



Kenai Fjords National Park

Sound Source Audibility Study 2008-2012

Natural Resource Technical Report NPS/NRSS/NRTR—2013/799



ON THE COVER

Environmental Protection Specialist, Christina Kriedeman during an onsite listening session, 2008
Photograph by: Kenai Fjords National Park

Kenai Fjords National Park

Sound Source Audibility Study 2008-2010

Natural Resource Technical Report NPS/NRSS/NRTR—2013/799

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Introduction

Onsite listening is the practice of placing an observer near at a particular point in the park with a handheld personal digital assistant (PDA). The observer listens for a designated period of time, and identifies all sound sources and their durations. Onsite listening takes full advantage of human binaural hearing capabilities, and closely matches the experience of park visitors. Logistic constraints prevent comprehensive sampling by this technique, but selective samples of onsite listening provide a basis for relating the results of long term, calibrated acoustic monitoring to the probable auditory perception of events by park visitors and wildlife. Whether a sound is audible or not depends on the hearing sensitivity of the receiver, the frequency content and amplitude of a sound, and the presence or absence of other masking sounds. These on-site listening sessions, distributed over multiple years, thoroughly document the inventory of audible sounds in each location from 2008-2012, as perceived by an attentive listener.

Onsite listening sessions are also an excellent screening tool for parks initiating acoustical environment studies. They produce an extensive inventory of sound sources, require little equipment or training, and can help educate park staff and volunteers. Onsite listening is part of the Natural Sounds and Night Skies Division standard acoustical monitoring protocol (NPS 2005, NPS 2013). In the case of KEFJ, onsite listening will be used to track long term changes in the acoustical environment.

Study Area

These data were gathered from six sites over the monitoring period (2008-2012). These sites were selected because they represent the different management zones in the Exit Glacier area of the park. As shown in Table 1, they include a frontcountry site near the visitor center (Visitor Facilities Zone), a site located off of a developed trail on a moraine by the toe of Exit Glacier (Pedestrian Zone), a backcountry site off of the Harding Icefield trail (Hiker Zone), and a backcountry site north of the Exit Glacier road (Backcountry Semi-primitive Zone). On site listening sessions were conducted at KEFJ001-KEFJ004 during the summer months, and KEFJ005-KEFJ006 during the winter months. See Figure 1 for a map of locations, and Appendix C for detailed maps.

Table 1. Location and metadata for onsite listening study areas

Site	Site Name	Vegetation and surroundings	Elevation	Latitude	Longitude
KEFJ001	Visitor Facilities Zone (Exit Glacier Nature Center)	Edge of forest near SE corner of parking lot for Exit Glacier Nature Center. Deciduous trees: willow, cottonwood, Alder shrubs, and rocky/moraine material.	131 m	60.18830	-149.63137
KEFJ002	Hiker Zone (Harding Icefield Trail)	Harding Icefield trail. Alder, heather, hellebore, and snow cover.	630 m	60.18374	-149.66438
KEFJ003	Pedestrian Zone (Exit Glacier Trail)*	Exit Glacier trail on an exposed rock face. Alder, willow, moss, and 75% bedrock (moraine).	179 m	60.18231	-149.64233
KEFJ004	Backcountry semi-primitive Zone	Nike site. Spruce, cottonwood, willow, lichen, moss, dwarf fireweed; glacier deposit – gravel.	105 m	60.19999	-149.60349
KEFJ005	Visitor Facilities Zone (Winter)	Flat, deciduous trees, snow cover. Open area for snow course.	143 m	60.18938	-149.62253
KEFJ006	Pedestrian Zone (Winter)*	Alders, gravel, moss, and lichen. Moraine next to toe of Glacier	179 m	60.18231	-149.64233

*KEFJ003 and KEFJ006 are in the same physical location, but were monitored in summer and winter, respectively.



Kenai Fjords National Park: On site listening



Produced by E Lynch, Natural Sounds and Night Skies Division, March 2013

FILE: AL_Sites.mxd

Figure 1. Locations of six onsite listening sites

Methods

A total of 70 onsite listening sessions (4,201 minutes) were conducted at six sites between summer 2008 and winter 2012. Sound sources were recorded by trained listeners on Palm T|X handheld personal digital assistant devices (Palm, Inc, Sunnyvale, CA). Data logging software was custom designed for the National Park Service (Mercury Development, LLC, Valley Park, MO). Each listening session lasted one hour. Both natural and non-natural sounds were tracked during these sessions, but for simplicity, non-natural noise event results will be highlighted in this report. For the purposes of this document, we define “noise” as any human-caused sound that masks or degrades natural sounds (Lynch et al. 2011).

The on-site listening sessions provided the basis for the calculation of metrics including the period of time between noise events (average noise free interval [NFI]), percent time each sound source was audible (PA), and maximum, minimum, and mean length (in seconds) of sound source events. Each noise event was stored in a Microsoft Access database. The results of all on-site listening sessions are summarized below, and detailed report files are included in the appendices section.

Results

To best demonstrate comparisons in noise source audibility, results are grouped by location in the six figures (Figure 2 - Figure 7) below. While both natural and non-natural sound sources were logged during these sessions, each site possessed a unique set of audible sources. Commonplace sources appear at the bottom of each figure while less common sources appear at the top (though these infrequent sources appear not to have associated data, they were simply audible less than 1.0 percent of the time). Table 2 shows the number of listening sessions conducted per season. Note: Session # 7856135 was omitted due to corrupt data, resulting in n=3 for KEFJ005, Winter 2008, instead of n=4.

Table 2. Number of hour-long sessions conducted by site and season at KEFJ

	Summer 2008	Winter 2008	Summer 2012	Winter 2012	All Seasons
KEFJ001	5	0	3	0	8
KEFJ002	4	0	4	0	8
KEFJ003	5	0	5	0	10
KEFJ004	4	0	5	0	9
KEFJ005	0	4	0	11	15
KEFJ006	0	8	0	12	20
TOTAL # minutes	1140	660	1020	1381	4201

Figure 2. Percent time audible (PA) for KEFJ001, visitor facilities zone. n=8 sessions.

Session notes for this site indicate that a fuel cell was audible, and was coded as “generator” or “motor.” In addition, bear bells were coded as “people, voices” and sounds of the parking lot such as vehicle alarms and doors were coded as “non-natural unknown.”

