2

Ninety-three percent of visitors were not part of a larger group (Table 3.1.12).

Table 0.12. Overall larger group (such as school, church, scout or tour groups).

With Large Group	*N*	*Percent*
Yes	43	7
No	602	93

Of the respondents who reported being part of a larger group, 37% indicated they were part of a school or educational group, and 37% indicated they were part of another type of organized group (Table 3.1.13).

Table 0.13. Overall type of larger group.

Large Group Type	*N*	*Percent*
Commercial guided tour group	1	2
School or educational group	16	37
Family reunion group	10	23
Other organized group	16	37

Fifty-four percent of respondents who reported being part of a larger group were in a group of 21 or more people (Table 3.1.14).

Table 0.14. Overall size of larger group.

Large Group Size	*N*	*Percent*
Less than 10	8	19
10 – 15	4	9
16 – 20	8	19
21 or More	23	54

Primary Activity and Destination

The highest percentage of respondents (48%) indicated that their primary activity was archeological or cultural interests (Table 3.1.15).

Table 0.15. Overall primary activity type.

Activity	***N***	***Percent***
Day hiking	256	40
Archaeological/cultural interests	304	48
Backpacking	4	1
Wildlife viewing	13	2
Camping	13	2
Photography	40	6

Most respondents (58%) indicated that the visitor center/Main Loop Trail was their primary destination (Table 3.1.16).

Table 0.16. Overall primary destination.

Destination	***N***	***Percent***
Alcove House	161	25
Ponderosa/Upper Crossing	14	2
Tsankawi	21	3
Falls Trail	24	4
Visitor Center/Main Loop Trail	366	58
Other	49	8

Air Tours and Over-flights

The vast majority of respondents (99%) indicated that they had not taken an air tour over Bandelier National Monument (Table 3.1.17).

Table 0.17. Overall air tour over Bandelier National Monument.

Air tour/Over-flight	*N*	*Percent*
Yes	7	1
No	636	99

Eleven percent of respondents indicated that they had taken an air tour over another park (Table 3.1.18).

Table 0.18. Overall air tour over other parks.

Air tour/Over-flight	*N*	*Percent*
Yes	72	11
No	572	89

Demographics

Fifty-five percent of all respondents were female (Table 3.1.19).

Table 0.19. Overall gender.

Gender	*N*	*Percent*
Male	288	45
Female	352	55

The average age of the total sample was approximately 50 years old, with a range of 18 to 84 years old (Table 3.1.20).

Table 0.20. Overall age.

Mean	*SD*	*Range*
49.9	16.14	18 - 84

The majority of respondents (95%) reported being from the United States (Table 3.1.21).

Table 0.21. Overall origin by country.

Country	***N***	***Percent***
Australia	2	<1
Canada	9	1
Czech Republic	2	<1
France	3	1
Germany	1	<1
Guatemala	1	<1
India	1	<1
Japan	2	<1
Lebanon	1	<1
Poland	2	<1
Scotland	3	1
Singapore	1	<1
Spain	1	<1
United Kingdom	5	1
United States	615	95

Of the respondents who indicated they were from the United States, 31% reported being from the Southwest region, while 19% reported being from the Pacific region, and 17% reported being from the Southeast (Figure 3.1.9).

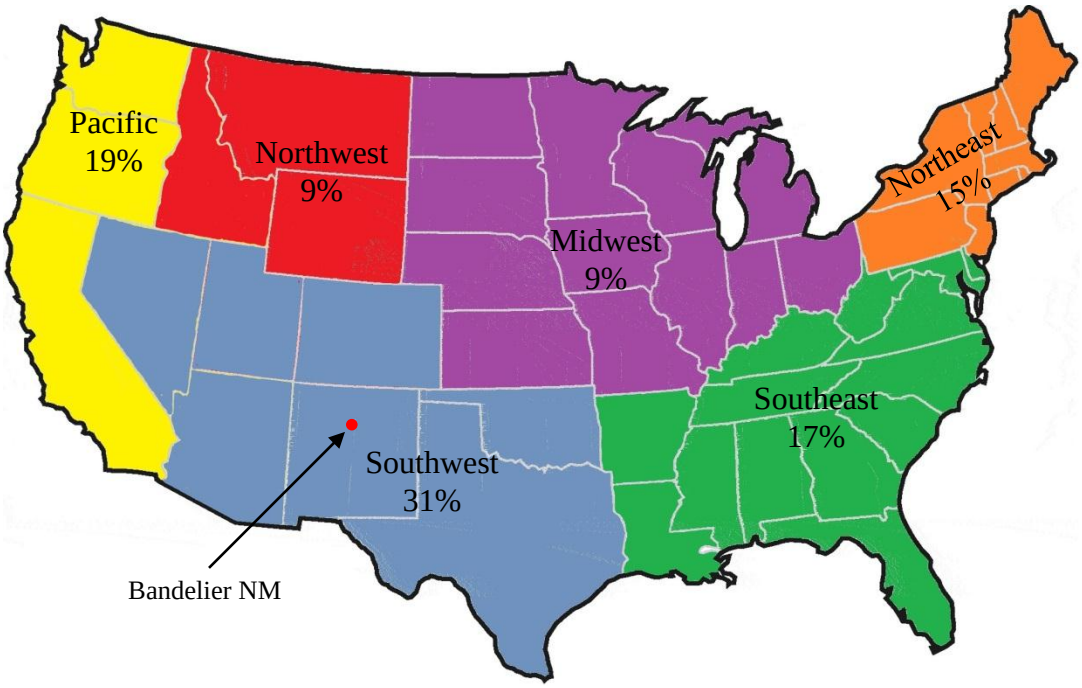

Figure 0.10. Overall origin by U.S. region.

States surrounding the Monument were also investigated and the majority of respondents were from New Mexico (17%) (Figure 3.1.10)

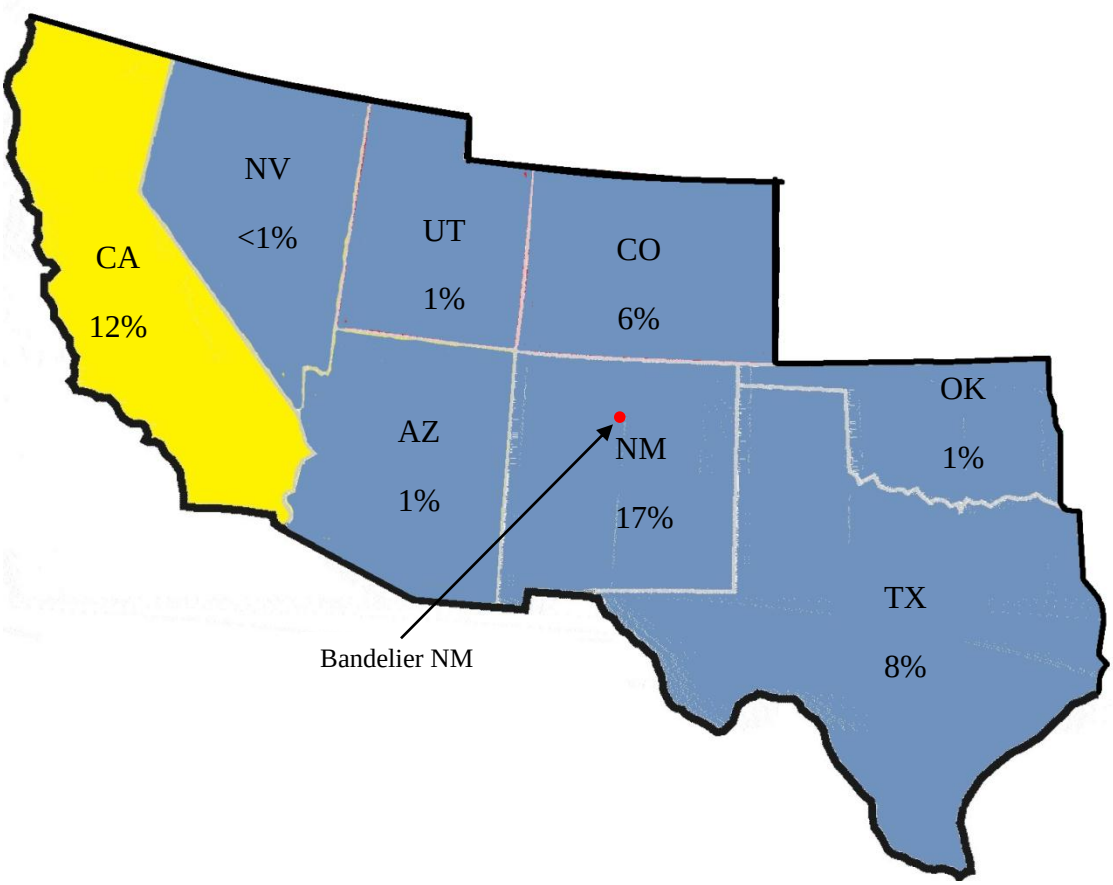

Figure 0.11. Overall origin by selected surrounding states.

Thirty-seven percent of respondents indicated they resided in large cities of 250,000 people or more (Table 3.1.22).

Table 0.22. Overall size of residence community.

Residence Community Size	***N***	***Percent***
Large City: 250,000 or more people	235	37
City: 100,000 to 249,999 people	74	12
City: 50,000 to 99,999 people	87	14
Small City: 25,000 to 49,999 people	68	11
Town: 10,000 to 24,999 people	83	13
Town: 5,000 to 9,999 people	36	6
Small Town: 5,000 or fewer people	56	9
Rural or Farm	1	<1

Nearly three-quarters of the respondents (74%) reported having at least a degree from a four-year college, and one-third had a postgraduate degree (Table 3.1.23).

Table 0.23. Overall highest level of education.

Level of Education	***N***	***Percent***
Some high school	5	1
High school graduate	40	6
Trade/technical/vocational training	15	2
Some college	60	9
Two-year college degree	50	8
Four-year college degree	180	28
Some postgraduate work	82	13
Postgraduate degree	208	33

Six percent of respondent reported being Hispanic or Latino (Table 3.1.24).

Table 0.24. Overall Hispanic or Latino.

Hispanic or Latino	***N***	***Percent***
Yes	40	6
No	597	93

The majority (87%) of respondents indicated that they were White (Table 3.1.25).

Table 0.25. Overall race.

Race	***N***	***Percent****
American Indian or Alaskan Native	21	3
Asian	33	5
Black or African American	2	<1
Native Hawaiian or Pacific Islander	5	1
White	566	87
Other	27	4

*Percentage may sum to more than 100% because respondents could indicate more than one race.

Descriptive Results – Ponderosa Campground/Burnt Mesa Trail

Sounds: Acceptability

Visitors identified and evaluated the sounds they heard at the wilderness sites during three-minute listening sessions on two scales, acceptability (appropriateness for the setting) (Table 3.2.1) and personal interpretation (personal feeling or emotion toward the sound) (Table 3.2.2).

The four natural sounds heard at the wilderness sites were bird song (92% of visitors), wind (89%), insects (77%), and small mammals (4%) (Table 3.2.1). The five most frequently heard anthropogenic sounds were passenger vehicles (31%), unknown aircraft (27%), jets (23%), unknown vehicles (23%), and motorcycles (15%) (Table 3.2.1). On average, natural sounds were rated as more highly acceptable (*M* = 3.02; *SD* = 2.27) than anthropogenic sounds (*M* = 0.69; *SD* = 1.92) (Table 3.2.1) and more pleasing (*M* = 3.25; *SD* = 0.95) than anthropogenic sounds (*M* = -1.03; *SD* = 1.06) (Table 3.2.2).

Table 0.26. Ponderosa Campground/Burnt Mesa Trail acceptability of sounds heard.

Sound			**Acceptability Percentage**				
	N	***% Heard***	***Unacceptable***	***Neutral***	***Acceptable*[1]**	***Mean*[1]**	***Std Dev.***
Natural						**3.02**	**2.27**
Wind	23	89	4.3	0	95.7	3.61	1.67
Running Water	0	0	-	-	-	-	-
Rain	0	0	-	-	-	-	-
Thunder	0	0	-	-	-	-	-
Small Mammal (e.g. Squirrel or Chipmunk)	4	4	25.0	0	75.0	1.75	3.86
Large Mammal (e.g. Deer or Coyote)	0	0	-	-	-	-	-
Bird Song/Chatter	26	92	3.8	0	96.2	3.65	1.57
Insects	20	77	5.0	5.0	90.0	3.05	1.96
Anthropogenic						**0.69**	**1.92**
Small Group Talking	1	4	0	0	100.0	-	-
Large Group Talking	0	0	-	-	-	-	-
Children	0	0	-	-	-	-	-
Ranger Talk[2]	2	8	0	0	100.0	4.00	0.00
Cultural Sounds (e.g. Drumming, Singing, Poetry, etc.)	1	4	0	100.0	0	-	-
Electronic Devices (e.g. Cell Phone, Radio, Camera, etc.)	1	4	0	100.0	0	-	-

Sound			Acceptability Percentage				
	N	*% Heard*	*Unacceptable*	*Neutral*	*Acceptable*[1]	*Mean*[1]	*Std Dev.*
Mechanical Noise (e.g. Compressor, Generator, Fan, etc.)	2	8	50.0	50.0	0	-1.00	1.41
Aircraft, Unknown	7	27	28.6	28.6	42.9	0.86	2.19
Aircraft, Jet	6	23	33.3	33.3	33.3	0.33	1.86
Aircraft, Propeller	3	12	33.3	33.3	33.3	0.33	2.52
Aircraft, Helicopter	1	4	0	0	100.0	-	-
Shuttle Bus	0	0	-	-	-	-	-
Passenger Vehicle	8	31	37.5	37.5	25.0	0.13	1.96
Motorcycle	4	15	0	50.0	50.0	1.75	2.06
Work Vehicle(e.g. Delivery Truck, etc.)	2	8	50.0	0	50.0	0.50	3.54
Vehicle, Unknown	6	23	50.0	33.3	16.7	-0.67	1.75
Vehicle Horn or Alarm	0	0	-	-	-	-	-
Park Maintenance (Trail Work, Repair etc.)	0	0	-	-	-	-	-
Explosion*	1	4	100.0	0	0	-	-

[1]Acceptability based on 9-point scale (-4 = Very Unacceptable to +4 = Very Acceptable); original scale was collapsed to a 3-point scale for reporting purposes.

[2]It is likely that the respondent who heard “ranger talk” at the wilderness site and evaluated it as “very annoying” was referring to the survey administrator, not a park ranger or volunteer.

*Bandelier National Monument is within hearing range of the Los Alamos National Laboratory (LANL) which conducts above ground explosives testing.

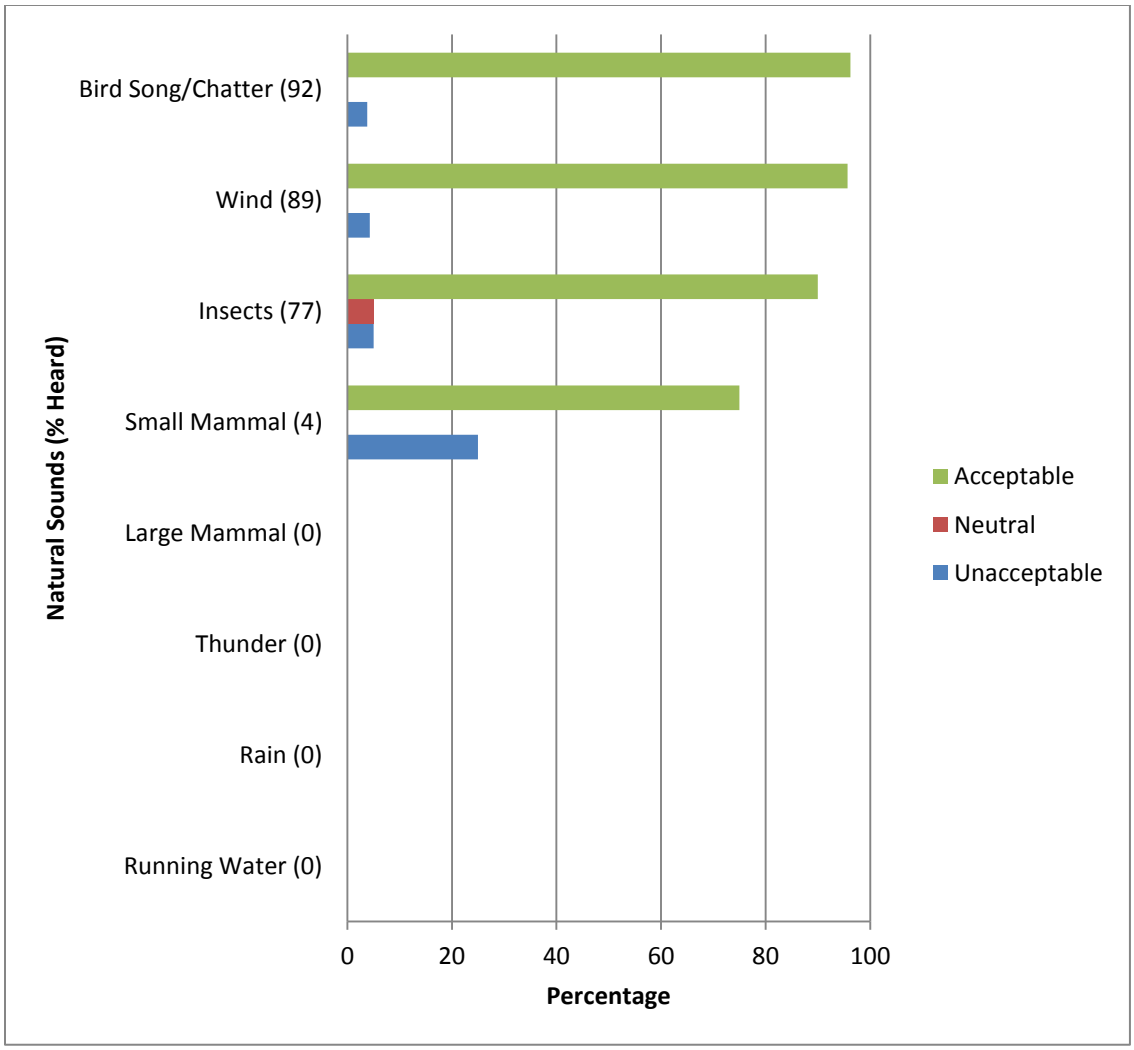

Figure 0.12. Ponderosa Campground/Burnt Mesa Trail acceptability (natural sounds).

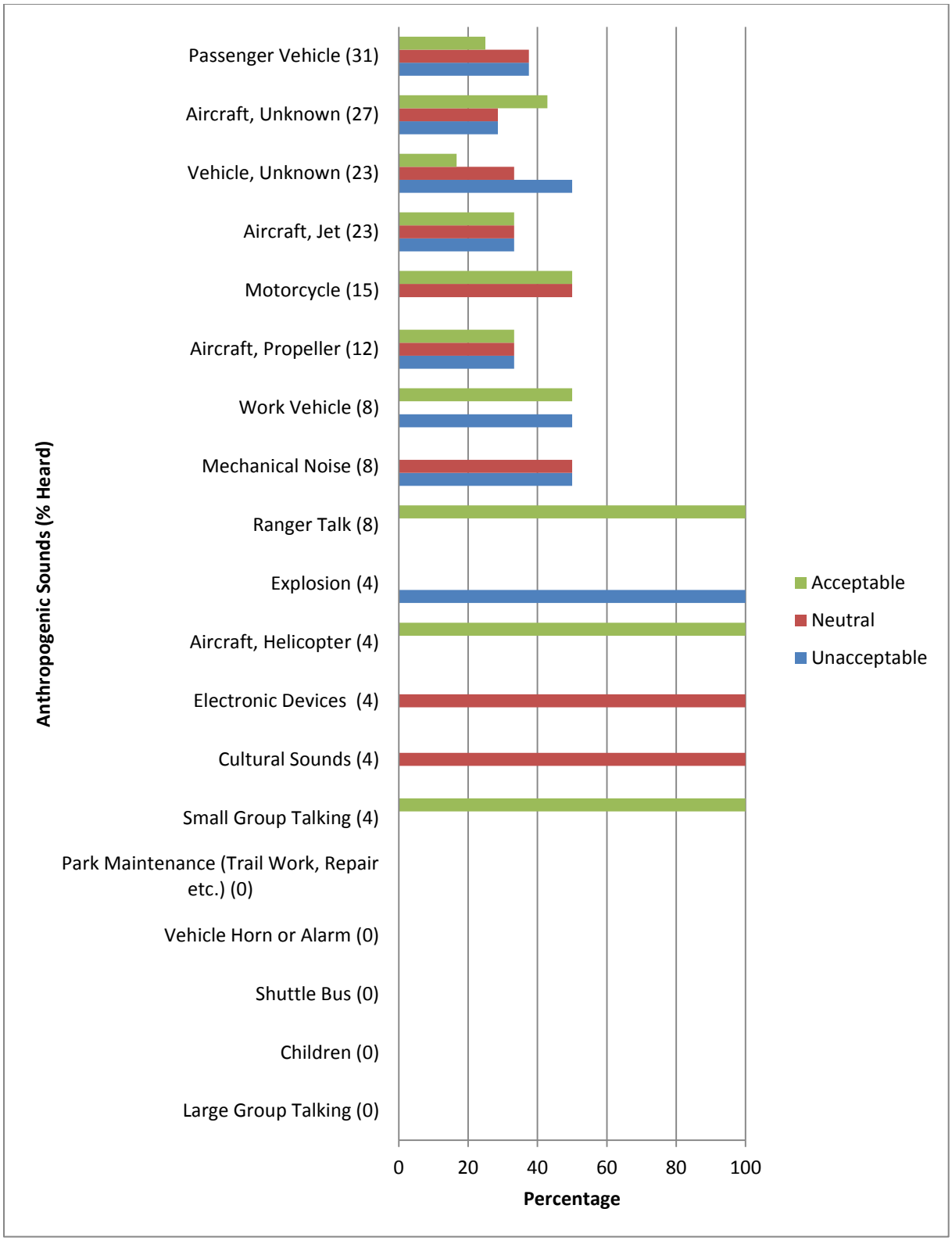

Figure 0.13. Ponderosa Campground/Burnt Mesa Trail acceptability (anthropogenic sounds).

Sounds: Personal Interpretation

Table 0.27. Ponderosa Campground/Burnt Mesa Trail personal interpretation of sounds heard.

Sound			**Personal Interpretation Percentage**				
	N	***% Heard***	***Very Annoying***	***Neutral***	***Very Pleasing[1]***	***Mean[1]***	***Std Dev.***
Natural						**3.25**	**0.95**
Wind	23	89	0	4.3	95.7	3.43	0.99
Running Water	0	0	-	-	-	-	-
Rain	0	0	-	-	-	-	-
Thunder	0	0	-	-	-	-	-
Small Mammal (e.g. Squirrel or Chipmunk)	4	15	0	0	100	3.75	0.50
Large Mammal (e.g. Deer or Coyote)	1	4	0	0	100	4.00	-
Bird Song/Chatter	25	96	0	0	100	3.92	0.28
Insects	19	73	26.3	21.1	52.6	1.16	2.01
Anthropogenic						**-1.03**	**1.06**
Small Group Talking	1	4	0	0	100	-	-
Large Group Talking	0	0	-	-	-	-	-
Children	0	0	-	-	-	-	-
Ranger Talk[2]	1	4	100	0	0	-	-
Cultural Sounds (e.g. Drumming, Singing, Poetry, etc.)	1	4	0	100	0	-	-
Electronic Devices (e.g. Cell Phone, Radio, Camera, etc.)	1	4	100	0	0	-	-
Mechanical Noise (e.g. Compressor, Generator, Fan, etc.)	1	4	100	0	0	-	-
Aircraft, Unknown	6	23	50.0	33.3	16.7	-0.67	1.21
Aircraft, Jet	5	19	20.0	80.0	0	-0.40	0.89
Aircraft, Propeller	3	12	66.7	33.3	0	-0.67	0.58
Aircraft, Helicopter	1	4	100	0	0	-	-
Shuttle Bus	0	0	-	-	-	-	-
Passenger Vehicle	7	27	71.4	28.6	0	-1.29	0.95
Motorcycle	4	15	75.0	25.0	0	-2.00	1.41
Work Vehicle(e.g. Delivery Truck, etc.)	2	8	100	0	0	-1.00	-
Vehicle, Unknown	5	19	60.0	40.0	0	-1.20	1.30
Vehicle Horn or Alarm	0	0	-	-	-	-	-
Park Maintenance (Trail Work, Repair etc.)	0	0	-	-	-	-	-

Sound			Personal Interpretation Percentage				
	N	*% Heard*	*Very Annoying*	*Neutral*	*Very Pleasing*[1]	*Mean*[1]	*Std Dev.*
Explosion*	0	0	-	-	-	-	-

[1] Interpretation based on 9-point scale (-4 = Very Annoying to +4 = Very Pleasing); original scale was collapsed to a 3-point scale for reporting purposes.

[2] It is likely that the respondent who heard "ranger talk" at the wilderness site and evaluated it as "very annoying" was referring to the survey administrator, not a park ranger or volunteer.

*Bandelier National Monument is within hearing range of the Los Alamos National Laboratory (LANL) which conducts above ground explosives testing.

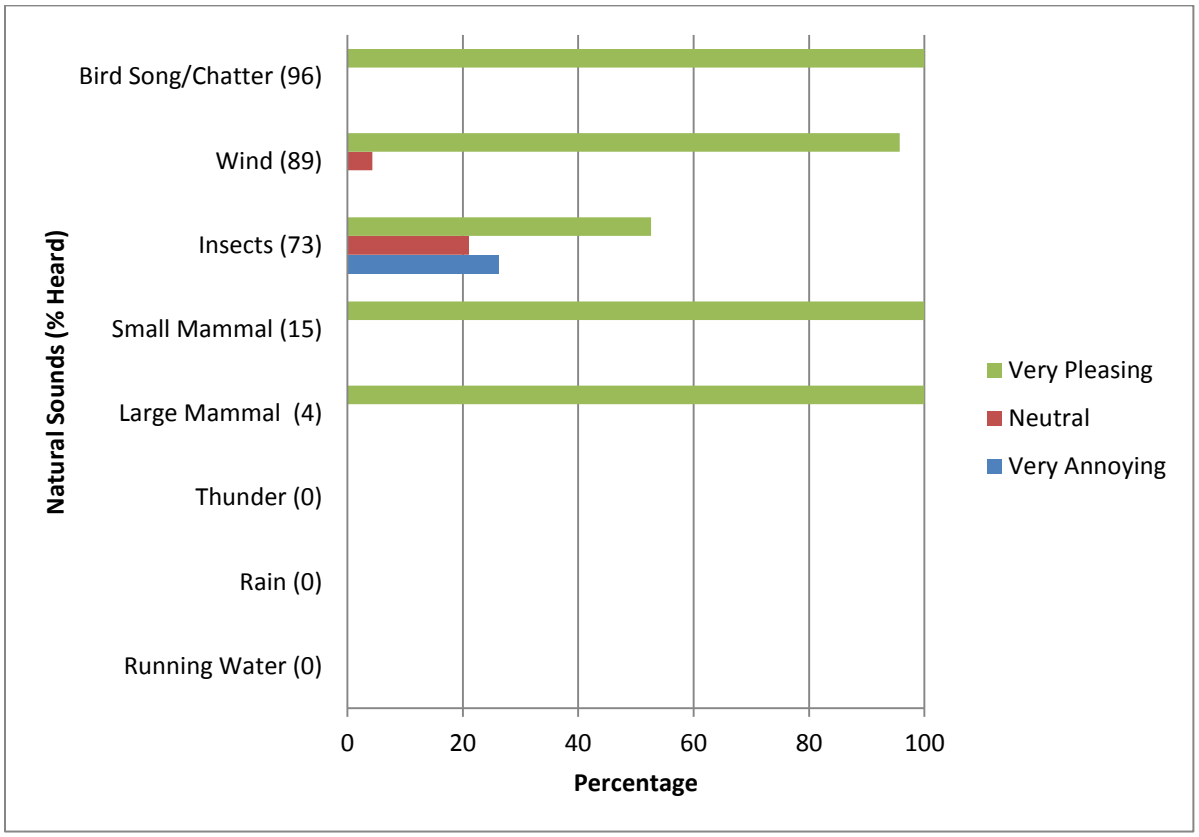

Figure 0.14. Ponderosa Campground/Burnt Mesa Trail personal interpretation (natural sounds).

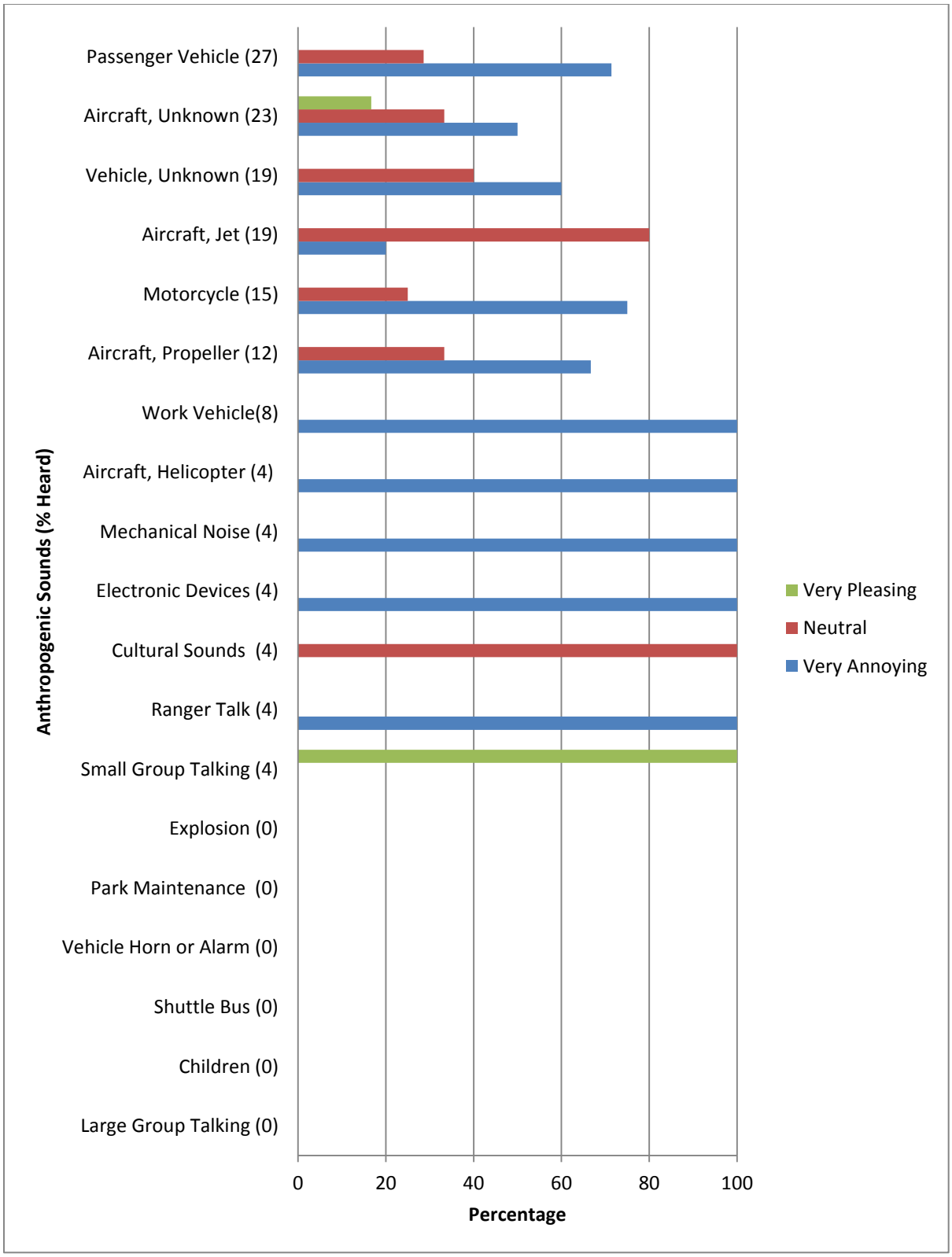

Figure 0.15. Ponderosa Campground/Burnt Mesa Trail personal interpretation (anthropogenic sounds).

Visitors at Ponderosa Campground and Burnt Mesa were asked to rate the acceptability of certain management actions (Table 3.2.3). Respondents were most supportive (*M* = 0.77; *SD* = 2.78) of potential management actions that would inform them via sign that they may hear traditional cultural sounds and least supportive (*M* = -1.28; *SD* = 2.49) of having rangers quieting visitors along the Monument's trails (Table 3.2.3).

Table 0.28. Ponderosa Campground/Burnt Mesa Trail evaluations of potential management actions.

		Percentage				
Potential Management Action	***N***	***Unacceptable***	***Neutral***	***Acceptable***[1]	***Mean***[1]	***Std. Dev.***
See: Sign(s) informing you about the park's concerns with human-caused noise	26	34.6	26.9	38.5	0.23	2.58
See: Sign(s) informing you that you may hear traditional cultural sounds (e.g. drumming, singing, chanting).	26	26.9	11.5	61.5	0.77	2.78
Experience: Traditional cultural sounds (e.g. drumming, singing, chanting).	26	30.8	11.5	57.7	0.50	2.73
Experience: Park rangers stationed along the trail quieting visitors.	25	64.0	12.0	24.0	-1.28	2.49

[1] Acceptability based on 9-point scale (-4 = Very Unacceptable to +4 = Very Acceptable); original scale was collapsed to a 3-point scale for reporting purposes.

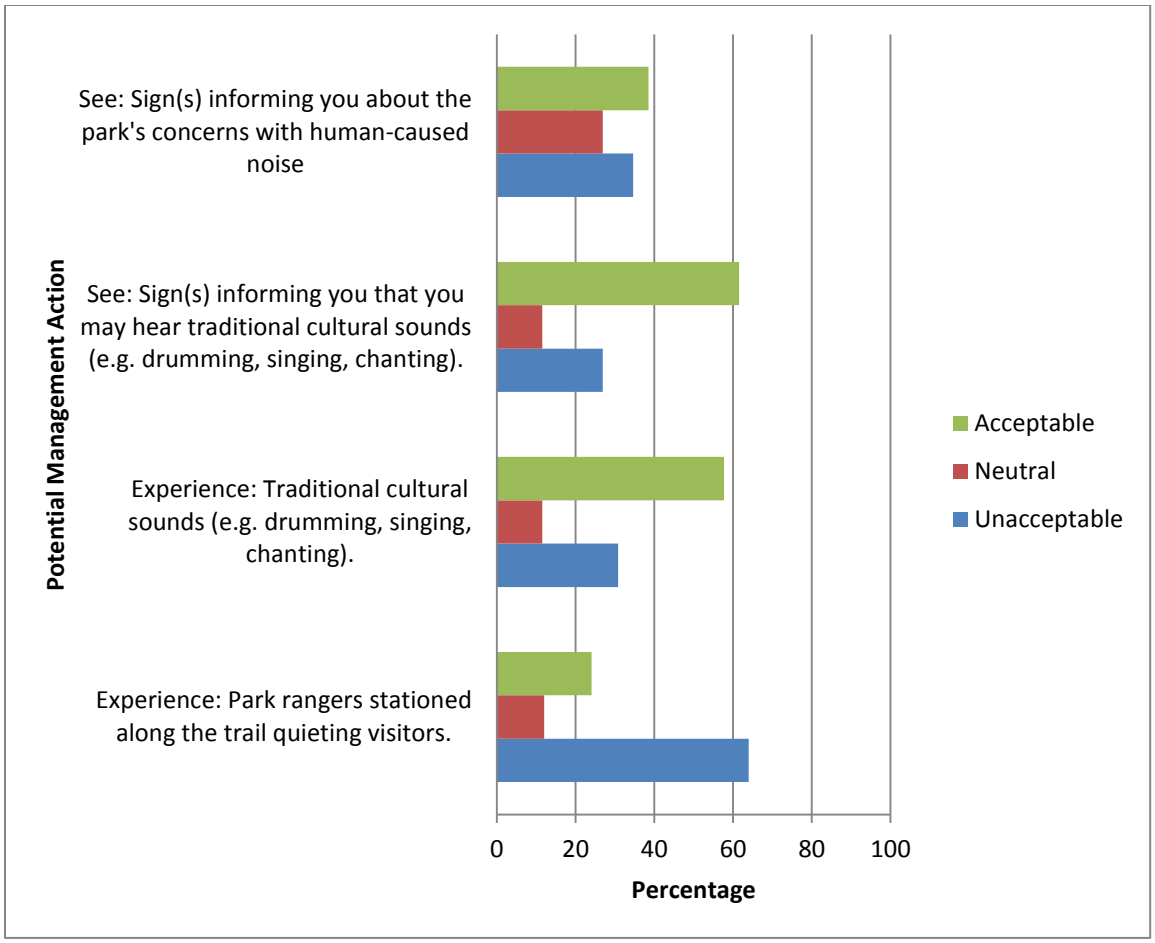

Figure 0.16. Ponderosa Campground/Burnt Mesa Trail potential management actions.

Visitors were also asked to rate the extent to which the presence of cultural sounds in the Monument would improve their experience and understanding (based on a 5-point scale ranging from 1 = "Not at All" to 5 = "Very Much") (Table 3.2.4). Responses suggested that cultural sounds would enhance visitor experiences (*M* = 2.62; *SD* = 1.53), understanding of traditional Pueblo cultures (*M* = 2.85; *SD* = 1.49), understanding of Bandelier's significance (*M* = 2.69; *SD* = 1.57), understanding of Bandelier's mission (*M* = 2.54; *SD* = 1.63), and appreciation of Bandelier (*M* = 2.65; *SD* = 1.55).

Table 0.29. Ponderosa Campground/Burnt Mesa Trail degree to which cultural sounds would improve visitor experiences and understanding.

		Percentage				
Potential Management Action	***N***	***Not At All***	***Somewhat***	***Very Much[1]***	***Mean[1]***	***Std. Dev.***
Enhance your visitor experience	26	56.0	7.7	34.6	2.62	1.53
Increase your understanding of traditional Pueblo cultures	26	57.7	7.7	34.6	2.85	1.49
Increase your understanding of Bandelier's significance	26	50.0	16.7	33.3	2.69	1.57
Increase your understanding of Bandelier's mission	26	60.0	12.0	28.0	2.54	1.63
Increase your appreciation of Bandelier	26	50.0	20.8	29.2	2.65	1.55

[1]Impact based on 5-point scale (1 = Not at All to 5 = Very Much); original scale was collapsed to a 3-point scale for reporting purposes.

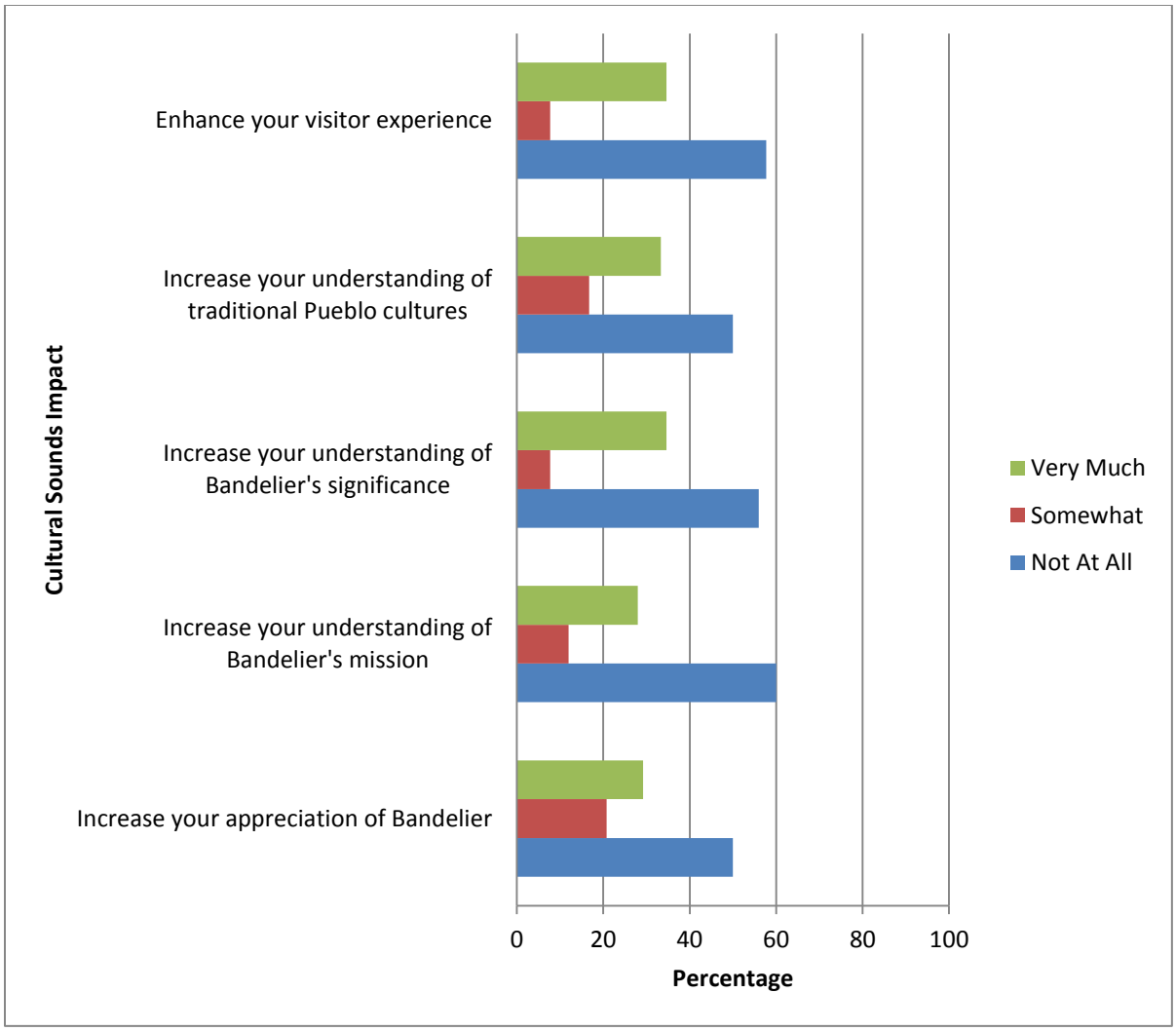

Figure 0.17. Ponderosa Campground/Burnt Mesa Trail degree to which cultural sounds would improve visitor experiences and understanding.

Motivations for Visiting

The top reported motivations for visiting Bandelier National Monument for visitors to the wilderness sites (based on a 5-point scale ranging from 1 = "Not Important at All" to 5 = "Extremely Important") (Table 3.2.5) were getting some exercise (*M* = 4.35; *SD* = 1.06), appreciating the scenic beauty (*M* = 4.31; *SD* = 0.93), experiencing the sounds of nature (*M* = 4.16; *SD* = 0.80), experiencing a sense of connection with nature (*M* = 4.00; *SD* = 1.02), and experiencing peace and quiet (*M* = 3.84; *SD* = 1.21). The least important motivations for visiting the Monument were experiencing cultural sounds (*M* = 1.75; *SD* = 1.26) and experiencing Bandelier National Monument in an air-tour overflight (*M* = 1.45; *SD* = 1.23).

Table 0.30. Ponderosa Campground/Burnt Mesa Trail importance of motivations for visiting Bandelier National Monument.

		Percentage				
Motivations[2]	***N***	***Not Important At All***	***Moderately Important***	***Extremely Important***[1]	***Mean***[1]	***Std. Dev.***
Appreciate the scenic beauty	26	3.8	7.7	88.5	4.31	0.93
Experience solitude	26	19.2	11.5	69.2	3.69	1.41
Spend time with family/friends	26	42.3	26.9	30.8	2.62	1.39
Get some exercise	26	7.7	7.7	84.6	4.35	1.06
Experience the sounds of nature	25	0	24.0	76.0	4.16	0.80
Experience cultural sounds	24	83.3	4.2	12.5	1.75	1.26
Experience a sense of connection with nature	26	7.7	26.9	65.4	4.00	1.02
Experience peace and quiet	25	16.0	8.0	76.0	3.84	1.21
Experience a sense of challenge	25	32.0	20.0	48.0	3.28	1.37
Appreciate the archaeological and cultural sites	25	24.0	28.0	48.0	3.44	1.19
Experience Bandelier in an air-tour overflight	20	90.0	0	10.0	1.45	1.23

[1]Degree of importance based on 5-point scale (1 = Not Important at All to 5 = Extremely Important); original scale was collapsed to a 3-point scale for reporting purposes.

[2]Respondents may interpret the meaning of these motivational statements differently. They were not provided additional context for these items during survey administration.

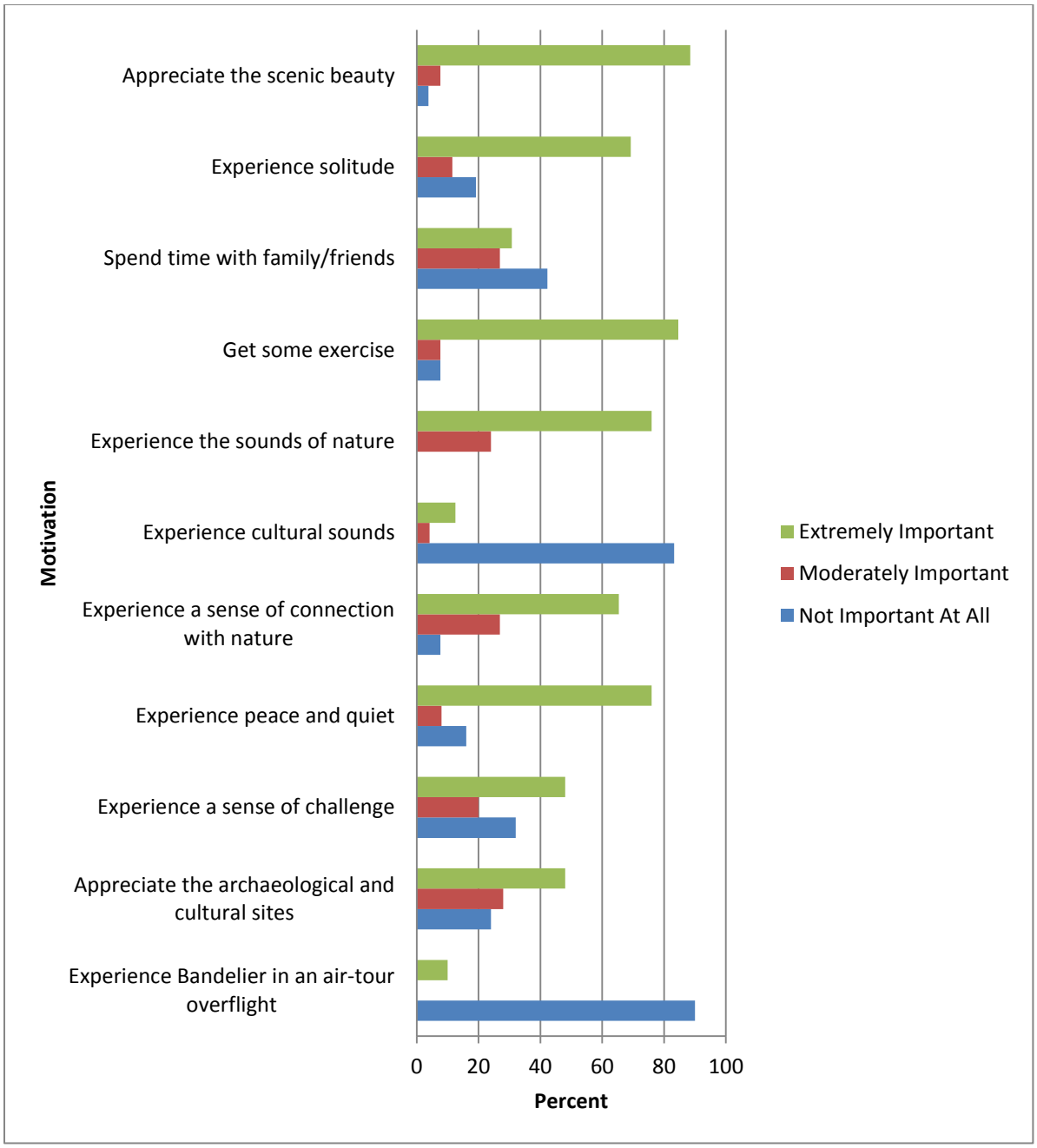

Figure 0.18. Ponderosa Campground/Burnt Mesa Trail importance of motivations for visiting Bandelier National Monument.

Expectations for Visit

Visitors at Ponderosa Campground and Burnt Mesa were asked to compare their actual experiences in the Monument to their expectations for their visit (based on a 5-point scale ranging from 1 = "A Lot Less than Expected" to 5 = "A Lot More than Expected") (Table 3.2.6). On average, respondents indicated that they had more opportunities to experience the sounds of nature than they expected (*M* = 3.08; *SD* = 0.50). With regard to hearing aircraft, respondents indicated hearing slightly more than expected (*M* = 2.94; *SD* = 0.76), although thirty percent indicated having no expectation for hearing aircraft while in the Monument. Visitors reported hearing vehicles (*M* = 2.63; *SD* = 0.83), and other visitors (*M* = 2.4; *SD* = 0.83) less frequently than expected. Respondents also reported seeing fewer people while hiking than expected (*M* = 2.39; *SD* = 0.85). With regard to viewing wildlife, respondents indicated having slightly more opportunities for viewing than expected (*M* = 2.91; *SD* = 0.67). Finally, visitors indicated experiencing cultural sounds less than expected (*M* = 2.78; *SD* = 0.83). However, the majority of respondents (65%) indicated having no expectation for hearing cultural sounds while in the Monument.

Table 0.31. Ponderosa Campground/Burnt Mesa Trail conditions experienced compared to expectations.

		Percentage							
Expectation	***N***	***No Expectation***	***A Lot Less Than Expected***	***Less Than Expected***	***About as Expected***	***More Than Expected***	***A Lot More Than Expected***	***Mean[1]***	***Std. Dev.***
Number of people you saw while hiking	18	31	15.4	11.5	42.3	0	0	2.39	0.85
Amount of time you heard aircraft	18	31	3.8	7.7	46.2	11.5	0	2.94	0.76
Opportunity to view wildlife	23	12	3.8	11.5	61.5	11.5	0	2.91	0.67
Opportunity to experience sounds of nature	24	8	0	7.7	69.2	15.4	0	3.08	0.50
Amount of time you heard vehicles	19	27	11.5	7.7	50.0	3.8	0	2.63	0.83
Amount of time you heard other visitors	15	42	7.7	23.1	23.1	3.8	0	2.40	0.83
Opportunity to experience cultural sounds	9	65	3.8	9.8	23.1	3.8	0	2.78	0.83

[1]Conditions compared to expectations based on 5-point scale (1 = A Lot Less than Expected to 5 = A Lot More than Expected). Respondents that indicated having no expectation were not considered within the mean value.

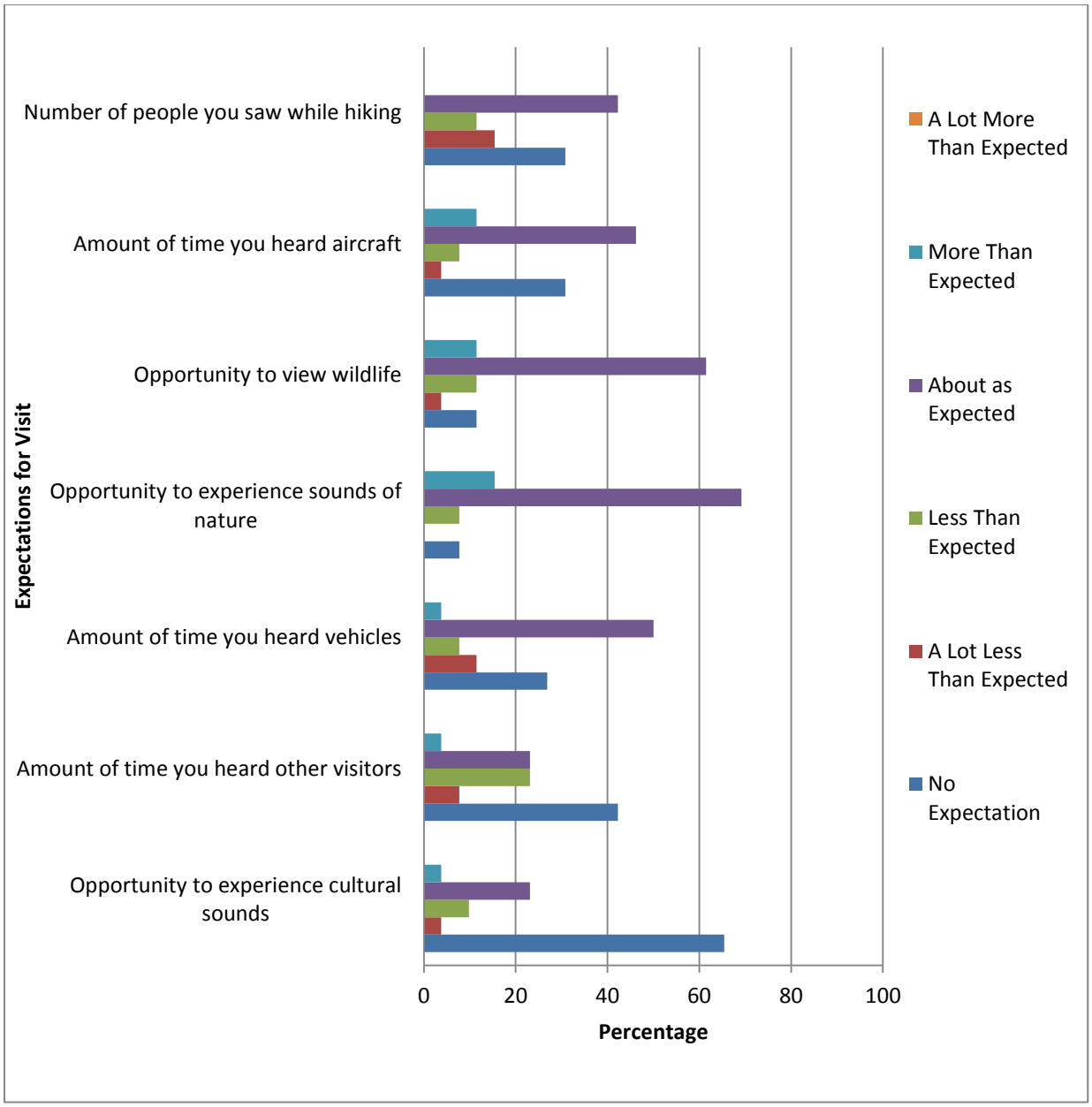

Figure 0.19. Ponderosa Campground/Burnt Mesa Trail conditions experienced compared to expectations.

Ponderosa Campground/Burnt Mesa Trail Visitation and Demographic Results

Visitation and demographic results from the wilderness sites (*N* = 26) are listed below in Tables 3.2.7-3.2.25.

Visit Length and Group Type

The majority (77%) of wilderness site respondents indicated that it was not their first time to Bandelier National Monument (Table 3.27).

Table 0.32. Ponderosa Campground/Burnt Mesa Trail first-time visitors to Bandelier National Monument.

First Visit	*N*	*Percent*
Yes	6	23
No	20	77

Of those wilderness site visitors who had previously visited Bandelier, the majority (70%) had visited ten or more times (Table 3.2.8).

Table 0.33. Ponderosa Campground/Burnt Mesa Trail repeat visitor number of total visits.

Times Visited	*N*	*Percent*
2	1	5
3 – 5	2	10
6 – 10	3	15
More than 10	14	70

The majority (62%) of wilderness site respondents were day visitors (Table 3.2.9).

Table 0.34. Ponderosa Campground/Burnt Mesa Trail length of current visit.

Visit Length	*N*	*Percent*
Today Only	16	62
2 - 3 Days	4	15
4 - 7 Days	1	4
8 or More Days	5	19

Fifty-six percent of wilderness site respondents were visiting with their families (Table 3.2.10).

Table 0.35. Ponderosa Campground/Burnt Mesa Trail type of personal group.

Personal Group Type	*N*	*Percent*
Alone	8	32
Friends	3	12
Family	14	56
Friends and Family	0	0

The highest percentage (46%) of visitors to the wilderness sites had two to three people in their group (Table 3.2.11).

Table 0.36. Ponderosa Campground/Burnt Mesa Trail number of people in personal group.

Personal Group Size	*N*	*Percent*
Just Myself	9	35
2 – 3	12	46
4 – 7	3	12
8 or more	0	0

Eighty-nine percent of visitors to the wilderness sites were not with a larger group (Table 3.2.12).

Table 0.37. Ponderosa Campground/Burnt Mesa Trail larger group (such as school, church, scout or tour groups).

With Large Group	*N*	*Percent*
Yes	3	12
No	23	89

Of the wilderness site respondents who reported being part of a larger group, 100% indicated they were part of another organized group (Table 3.2.13).

Table 0.38. Ponderosa Campground/Burnt Mesa Trail type of larger group.

Large Group Type	*N*	*Percent*
Commercial guided tour group	0	0
School or educational group	0	0
Family reunion group	0	0
Other organized group	3	100

Sixty-eight percent of wilderness site respondents who reported being part of a larger group were in a group of less than ten people (Table 3.2.14).

Table 0.39. Ponderosa Campground/Burnt Mesa Trail size of larger group.

Large Group Size	*N*	*Percent*
Less than 10	2	68
10 – 15	0	0
16 – 20	0	0
21 or More	1	33

Primary Activity and Destination

The majority (77%) of wilderness site respondents indicated day hiking as their primary activity (Table 3.2.15).

Table 0.40. Ponderosa Campground/Burnt Mesa Trail primary activity type.

Activity	***N***	***Percent***
Day hiking	20	77
Archaeological/cultural interests	1	4
Backpacking	0	0
Wildlife viewing	0	0
Camping	1	4
Photography	0	0
Other	4	15

Most (79%) wilderness site respondents reported "Other" as their primary destination (Table 3.2.16).

Table 0.41. Ponderosa Campground/Burnt Mesa Trail primary destination.

Destination	***N***	***Percent***
Alcove House	0	0
Ponderosa/Upper Crossing	4	17
Tsankawi	0	0
Falls Trail	1	4
Visitor Center/Main Loop Trail	0	0
Other	19	79

Air Tours and Over-flights

A large majority (92%) of wilderness site respondents indicated they had not taken an air tour over Bandelier (Table 3.2.17).

Table 0.42. Ponderosa Campground/Burnt Mesa Trail air tour over Bandelier National Monument.

Air tour/Over-flight	*N*	*Percent*
Yes	1	4
No	24	92

Twelve percent of wilderness site respondents indicated they had taken an air tour over another park (Table 3.2.18).

Table 0.43. Ponderosa Campground/Burnt Mesa Trail air tour over other parks.

Air tour/Over-flight	*N*	*Percent*
Yes	3	12
No	21	81

Demographics

Fifty-eight percent of wilderness site respondents were male (Table 3.2.19).

Table 0.44. Ponderosa Campground/Burnt Mesa Trail gender.

Gender	*N*	*Percent*
Male	15	58
Female	11	42

The average age of wilderness site respondents was 48 years old, with a range of 26 to 73 years old (Table 3.2.20).

Table 0.45. Ponderosa Campground/Burnt Mesa Trail age.

Mean	*SD*	*Range*
48.3	16.71	26 - 73

All wilderness site respondents were from the United States (Table 3.2.21).

Table 0.46. Ponderosa Campground/Burnt Mesa Trail origin by country.

Country	***N***	***Percent***
United States	26	100

For the wilderness site respondents, the majority (77%) reported being from the Southwest region, while 19% reported being from the Southeast region (Figure 3.2.9).

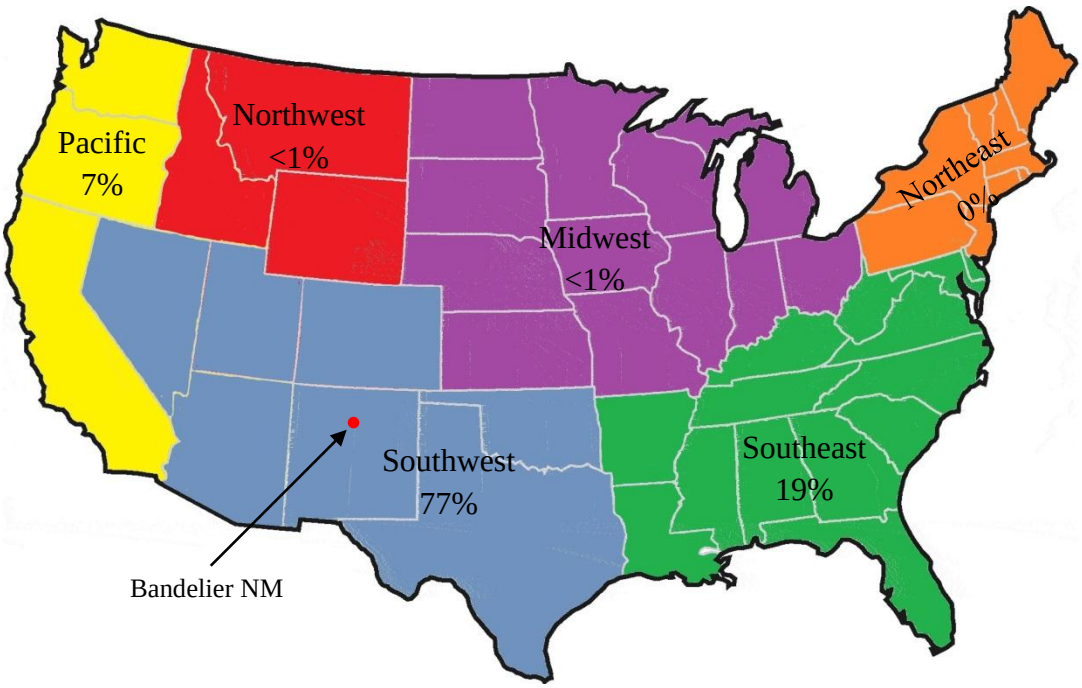

Figure 0.20. Ponderosa Campground/Burnt Mesa Trail origin by U.S. region.

Of the selected states surrounding the Monument, the majority of respondents reported being from New Mexico (69%) (Figure 3.2.10).

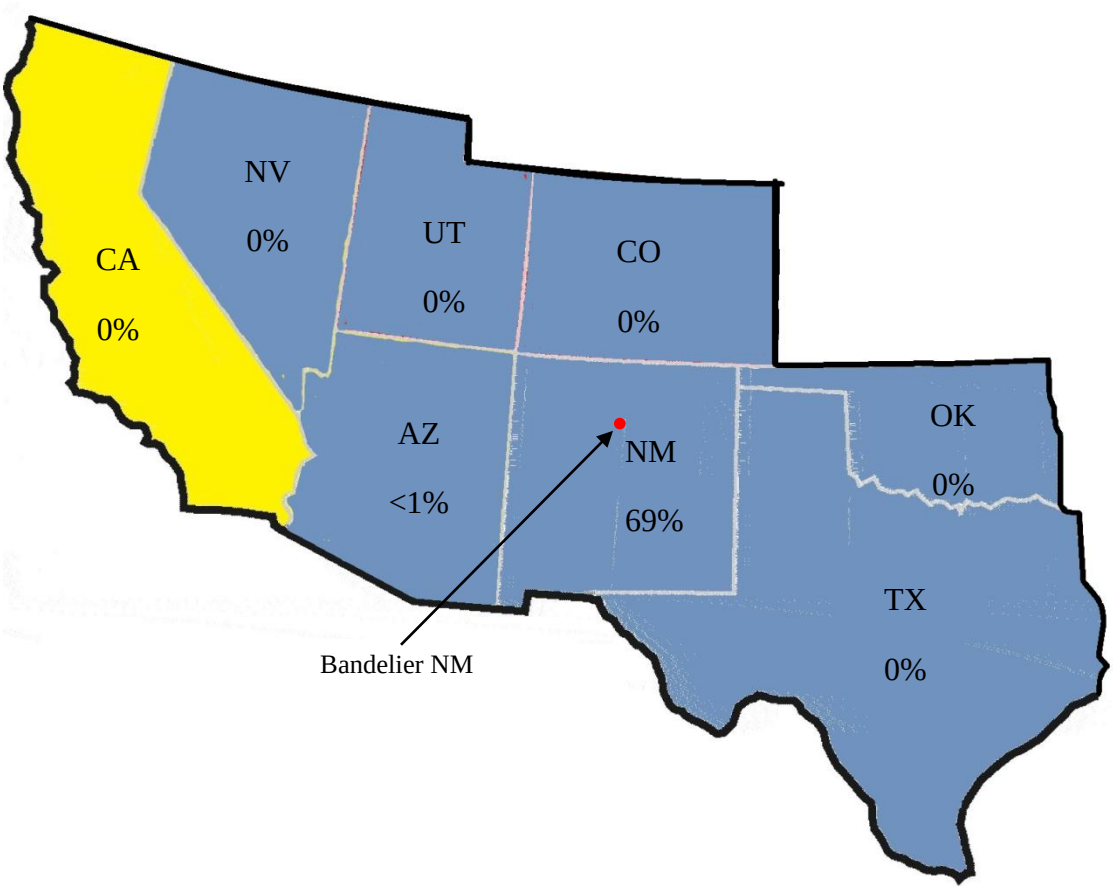

Figure 0.21. Ponderosa Campground/Burnt Mesa Trail origin by surrounding selected states

Thirty-five percent of wilderness site respondents indicated they resided in towns of 10,000 to 24,999 people (Table 3.2.22).