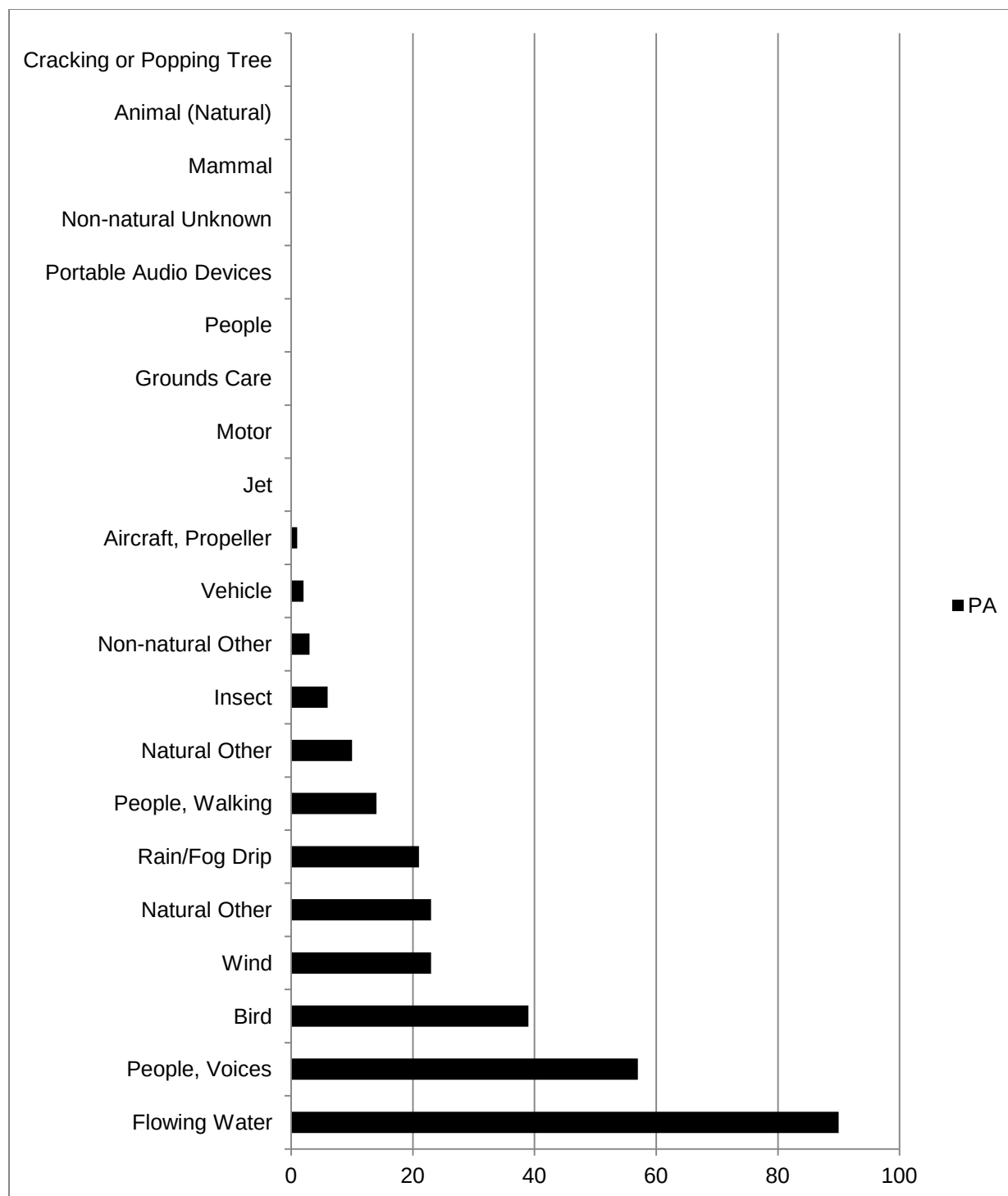


Figure 3. Percent time audible (PA) for KEFJ002, hiker zone. n=8 sessions.

Session notes for this site indicate that a whistling sound was frequently audible but was identified generally as “natural other,” because it was not clear whether it was a mammal or bird generating the sound.

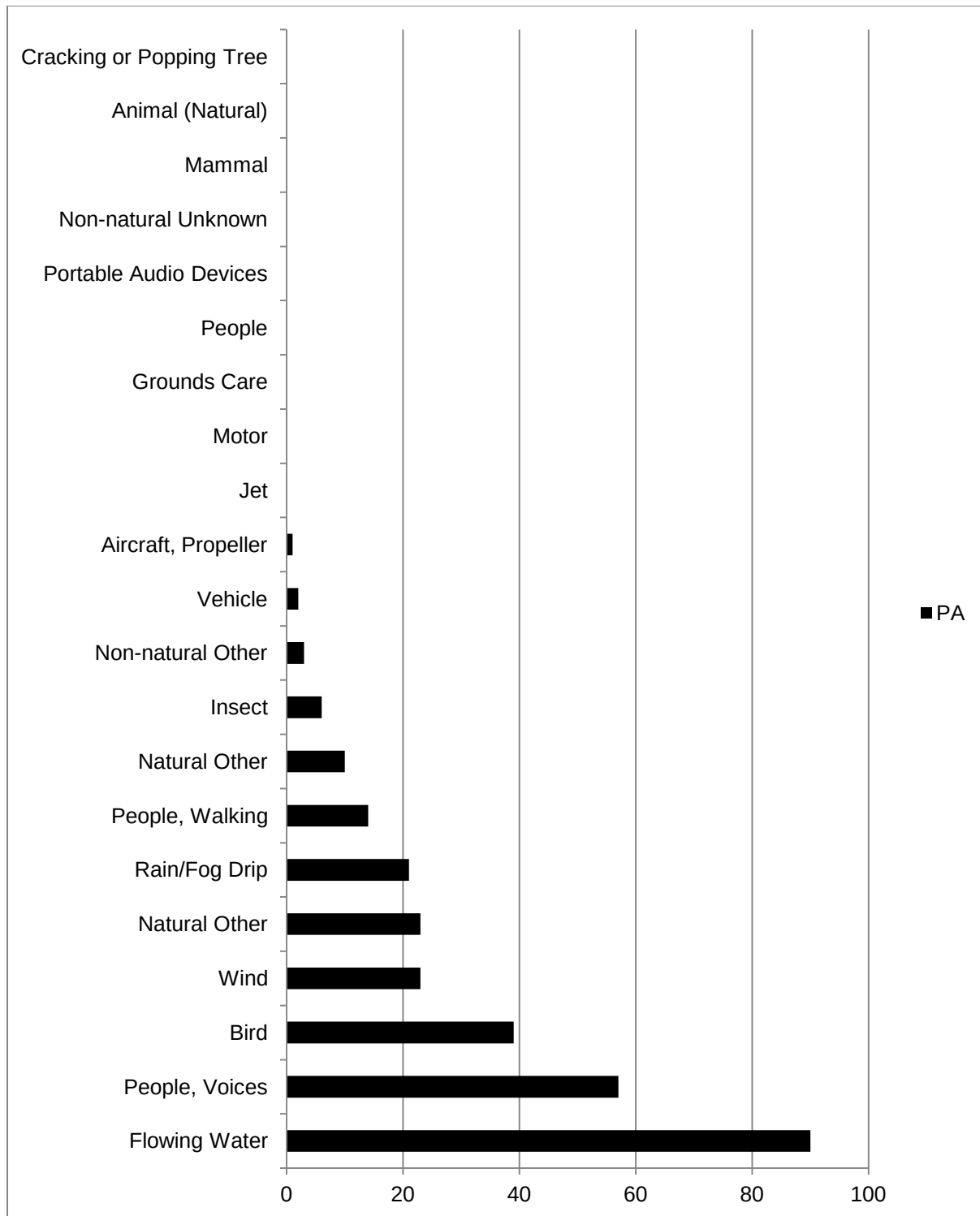


Figure 4. Percent time audible (PA) for KEFJ003, pedestrian zone. n=10 sessions.

Session notes for this site indicated that bear bells were frequently audible, and were coded as “people, voices.” In addition, insects were a prominent part of the acoustic environment.