Table 0.47. Ponderosa Campground/Burnt Mesa Trail size of residence community.

Residence Community Size	***N***	***Percent***
Large City: 250,000 or more people	4	15
City: 100,000 to 249,999 people	0	0
City: 50,000 to 99,999 people	2	8
Small City: 25,000 to 49,999 people	0	0
Town: 10,000 to 24,999 people	9	35
Town: 5,000 to 9,999 people	3	12
Small Town: 5,000 or fewer people	7	27
Rural or Farm	0	0

Eighty-two percent of wilderness site respondents reported having at least a degree from a four-year college, and over one-third (35%) had a postgraduate degree (Table 3.2.23).

Table 0.48. Ponderosa Campground/Burnt Mesa Trail highest level of education.

Level of Education	*N*	*Percent*
Some high school	0	0
High school graduate	0	0
Trade/technical/vocational training	0	0
Some college	1	4
Two-year college degree	3	12
Four-year college degree	9	35
Some postgraduate work	3	12
Postgraduate degree	9	35

None of the wilderness site respondents indicated being Hispanic or Latino (Table 3.2.24).

Table 0.49. Ponderosa Campground/Burnt Mesa Trail Hispanic or Latino.

Hispanic or Latino	*N*	*Percent*
Yes	0	0
No	25	100

The majority (89%) of wilderness site respondents indicated White as their race (Table 3.2.25).

Table 0.50. Ponderosa Campground/Burnt Mesa Trail race.

Race	*N*	*Percent**
American Indian or Alaskan Native	1	4
Asian	0	0
Black or African American	0	0
Native Hawaiian or Pacific Islander	0	0
White	23	89
Other	1	4

*Percentage may sum to more than 100% because respondents could indicate more than one race.

Descriptive Results – Main Loop Trail

Sounds: Acceptability

Visitors identified and evaluated the sounds they heard on the Main Loop Trail during three-minute listening sessions on two scales, acceptability (appropriateness for the setting) (Table 3.3.1) and personal interpretation (personal feeling or emotion toward the sound) (Table 3.3.2).

The five most frequently heard natural sounds on the Main Loop Trail were bird song (95% of visitors), wind (93%), running water (76%), insects (63%), and small mammals (25%) (Table 3.3.1). The five most frequently heard anthropogenic sounds were small groups of visitors talking (65%), children (36%), large groups of visitors talking (14%), rangers talking (14%), and jets (14%) (Table 3.3.1). On average, natural sounds were rated as more highly acceptable (*M* = 3.31; *SD* = 1.49) than anthropogenic sounds (*M* = 0.19; *SD* = 2.14) (Table 3.3.1) and more pleasing (*M* = 2.59; *SD* = 1.34) than anthropogenic sounds (*M* = -0.94; *SD* = 1.97) (Table 3.3.2).

Table 0.51. Main Loop Trail acceptability of sounds heard.

Sound			**Acceptability Percentage**				
	N	***% Heard***	***Unacceptable***	***Neutral***	***Acceptable[1]***	***Mean[1]***	***Std Dev.***
Natural						**3.31**	**1.49**
Wind	310	93	1.6	2.3	96.1	3.66	1.23
Running Water	255	76	1.2	1.2	97.6	3.81	1.01
Rain	5	2	0	20.0	80.0	3.20	1.79
Thunder	15	5	0	13.3	86.7	3.20	1.42
Small Mammal (e.g. Squirrel or Chipmunk)	82	25	2.4	4.9	92.7	3.41	1.45
Large Mammal (e.g. Deer or Coyote)	22	7	4.5	13.6	81.8	3.14	1.67
Bird Song/Chatter	319	95	1.6	0.6	97.8	3.80	1.08
Insects	211	63	12.3	15.6	72.0	2.24	2.24
Anthropogenic						**0.19**	**2.14**
Small Group Talking	219	65	16.0	29.2	54.8	1.33	2.13
Large Group Talking	47	14	38.3	12.8	48.9	0.47	2.66
Children	121	36	16.5	24.8	58.7	1.48	2.29
Ranger Talk	48	14	8.3	29.2	62.5	2.10	2.20
Cultural Sounds (e.g. Drumming, Singing, Poetry, etc.)	9	2	11.1	0	88.9	3.00	2.00
Electronic Devices (e.g. Cell Phone, Radio, Camera, etc.)	29	9	62.1	31.0	6.9	-1.45	2.06

Sound			Acceptability Percentage				
	N	*% Heard*	*Unacceptable*	*Neutral*	*Acceptable*[1]	*Mean*[1]	*Std Dev.*
Mechanical Noise (e.g. Compressor, Generator, Fan, etc.)	11	3	54.5	36.4	9.1	-1.36	1.63
Aircraft, Unknown	40	12	30.0	35.0	35.0	0.18	2.19
Aircraft, Jet	46	14	39.1	28.3	32.6	-0.09	2.25
Aircraft, Propeller	9	3	33.3	11.1	55.6	0.22	1.99
Aircraft, Helicopter	15	5	60.0	20.0	20.0	-1.00	2.14
Shuttle Bus	27	8	25.9	29.6	44.4	0.56	1.97
Passenger Vehicle	19	6	36.8	21.1	42.1	0.32	2.36
Motorcycle	5	2	40.0	20.0	40.0	0.40	3.05
Work Vehicle (e.g. Delivery Truck, etc.)	8	2	50.0	0	50.0	0.50	2.20
Vehicle, Unknown	37	11	37.8	29.7	32.4	0.16	2.43
Vehicle Horn or Alarm	7	2	85.7	14.3	0	-2.29	1.38
Park Maintenance (Trail Work, Repair etc.)	5	2	40.0	60.0	0	-1.20	1.64
Explosion*	1	1	100.0	0	0	-	-

[1] Acceptability based on 9-point scale (-4 = Very Unacceptable to +4 = Very Acceptable); original scale was collapsed to a 3-point scale for reporting purposes.

*Bandelier National Monument is within hearing range of the Los Alamos National Laboratory (LANL) which conducts above ground explosives testing.

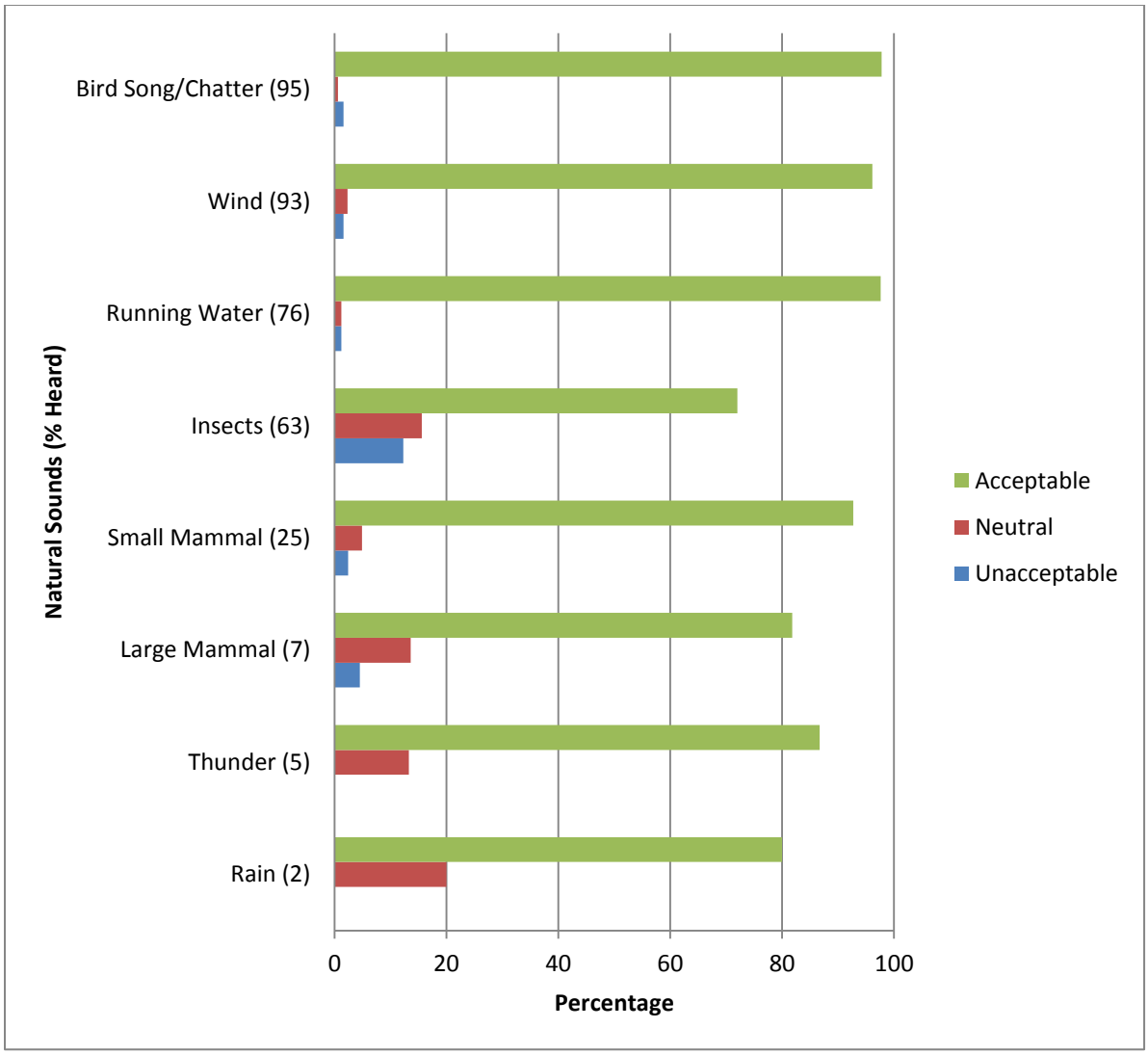

Figure 0.22. Main Loop Trail acceptability (natural sounds).

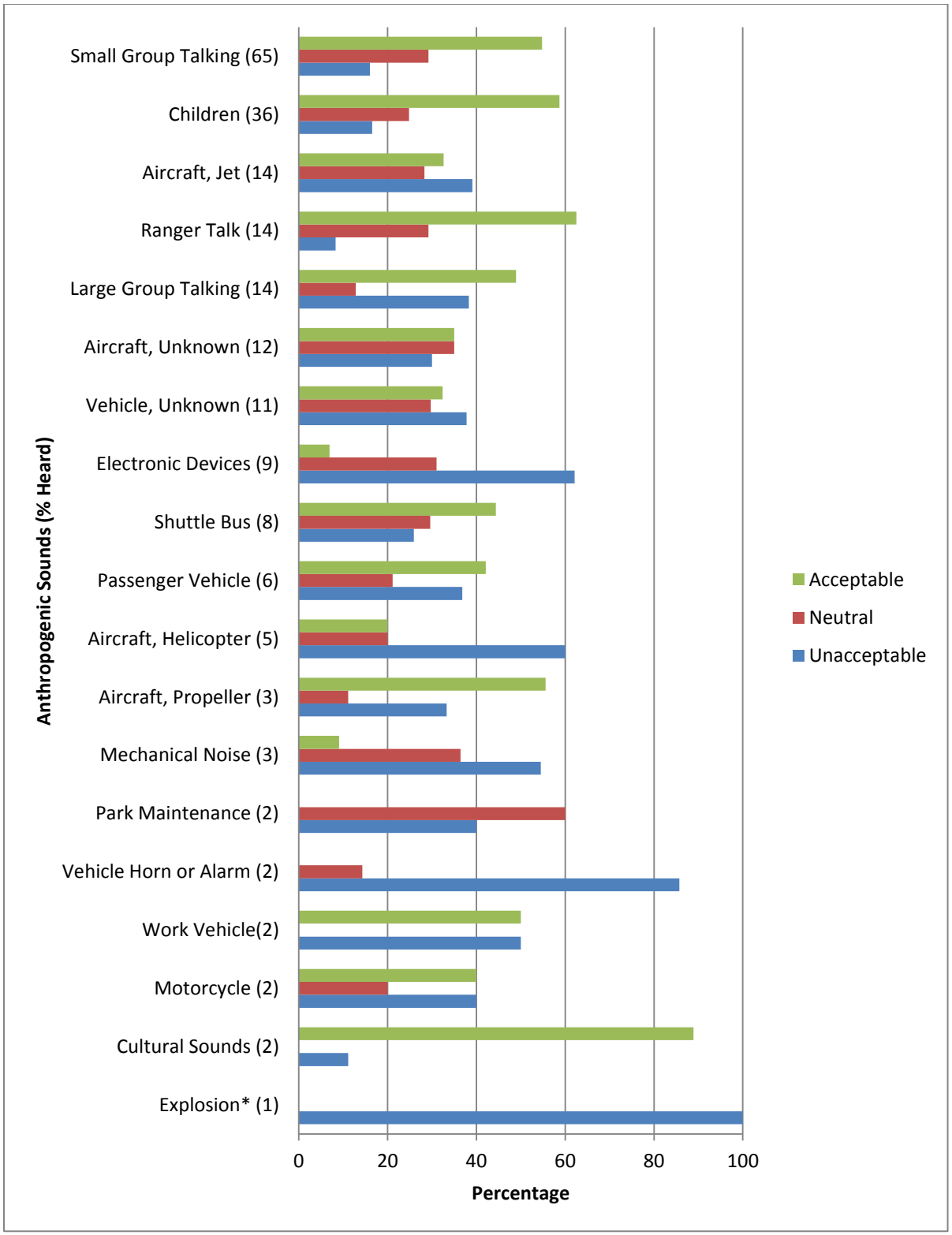

Figure 0.23. Main Loop Trail acceptability (anthropogenic sounds).

Sounds: Personal Interpretation

Table 0.52. Main Loop Trail personal interpretation of sounds heard.

Sound			Personal Interpretation Percentage				
	N	*% Heard*	*Very Annoying*	*Neutral*	*Very Pleasing*[1]	*Mean*[1]	*Std Dev.*
Natural						**2.59**	**1.34**
Wind	304	91	0.7	3.0	96.1	3.50	1.14
Running Water	248	74	0	1.2	98.8	3.87	0.55
Rain	3	1	33.3	33.3	33.3	0.00	2.00
Thunder	11	3	9.1	18.2	72.7	1.73	1.90
Small Mammal (e.g. Squirrel or Chipmunk)	75	22	0	5.3	94.7	3.37	1.15
Large Mammal (e.g. Deer or Coyote)	18	5	0	5.6	94.4	3.56	1.04
Bird Song/Chatter	266	79	0	0.4	99.6	3.89	0.45
Insects	176	53	30.1	22.2	47.7	0.83	2.45
						-0.94	**1.97**
Small Group Talking	207	62	31.9	45.9	22.2	-0.08	1.75
Large Group Talking	48	14	50.0	29.2	20.8	-0.65	2.38
Children	115	34	28.7	37.4	33.9	0.36	2.11
Ranger Talk	45	13	15.6	44.4	40.0	0.91	2.15
Cultural Sounds (e.g. Drumming, Singing, Poetry, etc.)	9	3	11.1	22.2	66.7	1.44	2.60
Electronic Devices (e.g. Cell Phone, Radio, Camera, etc.)	25	8	76.0	20.0	4.0	-2.08	1.94
Mechanical Noise (e.g. Compressor, Generator, Fan, etc.)	6	2	66.7	33.3	0	-2.17	1.72
Aircraft, Unknown	23	7	30.4	60.9	8.7	-0.43	1.62
Aircraft, Jet	33	10	45.5	36.4	18.2	-0.61	1.94
Aircraft, Propeller	4	1	75.0	0	25.0	-0.75	3.40
Aircraft, Helicopter	7	2	57.1	42.9	0	-1.43	1.51
Shuttle Bus	15	5	46.7	26.7	26.7	-0.53	2.00
Passenger Vehicle	12	4	58.3	25.0	16.7	-1.08	1.62
Motorcycle	2	1	100	0	0	-2.50	0.71
Work Vehicle (e.g. Delivery Truck, etc.)	5	2	60.0	20.0	20.0	-1.40	2.41
Vehicle, Unknown	18	5	44.4	33.3	22.2	-0.50	2.04
Vehicle Horn or Alarm	2	1	100	0	0	-3.00	1.41
Park Maintenance (Trail Work, Repair etc.)	3	1	66.7	33.3	0	-2.33	2.08

Sound			Personal Interpretation Percentage				
	N	*% Heard*	*Very Annoying*	*Neutral*	*Very Pleasing*[1]	*Mean*[1]	*Std Dev.*
Explosion*	0	0	-	-	-	-	-

[1]Interpretation based on 9-point scale (-4 = Very Annoying to +4 = Very Pleasing); original scale was collapsed to a 3-point scale for reporting purposes.

*Bandelier National Monument is within hearing range of the Los Alamos National Laboratory (LANL) which conducts above ground explosives testing.

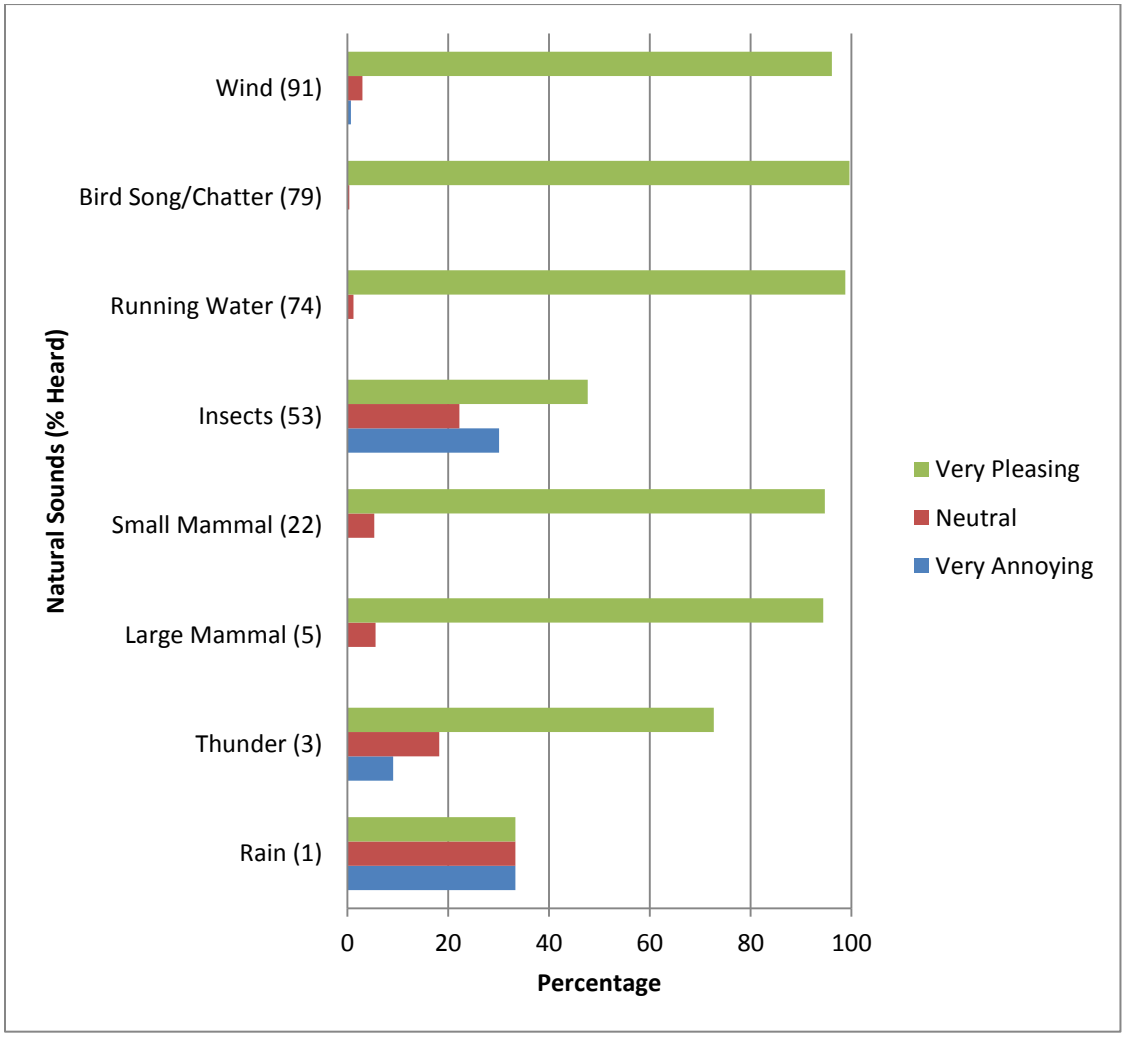

Figure 0.24. Main Loop Trail personal interpretation (natural sounds).

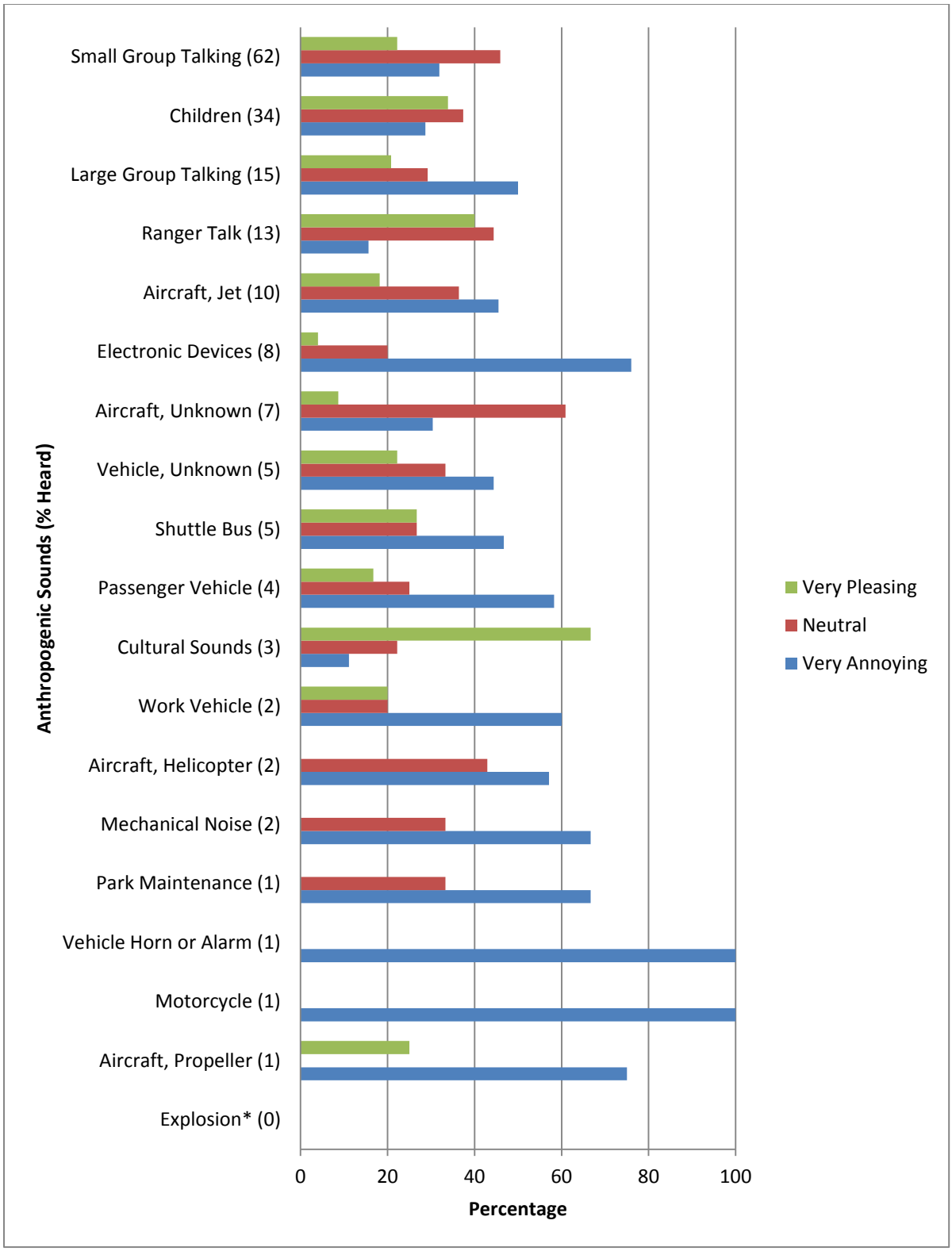

Figure 0.25. Main Loop Trail personal interpretation (anthropogenic sounds).

Management Actions

Visitors on the Main Loop Trail were asked to rate the acceptability of certain management actions (Table 3.3.3). Respondents were most supportive (*M* = 2.48; *SD* = 2.14) of potential management actions that would increase their opportunity to experience traditional cultural sounds and least supportive (*M* = 0.57; *SD* = 2.79) of having rangers quieting visitors along the Monument's trails. Survey respondents found management actions that employed signage intended to educate visitors about soundscape management (*M* = 1.57; *SD* = 2.54) and cultural sounds (*M* = 2.31; *SD* = 2.25) to be acceptable, on average.

Table 0.53. Main Loop Trail evaluations of potential management actions.

		Percent				
Potential Management Action	***N***	***Unacceptable***	***Neutral***	***Acceptable[1]***	***Mean[1]***	***Std. Dev.***
See: Sign(s) informing you about the park's concerns with human-caused noise	329	18.2	17.9	63.8	1.57	2.54
See: Sign(s) informing you that you may hear traditional cultural sounds (e.g. drumming, singing, chanting).	331	9.1	13.0	77.9	2.31	2.25
Experience: Traditional cultural sounds (e.g. drumming, singing, chanting).	330	8.8	10.0	81.2	2.48	2.14
Experience: Park rangers stationed along the trail quieting visitors.	330	36.4	16.7	47.0	0.57	2.79

[1] Potential management actions based on 9-point scale (-4 = Very Unacceptable to +4 = Very Acceptable); original scale was collapsed to a 3-point scale for reporting purposes.

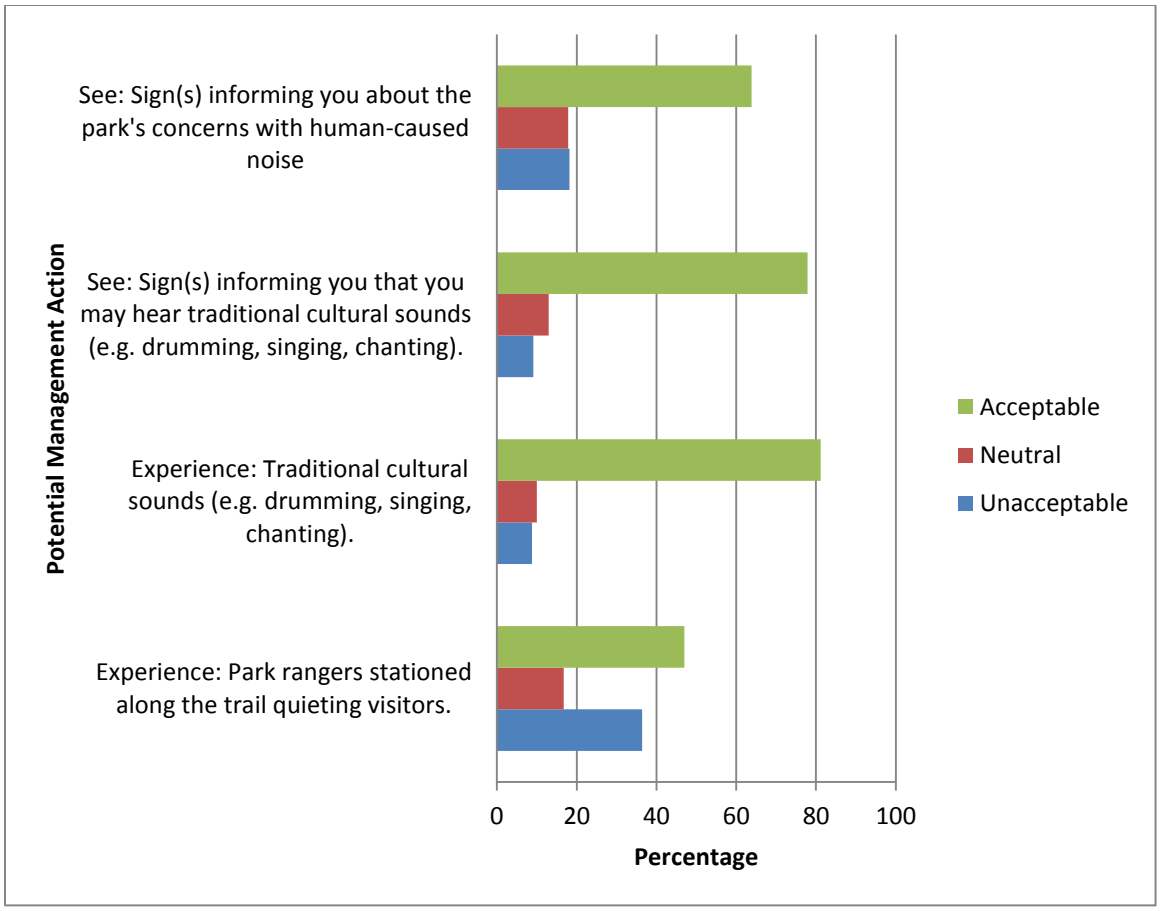

Figure 0.26. Main Loop Trail potential management actions.

Visitors to the Main Loop Trail were also asked to rate the extent to which the presence of cultural sounds in the Monument would improve their experience and understanding (based on a 5-point scale ranging from 1 = "Not at All" to 5 = "Very Much") (Table 3.3.4). Responses suggested that cultural sounds would enhance visitor experiences (*M* = 3.82; *SD* = 1.25), understanding of traditional Pueblo cultures (*M* = 3.92; *SD* = 1.17), understanding of Bandelier's significance (*M* = 3.77; *SD* = 1.28), understanding of Bandelier's mission (*M* = 3.68; *SD* = 1.31), and appreciation of Bandelier (*M* = 3.81; *SD* = 1.31).

Table 0.54. Main Loop Trail degree to which cultural sounds would improve visitor experiences and understanding.

Potential Management Action	***N***	***Not At All***	***Somewhat***	***Very Much*[1]**	***Mean*[1]**	***Std. Dev.***
Enhance your visitor experience	329	17.3	18.2	64.5	3.82	1.25
Increase your understanding of traditional Pueblo cultures	331	16.7	17.3	66.0	3.92	1.17
Increase your understanding of Bandelier's significance	331	18.3	17.3	64.4	3.77	1.28
Increase your understanding of Bandelier's mission	331	20.1	19.2	60.7	3.68	1.31
Increase your appreciation of Bandelier	329	20.9	14.8	64.3	3.81	1.31

[1]Degree of importance based on 5-point scale (1 = Not at All to 5 = Very Much); original scale was collapsed to a 3-point scale for reporting purposes.

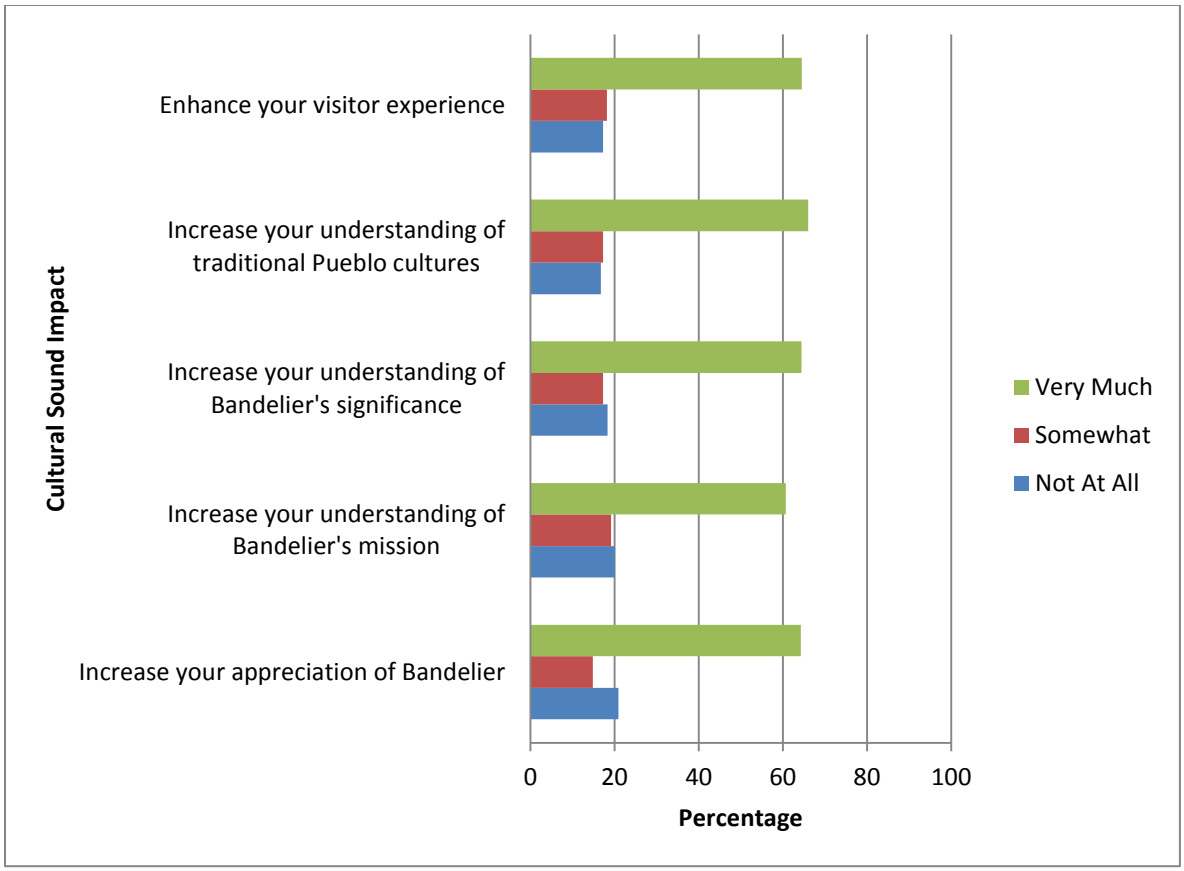

Figure 0.27. Main Loop Trail degree to which cultural sounds would improve visitor experiences and understanding.