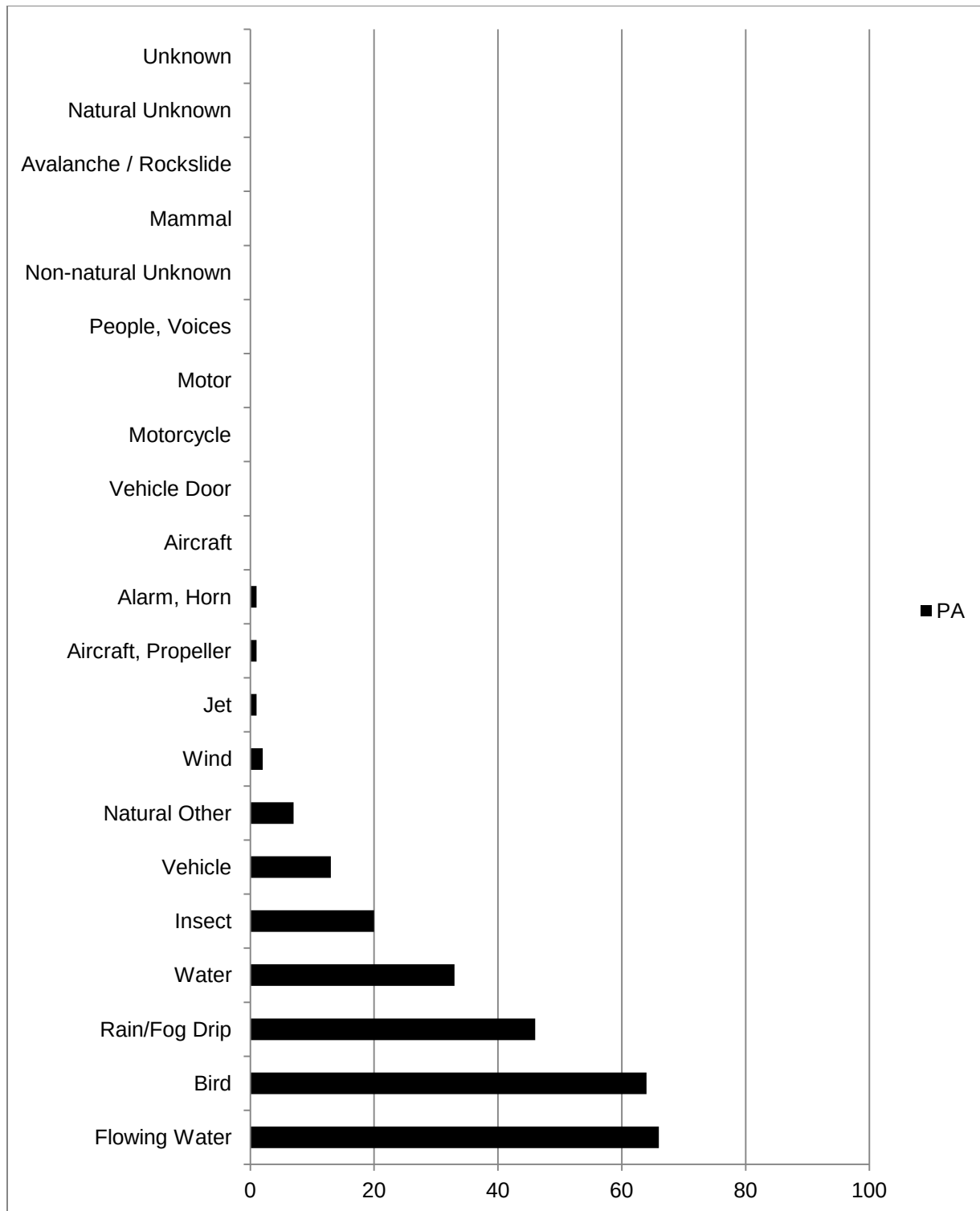


Figure 5. Percent time audible (PA) for KEFJ004, backcountry semi-primitive (nike stripe). n=9 sessions.

Session notes for this site indicate that “natural unknown” was selected to represent the rustling sound of an animal or bird in nearby vegetation.

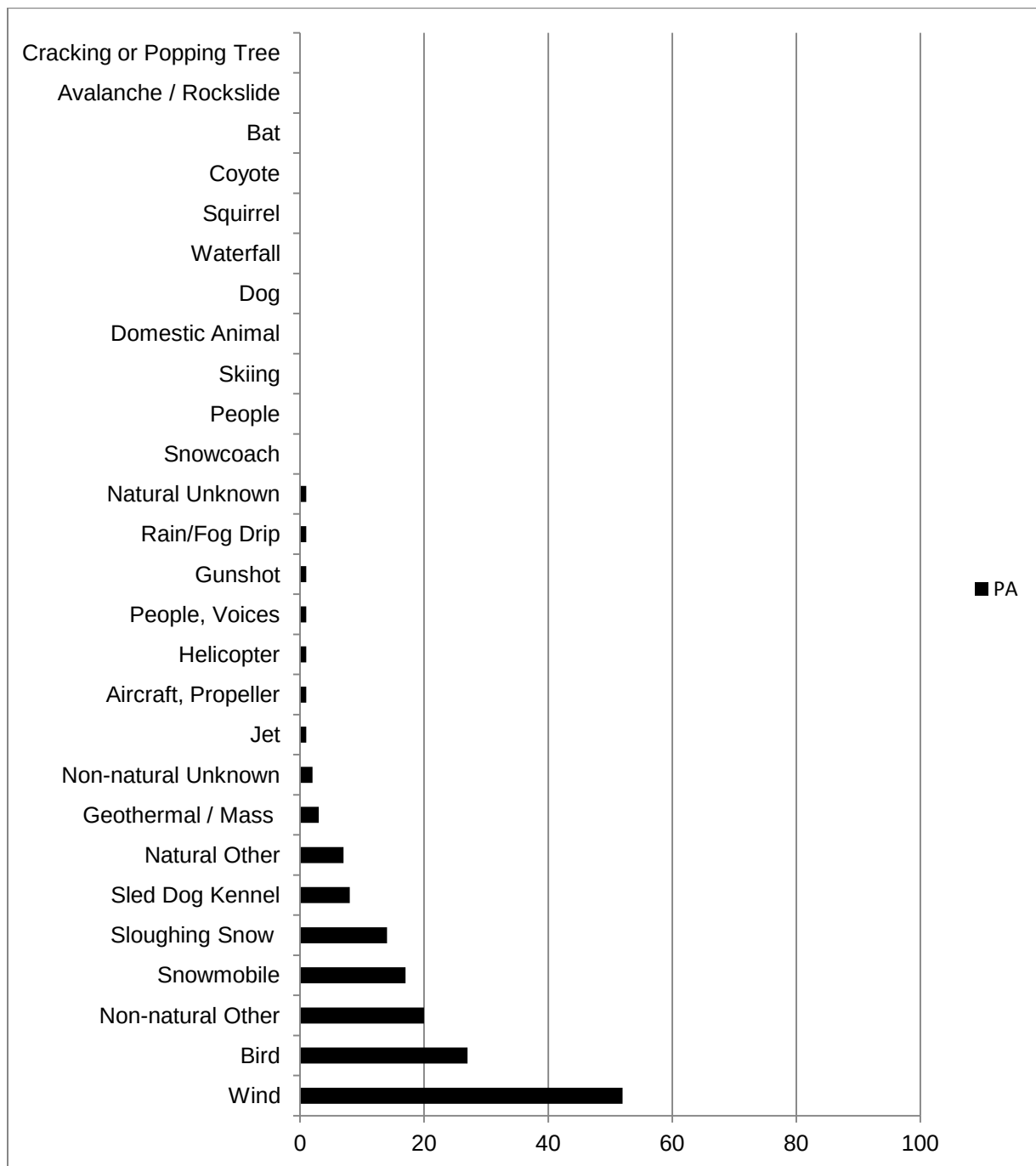


Figure 6. Percent time audible (PA) for KEFJ005. n=15 sessions.

Session notes for this site indicate that rockslides are coded as “natural unknown” and that “domestic animal” refers to the sound of a barking dogsled team. Non-natural other represents distant engine sounds of unknown origin. Ravens and chickadees were frequently audible. Sled dog kennel represents barking sled dog teams. Gunshots were likely distant echoes from Seward shooting range.

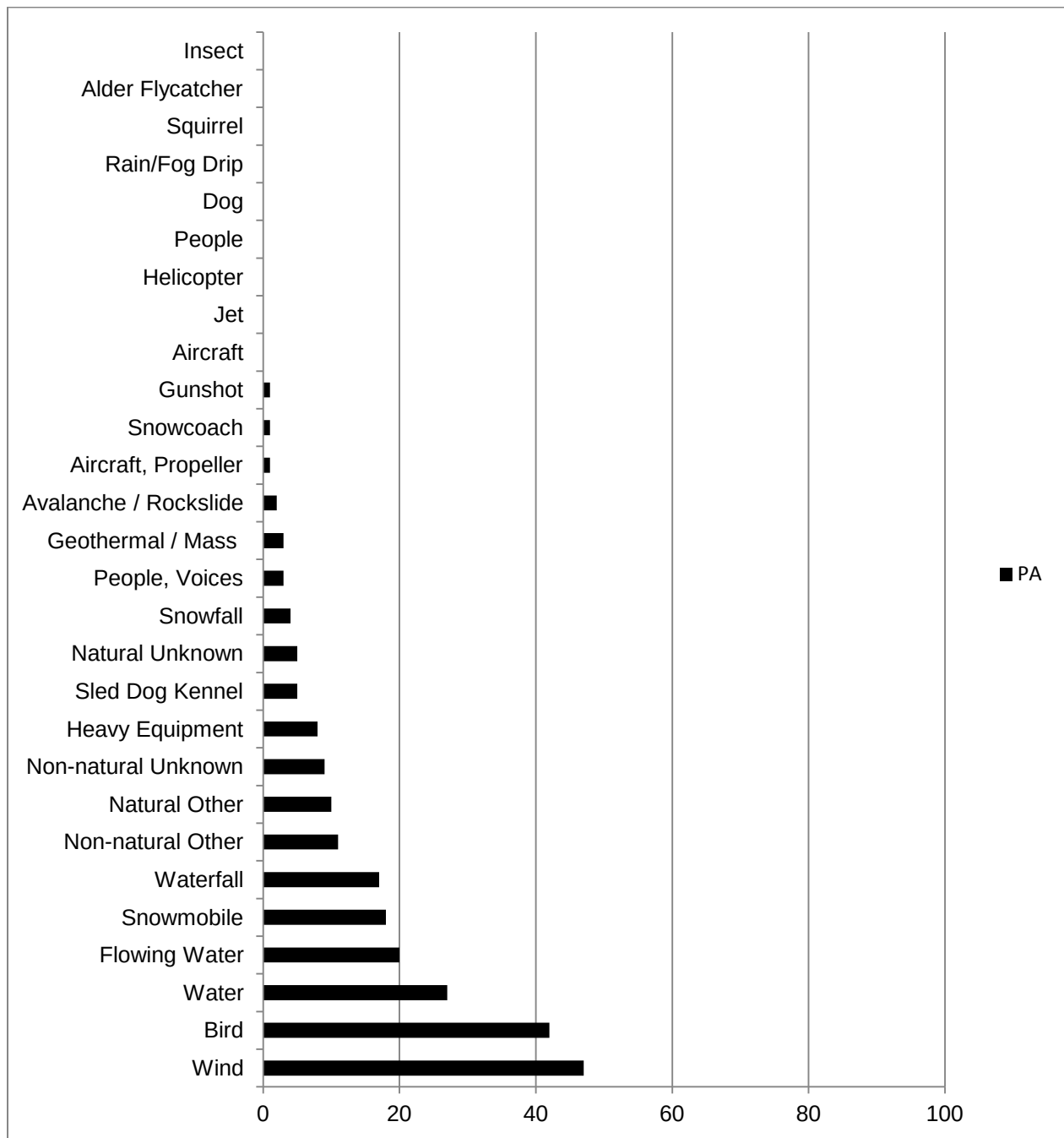


Figure 7. Percent time audible (PA) for KEFJ006. n=20 sessions.

Session notes for this site indicate that trains and train horns are coded as “non-natural unknown,” and avalanches and rockslides are coded as “natural unknown.” Low-level motor and highway sounds were occasionally audible at this site. Gunshots were audible in the distance, and likely originated from a downvalley firing range.

The figures above reveal information about how often noise sources were audible at each site. The inverse of this audibility metric is noise free interval, which is defined as the period of time between noise events. One might translate the term “noise free interval” as the typical length of time one could sit at the each monitoring site without hearing anthropogenic noise. It is an essential metric because it describes the degree of solitude one can experience at a given acoustical monitoring site. Table 3 reports mean percent time audible for anthropogenic noise (PA) and mean noise free interval (NFI) for summer sites (by season), and also for all sessions at each site. Table 4 details the NFI and PA results for winter sites.

Although noise free interval was largely consistent across seasons, it was found to be shorter in 2012 for KEFJ002, KEFJ003, and KEFJ004 than it was in 2008. These changes could be due to temporary conditions (construction, grounds maintenance, and high visitation were all mentioned at some point in session comments), but a consistent reduction in NFI from year to year might indicate that the quality of the acoustical environment is being degraded by the presence of anthropogenic noise. Overall, NFI was greatest during the winter monitoring sessions. Percent time audible for anthropogenic noise did not necessarily correlate with season. For instance, the mean percent time audible for noise was higher at KEFJ006 (a winter site) than it was at KEFJ002 (a summer site). These differences in audibility are most likely related to the zones in which the sessions were conducted. Of the six sites, KEFJ004 had the lowest percent time audible of anthropogenic sources. To highlight the comparison between the two years in Table 3 and Table 4, the best acoustical resource condition (longer NFI and lower PA) is highlighted in bold font. For the majority of sites, NFI was shorter and PA was higher in 2012.

Table 3. Mean noise free interval (NFI) in seconds, and percent time audible (PA) for summer sites

	NFI		PA		NFI	PA
	2008	2012	2008	2012	All sessions	All sessions
KEFJ001	6	7	99.6	99.8	6	99.7
KEFJ002	142	91	23.7	29.9	112	26.8
KEFJ003	48	39	65.1	64	43	64.5
KEFJ004	328	139	9	18.9	191	14.5

Note: the data point showing the best acoustical resource condition (i.e. longer NFI and lower PA) between 2008 and 2012 has been highlighted in bold font

Table 4. Mean noise free interval (NFI) in seconds, and percent time audible (PA) for winter sites

	NFI		PA		NFI	PA
	2008	2012	2008	2012	All sessions	All sessions
KEFJ005	386	157	42.9	50.8	42.9	47.6
KEFJ006	562	120	51.4	53.6	51.4	52.7

Note: the data point showing the best acoustical resource condition (i.e. longer NFI and lower PA) between 2008 and 2012 has been highlighted in bold font

For KEFJ001, KEFJ002, and KEFJ003, the most common non-natural sound source was the sound of human voices. At KEFJ004, KEFJ005, and KEFJ006, vehicles (passenger, oversnow, and construction) were the most common non-natural sound sources. While flowing water was consistently audible during summer sessions, birds were audible year-round. In terms of number of sound sources, the acoustic environment is often more complex during the summer months in national parks when both visitation and biologic activity peak, but this was not always the case at KEFJ. The summer and winter sites had a similar number of sound sources.

Conclusion

The on-site listening sessions summarized in this report describe the sound sources which were perceived at each site by an attentive listener. In order to gather information about the current conditions of the acoustical environment in the park, six sites were chosen to represent each management zone (visitor facilities, hiker, pedestrian, and backcountry for summer operations/ visitor facilities and pedestrian for winter operations). In all, 70 hour- long listening sessions were conducted in the park by trained staff, totaling over 4,000 minutes over four seasons (summer and winter of 2008 and 2012).

The results of this extensive effort are detailed inventories of audible sounds at six locations in the park. They indicate that the most common audible sources of noise are human voices and vehicles. This condition is somewhat unique in that a comprehensive survey of noise audibility at 93 sites in 22 national parks (including Kenai Fjords) found high altitude commercial jets to be the most ubiquitous noise source (Lynch et al. 2011). The same study also revealed that median noise audibility across all 24 hours of the day is over 28%. When examined on an hourly basis, daytime hours from 0700 – 2200 were most likely to have the highest noise audibility, and nighttime hours from 0000 – 0600 displayed the lowest levels of noise audibility. On average, audibility of anthropogenic noise ranged from 14.5% to 99.7% at the six sites in KEFJ, placing some sites well below and other sites well above the national average. However, it should be noted that most of the onsite listening in this study was conducted in the daytime hours, so it is expected that noise free intervals would be longer at night, and noise would be audible less frequently at night. Three (out of four) summer sites and both winter sites had longer noise free intervals (NFI) in 2008 than 2012. Three summer sites and both winter sites had lower percent time audible in 2008.