Motivations for Visiting

The top reported motivations for visiting Bandelier National Monument for visitors of the Main Loop Trail (based on a 5-point scale ranging from 1 = "Not Important at All" to 5 = "Extremely Important") (Table 3.3.5) were appreciating the scenic beauty (*M* = 4.57; *SD* = 0.65), appreciating the archaeological and cultural sites (*M* = 4.52; *SD* = 0.73), experiencing a sense of connection with nature (*M* = 4.14; *SD* = 1.02), experiencing the sounds of nature (*M* = 4.09; *SD* = 0.94), and spending time with family and friends (*M* = 3.91; *SD* = 1.20). The least important motivations for visiting the Monument were experiencing cultural sounds (*M* = 2.74; *SD* = 1.44) and experiencing the Monument in an air-tour overflight (*M* = 1.63; *SD* = 1.22).

Table 0.55. Main Loop Trail importance of motivations for visiting Bandelier National Monument.

		Percentage				
Motivations[2]	***N***	***Not At All Important***	***Moderately Important***	***Extremely Important***[1]	***Mean***[1]	***Std. Dev.***
Appreciate the scenic beauty	332	0.9	4.8	94.3	4.57	0.65
Experience solitude	330	24.8	29.4	45.8	3.31	1.28
Spend time with family/friends	329	14.0	16.1	69.9	3.91	1.20
Get some exercise	327	19.3	27.8	52.9	3.56	1.18
Experience the sounds of nature	331	5.7	19.3	74.9	4.09	0.94
Experience cultural sounds	322	45.7	21.7	32.6	2.74	1.44
Experience a sense of connection with nature	332	7.5	15.7	76.8	4.14	1.02
Experience peace and quiet	330	13.6	25.8	60.6	3.72	1.12
Experience a sense of challenge	323	37.8	30.3	31.9	2.91	1.28
Appreciate the archaeological and cultural sites	330	1.8	7.9	90.3	4.52	0.73
Experience Bandelier in an air-tour overflight	293	80.9	8.2	10.9	1.63	1.22

[1]Degree of importance based on 5-point scale (1 = Not Important at All to 5 = Extremely Important); original scale was collapsed to a 3-point scale for reporting purposes.

[2]Respondents may interpret the meaning of these motivational statements differently. They were not provided additional context for these items during survey administration.

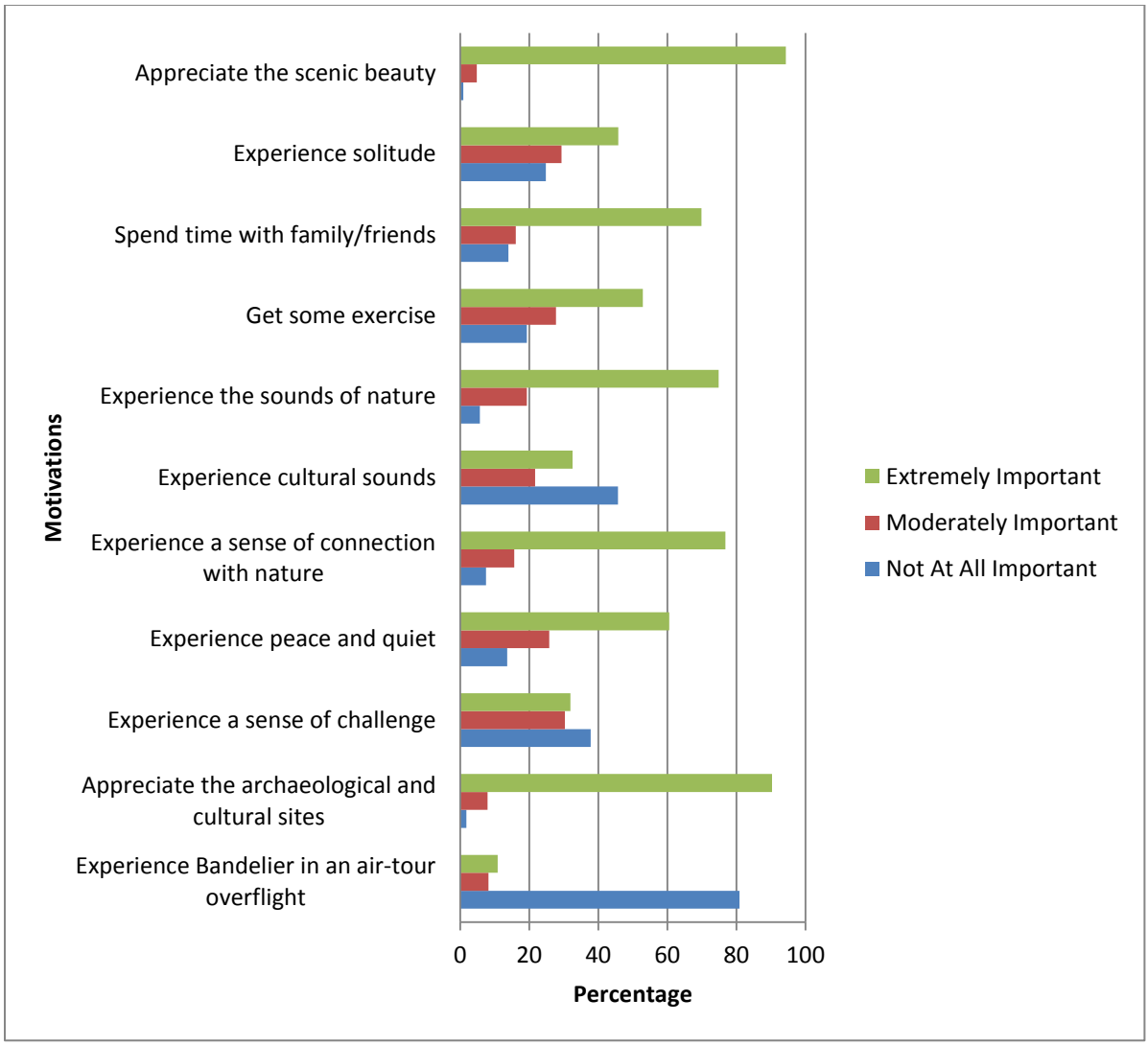

Figure 0.28. Main Loop Trail importance of motivations for visiting Bandelier National Monument.

Expectations for Visit

Visitors of the Main Loop Trail were asked to compare their actual experiences in Bandelier National Monument to their expectations for their visit (based on a 5-point scale ranging from 1 = "A Lot Less than Expected" to 5 = "A Lot More than Expected") (Table 3.3.6). On average, respondents indicated that they had more opportunities to experience the sounds of nature than they expected (*M* = 3.33; *SD* = 1.02). With regard to hearing aircraft, respondents indicated hearing less than expected (*M* = 2.59; *SD* = 1.14), although the majority (56%) indicated having no expectation for hearing aircraft while in Bandelier National Monument. Visitors reported hearing vehicles (*M* = 2.30; *SD* = 1.02), and other visitors (*M* = 2.57; *SD* = 0.86) less frequently than expected. Respondents also reported seeing fewer people while hiking than expected (*M* = 2.48; *SD* = 0.82). With regard to viewing wildlife, respondents indicated having slightly more opportunities for viewing than expected (*M* = 3.05; *SD* = 0.81). Finally, visitors indicated experiencing cultural sounds less than expected (*M* = 2.52; *SD* = 0.99). However, forty-six percent of respondents indicated having no expectation for hearing cultural sounds while in Bandelier National Monument.

Table 0.56. Main Loop Trail conditions experienced compared to expectations.

		Percentage							
Expectation	***N***	***No Expectation***	***A Lot Less Than Expected***	***Less Than Expected***	***About as Expected***	***More Than Expected***	***A Lot More Than Expected***	***Mean[1]***	***Std. Dev.***
Number of people you saw while hiking	264	19	10.7	24.2	39.4	3.9	0.6	2.48	0.82
Amount of time you heard aircraft	139	56	9.3	9.0	14.6	6.9	1.8	2.59	1.14
Opportunity to view wildlife	269	17	2.7	10.4	52.8	8.7	5.7	3.05	0.81
Opportunity to experience sounds of nature	301	8	0.9	3.3	59.1	18.5	8.1	3.33	1.02
Amount of time you heard vehicles	213	33	16.4	20.3	20.0	5.4	1.5	2.30	1.02
Amount of time you heard other visitors	270	18	11.3	19.4	42.7	6.6	0.6	2.57	0.86
Opportunity to experience cultural sounds	173	46	9.6	12.8	24.2	3.0	2.1	2.52	0.99

[1]Conditions compared to expectations based on 5-point scale (1 = A Lot Less than Expected to 5 = A Lot More than Expected). Respondents that indicated having no expectation were not considered within the mean value.

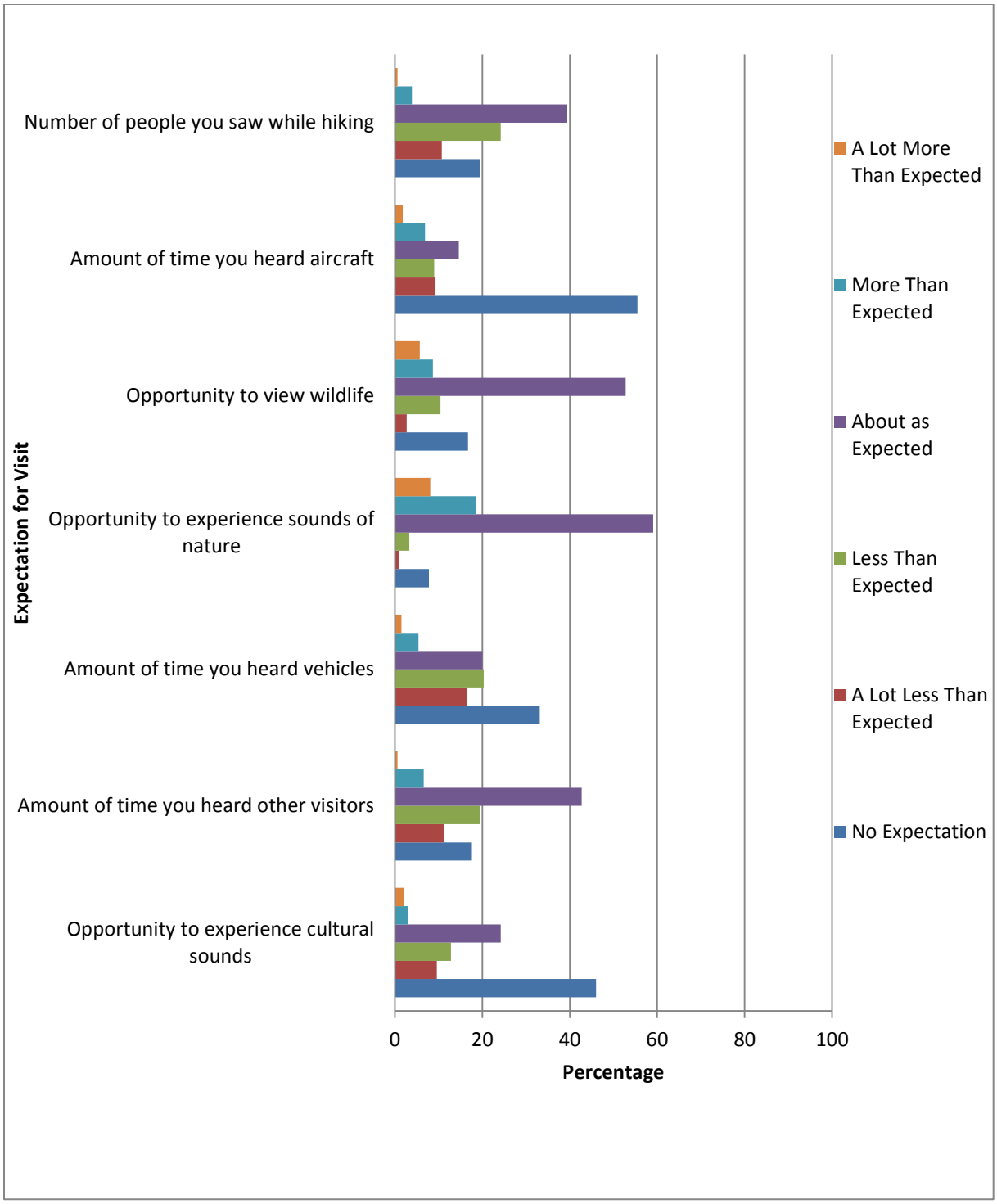

Figure 0.29. Main Loop Trail conditions experienced compared to expectations.

Main Loop Trail Visitation and Demographic Results

Visitation and demographic results from the Main Loop Trail site (*N* = 335) are listed below in Tables 3.3.7-3.3.25.

The majority (68%) of Main Loop Trail respondents indicated that it was not their first time to Bandelier National Monument (Table 3.37).

Visit Length and Group Type

Table 0.57. Main Loop Trail first-time visitors to Bandelier National Monument.

First Visit	*N*	*Percent*
Yes	224	68
No	108	33

Of those Main Loop Trail visitors who had previously visited the Monument, the highest percentage (40%) were visiting for the second time (Table 3.3.8).

Table 0.58. Main Loop Trail repeat visitor number of total visits.

Times Visited	*N*	*Percent*
2	45	40
3 – 5	34	30
6 – 10	11	10
More than 10	22	20

The majority (91%) of Main Loop Trail respondents were day visitors (Table 3.3.9).

Table 0.59. Main Loop Trail length of current visit.

Visit Length	*N*	*Percent*
Today Only	306	91
2 - 3 Days	19	6
4 - 7 Days	3	1
8 or More Days	3	1

Seventy percent of Main Loop Trail respondents were with their families (Table 3.3.10).

Table 0.60. Main Loop Trail type of personal group.

Personal Group Type	*N*	*Percent*
Alone	10	3
Friends	66	20
Family	233	70
Friends and Family	21	6

The largest percentage (49%) of visitors to Main Loop Trail had two to three people in their group (Table 3.3.11).

Table 0.61. Main Loop Trail number of people in personal group.

Personal Group Size	*N*	*Percent*
Just Myself	23	7
2 – 3	163	49
4 – 7	115	34
8-12	15	5
13 or more	10	3

Ninety percent of visitors to Main Loop Trail were not with a larger group (Table 3.3.12).

Table 0.62. Main Loop Trail larger group (such as school, church, scout or tour groups).

With Large Group	*N*	*Percent*
Yes	30	9
No	303	90

Of the respondents at Main Loop Trail who reported being part of a larger group, 50% indicated they were part of a school or educational organized group (Table 3.3.13).

Table 0.63. Main Loop Trail type of larger group.

Large Group Type	*N*	*Percent*
Commercial guided tour group	1	3
School or educational group	15	50
Family reunion group	8	27
Other organized group	6	20

Sixty-nine percent of respondents at Main Loop Trail who reported being part of a larger group were in a group of 21 or more people (Table 3.3.14).

Table 0.64. Main Loop Trail size of larger group.

Large Group Size	*N*	*Percent*
Less than 10	3	10
10 – 15	3	10
16 – 20	3	10
21 or More	20	69

Primary Activity and Destination

Forty-five percent of respondents at Main Loop Trail indicated archeological/cultural interests as their primary activity, while 39% chose day hiking (Table 3.3.15).

Table 0.65. Main Loop Trail primary activity type.

Activity	*N*	*Percent*
Day hiking	132	39
Archaeological/cultural interests	151	45
Wildlife viewing	10	3
Camping	9	3
Photography	22	7
Other	4	1

Most respondents (58%) at Main Loop Trail reported the Visitor Center or Main Loop Trail as their primary destination (Table 3.3.16).

Table 0.66. Main Loop Trail primary destination.

Destination	*N*	*Percent*
Alcove House	74	22
Ponderosa/Upper Crossing	8	3
Tsankawi	13	4
Falls Trail	16	5
Visitor Center/Main Loop Trail	194	58
Other	19	6

Air Tours and Over-flights

A large majority (97%) of respondents at Main Loop Trail indicated they had not taken an air tour over Bandelier National Monument (Table 3.3.17).

Table 0.67. Main Loop Trail air tour over Bandelier National Monument.

Air tour/Over-flight	*N*	*Percent*
Yes	5	2
No	325	97

Twelve percent of respondents at Main Loop Trail indicated they had taken an air tour over another park (Table 3.3.18).

Table 0.68. Main Loop Trail air tour over other parks.

Air tour/Over-flight	*N*	*Percent*
Yes	39	12
No	293	88

Demographics

Fifty-three percent of Main Loop Trail respondents were female (Table 3.3.19).

Table 0.69. Main Loop Trail gender.

Gender	*N*	*Percent*
Male	155	47
Female	172	53

The average age of Main Loop Trail respondents was 49 years old, with a range of 18 to 84 years old (Table 3.3.20).

Table 0.70. Main Loop Trail age.

Mean	*SD*	*Range*
49.3	16.4	18-84

The majority (92%) of Main Loop Trail respondents were from the United States (Table 3.3.21).

Table 0.71. Main Loop Trail origin by country.

Country	*N*	*Percent*
Australia	2	1
Canada	7	2
France	3	1
Germany	1	<1
Guatemala	1	<1
Lebanon	1	<1
Poland	2	1
Scotland	1	<1
Spain	1	<1
United Kingdom	1	<1
USA	309	92

The highest percentage (36%) of Main Loop Trail respondents reported being from the Southwest region, while 17% were from the Northeast region, and 16% were from the Pacific region (Figure 3.3.9).

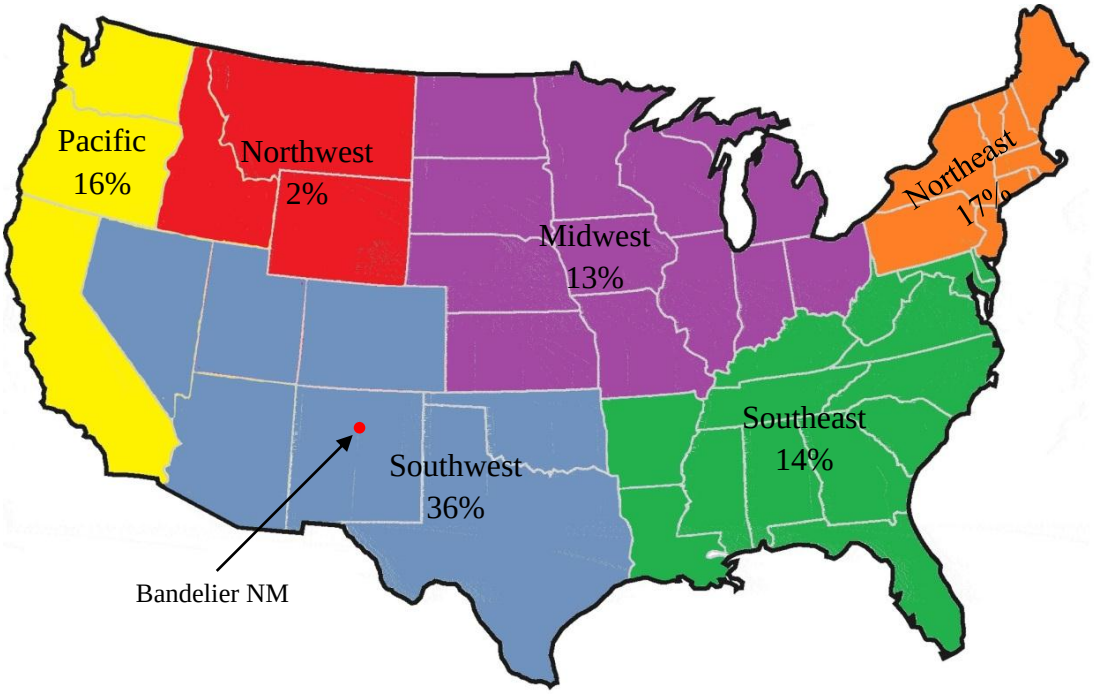

Figure 0.30. Main Loop Trail origin by U.S. region.

Of the states surrounding the Monument, the majority of respondents (19%) reported being from New Mexico (Figure 3.3.10).

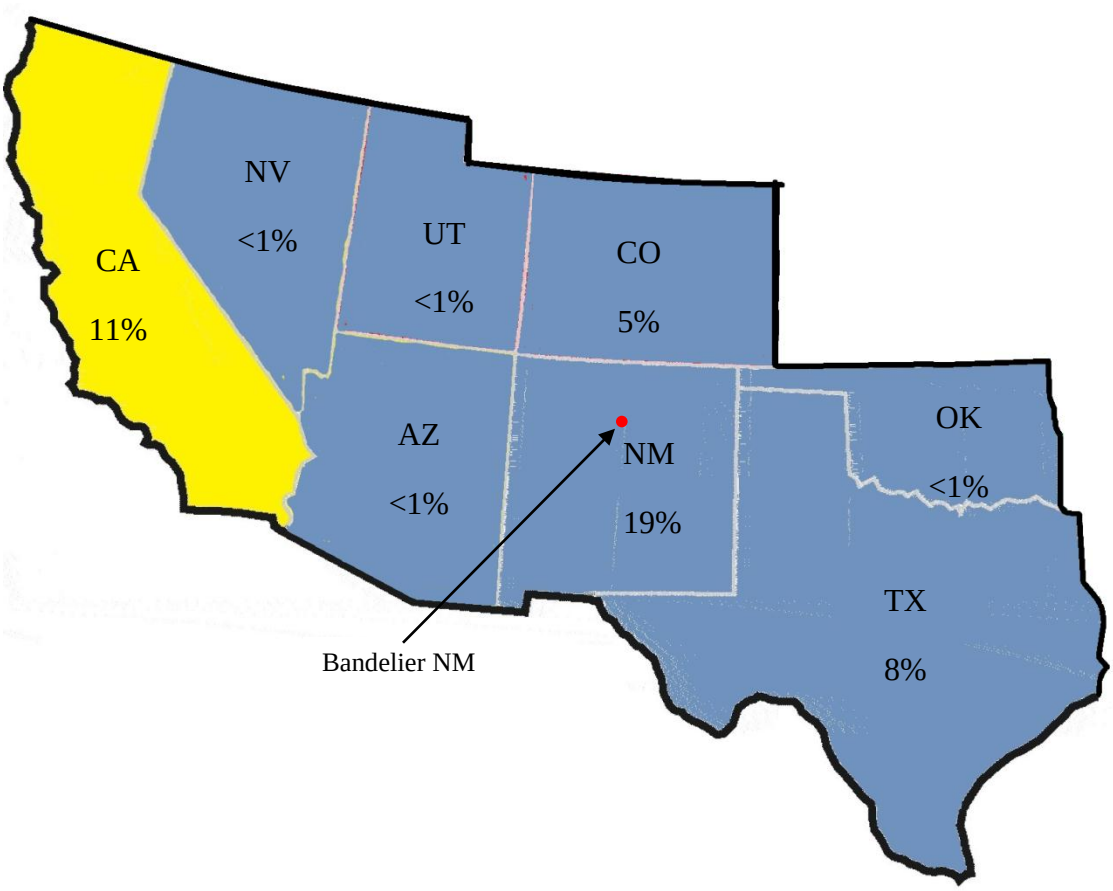

Figure 0.31. Main Loop Trail origin by selected surrounding states

Thirty-two percent of Main Loop Trail respondents indicated they resided in large cities of 250,000 or more people (Table 3.3.22)

Table 0.72. Main Loop Trail size of residence community.

Residence Community Size	***N***	***Percent***
Large City: 250,000 or more people	107	32
City: 100,000 to 249,999 people	41	12
City: 50,000 to 99,999 people	48	14
Small City: 25,000 to 49,999 people	46	14
Town: 10,000 to 24,999 people	41	12
Town: 5,000 to 9,999 people	20	6
Small Town: 5,000 or fewer people	24	7
Rural or Farm	0	0

More than two-thirds (68%) of Main Loop Trail respondents reported having at least a degree from a four-year college, and nearly one-third (29%) had a postgraduate degree (Table 3.3.23).

Table 0.73. Main Loop Trail highest level of education.

Level of Education	*N*	*Percent*
Some high school	5	2
High school graduate	26	8
Trade/technical/vocational training	8	2
Some college	44	13
Two-year college degree	18	5
Four-year college degree	77	23
Some postgraduate work	54	16
Postgraduate degree	97	29

Seven percent of Main Loop Trail respondents indicated being Hispanic or Latino (Table 3.3.24).

Table 0.74. Main Loop Trail Hispanic or Latino.

Hispanic or Latino	*N*	*Percent*
Yes	24	7
No	303	90

The majority (86%) of Main Loop Trail respondents indicated White as their race (Table 3.3.25).

Table 0.75. Main Loop Trail race.

Race	*N*	*Percent**
American Indian or Alaskan Native	14	4
Asian	18	5
Black or African American	2	1
Native Hawaiian or Pacific Islander	2	1
White	288	86
Other	18	5

*Percentage may sum to more than 100% because respondents could indicate more than one race.

Descriptive Results – Alcove House Trail

Sounds: Acceptability

Visitors identified and evaluated the sounds they heard at the Alcove House Trail site during three-minute listening sessions on two scales, Acceptability (appropriateness for the setting) (Table 3.4.1) and Personal Interpretation (personal feeling or emotion toward the sound) (Table 3.4.2).

The five most frequently heard natural sounds at the Alcove House Trail site were bird song (97% of visitors), wind (92%), insects (88%), running water (54%), and small mammals (36%) (Table 3.4.1). The five most frequently heard anthropogenic sounds were small groups of visitors talking (77%),

children (40%), large groups of visitors talking (22%), rangers talking (17%), and unknown aircraft (10%) (Table 3.4.1). On average, natural sounds were rated as more highly acceptable (*M* = 3.00; *SD* = 1.78) than anthropogenic sounds (*M* = 0.29; *SD* = 2.07) (Table 76) and more pleasing (*M* = 2.60; *SD* = 1.72) than anthropogenic sounds (*M* = -0.49; *SD* = 1.78) (Table 3.4.2).

Table 0.76. Alcove House Trail acceptability of sounds heard.

Sound			**Acceptability Percentage**				
	N	***% Heard***	***Unacceptable***	***Neutral***	***Acceptable[1]***	***Mean[1]***	***Std Dev.***
Natural						**3.00**	**1.78**
Wind	263	92	3.8	3.0	93.2	3.49	1.65
Running Water	156	54	2.6	5.1	92.3	3.46	1.53
Rain	6	2	0	50.0	50.0	2.00	2.19
Thunder	19	7	0	15.8	84.2	3.11	1.52
Small Mammal (e.g. Squirrel or Chipmunk)	103	36	4.9	4.9	90.3	3.22	1.83
Large Mammal (e.g. Deer or Coyote)	10	4	0	20.0	80.0	2.80	1.62
Bird Song/Chatter	279	97	2.9	1.1	96.1	3.71	1.40
Insects	251	88	14.3	11.6	74.1	2.17	2.50
Anthropogenic						**0.29**	**2.07**
Small Group Talking	221	77	23.1	29.9	47.1	0.81	2.17
Large Group Talking	62	22	30.6	32.3	37.1	0.19	2.08
Children	114	40	15.8	31.6	52.6	1.28	2.18
Ranger Talk	50	17	14.0	28.0	58.0	1.74	2.36
Cultural Sounds (e.g. Drumming, Singing, Poetry, etc.)	5	2	40.0	20.0	40.0	0.20	3.03
Electronic Devices (e.g. Cell Phone, Radio, Camera, etc.)	20	7	45.0	30.0	25.0	-0.50	2.50
Mechanical Noise (e.g. Compressor, Generator, Fan, etc.)	9	3	44.4	33.3	22.2	-1.00	2.18
Aircraft, Unknown	28	10	32.1	42.9	25.0	-0.21	1.95
Aircraft, Jet	26	9	26.9	42.3	30.8	-0.04	1.82
Aircraft, Propeller	8	3	37.5	25.0	37.5	0.13	2.17
Aircraft, Helicopter	7	2	14.3	28.6	57.1	1.43	1.99
Shuttle Bus	4	1	0	75.0	25.0	0.50	1.00
Passenger Vehicle	10	4	40.0	20.0	40.0	0.10	1.66

Sound			**Acceptability Percentage**				
	N	***% Heard***	***Unacceptable***	***Neutral***	***Acceptable[1]***	***Mean[1]***	***Std Dev.***
Motorcycle	0	0		-	-	-	-
Work Vehicle (e.g. Delivery Truck, etc.)	11	4	45.5	36.4	18.2	-1.18	1.89
Vehicle, Unknown	16	6	50.0	25.0	25.0	-0.37	2.06
Vehicle Horn or Alarm	0	0	-	-	-	-	-
Park Maintenance (Trail Work, Repair etc.)	24	8	8.3	33.3	58.3	1.58	2.00
Explosion*	0	0	-	-	-	-	-

[1] Acceptability based on 9-point scale (-4 = Very Unacceptable to +4 = Very Acceptable); original scale was collapsed to a 3-point scale for reporting purposes.

*Bandelier National Monument is within hearing range of the Los Alamos National Laboratory (LANL) which conducts above ground explosives testing.

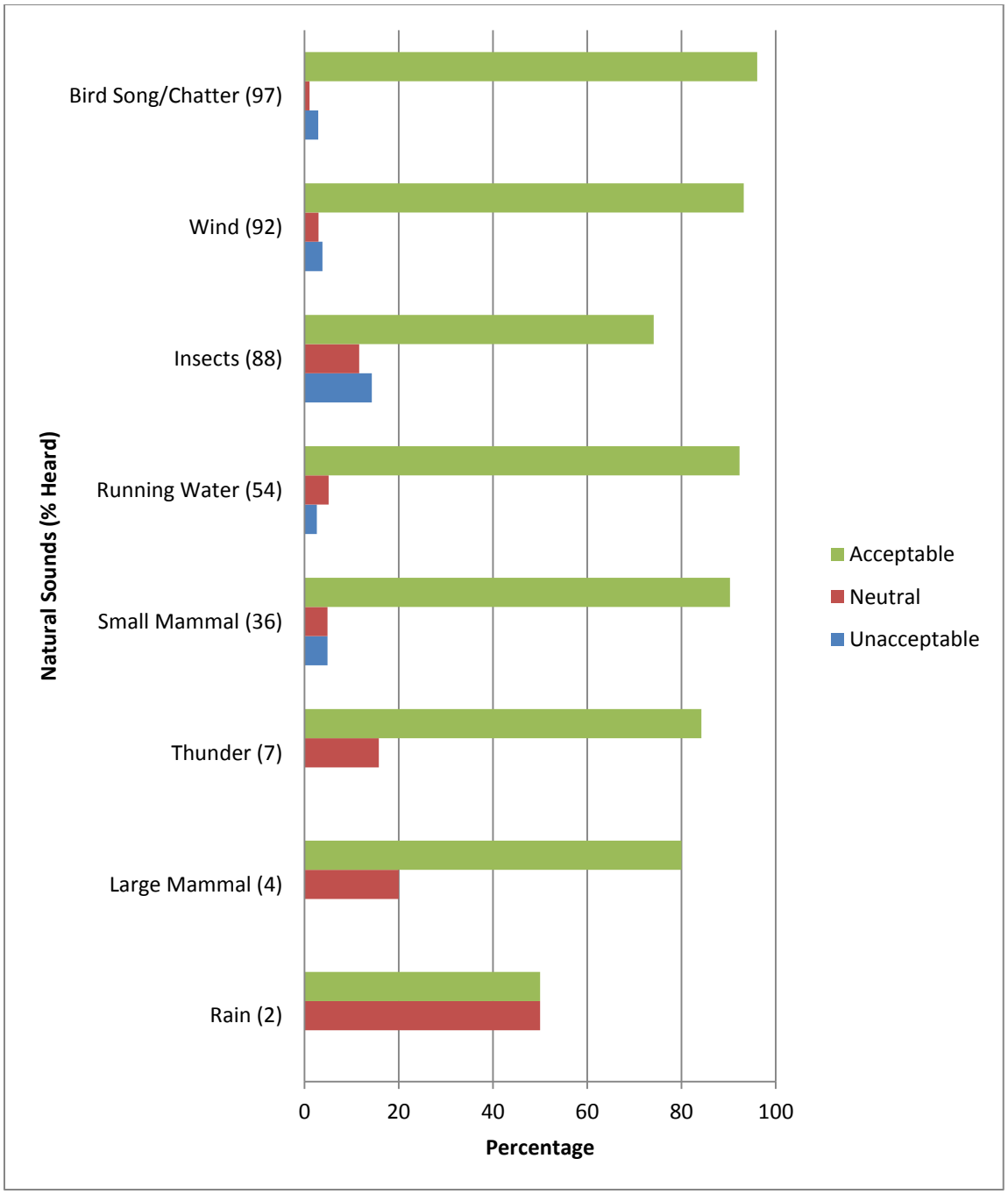

Figure 0.32. Alcove House Trail acceptability (natural sounds).

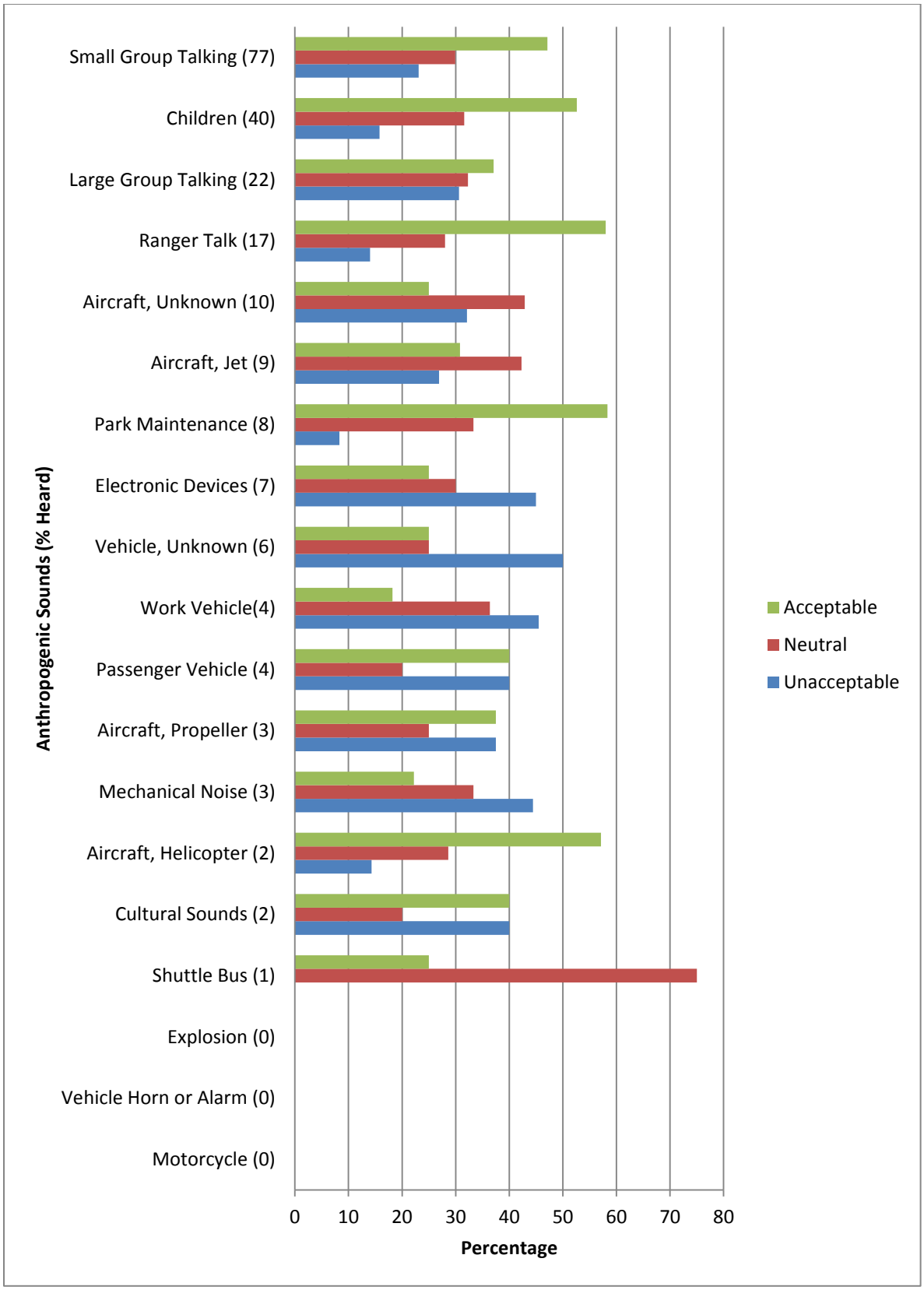

Figure 0.33. Alcove House Trail acceptability (anthropogenic sounds).

Sounds: Personal Interpretation

Table 0.77. Alcove House Trail personal interpretation of sounds heard.

Sound			Personal Interpretation Percentage				
	N	*% Heard*	*Very Annoying*	*Neutral*	*Very Pleasing*[1]	*Mean*[1]	*Std Dev.*
Natural						**2.60**	**1.72**
Wind	255	89	1.2	2.7	96.1	3.63	1.08
Running Water	155	54	0.6	5.2	94.2	3.63	1.06
Rain	3	1	33.3	33.3	33.3	0.67	3.06
Thunder	14	5	7.1	7.1	85.7	2.71	2.05
Small Mammal (e.g. Squirrel or Chipmunk)	88	31	1.1	6.8	92.0	3.25	1.41
Large Mammal (e.g. Deer or Coyote)	10	4	0	20.0	80.0	3.20	1.69
Bird Song/Chatter	230	80	0.4	0.4	99.1	3.83	0.72
Insects	213	74	47.9	18.3	33.8	-0.15	2.70
Anthropogenic						**-0.49**	**1.78**
Small Group Talking	211	74	39.8	42.2	18.0	-0.48	1.74
Large Group Talking	63	22	50.8	36.5	12.7	-0.97	1.81
Children	111	39	27.9	31.5	40.5	0.50	2.11
Ranger Talk	51	18	11.8	39.2	49.0	1.39	1.96
Cultural Sounds (e.g. Drumming, Singing, Poetry, etc.)	4	1	0	25.0	75.0	1.75	1.71
Electronic Devices (e.g. Cell Phone, Radio, Camera, etc.)	15	5	60.0	33.3	6.7	-1.67	2.29
Mechanical Noise (e.g. Compressor, Generator, Fan, etc.)	5	2	60.0	40.0	0	-1.40	1.67
Aircraft, Unknown	17	6	47.1	47.1	5.9	-0.94	1.71
Aircraft, Jet	11	4	54.5	36.4	9.1	-0.91	1.76
Aircraft, Propeller	3	1	66.7	0	33.3	-0.67	3.22
Aircraft, Helicopter	4	1	50.0	25.0	25.0	0.00	2.16
Shuttle Bus	2	1	0	100	0	0.00	0.00
Passenger Vehicle	4	1	50.0	50.0	0	-1.25	1.50
Motorcycle	1	1	100	0	0	-	-
Work Vehicle (e.g. Delivery Truck, etc.)	7	2	71.4	28.6	0	-1.86	1.68
Vehicle, Unknown	6	2	66.7	33.3	0	-1.33	1.21
Vehicle Horn or Alarm	0	0	-	-	-	-	-
Park Maintenance (Trail Work, Repair etc.)	14	5	21.4	50.0	28.6	-.07	1.94

Sound			Personal Interpretation Percentage				
	N	*% Heard*	*Very Annoying*	*Neutral*	*Very Pleasing*[1]	*Mean*[1]	*Std Dev.*
Explosion*	0	0	-	-	-	-	-

[1]Interpretation based on 9-point scale (-4 = Very Annoying to +4 = Very Pleasing); original scale was collapsed to a 3-point scale for reporting purposes.

*Bandelier National Monument is within hearing range of the Los Alamos National Laboratory (LANL) which conducts above ground explosives testing.

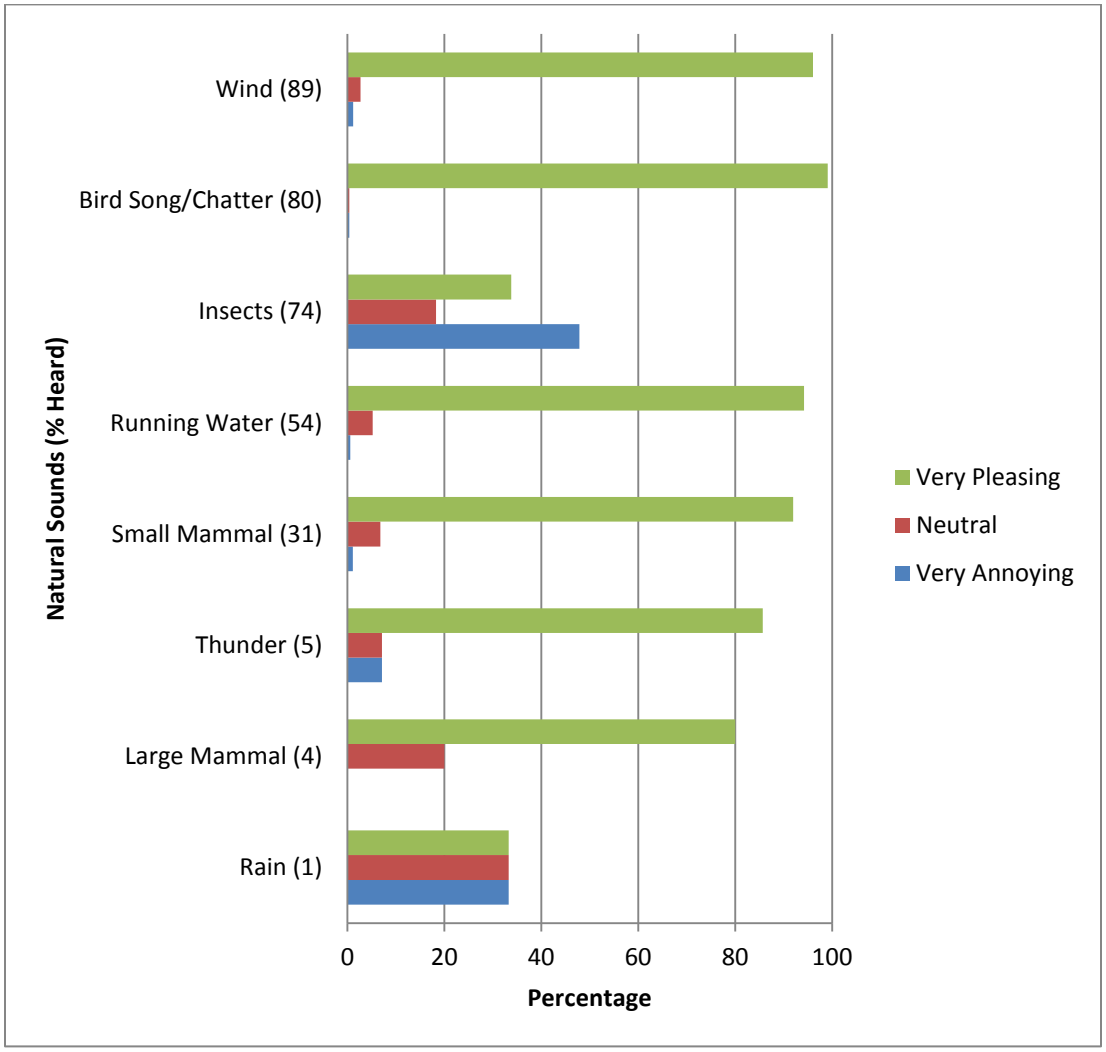

Figure 0.34. Alcove House Trail personal interpretation (natural sounds).

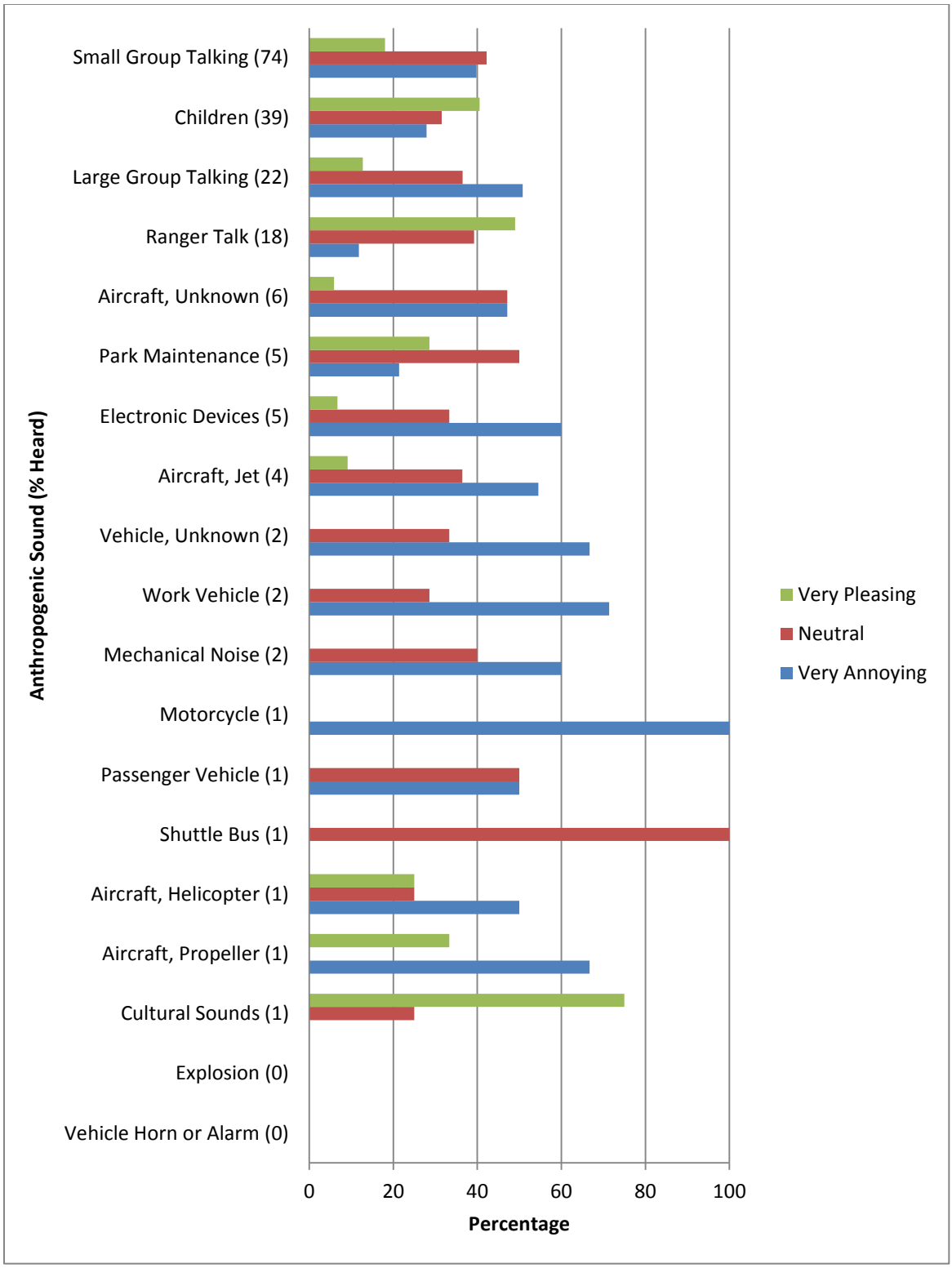

Figure 0.35. Alcove House Trail personal interpretation (anthropogenic sounds).

Management Actions

Visitors at the Alcove House Trail site were asked to rate the acceptability of certain management actions (Table 3.4.3). Respondents were most supportive (M = 2.25; SD = 2.19) of potential management actions that employed signage to inform visitors of cultural sounds and least supportive (M = 0.00; SD = 2.70) of having rangers quieting visitors along the Monument's trails. Survey respondents found management actions that employed signage intended to educate visitors about soundscape management (M = 1.53; SD = 2.30) and increase their opportunity to experience traditional cultural sounds (M = 2.21; SD = 2.38) to be acceptable, on average.

Table 0.78. Alcove House Trail evaluations of potential management actions.

		Percentage				
Potential Management Action	***N***	***Unacceptable***	***Neutral***	***Acceptable*[1]**	***Mean*[1]**	***Std. Dev.***
See: Sign(s) informing you about the park's concerns with human-caused noise	286	12.2	25.5	62.2	1.53	2.30
See: Sign(s) informing you that you may hear traditional cultural sounds (e.g. drumming, singing, chanting).	285	9.1	16.5	74.4	2.25	2.19
Experience: Traditional cultural sounds (e.g. drumming, singing, chanting).	285	13.3	12.3	74.4	2.21	2.38
Experience: Park rangers stationed along the trail quieting visitors.	286	43.7	18.2	38.1	0.00	2.70

[1] Acceptability based on 9-point scale (-4 = Very Unacceptable to +4 = Very Acceptable); original scale was collapsed to a 3-point scale for reporting purposes.

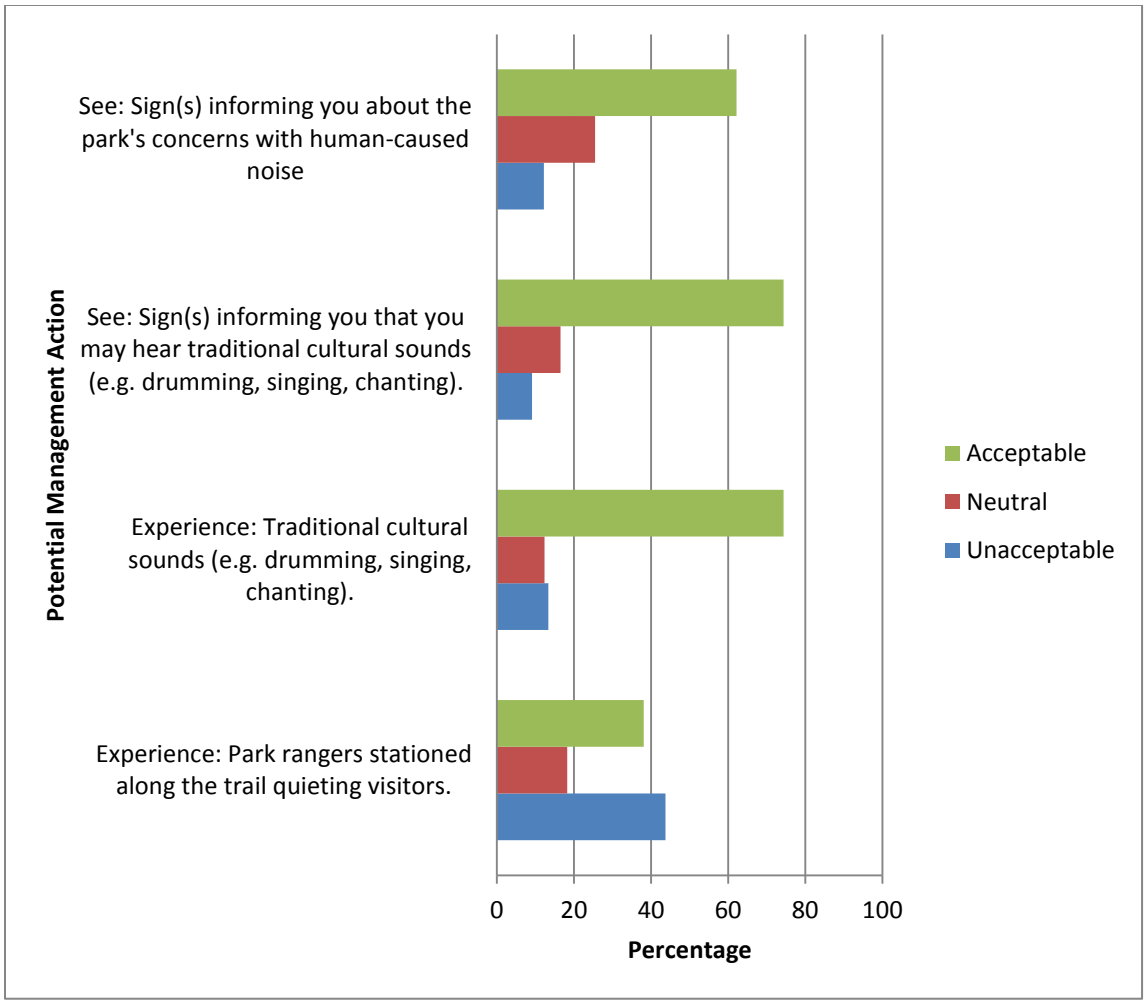

Figure 0.36. Alcove House Trail potential management actions.

Visitors at the Alcove House Trail site were also asked to rate the extent to which the presence of cultural sounds in the Monument would improve their experience and understanding (based on a 5-point scale ranging from 1 = "Not at All" to 5 = "Very Much") (Table 3.4.4). Responses suggested that cultural sounds would enhance visitor experiences (*M* = 3.46; *SD* = 1.41), understanding of traditional Pueblo cultures (*M* = 3.71; *SD* = 1.33), understanding of Bandelier's significance (*M* = 3.59; *SD* = 1.43), understanding of Bandelier's mission (*M* = 3.47; *SD* = 1.44), and appreciation of Bandelier (*M* = 3.51; *SD* = 1.45).

Table 0.79. Alcove House Trail degree to which cultural sounds would improve visitor experiences and understanding.

		Percentage				
Potential Management Action	***N***	***Not At All***	***Somewhat***	***Very Much***[1]	***Mean***[1]	***Std. Dev.***
Enhance your visitor experience	286	28.4	19.1	52.5	3.46	1.41
Increase your understanding of traditional Pueblo cultures	286	24.0	14.5	61.5	3.71	1.33
Increase your understanding of Bandelier's significance	286	24.4	17.2	58.4	3.59	1.43
Increase your understanding of Bandelier's mission	285	26.1	19.9	54.0	3.47	1.44
Increase your appreciation of Bandelier	286	25.4	17.2	57.3	3.51	1.45

[1]Degree of importance based on 5-point scale (1 = Not at All to 5 = Very Much); original scale was collapsed to a 3-point scale for reporting purposes.

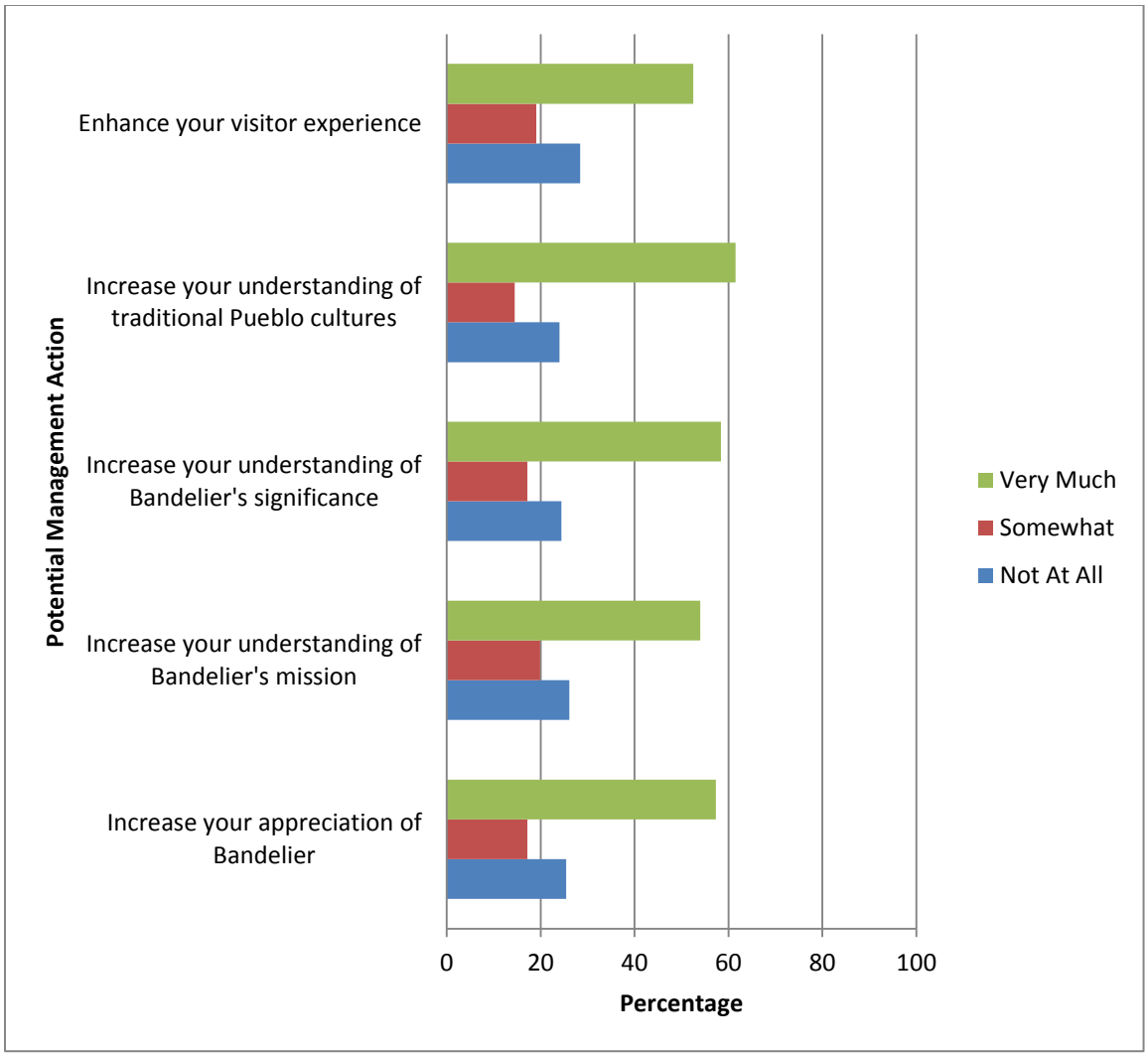

Figure 0.37. Alcove House Trail degree to which cultural sounds would improve visitor experiences and understanding.

Motivations for Visiting

The top reported motivations for visiting Bandelier National Monument for visitors to the Alcove House Trail site (based on a 5-point scale ranging from 1 = "Not Important at All" to 5 = "Extremely Important") (Table 3.4.5) were appreciating the archaeological and cultural sites (*M* = 4.62; *SD* = 0.65), appreciating the scenic beauty (*M* = 4.59; *SD* = 0.65), experiencing a sense of connection with nature (*M* = 4.23; *SD* = 0.94), spending time with family and friends (*M* = 4.14; *SD* = 1.06), and experiencing the sounds of nature (*M* = 4.04; *SD* = 1.04). The least important motivations for visiting the Monument were experiencing cultural sounds (*M* = 2.64; *SD* = 1.41) and experiencing Bandelier National Monument in an air-tour overflight (*M* = 1.36; *SD* = 0.93).

Table 0.80. Alcove House Trail importance of motivations for visiting Bandelier National Monument.

		Percentage				
Motivations[2]	***N***	***Not Important At All***	***Moderately Important***	***Extremely Important***	***Mean***[1]	***Std. Dev.***
Appreciate the scenic beauty	287	1.0	4.9	94.1	4.59	0.65
Experience solitude	286	24.5	24.8	50.7	3.42	1.29
Spend time with family/friends	285	9.1	12.3	78.6	4.14	1.06
Get some exercise	280	12.9	23.9	63.2	3.78	1.12
Experience the sounds of nature	283	8.8	19.4	71.7	4.04	1.04
Experience cultural sounds	275	49.8	21.8	28.4	2.64	1.41
Experience a sense of connection with nature	287	7.0	12.9	80.1	4.23	0.94
Experience peace and quiet	286	11.9	19.2	68.9	3.92	1.06
Experience a sense of challenge	278	27.7	27.0	45.3	3.28	1.28
Appreciate the archaeological and cultural sites	283	1.4	4.2	94.3	4.62	0.65
Experience Bandelier in an air-tour overflight	261	89.3	5.0	5.7	1.36	0.93

[1]Degree of importance based on 5-point scale (1 = Not Important at All to 5 = Extremely Important); original scale was collapsed to a 3-point scale for reporting purposes.

[2]Respondents may interpret the meaning of these motivational statements differently. They were not provided additional context for these items during survey administration.

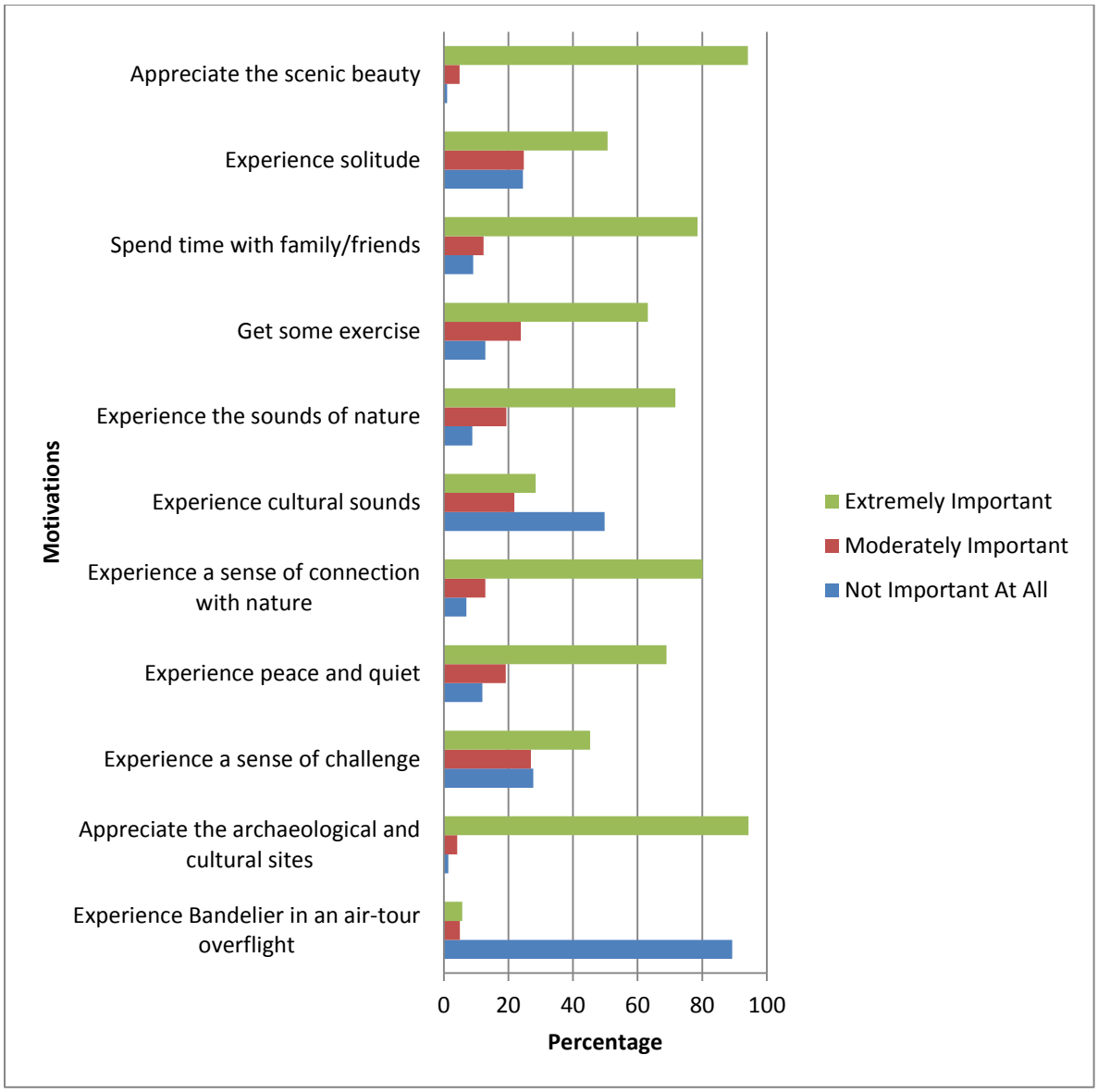

Figure 0.38. Alcove House Trail importance of motivations for visiting Bandelier National Monument.