It is important to note the low natural ambient sound levels measured in a related long-term study of acoustical conditions in the park (NPS 2010). Daytime natural ambient sound levels ranged from 18.1 dBA at KEFJ005 to 46.0 dBA at KEFJ003, while nighttime natural ambient sound levels ranged from 16.2 dBA at KEFJ005 to 46.4 at KEFJ003. When background sound levels are very low, as in the case of KEFJ005, an acoustic environment is more readily affected by distant or subtle noise intrusions. However, when other sound sources are present (such as flowing water or rustling vegetation), they may mask the subtle noise intrusions. Therefore, efforts to manage the acoustical environment of a park will be most successful if both noise source audibility and measured background sound levels are considered.

Literature Cited

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Appendix A. Site photos



Figure 8. KEFJ001 (Visitor Facilities Zone). This was a frontcountry site near the Exit Glacier Nature Center.



Figure 9. KEFJ002 (Hiker Zone). This backcountry site was located just off of the Harding Icefield Trail.

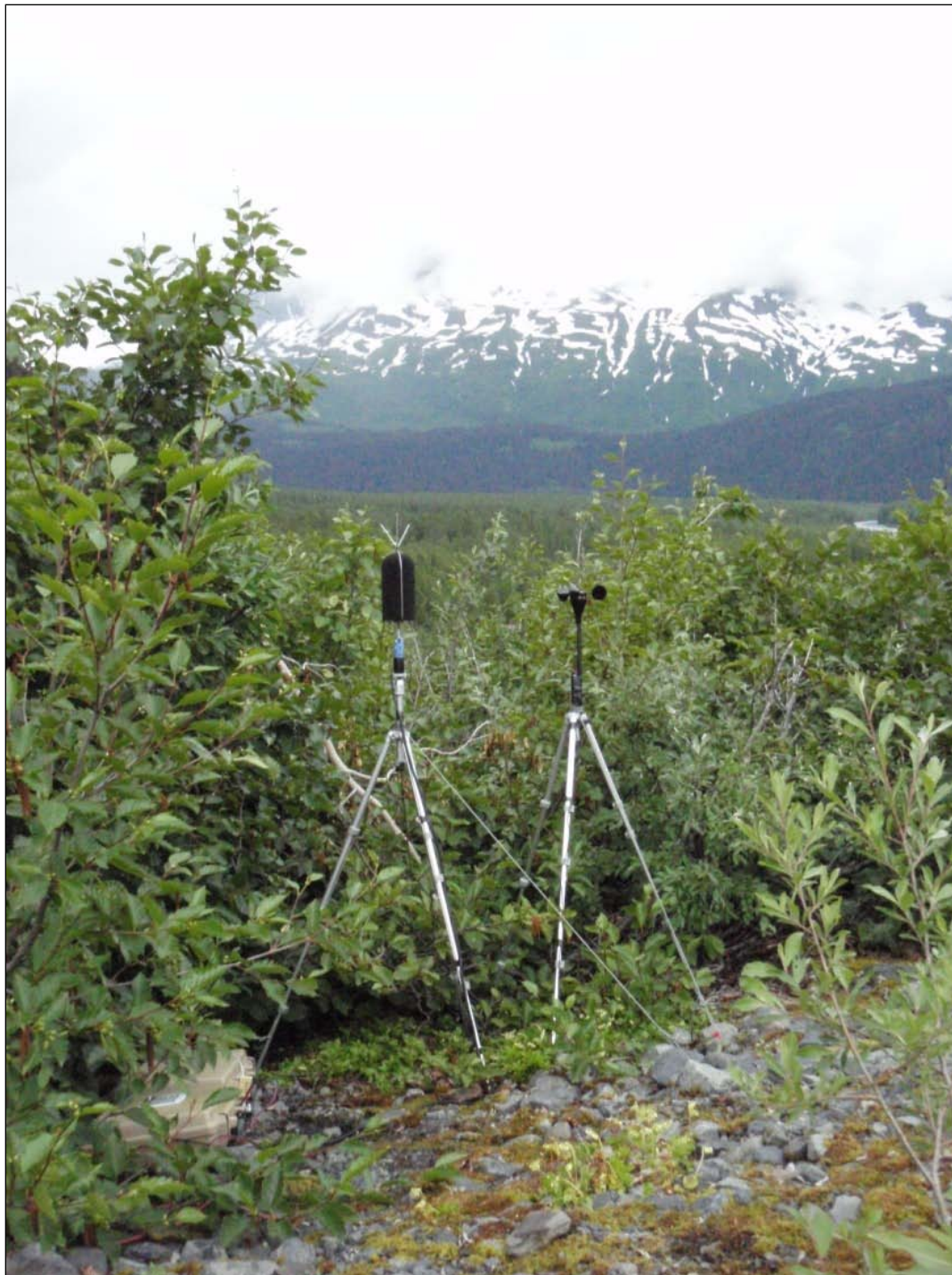


Figure 10. KEFJ003 (Pedestrian Zone). This was a frontcountry site right off of the Exit Glacier Trail which is a developed trail.



Figure 11. KEFJ004 (Backcountry Semi-primitive zone). This site was located north of Exit Glacier Road.



Figure 12. KEFJ005 (Visitor Facilities Winter). This site was located in an open area for snow course.



Figure 13. KEFJ006 (Pedestrian Zone Winter). This site was located on a moraine next to the toe of exit glacier.

Appendix B. Site-specific onsite listening audibility summaries

Audibility Report KEFJ001

Sessions: Duration as seconds: 28,805 Duration as minutes: 480.08 AudRpt ID: 100

Session ID: 6553617 Date: 8/16/2012 Name: Kriedeman, Christina
 Site: 001 Start Time: 8:15 AM Address:
 SubSite ID: Nature End Time: 9:15 AM Phone: Wind: none
 Park: KEFJ Time Group: 1 Palm ID: PN70M6W8M Weather: Cloudy
 Comments: generator is fuel cell fan rain/fog is water droplets falling from trees onto leaves non-natural other - bear bells

Session ID: 3498008 Date: 7/22/2008 Name: Ericka Pilcher
 Site: 001 Start Time: 2:00 PM Address:
 SubSite ID: visitor End Time: 3:00 PM Phone: Wind:
 Park: KEFJ Time Group: 2 Palm ID: PN5BM4M5V0 Weather: Cloudy
 Comments: In this session, bear bells and whistling were coded as people, motor refers to generator in this instance; vehicle doors, bathroom doors, end car alarms/horns were coded as non natural unknown. most of the natural unknown were voles. there may be a constant rush of water/wind but it is so hard to distinguish that i was not confident to include water sounds.

Session ID: 3498009 Date: 7/23/2008 Name: Charlotte Formichella
 Site: 001 Start Time: 2:00 PM Address:
 SubSite ID: Visitor End Time: 3:00 PM Phone: Wind:
 Park: KEFJ Time Group: 2 Palm ID: PN5BM4M5V0 Weather: Light Rain
 Comments: doing grounds work in this area today

Session ID: 12390407 Date: 7/18/2008 Name: Ericka Pilcher
 Site: 001 Start Time: 3:00 PM Address:
 SubSite ID: visitor End Time: 4:00 PM Phone: Wind:
 Park: KEFJ Time Group: 3 Palm ID: PN70UB15V0 Weather: Hard Rain
 Comments: Other sounds that may have been coded as unnatural unknown include car horn lock, backup beep, car door close, bathroom door close. buses, rvs, and deisel engines are hard to tell apart so all are coded as vehicle.