Expectations for Visit

Visitors at the Alcove House Trail site were asked to compare their actual experiences in the Monument to their expectations for their visit (based on a 5-point scale ranging from 1 = "A Lot Less than Expected" to 5 = "A Lot More than Expected") (Table 3.4.6). On average, respondents indicated that they had more opportunities to experience the sounds of nature than they expected (*M* = 3.28; *SD* = 0.71). With regard to hearing aircraft, respondents indicated hearing less than expected (*M* = 2.16; *SD* = 1.04), although the majority (63%) indicated having no expectation for hearing aircraft while in Bandelier National Monument. Visitors reported hearing vehicles (*M* = 2.10; *SD* = 1.02), and other visitors (*M* = 2.58; *SD* = 0.88) less frequently than expected. Respondents also reported seeing fewer people while hiking than expected (*M* = 2.36; *SD* = 0.86). With regard to viewing wildlife, respondents indicated having slightly less opportunities for viewing than expected (*M* = 2.71; *SD* = 0.88). Finally, visitors indicated experiencing cultural sounds less than expected (*M* = 2.41; *SD* = 1.00). However, the majority of respondents (56%) indicated having no expectation for hearing cultural sounds while in Bandelier National Monument.

Table 0.81. Alcove House Trail conditions experienced compared to expectations.

		Percentage							
Expectation	***N***	***No Expectation***	***A Lot Less Than Expected***	***Less Than Expected***	***About as Expected***	***More Than Expected***	***A Lot More Than Expected***	***Mean[1]***	***Std. Dev.***
Number of people you saw while hiking	241	16	15.3	28.2	35.9	3.8	0.7	2.36	0.86
Amount of time you heard aircraft	106	63	12.5	10.5	9.8	3.8	0.3	2.16	1.04
Opportunity to view wildlife	241	15	9.4	18.5	44.9	9.4	1.7	2.71	0.88
Opportunity to experience sounds of nature	259	9	1.0	4.5	58.5	20.2	5.9	3.28	0.71
Amount of time you heard vehicles	173	39	23.0	13.6	18.8	4.5	0.3	2.10	1.02
Amount of time you heard other visitors	250	13	12.5	21.3	44.9	7.3	1.0	2.58	0.88
Opportunity to experience cultural sounds	122	56	8.7	13.2	16.7	2.1	1.7	2.41	1.00

[1]Conditions compared to expectations based on 5-point scale (1 = A Lot Less than Expected to 5 = A Lot More than Expected). Respondents that indicated having no expectation were not considered within the mean value.

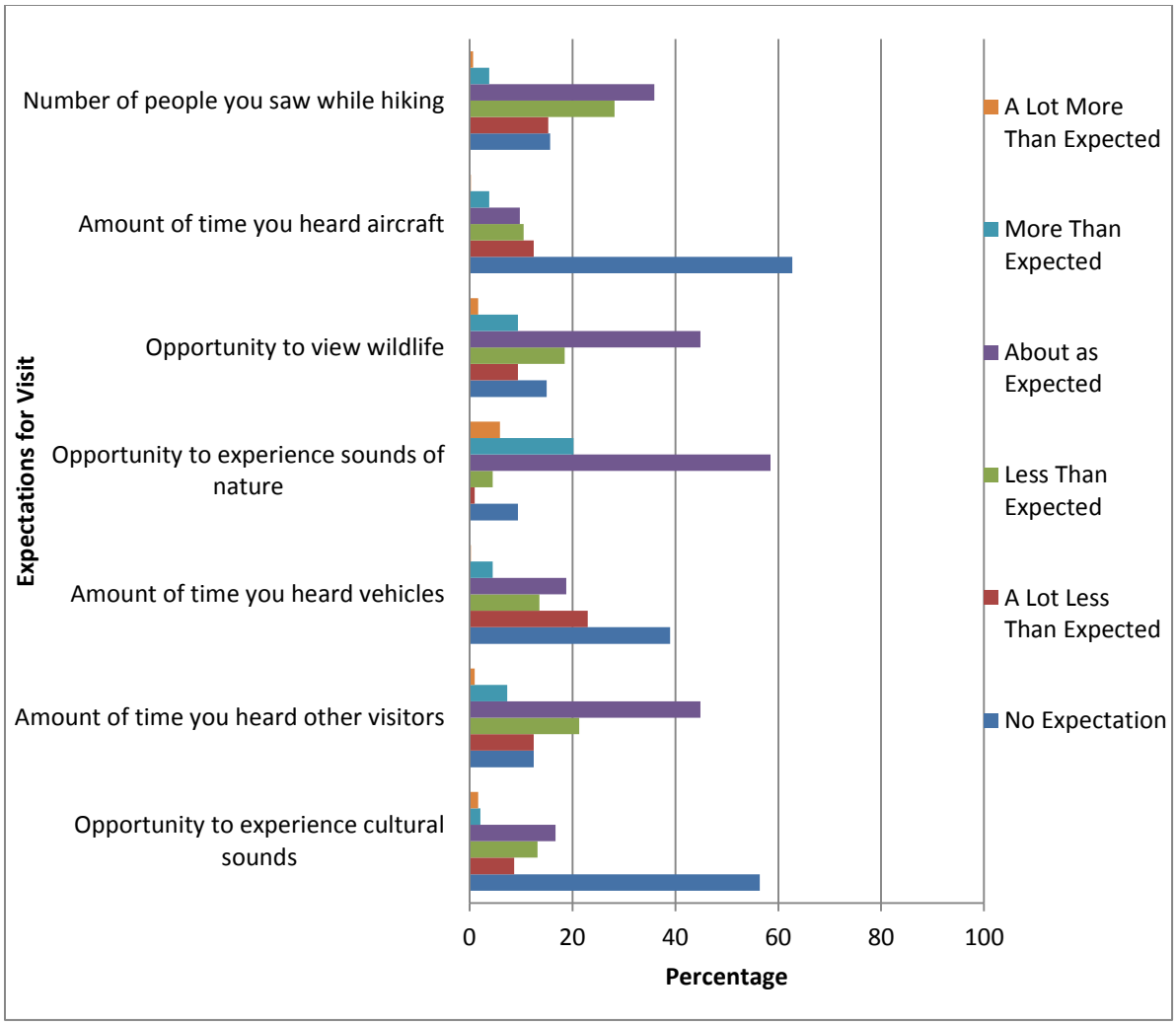

Figure 0.39. Alcove House Trail conditions experienced compared to expectations.

Alcove House Trail Visitation and Demographics

Visitation and demographic results from the Alcove House Trail site (*N* = 287) are listed below in Tables 82-100.

Visit Length and Group Type

The majority (75%) of Alcove House Trail respondents indicated that it was their first visit to Bandelier National Monument (Table 3.4.7).

Table 0.82. Alcove House Trail first-time visitors to Bandelier National Monument.

First Visit	*N*	*Percent*
Yes	213	75
No	70	25

Of those Alcove House Trail visitors who had previously visited the Monument, the majority (52%) were visiting for the second time (Table 3.4.8).

Table 0.83. Alcove House Trail repeat visitor number of total visits.

Times Visited	*N*	*Percent*
2	36	52
3 – 5	19	28
6 – 10	7	10
More than 10	7	10

The majority (91%) of Alcove House Trail respondents were day visitors (Table 3.4.9).

Table 0.84. Alcove House Trail length of current visit.

Visit Length	*N*	*Percent*
Today Only	261	91
2 - 3 Days	19	7
4 - 7 Days	5	2
8 or More Days	0	0

Sixty-five percent of Alcove House Trail respondents were with their families (Table 3.4.10).

Table 0.85. Alcove House Trail type of personal group.

Personal Group Type	*N*	*Percent*
Alone	5	2
Friends	72	25
Family	178	65
Friends and Family	28	10

Sixty percent of visitors to Alcove House Trail had two to three people in their group (Table 3.4.11).

Table 0.86. Alcove House Trail number of people in personal group.

Personal Group Size	*N*	*Percent*
Just Myself	13	5
2 – 3	172	60
4 – 7	84	29
8-12	11	4
13 or More	4	1

Ninety-six percent of visitors to Alcove House Trail were not with a larger group (Table 3.4.12).

Table 0.87. Alcove House Trail larger group (such as school, church, scout or tour groups).

With Large Group	*N*	*Percent*
Yes	10	4
No	275	96

Of the respondents at Alcove House Trail who reported being part of a larger group, 70% indicated they were part of another type of organized group (Table 3.4.13).

Table 0.88. Alcove House Trail type of larger group.

Large Group Type	*N*	*Percent*
Commercial guided tour group	0	0
School or educational group	1	10
Family reunion group	2	20
Other organized group	7	70

Forty-six percent of respondents at Alcove House Trail who reported being part of a larger group were in a group of 16 to 20 people (Table 3.4.14).

Table 0.89. Alcove House Trail size of larger group.

Large Group Size	*N*	*Percent*
Less than 10	3	27
10 – 15	1	9
16 – 20	5	46
21 or More	2	18

Primary Activity and Destination

Fifty-three percent of respondents at the Alcove House Trail site indicated archeological and cultural interests as their primary activity, while 36% chose day hiking (Table 3.4.15).

Table 0.90. Alcove House Trail primary activity type.

Activity	*N*	*Percent*
Day hiking	104	36
Archaeological/cultural interests	151	53
Backpacking	4	1
Wildlife viewing	3	1
Camping	3	1
Photography	18	6
Other	1	<1

Most respondents (60%) at Alcove House Trail reported the Visitor Center/Main Loop Trail as their primary destination (Table 3.4.16).

Table 0.91. Alcove House Trail primary destination.

Destination	*N*	*Percent*
Alcove House	87	30
Ponderosa/Upper Crossing	2	1
Tsankawi	8	3
Falls Trail	7	2
Visitor Center/Main Loop Trail	171	60
Other	11	4

Air Tours and Over-flights

Only one respondent (< 1%) at the Alcove House Trail site indicated they had taken an air tour over Bandelier National Monument (Table 3.4.17).

Table 0.92. Alcove House Trail air tour over Bandelier National Monument.

Air tour/Over-flight	*N*	*Percent*
Yes	1	<1
No	286	99

Eleven percent of respondents at Alcove House Trail indicated they had taken an air tour over another park (Table 3.4.18).

Table 0.93. Alcove House Trail air tour over other parks.

Air tour/Over-flight	*N*	*Percent*
Yes	30	11
No	257	90

Demographics

Fifty-nine percent of respondents at the Alcove House Trail site were female (Table 3.4.19).

Table 0.94. Alcove House Trail gender.

Gender	***N***	***Percent***
Male	118	41
Female	168	59

The average age of Alcove House Trail respondents was 51 years old, with a range of 18 to 84 years old (Table 3.4.20).

Table 0.95. Alcove House Trail age.

Mean	***SD***	***Range***
50.7	15.8	18 - 84

Ninety-five percent of Alcove House Trail respondents were from the United States (Table 3.4.21).

Table 0.96. Alcove House Trail origin by country.

Country	***N***	***Percent***
Canada	2	1
Czech Republic	2	1
India	1	<1
Japan	2	1
Scotland	2	1
Singapore	1	<1
UK	4	2
USA	272	95

Thirty percent of Alcove House Trail respondents reported being from the Southwest region, while 20% were from the Pacific and Northeast regions (Figure 3.4.9).

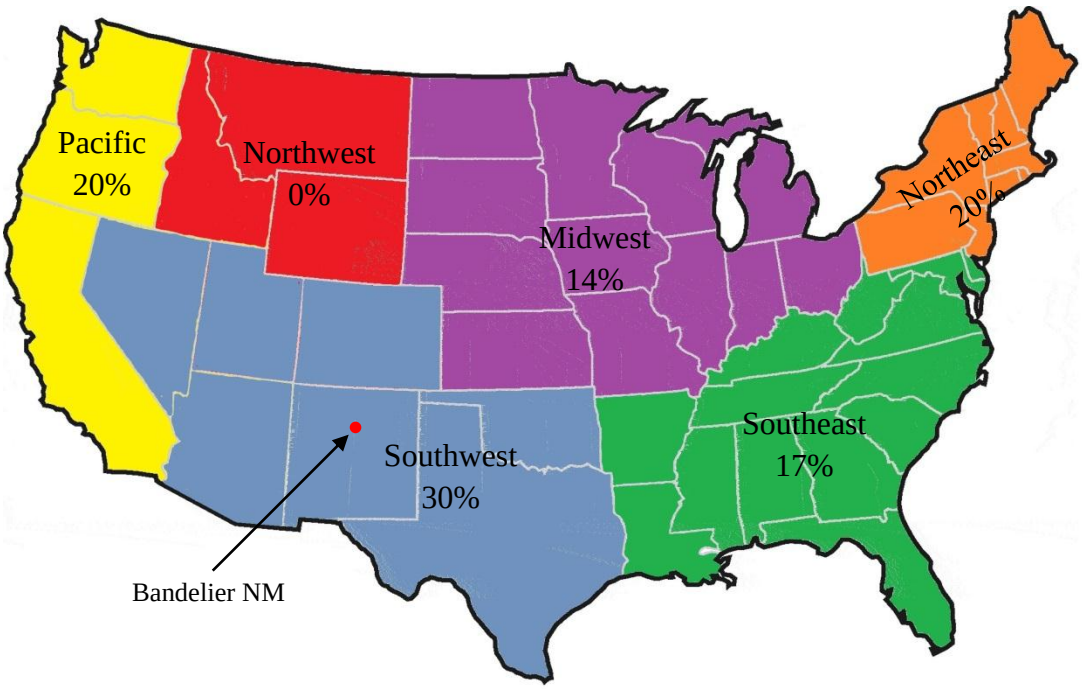

Figure 0.40. Alcove House Trail origin by U.S. region.

Of the states surrounding the Monument, the majority of respondents from the Alcove House Trail were from California (14%) (Figure3.4.10).

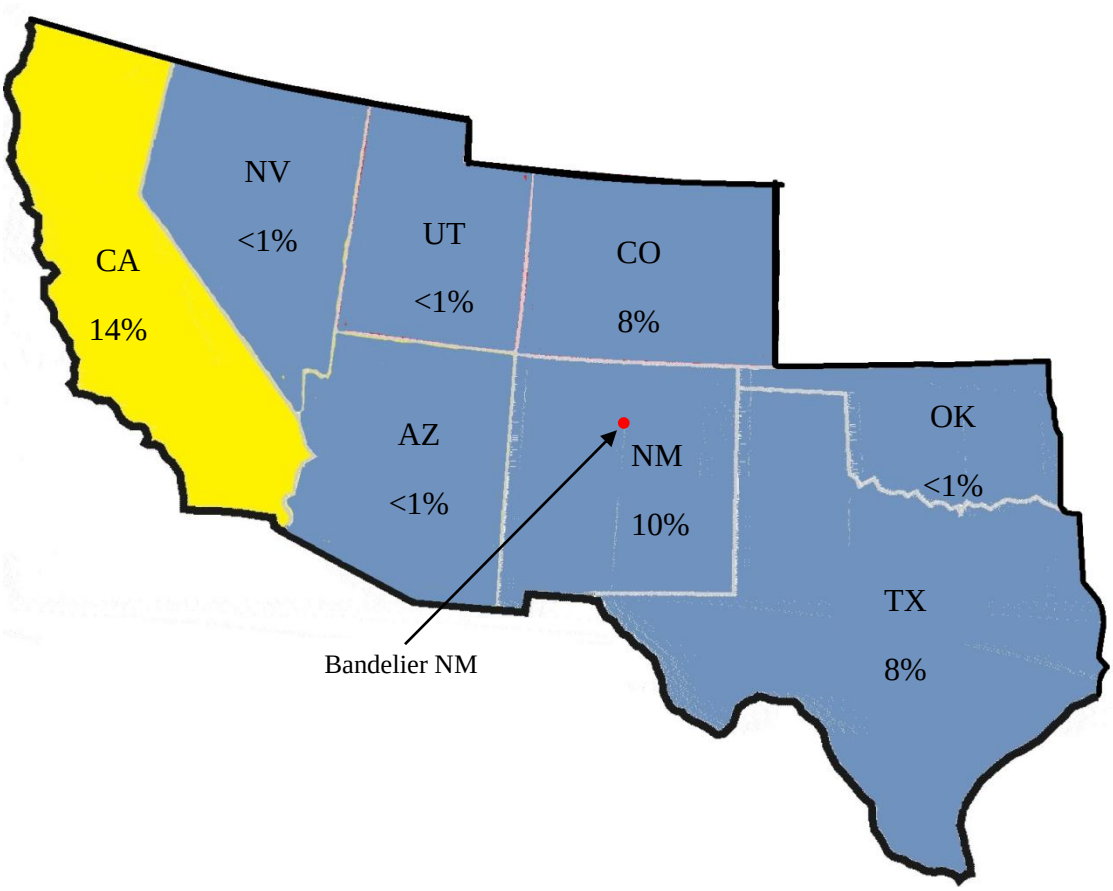

Figure 0.41. Alcove House Trail origin by selected states

Forty-three percent of Alcove House Trail respondents indicated residing in large cities of 250,000 or more people (Table 97).

Table 0.97. Alcove House Trail size of residence community.

Residence Community Size	*N*	*Percent*
Large City: 250,000 or more people	124	43
City: 100,000 to 249,999 people	33	12
City: 50,000 to 99,999 people	37	13
Small City: 25,000 to 49,999 people	22	8
Town: 10,000 to 24,999 people	32	11
Town: 5,000 to 9,999 people	13	5
Small Town: 5,000 or fewer people	25	9
Rural or Farm	0	0

More than three-quarters (77%) of Alcove House Trail respondents reported having at least a degree from a four-year college, and over one-third (35%) had a postgraduate degree (Table 3.4.23).

Table 0.98. Alcove House Trail highest level of education.

Level of Education	*N*	*Percent*
Some high school	0	0
High school graduate	14	5
Trade/technical/vocational training	7	2
Some college	15	5
Two-year college degree	29	10
Four-year college degree	94	33
Some postgraduate work	25	9
Postgraduate degree	101	35

Six percent of Alcove House Trail respondents indicated being Hispanic or Latino (Table 3.4.24).

Table 0.99. Alcove House Trail Hispanic or Latino.

Hispanic or Latino	*N*	*Percent*
Yes	16	6
No	268	93

The majority (89%) of Alcove House Trail respondents indicated White as their race (Table 3.4.25).

Table 0.100. Alcove House Trail race.

Race	***N***	***Percent****
American Indian or Alaskan Native	6	2
Asian	15	5
Black or African American	0	0
Native Hawaiian or Pacific Islander	3	1
White	254	89
Other	8	3

*Percentage may sum to more than 100% because respondents could indicate more than one race

Chapter 4: Discussion

The purpose of this study was to better understand and inform Bandelier National Monument managers of visitors' perspectives regarding the Monument's soundscape. This was accomplished by determining what sounds visitors heard while at the Monument, and subsequently investigating whether those sounds were evaluated positively or negatively (i.e., as noise). Additionally, this study examined respondents' motivations and expectations for their visit to Bandelier National Monument, specifically in regard to soundscape conditions. These factors have been found to influence preferences regarding soundscape conditions (Marin et al., 2011). Therefore, sampling was conducted at the Ponderosa and Burnt Mesa Trails to capture respondents who may be seeking a more wilderness experience, and at the Main Loop and Alcove House Trails to gather information from respondents who are perhaps seeking a different experience, in the canyon. While the previous chapters have shown the overall results across all of the sampling efforts (Chapter section 3.1) and the results of the individual sampling locations (Chapter sections 3.2 – 3.4), within this section, we will discuss the overall and individual site results, but also compare results between the sample locations to address potential differences between sites. However, it should be reiterated that due to the small sample size at the wilderness sites, the comparisons and implications should be interpreted with caution. Also, consideration should be given to the substantial number of respondents at the wilderness sites that reported living within close proximity to the Monument (i.e., zip codes 83318 – 87544).

Another goal of this study was to determine whether visitor experiences could be enhanced by introducing traditional cultural sounds. An aligning outcome of this was to evaluate potential management actions that could be used to protect natural sounds, and implement cultural sounds at the Monument. Within this section we will discuss the overall and individual site results, while also comparing findings between the sample locations to address potential differences between sites. In addition, because the NSNSD recently collected acoustical monitoring data at the Monument, this section will discuss cursory comparisons between these data and the respondent results provided in Chapter 3 of this report. Finally, because Monument staff must develop an Air Tour Management Plan, in this section we elaborate on the relevant results provided in Chapter 3 in an effort to inform future planning.

Overall, the results provided in the previous chapter and described here can be used to inform planning and soundscape management efforts by identifying potential social indicators of quality and visitor-based desired conditions for the soundscape in Bandelier National Monument. Furthermore, these findings are meant to inform NPS staff in their preparation of the Monument's Comprehensive Interpretive Plan update and Air Tour Management Plan. Due to the breadth of information captured through this study and the variety of management implications stemming from these results, this chapter presents these topics in the following sequence: (1) a discussion of sounds heard and visitor evaluations of those sounds across all sampling locations, and individual sampling locations; (2) an integration of sounds heard with NSNSD acoustical monitoring data; (3) comparing motivations across all sampling locations in regard to natural and cultural sound dimensions; (4) informing soundscape management in terms of soundscape interpretation and air tour management; and

implications for future research.

All Locations – Sounds Heard and Visitor Evaluations

Across all sites, the most common natural sounds that were heard by visitors were bird song (96% of visitors), wind (92%), insects (74%), running water (64%), and small mammals (29%) (Table 3.1.1). On average, natural sounds were rated as very acceptable (*M* = 3.16; *SD* = 1.65, based on a 9-point scale, -4 Very Unacceptable to 4 Very Acceptable) and pleasing (*M* = 2.62; *SD* = 1.50, based on a 9-point scale, -4 Very Annoying to 4 Very Pleasing). Bird song was rated as the most acceptable natural sound (*M* = 3.75; *SD* = 1.25), while insects were rated as the least acceptable natural sound (*M* = 2.23; *SD* = 2.38), based on the 9-point scale, -4 Very Unacceptable to 4 Very Acceptable. Bird song was also evaluated as the most pleasing natural sound to visitors (*M* = 3.87; *SD* = 0.58), based on the 9-point scale, -4 Very Annoying to 4 Very Pleasing. Insects (*M* = 0.33; *SD* = 2.61) and rain (*M* = 0.33; *SD* = 2.34) were the natural sounds that were evaluated as the least pleasing.

Across all sites, the most common anthropogenic sounds that were heard by visitors were small groups of visitors talking (68%), children (36%), large groups of visitors talking (17%), rangers talking (16%), and jets (12%) (Table 3.1.1). On average, anthropogenic sounds were rated as neither acceptable nor unacceptable (*M* = 0.26; *SD* = 2.16) and slightly annoying (*M* = -0.82; *SD* = 1.84). Ranger talk (*M* = 1.94; *SD* = 2.27) and cultural sounds (*M* = 1.87; *SD* = 2.64) were rated as the most acceptable anthropogenic sounds, while vehicle horn or alarm was rated as the least acceptable anthropogenic sound (*M* = -2.29; *SD* = 1.38), although that sound was only heard by seven respondents (mean values based on the 9-point scale, -4 Very Unacceptable to 4 Very Acceptable). Cultural sounds (*M* = 1.43; *SD* = 2.24) and ranger talk (*M* = 1.11; *SD* = 2.08) were also evaluated as the most pleasing anthropogenic sounds to visitors (based on the 9-point scale, -4 Very Annoying to 4 Very Pleasing). Vehicle horn or alarm (*M* = -3.00; *SD* = 1.41), motorcycle (*M* = -2.29; *SD* = 1.11), mechanical noise (*M* = -2.00; *SD* = 1.71), and electronic devices (*M* = -1.95; *SD* = 2.04) were the anthropogenic sounds that were evaluated as the most annoying.

Ponderosa Campground/Burnt Mesa Trail – Sounds Heard and Visitor Evaluations

At the wilderness sites, the most common natural sounds that were heard by visitors were bird song (92% of visitors), wind (89%), and insects (77%) (Table 3.2.1). On average, natural sounds were rated as very acceptable (*M* = 3.02; *SD* = 2.27) and pleasing (*M* = 3.25; *SD* = 0.95). Bird song (*M* = 3.65; *SD* = 1.57) and wind (*M* = 3.61; *SD* = 1.67) were rated as the most acceptable natural sounds, while small mammal was rated as the least acceptable natural sound (*M* = 1.75; *SD* = 3.86), although small mammal was only heard by four respondents. Large mammal (*M* = 4.00) and bird song (*M* = 3.92; *SD* = 0.28) were evaluated as the most pleasing natural sounds to visitors, although large mammal was only heard by one respondent. Insects (*M* = 1.16; *SD* = 2.01) were the natural sound that was evaluated as the least pleasing.

At the wilderness sites, the most common anthropogenic sounds that were heard by visitors were passenger vehicle (31%), unknown aircraft (27%), jet (23%), unknown vehicle (23%), and motorcycle (15%) (Table 3.2.1). On average, anthropogenic sounds were rated as neither acceptable nor unacceptable (*M* = 0.69; *SD* = 1.92) and slightly annoying (*M* = -1.03; *SD* = 1.06). Ranger talk (*M* = 4.00; *SD* = 0.00) (note that respondents were referring to the surveyors as rangers at this site) and motorcycle (*M* = 1.75; *SD* = 2.06) were rated as the most acceptable anthropogenic sounds,

although these sounds were only heard by two and four respondents, respectively. Mechanical noise (*M* = -1.00; *SD* = 1.41) and unknown vehicle (*M* = -0.67; *SD* = 1.75) were rated as the least acceptable anthropogenic sounds, although these sounds were only heard by two and six respondents, respectively. No anthropogenic sounds at the wilderness sites were evaluated as pleasing to visitors. Motorcycle (*M* = -2.00; *SD* = 1.41), passenger vehicle (*M* = -1.29; *SD* = 0.95), and unknown vehicle (*M* = -1.20; *SD* = 1.30) were the anthropogenic sounds that were evaluated as the most annoying.

Main Loop Trail – Sounds Heard and Visitor Evaluations

On the Main Loop Trail, the most common natural sounds that were heard by visitors were bird song (95% of visitors), wind (93%), running water (76%), insects (63%), and small mammals (25%) (Table 3.3.1). On average, natural sounds were rated as very acceptable (*M* = 3.31; *SD* = 1.49) and pleasing (*M* = 2.59; *SD* = 1.34). Running water (*M* = 3.81; *SD* = 1.01) and bird song (*M* = 3.80; *SD* = 1.08) were rated as the most acceptable natural sounds, while insects were rated as the least acceptable natural sound (*M* = 2.24; *SD* = 2.24). Bird song was also evaluated as the most pleasing natural sound to visitors (*M* = 3.89; *SD* = 0.45). Insects (*M* = 0.83; *SD* = 2.45) and rain (*M* = 0.00; *SD* = 2.00) were the natural sounds that were evaluated as the least pleasing.

On the Main Loop Trail, the most common anthropogenic sounds that were heard by visitors were small groups of visitors talking (65%), children (36%), large groups of visitors talking (14%), rangers talking (14%), and jets (14%) (Table 3.3.1). On average, anthropogenic sounds were rated as neither acceptable nor unacceptable (*M* = 0.19; *SD* = 2.14) and slightly annoying (*M* = -0.94; *SD* = 1.97). Cultural sounds (*M* = 3.00; *SD* = 2.00) and ranger talk (*M* = 2.10; *SD* = 2.20) were rated as the most acceptable anthropogenic sounds, while vehicle horn or alarm was rated as the least acceptable anthropogenic sound (*M* = -2.29; *SD* = 1.38), although that sound was only heard by seven respondents. Cultural sounds (*M* = 1.44; *SD* = 2.60) and ranger talk (*M* = 0.91; *SD* = 2.15) were also evaluated as the most pleasing anthropogenic sounds to visitors. Vehicle horn or alarm (*M* = -3.00; *SD* = 1.41), motorcycle (*M* = -2.50; *SD* = 0.71), park maintenance (*M* = -2.33; *SD* = 2.08), and mechanical noise (*M* = -2.17; *SD* = 1.72) were the anthropogenic sounds that were evaluated as the most annoying.

Alcove House Trail – Sounds Heard and Visitor Evaluations

On the Alcove House Trail, the most common natural sounds that were heard by visitors were bird song (97% of visitors), wind (92%), insects (88%), running water (54%), and small mammals (36%) (Table 3.4.1). On average, natural sounds were rated as very acceptable (*M* = 3.00; *SD* = 1.78) and pleasing (*M* = 2.60; *SD* = 1.72). Bird song (*M* = 3.71; *SD* = 1.40) and wind (*M* = 3.49; *SD* = 1.65) were rated as the most acceptable natural sounds, while rain was rated as the least acceptable natural sound (*M* = 2.00; *SD* = 2.19). Bird song was also evaluated as the most pleasing natural sound to visitors (*M* = 3.83; *SD* = 0.72). Insects (*M* = -0.15; *SD* = 2.70) and rain (*M* = 0.67; *SD* = 3.06) were the natural sounds that were evaluated as the least pleasing.

On the Alcove House Trail, the most common anthropogenic sounds that were heard by visitors were small groups of visitors talking (77%), children (40%), large groups of visitors talking (22%), rangers talking (17%), and unknown aircraft (10%) (Table 3.4.1). On average, anthropogenic sounds were rated as neither acceptable nor unacceptable (*M* = 0.29; *SD* = 2.07) and slightly annoying (*M* = -0.49;

SD = 1.78). Ranger talk (*M* = 1.74; *SD* = 2.36) and park maintenance (*M* = 1.58; *SD* = 2.00) were rated as the most acceptable anthropogenic sounds, while work vehicle (*M* = -1.18; *SD* = 1.89) and mechanical noise (*M* = -1.00; *SD* = 2.18) were rated as the least acceptable anthropogenic sounds. Cultural sounds (*M* = 1.75; *SD* = 1.71) and ranger talk (*M* = 1.39; *SD* = 1.96) were evaluated as the most pleasing anthropogenic sounds to visitors. Work vehicle (*M* = -1.86; *SD* = 1.68), electronic devices (*M* = -1.67; *SD* = 2.29), mechanical noise (*M* = -1.40; *SD* = 1.67), and unknown vehicle (*M* = -1.33; *SD* = 1.21) were the anthropogenic sounds that were evaluated as the most annoying.

Figures 4.1.1 and 4.1.2 offer a plotted view of the mean acceptability and personal interpretation (i.e., annoying or pleasing) of the sounds heard by the percentage of respondents that reported hearing these items at the individual sampling locations. These figures provide a clear understanding that nearly all respondents heard birds, water and wind and found these sounds to be very acceptable and pleasing. Fewer respondents (approximately one quarter) indicated that they heard anthropogenic sounds such as passenger vehicles, aircraft, electronics and groups talking. Trends imply that these anthropogenic sounds are much less acceptable and far more annoying than the natural sounds, suggesting that many visitors perceive these sounds as noise. However, mean values suggest that at the Main Loop Trail, respondents rated these noises as a bit more acceptable than respondents on the Alcove House Trail. This could indicate that those respondents that went slightly further into the canyon (i.e., all the way to the Alcove House), had less tolerance for anthropogenic noise. With regard to annoyance however, it is clear that on average, these noises were very annoying to respondents at all of the sampling locations.

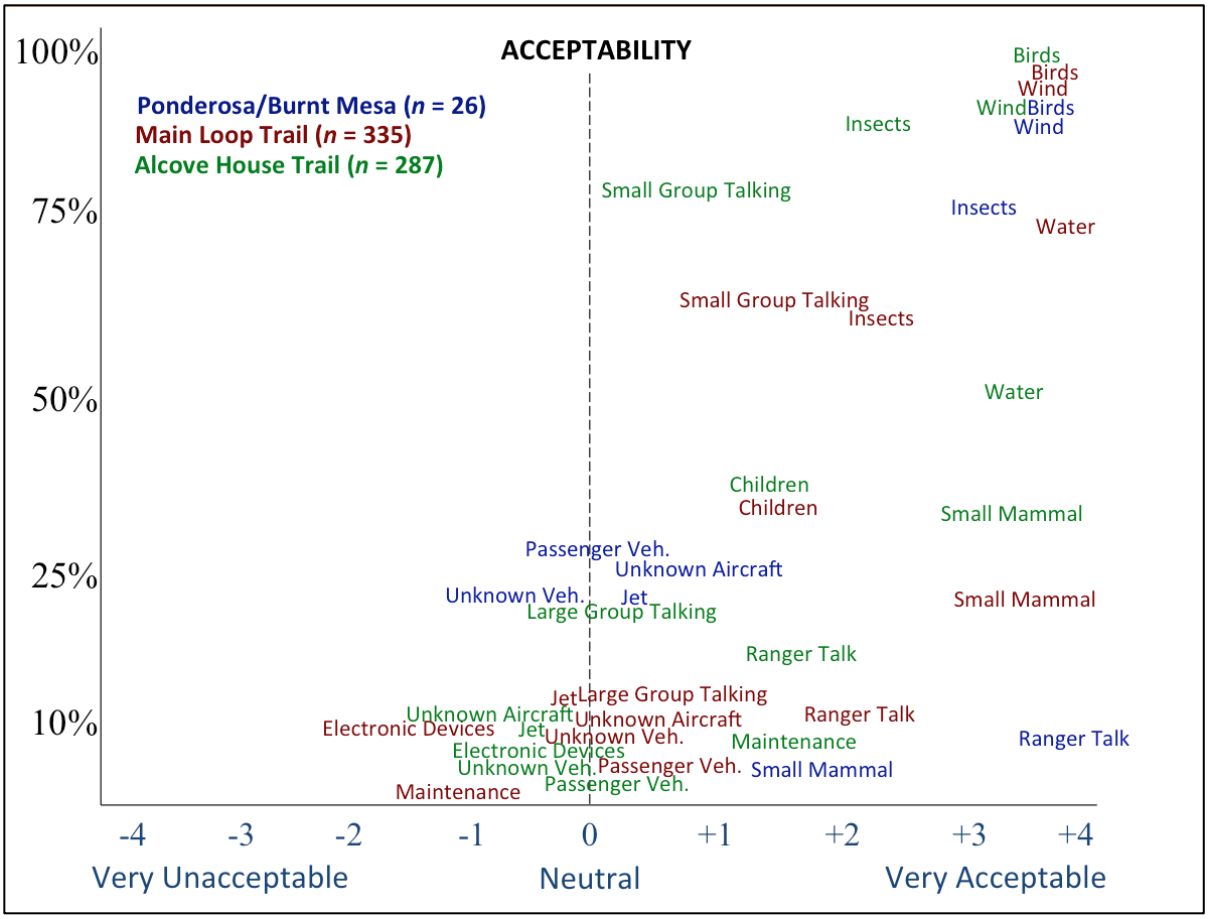

Figure 0.42 Plotted sounds heard and acceptability across all sampling locations

Note that the respondent who heard "ranger talk" at the wilderness site and evaluated it as "very annoying" was referring to the survey administrator, not a park ranger or volunteer.

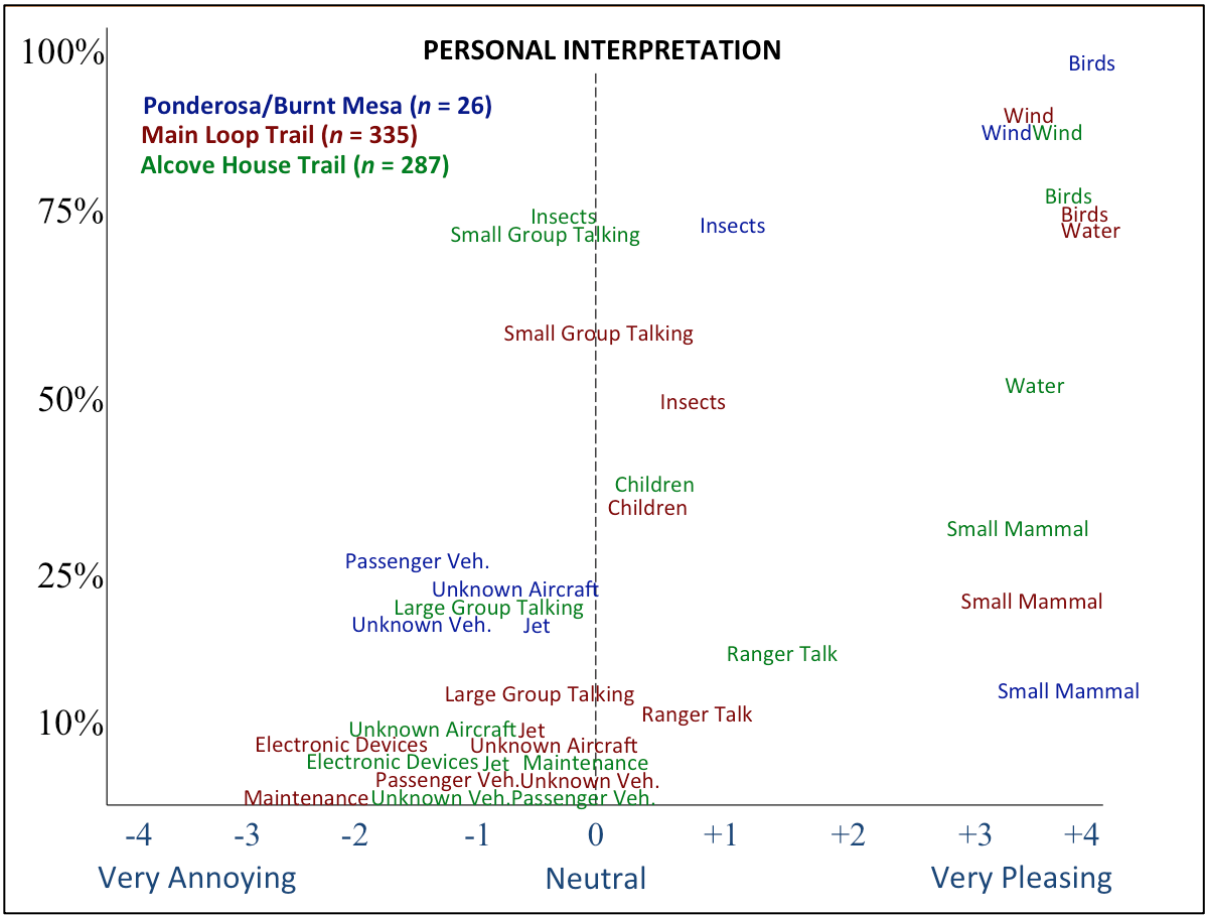

Figure 0.43. Plotted sounds heard and personal interpretation across all sampling locations

Note that the respondent who heard "ranger talk" at the wilderness site and evaluated it as "very annoying" was referring to the survey administrator, not a park ranger or volunteer.

Integration of Sounds Heard with NSNSD Acoustical Monitoring Data

The NSNSD conducted acoustical monitoring at four sites in Bandelier National Monument during February and June, 2012. In addition to collecting various soundscape metrics like percent time above, exceedence levels, and one-third octave band plots, the NSNSD also performed attended listening sessions, in which trained observers note all sounds – natural and anthropogenic – that are audible from a specific site during a fixed time interval. In this case, four 1-hour listening sessions were performed at four sites where acoustical monitoring stations were also set up. Although the individual listening sessions only represent a small snapshot in time and place, the results are informative in determining the balance between natural, cultural, and other anthropogenic sounds that may typically be audible to the Monument's visitors.

Managers at Bandelier National Monument were interested in comparing the results from the visitor surveys reported here with the previous acoustical monitoring study conducted by the NSNSD in 2012. It should be noted that these two studies are not directly comparable, as different observers and metrics were utilized over different study periods and locations in the Monument. We are not attempting to look for changes over time in soundscape conditions. However, the comparison allows

for a cursory look at how well the general findings from the two studies align, in terms of the prevalence of certain sounds in different areas of the Monument.

For the purposes of this report, the summer attended listening sessions from two of the four NSNSD sites were compared to the results from this study to determine how closely the audibility data aligned between NSNSD trained observers and the respondents in this listening study. The NSNSD summer attended listening data were collected in June 2012, during mid-day hours. The sessions occurred at approximately the same time of year and day as the present listening study (though one year earlier). Two of the NSNSD sites (BAND001 and BAND002) were located in similar areas as our sampling locations. Thus, general comparisons between the audibility measures from the two studies would appear to be justified.

Table 4.2.1. compares the audibility results for various natural and anthropogenic sound sources between the NSNSD attended listening sessions and the present visitor listening study. Both studies took place near the Visitor Center and Main Loop Trail. Results indicate that the 2013 visitor survey participants heard fewer mechanical sounds and more natural sounds than the 2012 NSNSD trained observers. For example, 14% of survey respondents on the Main Loop Trail in 2013 reported hearing jets, while jets were audible for 30% of the time during the NSNSD attended listening sessions in 2012. Similarly, 31% of survey respondents reported hearing vehicles in 2013, while vehicles were audible 69% of the time to the NSNSD observers in 2012. Grounds care/park maintenance activities were heard by only 2% of our Main Loop Trail respondents in 2013, while NSNSD observers heard those sounds 12% of the time near the Visitor Center in 2012.

Table 0.101. Comparison between CSU listening survey and NSNSD attended listening sessions near Bandelier Visitor Center.

	% Time Audible	*% Visitors Heard*
Source	***NSNSD***	***CSU (Main Loop Trail)***
Jet	30	14
Propeller	3	3
Vehicle	69	31
Grounds care	12	2
People	87	79
People, voices	43	79
Wind	50	93
Water	50	76
Mammal	8	31
Bird	100	95
Insect	11	63

By contrast, 93% of listening survey respondents heard the sound of wind in 2013 (compared to 50% time audible during the NSNSD attended listening sessions in 2012), 76% of survey respondents heard water in 2013 (compared to 50% time audible during the NSNSD study in 2012), 63% of respondents heard the sounds of insects in 2013 (compared to 11% time audible during the NSNSD study in 2012), and 31% of survey respondents reported hearing mammals in 2013 (compared to 8% time audible during the NSNSD study in 2012). The audibility percentages were very similar

between the two studies with respect to the sounds of propeller planes (3% in both), people (79% in the visitor listening study; 87% in the attended listening sessions in 2012), and birds (95% in the visitor listening study; 100% in the attended listening sessions in 2012). Note that these percentages represent different metrics for each study – *percentage of visitors* that heard the sound in the 2013 visitor surveys and *percent time audible* of the sound in the 2012 NSNSD attended listening study.

The NSNSD also conducted an audibility analysis of anthropogenic noise events near the Monument's visitor center. Acoustical monitoring was performed over eight days during summer and eight days during winter. Acoustical monitoring includes sound pressure level measurements, digital audio recordings, and collection of meteorological data using sophisticated recording equipment. Acoustical data collection is continuous during the monitoring period and does not require a field technician to be present (in contrast to the attended listening sessions reported above). The summer results, which are most directly relevant to the findings from this listening study, showed that aircraft were most frequently audible during the 8:00 AM hour – for 26% of the time. Between the hours of 9:00 AM and 5:00 PM, aircraft audibility ranged from 13-22% of the time. Vehicles were audible for 40% of the time during the 1:00 PM hour, ranging from 28-40% between the hours of 9:00 AM and 5:00 PM. Other visitors were audible 71% of the time during both the 11:00 AM and 12:00 PM hours. Between 9:00 AM and 5:00 PM, people were audible 43-71% of the time near the Bandelier visitor center.

Table 4.2.2 compares the audibility results for various natural and anthropogenic sound sources between the NSNSD attended listening sessions and the present visitor listening study. Both studies took place in roughly similar areas of the Bandelier backcountry. The NSNSD data were obtained from the vicinity of the Cerro elk exclosure, while the visitor listening study data were obtained from the Ponderosa Campground area and the Burnt Mesa Trail. Results indicate that the 2013 visitor survey participants heard similar sounds as the 2012 NSNSD trained observers in the Bandelier National Monument backcountry. For example, 23% of visitors reported hearing jets in the backcountry in 2013, while jets were audible 18% of the time during the NSNSD attended listening sessions in 2012. The sound of wind was detected by 89% of survey respondents in 2013 and audible 86% of the time to the NSNSD observers in 2012. And 92% of visitors reported hearing birds in 2013, while birds were audible 100% of the time during the attended listening sessions in 2012. Survey respondents on the Burnt Mesa Trail and near the Ponderosa Campground in 2013 were somewhat more likely to hear the sounds of propeller planes (12% of visitors compared to 1% time audible during the NSNSD attended listening sessions in 2012), vehicles (62% of visitors compared to 47% time audible from the NSNSD in 2012), motorcycles (15% of visitors compared to 1% time audible from the NSNSD in 2012), and insects (77% of visitors compared to 53% time audible from the NSNSD in 2012). Note again that these percentages represent different metrics for each study – *percentage of visitors* that heard the sound in the 2013 visitor surveys and *percent time audible* of the sound in the 2012 NSNSD attended listening study.

Table 0.102. Comparison between CSU listening survey and NSNSD attended listening sessions in Bandelier backcountry.

	% Time Audible	*% Visitors Heard*
Source	***NSNSD***	***CSU (Ponderosa Campground/ Burnt Mesa Trail)***
Jet	18	23
Propeller	1	12
Vehicle	47	62
Motorcycle	1	15
Grounds care	0	0
People	1	4
People, voices	1	4
Wind	86	89
Water	0	0
Mammal	0	4
Bird	100	92
Insect	53	77

The NSNSD also conducted an audibility analysis of anthropogenic noise events in the Bandelier National Monument backcountry in a comparable location to the wilderness sites reported in this listening study. Acoustical monitoring was performed over eight days during summer and eight days during winter. The summer results, which are most directly relevant to this study, showed that aircraft were most frequently audible during the 8:00 AM hour – for 26% of the time. Between the hours of 9:00 AM and 5:00 PM, aircraft audibility ranged from 10-25% of the time. Vehicles were audible for 69% of the time during the 7:00 AM hour, ranging from 43-58% between the hours of 9:00 AM and 5:00 PM. Other visitors were audible at most 2% of the time during the 1:00 PM hour. Between 9:00 AM and 5:00 PM, people were only audible 0-2% of the time at the backcountry location.

Comparative Motivations Across All Sampling Locations

Across all sampling locations, respondents' top reported motivations for visiting the Monument (based on a 5-point scale ranging from 1 = "Not Important at All" to 5 = "Extremely Important") (Table 3.2.5.) were appreciating the scenic beauty (M = 4.57; SD = 0.66), appreciating the archaeological and cultural sites (M = 4.52; SD = 0.76), experiencing a sense of connection with nature (M = 4.17; SD = 0.98), experiencing the sounds of nature (M = 4.07; SD = 0.98), and spending time with family and friends (M = 3.95; SD = 1.19). The least important motivations for visiting the Monument were experiencing cultural sounds (M = 2.65; SD = 1.43) and experiencing Bandelier National Monument in an air-tour overflight (M = 1.50; SD = 1.10).

Respondents also compared their actual experiences in the Monument to their expectations for their visit (based on a 5-point scale ranging from 1, A Lot Less than Expected to 5, A Lot More than Expected) (Table 3.2.6.). On average, across all sampling locations respondents indicated that they had more opportunities to experience the sounds of nature than they expected (M = 3.30; SD = 0.72). With regard to hearing aircraft, on average respondents indicated hearing less than expected (M = 2.44; SD = 1.10), although the majority (59%) indicated having no expectation for hearing aircraft

while in Bandelier. Visitors reported hearing vehicles (*M* = 2.23; *SD* = 1.02), and other visitors (*M* = 2.57; *SD* = 0.87) less frequently than expected. Respondents also reported seeing fewer people while hiking than expected (*M* = 2.43; *SD* = 0.84). With regard to viewing wildlife, respondents indicated having slightly less opportunities for viewing than expected (*M* = 2.89; *SD* = 0.85). Finally, visitors indicated experiencing cultural sounds less than expected (*M* = 2.48; *SD* = 0.99). However, the majority of respondents (52%) indicated having no expectation for hearing cultural sounds while in Bandelier.

Table 4.3.1 provides comparative respondent motivations regarding natural and cultural sound dimensions between the sampling locations. Statistical comparisons were not merited given the extremely small, yet representative sample of wilderness visitors at the Ponderosa Campground and Burnt Mesa Trail. However, percentage breakdowns offer insight regarding how motivations differ between respondents at the three sites. With regard to experiencing solitude, those respondents at the Ponderosa Campground and Burnt Mesa Trail indicated that this was slightly more important than those sampled at the two canyon locations. Although, experiencing solitude was important to all respondents. Experiencing the sounds of nature was also extremely important to all respondents, but slightly more so for the wilderness respondents at the Ponderosa Campground and Burnt Mesa Trail. Experiencing cultural sounds was of importance for approximately 50% of respondents at the Main Loop and Alcove House Trails, but not at all important for over 80% of wilderness respondents. Experiencing a sense of connection with nature was important for all respondents, but of most importance for those respondents on the Alcove House Trail. Experiencing peace and quiet was important for all respondents, but a slightly larger percentage of wilderness visitors indicated that it was extremely important. Finally, over 90% of respondents at the Main Loop and Alcove House Trails indicated that appreciating the archeological and cultural sites found at the Monument were extremely important. However, less than half of the respondents at the Ponderosa Campground and Burnt Mesa Trail indicated that this was important reason for their visit.

Table 0.103. Comparative evaluation of motivations for visiting Bandelier.

			Percentage				
Motivations[2]	***Sample Locations****	***N***	***Not Important At All***	***Moderately Important***	***Extremely Important***	***Mean[1]***	***Std. Dev.***
Experience solitude	PC/BM	26	19.2	11.5	69.2	3.69	1.41
	MLT	330	24.8	29.4	45.8	3.31	1.28
	AHT	286	24.5	24.8	50.7	3.42	1.29
Experience the sounds of nature	PC/BM	25	0	24.0	76.0	4.16	0.80
	MLT	331	5.7	19.3	74.9	4.09	0.94
	AHT	283	8.8	19.4	71.7	4.04	1.04
Experience cultural sounds	PC/BM	24	83.3	4.2	12.5	1.75	1.26
	MLT	322	45.7	21.7	32.6	2.74	1.44
	AHT	275	49.8	21.8	28.4	2.64	1.41
Experience a sense of connection with nature	PC/BM	26	7.7	26.9	65.4	4.00	1.02
	MLT	332	7.5	15.7	76.8	4.14	1.02

			Percentage				
Motivations[2]	***Sample Locations****	***N***	***Not Important At All***	***Moderately Important***	***Extremely Important***	***Mean***[1]	***Std. Dev.***
	AHT	287	7.0	12.9	80.1	4.23	0.94
Experience peace and quiet	PC/BM	25	16.0	8.0	76.0	3.84	1.21
	MLT	330	13.6	25.8	60.6	3.72	1.12
	AHT	286	11.9	19.2	68.9	3.92	1.06
Appreciate the archaeological and cultural sites	PC/BM	25	24.0	28.0	48.0	3.44	1.19
	MLT	330	1.8	7.9	90.3	4.52	0.73
	AHT	283	1.4	4.2	94.3	4.62	0.65

[1]Degree of importance based on 5-point scale (1 = Not Important at All to 5 = Extremely Important); original scale was collapsed to a 3-point scale for reporting purposes.

[2]Respondents may interpret the meaning of these motivational statements differently. They were not provided additional context for these items during survey administration.

* PC/BM – Ponderosa Campground and Burnt Mesa Trail Respondents; MLT – Main Loop Trail Respondents; AHT – Alcove House Trail Respondents

Respondents at the Ponderosa Campground and Burnt Mesa Trail indicated that they had slightly more opportunities to experience the sounds of nature during their visit than they expected. They heard vehicles and other visitors less frequently during their visit than they expected, and they reported hearing aircraft about as frequently as they expected. Respondents on the Main Loop Trail also indicated that they had more opportunities to experience the sounds of nature during their visit than they expected. Similarly, these respondents indicated that they heard aircraft, vehicles, and other visitors less frequently during their visit than they expected. Alcove House Trail respondents also suggested that they had more opportunities to experience the sounds of nature during their visit than they expected, and ultimately heard aircraft, vehicles, and other visitors less frequently during their visit than they expected.

Monument visitors want to experience solitude, natural sounds, peace and quiet, and a sense of connection with nature. These data suggest that they are currently having experiences in the Monument that exceed these expectations. Experiencing cultural sounds is of importance for approximately half of the respondents surveyed in the canyon, but not for those respondents on the Ponderosa Campground and Burnt Mesa Trail. Experiencing archeological and cultural sites is extremely important for Canyon visitors, but much less important for Ponderosa Campground and Burnt Mesa Trail visitors.

Informing Soundscape Management

Soundscape Interpretation

The largest percentage of visitors (48%) reported that their primary activity in Bandelier National Monument was archaeological or cultural interests, although this was not the case with respondents at the Ponderosa Campground and Burnt Mesa Trail. This finding underscores the importance of interpreting the cultural resources of the Monument for visitors in the Canyon, including the Monument's soundscape. A large percentage of respondents indicated that they had fewer opportunities to experience cultural sounds during their visit than they expected. However, more than half of the respondents reported having no expectation for cultural sounds in the Monument. This lack of expectations (and presumably knowledge) may represent an opportunity to focus interpretive planning to influence visitor experiences and expectations around management objectives.

Overall, respondents believed that cultural sounds would greatly enhance the experiential and educational aspects of their visit to the Monument (based on 5-point scale, 1 = Not at All to 5 = Very Much). Responses suggested that cultural sounds would enhance visitor experiences (M = 3.61; SD = 1.36), understanding of traditional Pueblo cultures (M = 3.78; SD = 1.27), understanding of Bandelier's significance (M = 3.65; SD = 1.38), understanding of Bandelier's mission (M = 3.54; SD = 1.40), and appreciation of Bandelier (M = 3.63; SD = 1.40) (Table 3.1.4.).

Table 4.4.1 provides a comparative view of the degree to which cultural sounds would improve visitor experiences and understanding of the Monument between all of the sampling locations. The majority of respondents on the Main Loop and Alcove House Trails indicated that cultural sounds would enhance their experience, increase their understanding of traditional Pueblo cultures, increase their understanding of the Monument's significance and mission, and increase their appreciation of the park unit. However, a substantially smaller percentage of respondents at the Ponderosa Campground and Burnt Mesa Trail indicated that cultural sounds would improve their experiences or understanding of the Monument. These results suggest that the introduction of cultural sounds may be appropriate at specific locations within the Canyon. However wilderness areas of the Monument would not likely serve as good locations for this type of interpretive activity.

Table 0.104. Comparative evaluation of the degree to which cultural sounds would improve visitor experiences and understanding.

			Percentage				
Experience or Understanding	***Sample Locations****	***N***	***Not At All***	***Somewhat***	***Very Much[1]***	***Mean[1]***	***Std. Dev.***
Enhance your visitor experience	PC/BM	26	56.0	7.7	34.6	2.62	1.53
	MLT	329	17.3	18.2	64.5	3.82	1.25
	AHT	286	28.4	19.1	52.5	3.46	1.41
Increase your understanding of traditional Pueblo cultures	PC/BM	26	57.7	7.7	34.6	2.85	1.49
	MLT	331	16.7	17.3	66.0	3.92	1.17
	AHT	286	24.0	14.5	61.5	3.71	1.33
Increase your understanding of Bandelier's significance	PC/BM	26	50.0	16.7	33.3	2.69	1.57
	MLT	331	18.3	17.3	64.4	3.77	1.28
	AHT	286	24.4	17.2	58.4	3.59	1.43
Increase your understanding of Bandelier's mission	PC/BM	26	60.0	12.0	28.0	2.54	1.63
	MLT	331	20.1	19.2	60.7	3.68	1.31
	AHT	285	26.1	19.9	54.0	3.47	1.44
Increase your appreciation of Bandelier	PC/BM	26	50.0	20.8	29.2	2.65	1.55
	MLT	329	20.9	14.8	64.3	3.81	1.31
	AHT	286	25.4	17.2	57.3	3.51	1.45

[1]Impact based on 5-point scale (1 = Not at All to 5 = Very Much); original scale was collapsed to a 3-point scale for reporting purposes.

* PC/BM – Ponderosa Campground and Burnt Mesa Trail Respondents; MLT – Main Loop Trail Respondents; AHT – Alcove House Trail Respondents

The results from the survey questions evaluating potential management actions in the Monument may be informative for planning of future soundscape management and interpretation activities. Across sites, respondents were most supportive of potential management actions that would increase their opportunity to experience traditional cultural sounds (*M* = 2.25; *SD* = 2.31) and least supportive of having rangers quieting visitors along the Monument's trails (*M* = 0.24; *SD* = 2.77) (based upon 9-point scale, -4 = Very Unacceptable to +4 = Very Acceptable collapsed in Table 4.2.4). Survey respondents found management actions that employed signage intended to educate visitors about soundscape management (*M* = 1.50; *SD* = 2.45) and cultural sounds (*M* = 2.22; *SD* = 2.60) to be acceptable, on average.

Table 4.4.2 provides comparative results of the potential soundscape-focused management actions between the sampling locations. Should noise in the Canyon, particularly noise from other visitors, reach levels that mask opportunities for experiencing the sounds of nature, Monument management may consider implementing signage that informs visitors regarding the concerns with human-caused

noise. The majority of respondents at the Main Loop and Alcove Trails indicated that this indirect management action would be acceptable. Although, respondents at the wilderness sites were less accepting of signage such as this. Signage informing visitors that they may hear traditional cultural sounds while at the Monument was very acceptable by the majority of respondents at all sampling locations. Other NPS units have found that signage could improve visitor experiences by decreasing visitor-generated noise (Pilcher, Newman, & Manning, 2009; Stack, Newman, Manning, & Fristrup, 2011). It would be useful for future research to determine what types of messages would be the most effective in mitigating visitor noise.

Potentially experiencing traditional cultural sounds such as drumming, singing, and/or chanting was very acceptable for respondents at the Main Loop and Alcove House Trails, and acceptable for those at the Ponderosa Campground and Burnt Mesa Trail. However, approximately 31% of Ponderosa Campground and Burnt Mesa Trail respondents indicated that experiencing cultural sounds would be unacceptable. Finally, when asked about the direct management action – potentially experiencing park rangers quieting visitors – 64% of respondents at the Ponderosa Campground and Burnt Mesa Trail indicated that this would be unacceptable. Slightly more respondents on the Main Loop and Alcove House Trails found this to be acceptable, but generally, this type of management action was perceived to be unacceptable by a substantial amount of respondents. These findings align with a large body of previous research suggesting that indirect management is preferred over direct management (Duncan & Martin, 2002; Hammitt & Cole, 1998; Hendee & Dawson, 2002; Lucas, 1983; Manning, 2003). However, these responses could change should the Monument experience extreme increases in noise.

Table 0.105. Comparative evaluations of potential management actions.

			Percentage				
Potential Management Action	***Sample Locations****	***N***	***Unacceptable***	***Neutral***	***Acceptable*[1]**	***Mean*[1]**	***Std. Dev.***
See: Sign(s) informing you about the park's concerns with human-caused noise	PC/BM	26	34.6	26.9	38.5	0.23	2.58
	MLT	329	18.2	17.9	63.8	1.57	2.54
	AHT	286	12.2	25.5	62.2	1.53	2.30
See: Sign(s) informing you that you may hear traditional cultural sounds (e.g. drumming, singing, chanting).	PC/BM	26	26.9	11.5	61.5	0.77	2.78
	MLT	331	9.1	13.0	77.9	2.31	2.25
	AHT	285	9.1	16.5	74.4	2.25	2.19
Experience: Traditional cultural sounds (e.g. drumming, singing, chanting).	PC/BM	26	30.8	11.5	57.7	0.50	2.73
	MLT	330	8.8	10.0	81.2	2.48	2.14
	AHT	285	13.3	12.3	74.4	2.21	2.38
Experience: Park rangers stationed along the trail quieting visitors.	PC/BM	25	64.0	12.0	24.0	-1.28	2.49
	MLT	330	36.4	16.7	47.0	0.57	2.79
	AHT	286	43.7	18.2	38.1	0.00	2.70

[1] Acceptability based on 9-point scale (-4 = Very Unacceptable to +4 = Very Acceptable); original scale was collapsed to a 3-point scale for reporting purposes.

* PC/BM – Ponderosa and Burnt Mesa Trails Respondents; MLT – Main Loop Trail Respondents; AHT – Alcove House Trail Respondents

Notes from informal conversations with respondents following completion of their surveys were recorded on survey logs. A common attitude shared by many visitors was that the introduction of traditional cultural sounds would be acceptable only in the form of live performances or demonstrations. Respondents noted that if interpreters introduced live performances or demonstrations, they should be “authentic” and “accurate”. The majority of visitors who expressed an opinion held unfavorable views towards the idea of recordings of cultural sounds broadcast within the Monument, such as in the caveates or on the trails. For example, respondents indicated that recordings or “piped-in” sounds in these areas would be “hokey” and “cheesy”. Several visitors noted hearing and enjoying the culturally-focused sounds set off by a motion detector while in the visitor center interpretive display area. These respondents indicated that the visitor center was an appropriate location for soundscape-focused interpretation, including recorded cultural sounds. Only a few respondents suggested that recorded cultural sounds would be acceptable in the trail areas, and one respondent recommended that the park supply interested visitors with headphone recordings as an option for hearing these sounds, while not disturbing other visitors not seeking such an experience.

Air Tour Management

Several questions in the survey investigated visitor evaluations of aircraft noise and may be useful for future air tour management-focused planning efforts. However, it should be noted that the results related to aircraft reported below may be slightly skewed due to increased aviation activity in the area from a nearby wildfire during the sampling period.

Across all sites, 12% of respondents heard unknown aircraft during the three-minute listening session, 12% heard a jet, 4% heard a helicopter, and 3% heard a propeller plane (Table 3.1.1.). All types of aircraft were evaluated relatively neutrally, with propeller planes being the most acceptable type (*M* = 0.20; *SD* = 2.02; 35% unacceptable) and helicopter being the least acceptable (*M* = -0.09; *SD* = 2.39; 44% unacceptable), based on a 9-point scale, -4 Very Unacceptable to 4 Very Acceptable. All types of aircraft were judged to be annoying, on average (Table 3.1.2.). Helicopter was rated as the most annoying aircraft sound (*M* = -0.92; *SD* = 1.73), while the other types of aircraft were evaluated as slightly less annoying than helicopters (though still annoying overall), based on a 9-point scale, -4 Very Annoying to 4 Very Pleasing. For those who heard aircraft during their listening session, 70% rated propeller plane sounds as very annoying (20% very pleasing), 58% rated helicopter sounds as very annoying (8% very pleasing), 45% rated jet sounds as very annoying (14% very pleasing), and 39% rated unknown aircraft sounds as very annoying (9% very pleasing).

The least important motivation for visiting the Monument of those evaluated in this study was experiencing Bandelier National Monument in an air-tour overflight (*M* = 1.50; *SD* = 1.10), with 85% of respondents reporting that this activity was not important at all to their visit (Table 3.1.5.), based on a 5-point scale, 1 = Not at All to 5 = Very Much. With regard to expectations for hearing aircraft during their visit, on average respondents indicated hearing less than expected (*M* = 2.44; *SD* = 1.10), although the majority (59%) indicated having no expectation for hearing aircraft while in Bandelier National Monument (Table 3.1.6.). Only 1% (*n* = 7) of respondents stated that they had previously taken an air tour over Bandelier, while 11% reported taking an air tour over another park (Tables 3.1.17. and 3.1.18.).

Evaluations of aircraft noise yielded some potentially interesting differences between sampling sites. Wilderness site respondents reported hearing aircraft about as much as they expected (*M* = 2.94; *SD* = 0.76), while Main Loop Trail (*M* = 2.59; *SD* = 1.14) and Alcove House Trail (*M* = 2.16; *SD* = 1.04) respondents reported hearing aircraft somewhat less than they expected (Tables 3.2.6, 3.3.6, and 3.4.6), based on a 5-point scale, ranging from 1 – A Lot Less than Expected, to 3 – About as Expected, to 5 – A Lot More than Expected. Interestingly, 56% of Main Loop Trail respondents and 63% of Alcove House Trail respondents reported having no expectation for hearing aircraft while in the monument, but only 31% of wilderness site respondents did not have an expectation.

Wilderness site respondents were also more likely to find the sounds of aircraft to be slightly acceptable than respondents at the Canyon sampling sites. Wilderness site respondents rated the sounds of unknown aircraft (*M* = 0.86; *SD* = 2.19), jets (*M* = 0.33; *SD* = 1.86), and propeller planes (*M* = 0.33; *SD* = 2.52) as slightly more acceptable than respondents on the Main Loop Trail and Alcove House Trail (based on 9-point scale, -4 Very Unacceptable to 4 Very Acceptable. Main

Loop Trail respondents were more neutral in their ratings of unknown aircraft (*M* = 0.18; *SD* = 2.19), jets (*M* = -0.09; *SD* = 2.25), and propeller planes (*M* = 0.22; *SD* = 1.99). A similar pattern emerged for respondents on the Alcove House Trail, who also rated the sounds of unknown aircraft (*M* = -0.21; *SD* = 1.95), jets (*M* = -0.04; *SD* = 1.82), propeller planes (*M* = 0.13; *SD* = 2.17) as slightly less acceptable than the respondents at the wilderness sites. One notable exception to this pattern of findings occurred with helicopter noise, which was rated as unacceptable by respondents on the Main Loop Trail (*M* = -1.00; *SD* = 2.14) but acceptable by Alcove House Trail respondents (*M* = 1.43; *SD* = 1.99). Only one respondent heard helicopter noise at the wilderness sites, so it is not possible to compare visitor evaluations of acceptability of this sound source between the Frijoles Canyon and wilderness sites.