Session ID: 12390412 Date: 7/22/2008 Name: Christina Kriedeman
 Site: 001 Start Time: 2:00 PM Address:
 SubSite ID: VISITOR End Time: 3:00 PM Phone: Wind:
 Park: KEFJ Time Group: 2 Palm ID: PN70UB15V0 Weather: Cloudy
 Comments: 1BEARBELLS AND WHISTLING CODED AS PEOPLE 2 MOTOR REFERS TO GENERATOR 3 VEHICLE DOORS AND BATHROOM DOORS, CAR ALARM/HORNS CODED AS NONNATURAL UNKNOWN 4 SOME OF NATURAL UNKNOWN WERE VOLES RUNNING IN VEG 5 PROBABLY CAN HEAR WATER, BUT MIXED WITH WIND HARD TO DISTIGUISH ESPECIALLY WITH GENERATOR AND MOTOR NOISE

Session ID: 12390417 Date: 7/28/2008 Name: Charlotte Formichella
 Site: 001 Start Time: 11:00 AM Address:
 SubSite ID: visitor End Time: 12:00 PM Phone: Wind:
 Park: KEFJ Time Group: 2 Palm ID: PN70UB15V0 Weather: Sunny
 Comments: grounds work in area today non-natural unknown is bathroom doors and car doors

Session ID: 6553605 Date: 6/14/2012 Name: Kriedeman, Christina
 Site: 001 Start Time: 5:19 PM Address:

SubSite ID: Nature End Time: 6:19 PM Phone: Wind: slight breeze
Park: KEFJ Time Group: 3 Palm ID: PN70M6W8M Weather: Partly Cloudy
Comments: NONNATURAL OTHER WAS SOUND OF WALKING WITH TREKING POLES
GENERATOR IS THE SOUND OF THE BUILDING FUEL CELL FAN VEHICLE LOCK
HORNS HEARD IN PARKING LOT - CALLED SOUND VEHICLE

Session ID: 6553609 Date: 7/3/2012 Name: Kriedeman, Christina
Site: 001 Start Time: 11:23 AM Address:
SubSite ID: Nature End Time: 12:23 PM Phone: Wind: none
Park: KEFJ Time Group: 2 Palm ID: PN70M6W8M Weather: Cloudy
Comments: Palm#1

Sound Source Audibility (PA: Percentage of period audible, Events reported as seconds)

Sound ID	Sound Source Description	PA	Max Event	Mean Event	Min Event	SD Event	Count
1.1	Jet	1.0	180	154	129	36	2
1.2	Aircraft, Propeller	1.0	255	120	26	120	3
1.3	Helicopter	1.0	238	238	238		1
2	Vehicle	47.0	1,259	82	1	125	167
2.12	Alarm, Horn	0.0	1	1	0	1	5
2.13	Vehicle Door	0.0	3	1	0	1	212
2.2	Motorcycle	0.0	144	72	0	102	2
2.3	Bus (capacity > 9 people)	0.0	39	18	1	19	3
2.42	Truck, Heavy (3+ ax 6+)	0.0	7	7	7		1
2.8	RV	0.0	115	115	115		1
6	Motor	48.0	3,599	1,955	2	1,595	7
6.1	Generator	37.0	3,583	2,131	72	1,621	5
7	Grounds Care	1.0	135	42	2	55	5
7.4	Dumpster / Trashcan	0.0	11	2	0	2	95
8	People	2.0	93	15	0	21	48
8.1	People, Voices	88.0	1,824	158	1	311	161
8.2	People, Walking	24.0	310	20	0	33	342
10.2	Building, Door	1.0	5	1	0	1	418
11	Construction	2.0	52	13	2	11	39
19	Non-natural Other	0.0	38	10	1	14	9
20	Non-natural Unknown	8.0	79	4	0	10	639
21	Wind	4.0	180	59	10	43	22
22.1	Rain/Fog Drip	44.0	3,592	847	2	1,318	15
22.2	Flowing Water	12.0	2,849	1,790	730	1,498	2
25	Bird	56.0	3,597	185	0	532	87

28	Insect	3.0	93	10	0	17	86
29	Animal (Natural)	0.0	6	6	6		1
39.1	Natural Other	12.0	681	163	13	173	22
40	Natural Unknown	0.0	42	4	0	8	25
999	Assigned on PDA	0.0	11	11	11		1
G0100	All Aircraft	3.1					
G0200	All Road Vehicles	48.2					
G2000	All Non-natural Sources	99.7					
G4000	All Natural Sources	94.6					
NFI	Noise Free Interval	0.4	29	6	1	7	17

Audibility Report KEFJ002

Sessions: Duration as seconds: 28,804 Duration as minutes: 480.07 AudRpt ID: 101

Session ID: 6553619 Date: 8/29/2012 Name: Fulton, Travis
 Site: 002 Start Time: 5:00 PM Address:
 SubSite ID: HIT End Time: 6:00 PM Phone: Wind: light breeze
 Park: KEFJ Time Group: 3 Palm ID: PN70M6W8M Weather: Sunny
 Comments: Staff - Travis Fulton

Session ID: 3498004 Date: 7/19/2008 Name: Charlotte Formichella
 Site: 002 Start Time: 1:00 PM Address:
 SubSite ID: Hiker zone End Time: 2:00 PM Phone: Wind:
 Park: KEFJ Time Group: 2 Palm ID: PN5BM4M5V0 Weather: Partly Cloudy
 Comments:

Session ID: 3498012 Date: 7/26/2008 Name: Charlotte Formichella
 Site: 002 Start Time: 1:00 PM Address:
 SubSite ID: hiker zone End Time: 2:00 PM Phone: Wind:
 Park: KEFJ Time Group: 2 Palm ID: PN5BM4M5V0 Weather: Cloudy
 Comments: wind masked some sounds

Session ID: 12390408 Date: 7/19/2008 Name: Ericka Pilcher
 Site: 002 Start Time: 12:00 PM Address:
 SubSite ID: HIKER End Time: 1:00 PM Phone: Wind:
 Park: KEFJ Time Group: 2 Palm ID: PN70UB15V0 Weather: Partly Cloudy
 Comments: I SAW A RED BACK VOLE, A SQUIRREL, AND HEARD A MARMOT WHISTLE

Session ID: 12390416 Date: 7/26/2008 Name: Ericka Pilcher
 Site: 002 Start Time: 12:00 PM Address:
 SubSite ID: hiker zone End Time: 1:00 PM Phone: Wind: wind picks up
 Park: KEFJ Time Group: 2 Palm ID: PN70UB15V0 Weather: Cloudy
 Comments: I HEARDa whistle that could have been a bird or a marmot and that accounts for most of the natural unknown during this session, The weather dropped at least 10 degrees and wind has

Session ID: 897026 Date: 6/28/2012 Name: Kriedeman, Christina
 Site: 002 Start Time: 12:50 PM Address:
 SubSite ID: HIT End Time: 1:50 PM Phone: Wind: SLIGHT
 Park: KEFJ Time Group: 2 Palm ID: PN70M6W8M Weather: Light Rain
 Comments

Session ID: 897027 Date: 7/6/2012 Name: Kriedeman, Christina
 Site: 002 Start Time: 10:01 AM Address:
 SubSite ID: HIT End Time: 11:01 AM Phone: Wind: none
 Park: KEFJ Time Group: 2 Palm ID: PN70M6W8M Weather: Fog
 Comments: mammel was marmot whistle vehicle sounds not loud masked by flowing water sounds

Session ID: 6553607 Date: 6/28/2012 Name: Adams, Leslie
 Site: 002 Start Time: 12:50 PM Address:
 SubSite ID: HIT End Time: 1:50 PM Phone: Wind: SLIGHT WIND
 Park: KEFJ Time Group: 2 Palm ID: PN70M6W8M Weather: Light Rain
 Comments:

Sound Source Audibility (PA: Percentage of period audible, Events reported as seconds)