Implications for Future Research

The results of this research have provided greater understanding regarding the sounds frequently heard at the Monument, visitor opinions regarding those sounds (i.e., whether these sounds are perceived as noise), visitor motivations and expectations, and attitudes toward cultural sounds and potential management actions. In particular these findings can be used to inform planning and soundscape management efforts by identifying potential social indicators of quality and visitor-based desired conditions for the soundscape in Bandelier National Monument. Future research may evaluate visitor thresholds, or standards regarding the amount of noise that is acceptable at the Monument. Should both social soundscape indicators and standards be developed, continual monitoring could be implemented at the Monument. If standards are exceeded, managers can implement adaptive management actions to mitigate noise, preserve soundscape resources and visitor experiences. If this were to occur, this research suggests that signage may be a viable method of indirect management. It would be pertinent for any future soundscape-related research to address multiple sites, to capture differing visitor motivations and expectations. Because cultural sounds were thought to enhance visitor experiences and understanding of the Monument, future research addressing the best method of implementing these interpretive activities would be useful. It would also be useful to determine exactly which authentic cultural sound interpretive activities are preferred by visitors. This could be accomplished simultaneously with a study evaluating visitor thresholds for noise in the Monument. For example, various cultural sounds could be played for visitors under the specific context of differing activities and locations within Bandelier National Monument.

This research also indicates that signage would be a useful method of notifying visitor that they may hear cultural sounds. Specific messages should be tested to determine what information can influence visitor attitudes, while aligning with management objectives and maximizing visitor experiences. Other NPS-based research suggests that pairing laboratory and field study methods have been useful in determining soundscape-focused messages that accomplish these goals (Taff et al., 2013). This research also suggested that visitor motivations varied slightly, depending upon the sampling location. Therefore, future research should be conducted at other locations within the Monument. For example, Tsankawi may provide different results given the site's proximity to the roadway and distance from the Monument's Visitor Center and associated interpretive staff and materials.

Chapter 5: Conclusions

The findings from this study may be used to inform visitor preferences for desired conditions at the Monument. Taken together, the results suggest that most visitors are highly motivated to experience natural sounds during their visit, and this motivation is largely fulfilled by the conditions experienced in the Monument. Although the majority of visitors have negative opinions about the presence of mechanical and other modern anthropogenic sounds, the extent of these sound sources in the Monument appears to be at an acceptable level, currently. Nevertheless, an increase in the number of modern anthropogenic noise events (for example, in scenic air tour overflights) would likely have detrimental impacts on visitor experiences, as evidenced by the negative evaluations of the infrequent events that did occur during the study (as well as anecdotal discussions with survey respondents). Given this strong preference by visitors for a soundscape in Bandelier National Monument dominated by natural quiet and the sounds of nature, any intentional introduction of appropriate cultural sounds would need to be sensitively implemented, so as not to undermine the quality of the natural soundscape that is so highly valued by visitors. Thus, according to this research, desired conditions for the soundscape of Bandelier National Monument would be achieved by maintaining the current balance between natural and modern anthropogenic sounds. Additionally, potentially introducing traditional cultural sounds beyond the visitor center may also positively contribute to the Monument's desired soundscape. If introduced, traditional cultural sounds should be authentic, historically-accurate, and not interfere with visitor opportunities to enjoy a quiet, solemn appreciation of the scenic beauty and archaeological resources of Bandelier National Monument.

Key Conclusions

Given the breadth of information captured through this study, the following describe the key conclusions resulting from this study:

- *Nearly all respondents at all sampling locations heard natural sounds and found these to be very acceptable and very pleasing. This suggests that these sounds should be protected from anthropogenic noise at the Monument. These findings should serve as baseline data regarding the current types and amounts of natural sounds that should be protected and therefore experienced at the Monument.*
- *Anthropogenic noise in the form of aircraft, vehicles, electronics and other visitor groups talking were heard by approximately one quarter of the respondents. These sounds were found to be less acceptable and very annoying by the respondents. These findings should serve as baseline data regarding the current types and amounts of anthropogenic sounds present at the Monument, and management should strive to decrease existing noise while minimizing the intrusion of future noise.*
- *Monument visitors want and expect to experience solitude, natural sounds, peace and quiet, and a sense of connection with nature. Under current conditions, visitors are having experiences in the Monument that exceed these expectations. Management should strive to continue providing these opportunities at all visitor use areas within the Monument.*
- *Experiencing cultural sounds is of importance for approximately half of the visitors that go to the Main Loop and Alcove House Trails, but not for those that visit the Ponderosa*

Campground and Burnt Mesa Trail.

- *Experiencing archeological and cultural sites is extremely important for canyon visitors, but much less important for wilderness visitors.*
- *Main Loop and Alcove House Trails indicated that cultural sounds would enhance their experience, increase their understanding of traditional Pueblo cultures, increase their understanding of the Monument's significance and mission, and increase their appreciation of the park unit suggesting that specific areas of the Canyon may be suitable for implementation of cultural sound-focused interpretive activities.*
- *Monument managers may consider signs informing visitors about concerns with visitor caused noise at Canyon areas, should noise levels increase to unacceptable levels. If noise levels become unacceptable, rangers quieting visitors would not be a preferred method of decreasing visitor noise. If Monument staff determine that implementation of cultural sounds is suitable in the Canyon areas, signage would likely be a very acceptable method of notifying visitors.*
- *Conversations following the completion of the surveys suggested that live performances or demonstrations would be preferred over recordings, should the Monument implement cultural sounds in the Canyon areas. Those that experienced the motion-detected cultural sound recordings in the visitor center indicated that only the visitor center would be appropriate for recorded sounds.*

- *With regard to air tour management, a relatively small percentage of respondents heard aircraft, and while it was on average rated neutrally with regard to acceptability, it was generally perceived as annoying. The least important motivation for visiting the Monument of those evaluated in this study was experiencing the Monument in an air-tour overflight, as the majority of respondents indicated that this activity was not important at all to their visit. Wilderness respondents had slightly more expectations for hearing aircraft and found these sounds to be slightly more acceptable than the respondents within the Canyon. If aircraft noise increases, messaging to visitors to inform their expectations for hearing aircraft may be a viable management option, although this would merit additional research.*

Chapter 6: References

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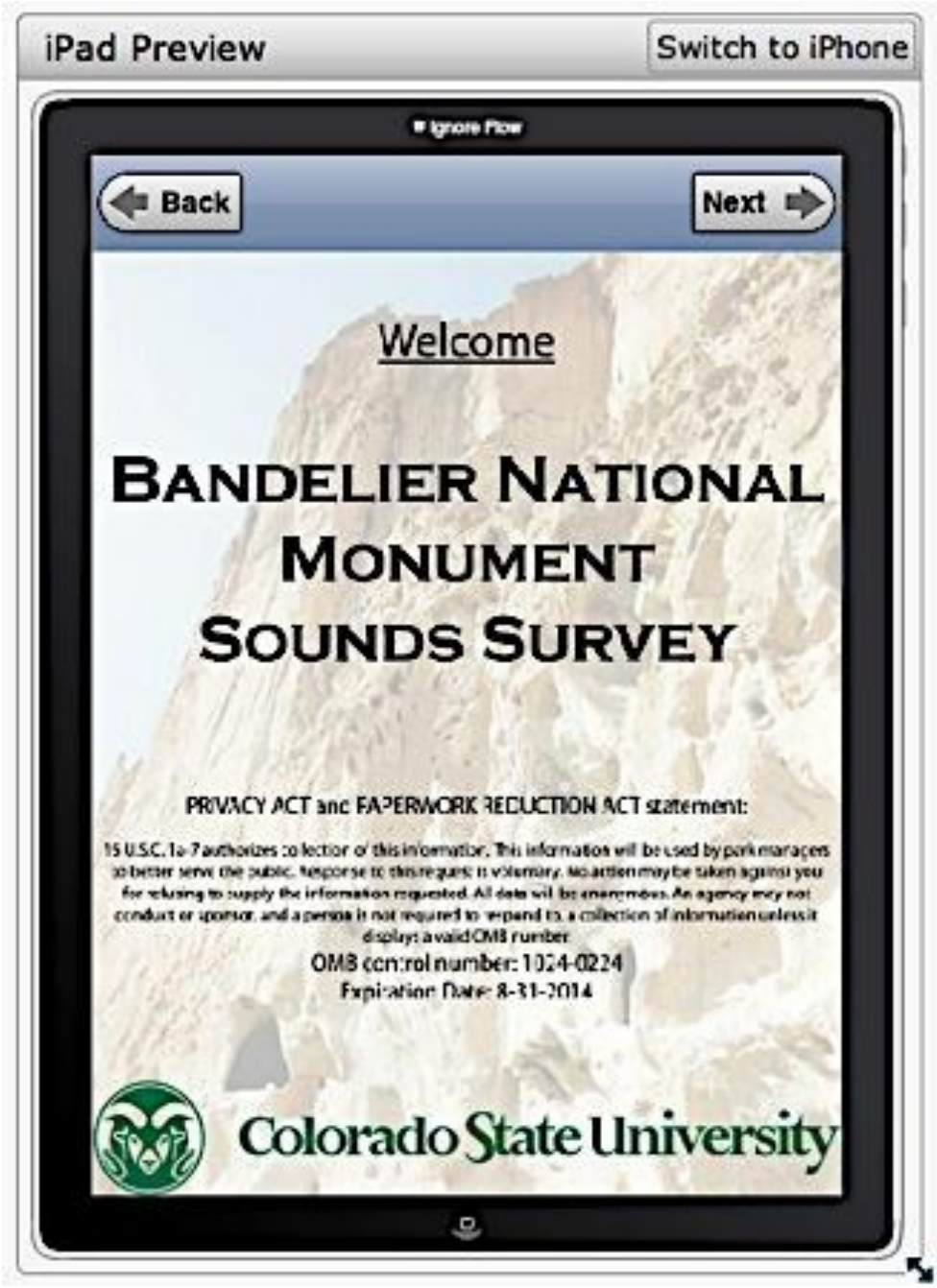
Appendix

iPad Listening Survey (Ponderosa Campground site example)

iPad Preview
Switch to iPhone
Ignore Flow
Back
Next
Survey Location
Ponderosa
Loop Trail
Alcove House
Colorado State University


iPad Preview
Switch to iPhone
Ignore Flow
Back
Next
Welcome
BANDELIER NATIONAL MONUMENT SOUNDS SURVEY
PRIVACY ACT and PAPERWORK REDUCTION ACT statement:
15 U.S.C. 1a-7 authorizes collection of this information. This information will be used by park managers to better serve the public. Response to this request is voluntary. No action may be taken against you for refusing to supply the information requested. All data will be anonymous. An agency may not conduct or sponsor, and a person is not required to respond to, a collection of information unless it displays a valid OMB number.
OMB control number: 1024-0224
Expiration Date: 8-31-2014
Colorado State University

iPad Preview
Switch to iPhone
Ignore Flow
Back
Pick 1
Next
Did you hear any natural sounds such as:
Wind - Running Water - Rain - Thunder - Small or Large Mammal - Birds - Insects?
Natural Sounds
Yes
No
Pick 1
Colorado State University

iPad Preview
Switch to iPhone
Ignore Flow
Back
Tap To Select
Next
Please select how acceptable hearing each sound was. If you did not hear that type of sound, select "Did not hear".
Wind
Running Water
Rain
Thunder
Small Mammal (e.g. Squirrel or Chipmunk)
Large Mammal (e.g. Deer or Coyote)
Bird Song/Chatter
Insects
Please mark your feeling/interpretation of these sounds. If you did not hear a sound, select "Did not hear".
Wind
Running Water
Rain
Thunder
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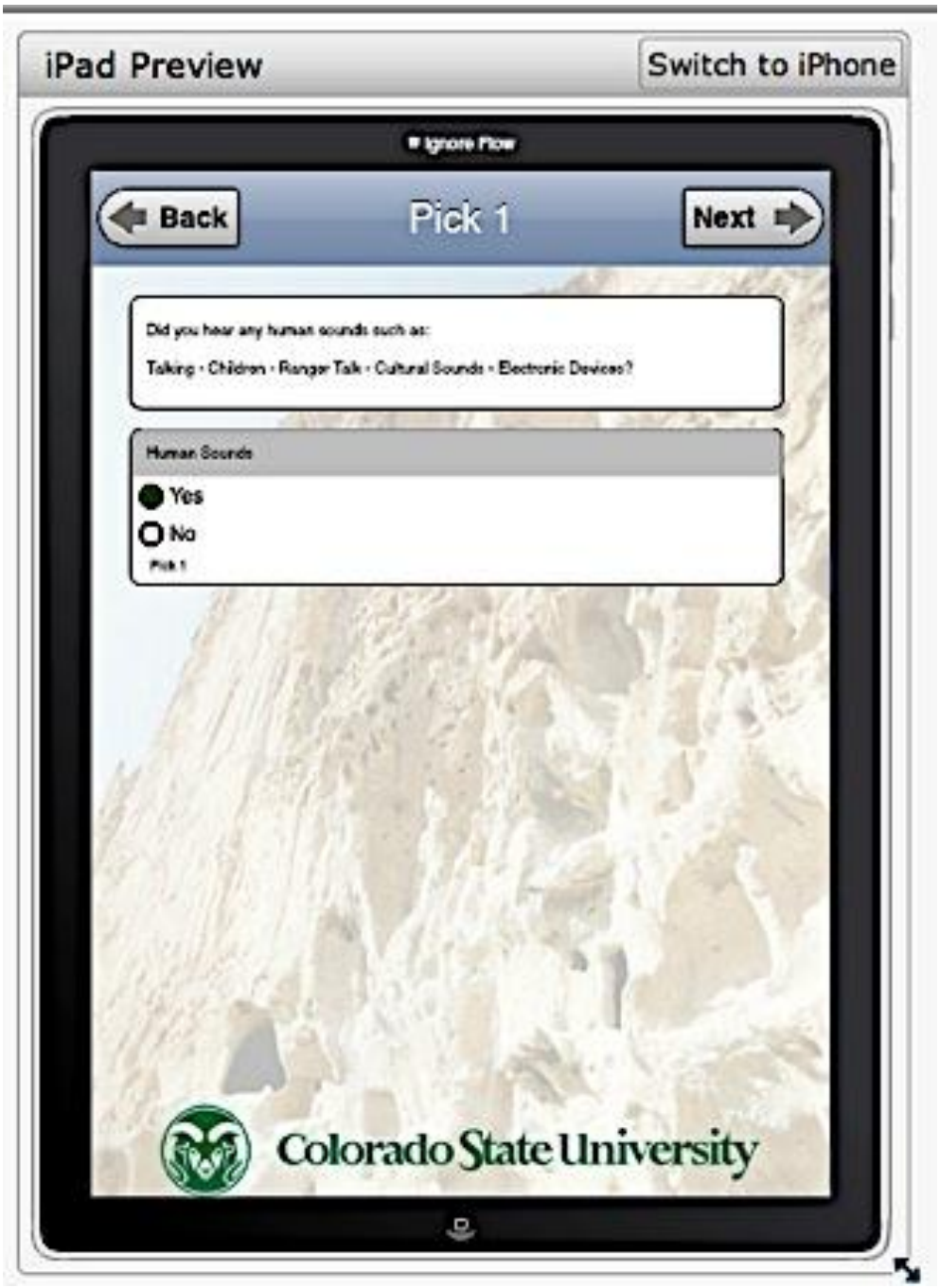
iPad Preview
Switch to iPhone
Ignore Flow
Back
Pick 1
Next
Did you hear any human sounds such as:
Talking · Children · Ranger Talk · Cultural Sounds · Electronic Devices?
Human Sounds
Yes
No
Pick 1
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Switch to iPhone
Ignore Flow
Back
Tap To Select
Next
Please select how acceptable hearing each sound was. If you did not hear that type of sound, select "Did not hear".
Small Group Talking
Large Group Talking
Children
Ranger Talk
Cultural Sounds (e.g. Drumming, Singing, Poetry, etc.)
Electronic Devices
Please mark your feeling/interpretation of each sound. If you did not hear a sound, select "Did not hear".
Small Group Talking
Large Group Talking
Children
Ranger Talk
Cultural Sounds (e.g. Drumming, Singing, Poetry, etc.)
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iPad Preview
Switch to iPhone
Ignore Flow
Back
Pick 1
Next
Did you hear any mechanical sounds such as:
Mechanical Noise • Aircraft • Shuttle Bus • Car • Motorcycle • Work Vehicle • Vehicle Horn • Park Maintenance • Explosion?
Mechanical Sounds
Yes
No
Pick 1
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Switch to iPhone
Ignore Flow
Back
Pick 1
Next
Did you hear any other sound not listed that you would like to note:
Yes
No
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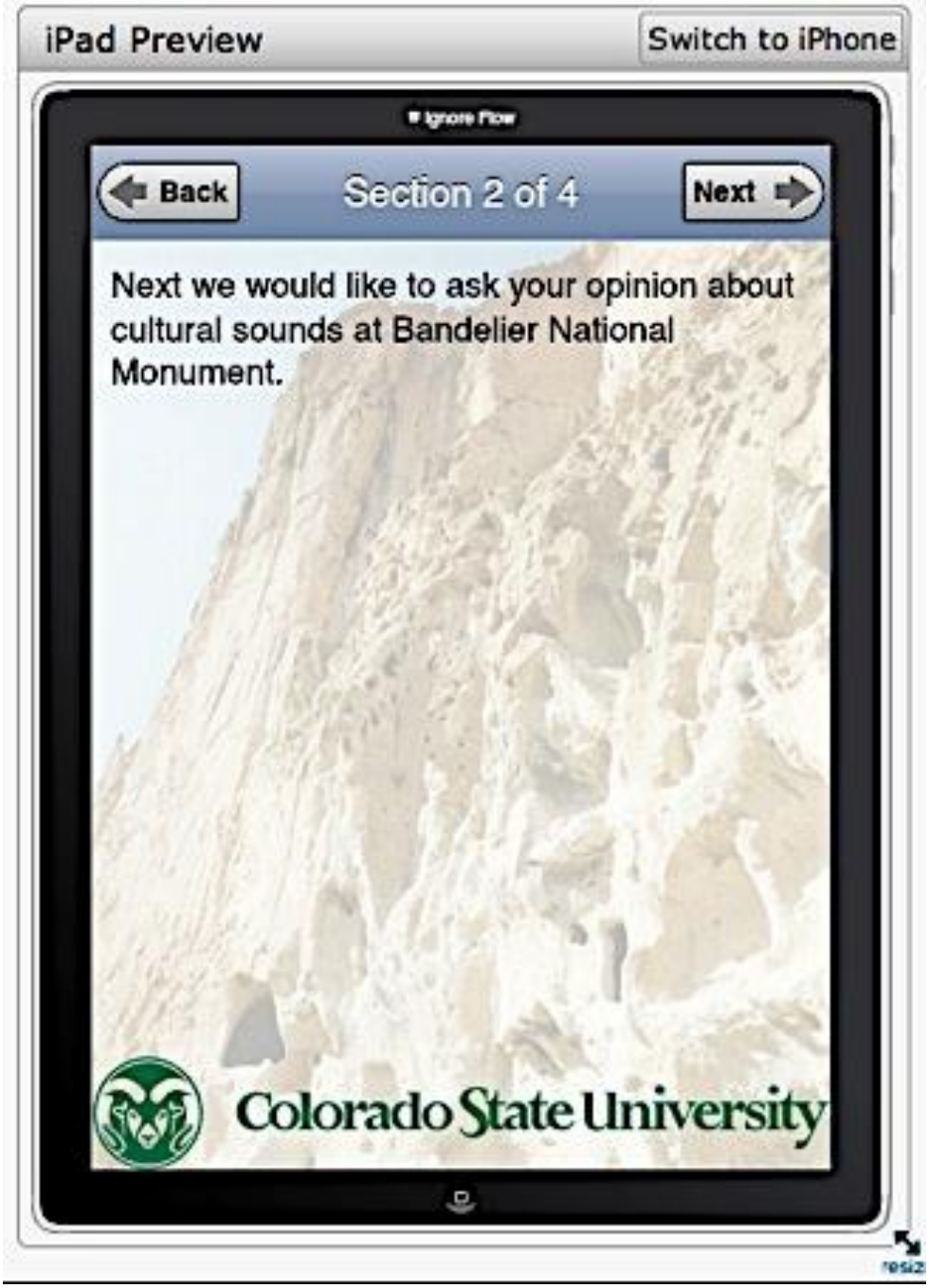
iPad Preview
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Ignore Flow
Back
Section 2 of 4
Next
Next we would like to ask your opinion about cultural sounds at Bandelier National Monument.
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iPad Preview
Switch to iPhone
Ignore Flow
Back
Tap To Select
Next
How acceptable would it be for you to see or experience the following during your visit:
See: Sign(s) informing you about the park's concerns with human-caused noise
See: Sign(s) informing you that you may hear traditional cultural sounds (e.g. drumming, singing, chanting).
Experience: Traditional cultural sounds (e.g. drumming, singing, chanting).
Experience: Park rangers stationed along the trail quieting visitors.
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iPad Preview
Switch to iPhone
Ignore Flow
Back
Tap To Select
Next
If you were to experience tradition cultural sounds (e.g. drumming, singing, chanting) during your visit, how much would it...
Not at all
Slightly
Somewhat
Moderately
Very Much
Enhance your visitor experience
Increase your understanding of traditional Pueblo cultures
Increase your understanding of Bandelier's significance
Increase your understanding of Bandelier's mission
Increase your appreciation of Bandelier
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iPad Preview
Switch to iPhone
Ignore Flow
Back
Section 3 of 4
Next
Next we would like to ask you some general questions about your visit to Bandelier National Monument.
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iPad Preview
Switch to iPhone
Ignore Flow
Back
Tap To Select
Next
How important was each of the following reasons for your visit?
Not at all
Slightly
Moderately
Very
Extremely
Appreciate the scenic beauty
Experience solitude
Spend time with family/friends
Get some exercise
Experience the sounds of nature
Experience cultural sounds
Experience a sense of connection with nature
Experience peace and quiet
Experience a sense of challenge
Appreciate the archaeological and cultural sites
Experience Bandelier in an air-tour overflight
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Switch to iPhone
Ignore Flow
Back
Tap To Select
Next
How do each of the following experiences compare to your expectations before visiting Bandelier?
I had no expectation
A lot less than expected
Less than expected
About as expected
More than expected
A lot more than expected
Number of people you saw while hiking
Amount of time you heard aircraft
Opportunity to view wildlife
Opportunity to experience sounds of nature
Amount of time you heard vehicles
Amount of time you heard other visitors
Opportunity to experience cultural sounds
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iPad Preview
Switch to iPhone
Ignore Flow
Back
Pick 1
Next
Is this your first visit to Bandelier?
Yes
No
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iPad Preview
Switch to iPhone
Ignore Flow
Back
Pick 1
Next
Approximately how long is your visit to Bandelier this time?
Today Only
2 - 3 Days
4 - 7 Days
More than 7 Days
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iPad Preview
Switch to iPhone
Ignore Flow
Back
Pick 1
Next
On this visit, what kind of personal group are you with (does not include large groups, such as school, church, scouts or tours)?
Alone
Friends
Family
Friends and Family
Pick 1
On this visit, how many people are in your personal group including yourself?
Just Myself
2 - 3
4 - 7
8 - 12
13 or More
Pick 1
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iPad Preview
Switch to iPhone
Ignore Flow
Back
Pick 1
Next
Were you and/or your personal group part of a larger group?
Yes
No
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iPad Preview
Switch to iPhone
Back
Pick 1
Next
Which of the following was your primary activity during your visit to Bandelier?
Day hiking
Archaeological/Cultural interests
Backpacking
Wildlife viewing
Camping
Photography
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Switch to iPhone
Ignore Flow
Back
Pick 1
Next
What was your primary destination during your visit to Bandelier?
Alcove House
Ponderosa/Upper Crossing
Tsankawi
Falls Trail
Visitor Center/Main Loop Trail
Other
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iPad Preview
Switch to iPhone
Ignore Flow
Back
Pick 1
Next
Have you taken an air-tour/overflight over Bandelier?
Yes
No
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Ignore Flow
Back
Pick 1
Next
Have you taken an air-tour/overflight over any other parks?
Yes
No
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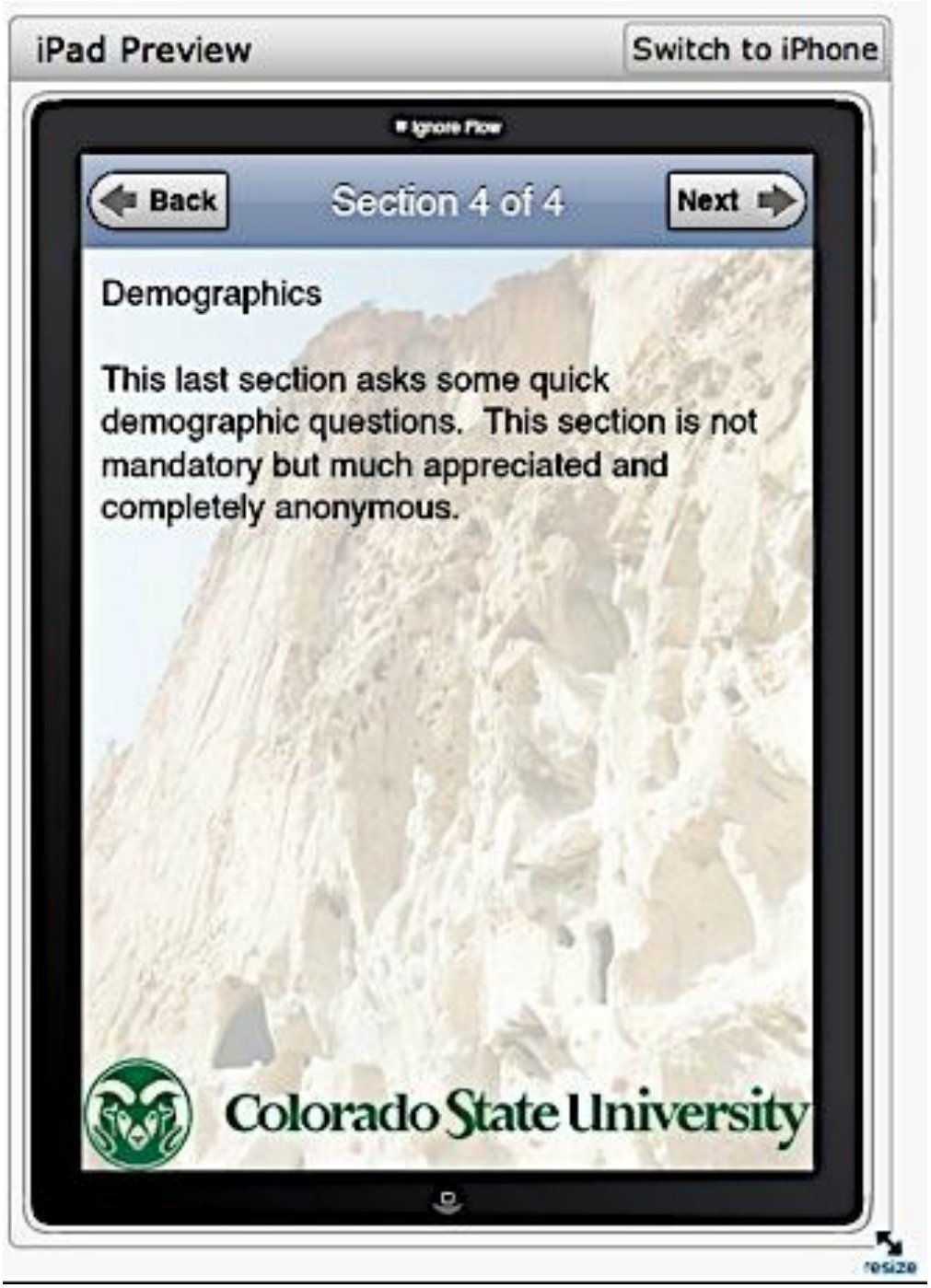
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Section 4 of 4
Next
Demographics
This last section asks some quick demographic questions. This section is not mandatory but much appreciated and completely anonymous.
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resize

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Switch to iPhone
Ignore Flow
Back
Pick 1
Next
What is your gender?
Male
Female
Pick 1
19
1967
Is your primary residence in the United States?
Yes
No
Pick 1
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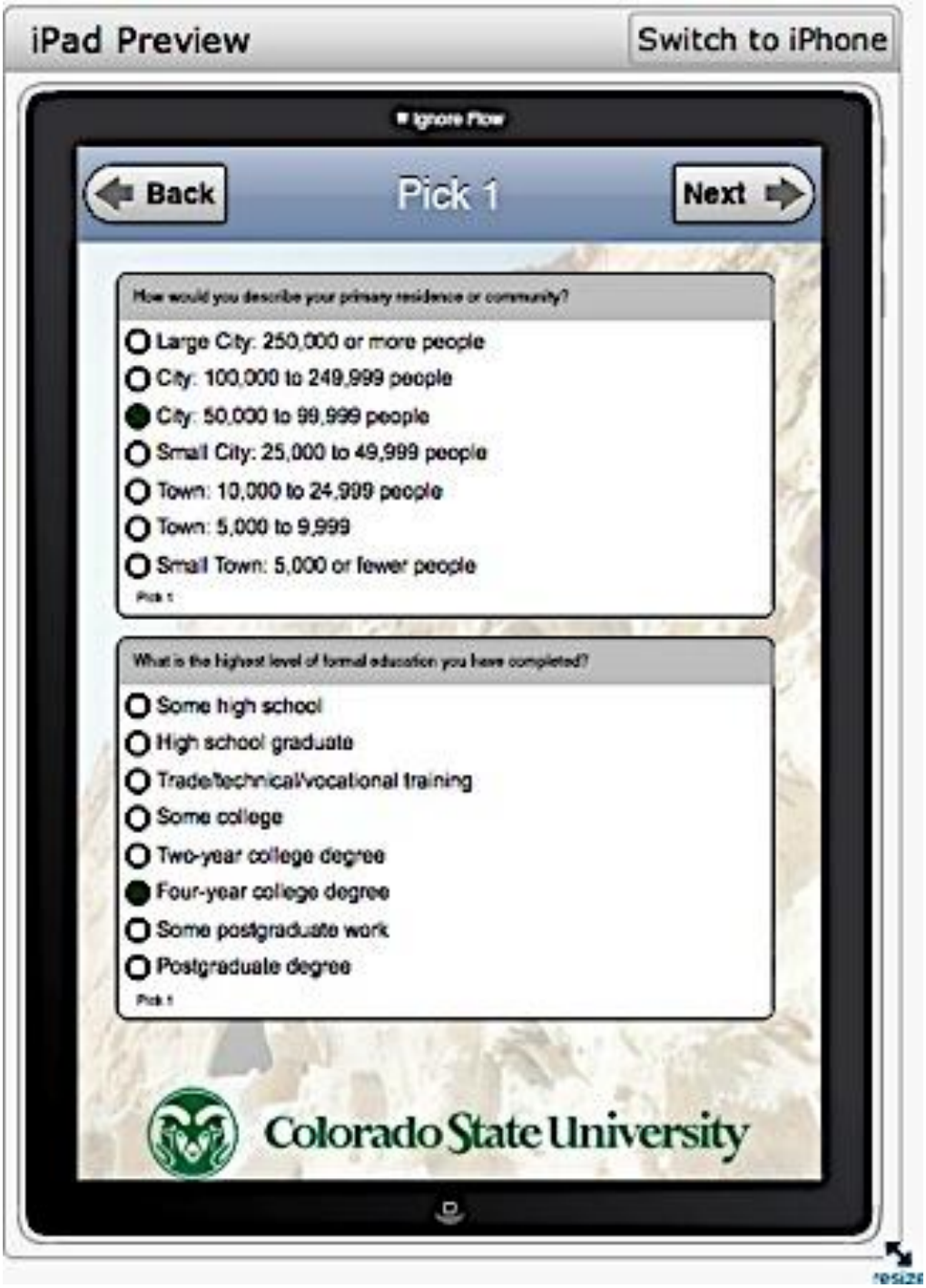
Switch to iPhone
Ignore Flow
Back
Enter Number
Next
What is your zip code?
80521
Enter
ABC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Pick 1
Next
How would you describe your primary residence or community?
Large City: 250,000 or more people
City: 100,000 to 249,999 people
City: 50,000 to 99,999 people
Small City: 25,000 to 49,999 people
Town: 10,000 to 24,999 people
Town: 5,000 to 9,999
Small Town: 5,000 or fewer people
Pick 1
What is the highest level of formal education you have completed?
Some high school
High school graduate
Trade/technical/vocational training
Some college
Two-year college degree
Four-year college degree
Some postgraduate work
Postgraduate degree
Pick 1
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Switch to iPhone
Ignore Flow
Back
Pick 1
Next
Would you describe yourself as Hispanic or Latino?
Yes
No
Pick 1
Would you describe yourself as:
American Indian or Alaskan Native
Asian
Black or African American
Native Hawaiian or Pacific Islander
White
Pick 1
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Switch to iPhone
Ignore Flow
Back
Thank you for completing our survey. Your input is important to us and we very much appreciate you taking time out of your visit to share your opinion with us.
Have a good day!
Finish
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The Department of the Interior protects and manages the nation's natural resources and cultural heritage; provides scientific and other information about those resources; and honors its special responsibilities to American Indians, Alaska Natives, and affiliated Island Communities.

NPS 315/123926, February 2014

National Park Service
U.S. Department of the Interior

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www.nature.nps.gov