Sound ID	Sound Source Description	PA	Max Event	Mean Event	Min Event	SD Event	Count
1	Aircraft	1.0	93	78	64	21	2
1.1	Jet	1.0	117	70	11	54	3
1.2	Aircraft, Propeller	3.0	257	104	23	78	7
2	Vehicle	11.0	644	40	1	78	82
2.12	Alarm, Horn	0.0	4	4	4		1
2.13	Vehicle Door	0.0	1	1	1	0	2
2.5	Heavy Equipment	0.0	7	7	7		1
6	Motor	1.0	78	51	35	24	3
8	People	2.0	116	29	1	33	18
8.1	People, Voices	9.0	157	32	0	32	79
8.2	People, Walking	2.0	89	22	1	22	32
8.4	Portable Audio Devices	0.0	11	10	10	1	2
10.2	Building, Door	0.0	3	2	0	2	2
19	Non-natural Other	0.0	2	2	2		1
20	Non-natural Unknown	0.0	86	26	1	41	4
21	Wind	26.0	3,599	286	1	808	26
22.2	Flowing Water	100.0	3,600	3,195	381	1,063	9
22.3	Snowfall	0.0	10	10	10		1
24	Mammal	0.0	25	3	0	6	17
25	Bird	61.0	3,596	155	1	578	114
28	Insect	15.0	3,213	53	0	352	84
29	Animal (Natural)	0.0	6	6	6		1
30.1	Avalanche / Rockslide	0.0	2	1	1	1	3
39	Natural Other	0.0	20	6	1	7	6
39.1	Natural Other	0.0	20	13	7	7	3
39.2	Cracking or Popping Tree	0.0	0	0	0		1
40	Natural Unknown	6.0	636	33	0	93	51
G0100	All Aircraft	3.8					
G0200	All Road Vehicles	11.4					
G2000	All Non-natural Sources	26.8					
G4000	All Natural Sources	99.9					
NFI	Noise Free Interval	73.6	1,100	112	1	173	189

Audibility Report KEFJ003

Sessions: Duration as seconds: 36,005 Duration as minutes: 600.08 AudRpt ID: 102

Session ID: 6553620 Date: 9/11/2012 Name: Adams, Leslie
 Site: 003 Start Time: 8:59 AM Address:
 SubSite ID: Upper Loop End Time: 9:59 AM Phone: Wind: none
 Park: KEFJ Time Group: 1 Palm ID: PN70M6W8M Weather: Cloudy
 Comments: Leslie Adams was the data collector

Session ID: 3498003 Date: 7/18/2008 Name: Charlotte Formichella
 Site: 003 Start Time: 2:00 PM Address:
 SubSite ID: End Time: 3:00 PM Phone: Wind:
 Park: KEFJ Time Group: 2 Palm ID: PN5BM4M5V0 Weather: Light Rain
 Comments:

Session ID: 3498007 Date: 7/22/2008 Name: Charlotte Formichella
 Site: 003 Start Time: 10:00 AM Address:
 SubSite ID: Pedestrian End Time: 11:00 AM Phone: Wind:
 Park: KEFJ Time Group: 2 Palm ID: PN5BM4M5V0 Weather: Cloudy
 Comments: saw a humming bird

Session ID: 3498011 Date: 7/24/2008 Name: Ericka Pilcher
 Site: 003 Start Time: 5:00 PM Address:
 SubSite ID: Pedestrian End Time: 6:00 PM Phone: Wind:
 Park: KEFJ Time Group: 3 Palm ID: PN5BM4M5V0 Weather: Light Rain
 Comments: People sounds included coughing and bear bells. it got quite rainy for about 15minutes near the beginning and the rain could have masked other sounds. brrrrr it is cold. i am going to go dry my hat in the oven now.

Session ID: 12390411 Date: 7/22/2008 Name: Christina Kriedeman
 Site: 003 Start Time: 10:00 AM Address:
 SubSite ID: PEDESTR End Time: 11:00 AM Phone: Wind:
 Park: KEFJ Time Group: 2 Palm ID: PN70UB15V0 Weather: Cloudy
 Comments: NON NATURAL HUMAN UNKNOWN WAS A BEARBELL A VISITOR WAS CARRYING

Session ID: 12390413 Date: 7/23/2008 Name: Ericka Pilcher
 Site: 003 Start Time: 3:00 PM Address:
 SubSite ID: pedestrian End Time: 4:00 PM Phone: Wind:
 Park: KEFJ Time Group: 3 Palm ID: PN70UB15V0 Weather: Light Rain
 Comments:

Session ID: 6553604 Date: 6/7/2012 Name: Kriedeman, Christina
 Site: 003 Start Time: 1:59 PM Address:
 SubSite ID: Upper Loop End Time: 2:59 PM Phone: Wind: windy
 Park: KEFJ Time Group: 2 Palm ID: PN70M6W8M Weather: Sunny
 Comments: natural other should be windinduced natural; very windy at this site today

Session ID: 897031 Date: 7/31/2012 Name: Kriedeman, Christina
 Site: 003 Start Time: 5:50 PM Address:
 SubSite ID: Upper Loop End Time: 6:50 PM Phone: Wind: light
 Park: KEFJ Time Group: 3 Palm ID: PN70M6W8M Weather: Partly Cloudy
 Comments: very buggy

Session ID: 897033 Date: 8/3/2012 Name: Adams, Leslie - Staff 1
 Site: 003 Start Time: 2:43 PM Address:

SubSite ID:	Upper Loop	End Time:	3:43 PM	Phone:		Wind:	mod breeze
Park:	KEFJ	Time Group:	2	Palm ID:	PN70M6W8M	Weather:	Partly Cloudy
Comments:	Leslie Adams was the surveyor						

Session ID:	6553616	Date:	8/3/2012	Name:	Dewberry, Nicole - Staff 2		
Site:	003	Start Time:	2:43 PM	Address:			
SubSite ID:	Upper Loop	End Time:	3:43 PM	Phone:		Wind:	mod breeze
Park:	KEFJ	Time Group:	2	Palm ID:	PN70M6W8M	Weather:	Partly Cloudy
Comments:	Nicole Dewberry surveyor						

Sound Source Audibility (PA: Percentage of period audible, Events reported as seconds)

Sound ID	Sound Source Description	PA	Max Event	Mean Event	Min Event	SD Event	Count
1.1	Jet	0.0	41	41	41		1
1.2	Aircraft, Propeller	1.0	161	102	81	40	4
2	Vehicle	2.0	99	38	1	31	18
6	Motor	0.0	17	17	17		1
7	Grounds Care	0.0	3	2	1	1	4
8	People	0.0	53	6	0	12	27
8.1	People, Voices	57.0	2,785	78	0	206	266
8.2	People, Walking	14.0	618	41	0	71	124
8.4	Portable Audio Devices	0.0	1	1	1		1
19	Non-natural Other	3.0	352	57	1	91	21
20	Non-natural Unknown	0.0	88	20	1	34	8
21	Wind	23.0	3,598	170	1	723	48
22.1	Rain/Fog Drip	21.0	2,091	444	6	573	17
22.2	Flowing Water	90.0	3,599	3,234	1,436	776	10
24	Mammal	0.0	0	0	0		1
25	Bird	39.0	772	57	0	110	242
28	Insect	6.0	299	11	0	27	198
29	Animal (Natural)	0.0	4	4	4		1
39	Natural Other	10.0	3,422	1,740	57	2,379	2
39.1	Natural Other	23.0	3,588	249	0	768	33
39.2	Cracking or Popping Tree	0.0	1	1	1	0	2
G0100	All Aircraft	1.2					
G0200	All Road Vehicles	1.9					
G2000	All Non-natural Sources	64.5					
G4000	All Natural Sources	99.9					
NFI	Noise Free Interval	35.5	658	43	1	76	295

Audibility Report KEFJ004

Sessions: Duration as seconds: 32,404 Duration as minutes: 540.07 AudRpt ID: 103

Session ID: 6553618 Date: 8/23/2012 Name: Torigoe, Stacey
 Site: 004 Start Time: 5:02 PM Address:
 SubSite ID: Nike End Time: 6:02 PM Phone: Wind: calm
 Park: KEFJ Time Group: 3 Palm ID: PN70M6W8M Weather: Light Rain
 Comments:

Session ID: 897037 Date: 8/23/2012 Name: Fulton, Travis
 Site: 004 Start Time: 5:02 PM Address:
 SubSite ID: Nike stripe End Time: 6:02 PM Phone: Wind: calm
 Park: KEFJ Time Group: 3 Palm ID: PN70M6W8M Weather: Light Rain
 Comments:

Session ID: 3498005 Date: 7/21/2008 Name: Charlotte Formichella
 Site: 004 Start Time: 12:00 PM Address:
 SubSite ID: Backcount End Time: 1:00 PM Phone: Wind:
 Park: KEFJ Time Group: 2 Palm ID: PN5BM4M5V0 Weather: Light Rain
 Comments:

Session ID: 3498010 Date: 7/24/2008 Name: Charlotte Formichella
 Site: 004 Start Time: 12:00 PM Address:
 SubSite ID: Semi End Time: 1:00 PM Phone: Wind:
 Park: KEFJ Time Group: 2 Palm ID: PN5BM4M5V0 Weather: Light Rain
 Comments:

Session ID: 12390414 Date: 7/24/2008 Name: Ericka Pilcher
 Site: 004 Start Time: 11:00 AM Address:
 SubSite ID: semi End Time: 12:00 PM Phone: Wind: none
 Park: KEFJ Time Group: 2 Palm ID: PN70UB15V0 Weather: Light Rain
 Comments: Every once in a while I thought i heard distance vehicles

Session ID: 12390415 Date: 7/24/2008 Name: Christina Kriedeman
 Site: 004 Start Time: 1:00 PM Address:
 SubSite ID: BACKCO End Time: 2:00 PM Phone: Wind:
 Park: KEFJ Time Group: 2 Palm ID: PN70UB15V0 Weather:
 Comments:

Session ID: 897030 Date: 7/26/2012 Name: Fulton, Travis
 Site: 004 Start Time: 8:47 AM Address:
 SubSite ID: Nike End Time: 9:47 AM Phone: Wind: calm
 Park: KEFJ Time Group: 1 Palm ID: PN70M6W8M Weather: Sunny
 Comments: Surveyor: Travis Fulton Natural unknown= rustling in brush caused by animal or bird

Session ID: 6553608 Date: 6/29/2012 Name: Kriedeman, Christina
 Site: 004 Start Time: 12:23 PM Address:
 SubSite ID: Nike End Time: 1:23 PM Phone: Wind: intermittent
 Park: KEFJ Time Group: 2 Palm ID: PN70M6W8M Weather: Partly Cloudy
 Comments:

Session ID: 6553614 Date: 7/26/2012 Name: Torigoe, Stacey
 Site: 004 Start Time: 8:47 AM Address:
 SubSite ID: Nike End Time: 9:47 AM Phone: Wind: calm

Park: KEFJ Time Group: 1 Palm ID: PN70M6W8M Weather: Sunny
 Comments: Surveyor: Stacey Torigoe SCA natural unknown = rustling in brush-caused by animal or bird

Sound Source Audibility (PA: Percentage of period audible, Events reported as seconds)

Sound ID	Sound Source Description	PA	Max Event	Mean Event	Min Event	SD Event	Count
1	Aircraft	0.0	47	47	47		1
1.1	Jet	1.0	135	57	1	64	4
1.2	Aircraft, Propeller	1.0	209	209	209		1
2	Vehicle	13.0	214	31	1	30	130
2.12	Alarm, Horn	1.0	164	164	164		1
2.13	Vehicle Door	0.0	3	2	2	1	3
2.2	Motorcycle	0.0	42	30	18	17	2
6	Motor	0.0	24	20	16	6	2
8.1	People, Voices	0.0	2	2	2		1
20	Non-natural Unknown	0.0	5	4	2	2	2
21	Wind	2.0	129	35	1	43	16
22	Water	33.0	3,594	1,541	1	1,335	7
22.1	Rain/Fog Drip	46.0	3,599	747	0	1,378	20
22.2	Flowing Water	66.0	3,599	3,071	61	1,328	7
24	Mammal	0.0	2	2	2		1
25	Bird	64.0	3,590	102	0	349	204
28	Insect	20.0	2,461	28	0	176	232
30.1	Avalanche / Rockslide	0.0	6	6	6		1
39.1	Natural Other	7.0	767	101	8	164	22
40	Natural Unknown	0.0	13	7	2	4	8
99	Unknown	0.0	12	9	6	4	2
G0100	All Aircraft	1.5					
G0200	All Road Vehicles	12.9					
G2000	All Non-natural Sources	14.5					
G4000	All Natural Sources	99.9					
NFI	Noise Free Interval	85.5	3,600	191	1	391	145

Audibility Report KEFJ005

Sessions: Duration as seconds: 54,038 Duration as minutes: 900.63 AudRpt ID: 48

Session ID: 897045 Date: 2/16/2013 Name: KEFJ Staff 1
 Site: KEFJ005 Start Time: 1:05 PM Address:
 SubSite ID: EXIT GL End Time: 2:05 PM Phone: Wind: CALM
 Park: KEFJ Time Group: 2 Palm ID: PN70M6W8M Weather: Sunny
 Comments:

Session ID: 897046 Date: 2/26/2013 Name: KEFJ Staff 1
 Site: KEFJ005 Start Time: 12:45 PM Address:
 SubSite ID: EXIT End Time: 1:45 PM Phone: Wind: INTERMITTE
 Park: KEFJ Time Group: 2 Palm ID: PN70M6W8M Weather: Cloudy
 Comments: NON NAT OTHER - distant engine sounds

Session ID: 897047 Date: 3/2/2013 Name: KEFJ Staff 1
 Site: KEFJ005 Start Time: 11:15 AM Address:
 SubSite ID: Snow End Time: 12:15 PM Phone: Wind: CALM
 Park: KEFJ Time Group: 2 Palm ID: PN70M6W8M Weather: Partly Cloudy
 Comments: NON NAT OTHER - distant engine sounds; indistinct origin, subtle

Session ID: 897048 Date: 3/13/2013 Name: KEFJ Staff 1
 Site: KEFJ005 Start Time: 3:55 PM Address:
 SubSite ID: EXIT End Time: 4:55 PM Phone: Wind: CALM
 Park: KEFJ Time Group: 2 Palm ID: PN70M6W8M Weather: Sunny
 Comments: WIND - constant wind sound on ridges; intermittent local gusts. WIND-INDUCED NAT - rustling cottonwood bark. GEO/MASS - rockfall. NON NAT OTHER - indistinct distant engine

Session ID: 897050 Date: 3/26/2013 Name: KEFJ Staff 1
 Site: KEFJ005 Start Time: 10:30 AM Address:
 SubSite ID: EXIT End Time: 11:30 AM Phone: Wind: LIGHT
 Park: KEFJ Time Group: 1 Palm ID: PN70M6W8M Weather: Partly Cloudy
 Comments: NON NAT OTHER - distant, indistinct engine sounds WIND INDUCED NAT - rustling cottonwood bark and branches

Session ID: 6553622 Date: 1/8/2013 Name: KEFJ Staff 1
 Site: KEFJ005 Start Time: 11:15 AM Address:
 SubSite ID: End Time: 12:15 PM Phone: Wind: calm
 Park: KEFJ Time Group: 2 Palm ID: PN70M6W8M Weather: Snowing
 Comments: NON NAT UNKNOWN - distant engine sounds, unknown origin SKIING, SNOWCAT.

Session ID: 6553623 Date: 1/21/2013 Name: KEFJ Staff 1
 Site: KEFJ005 Start Time: 3:59 PM Address:
 SubSite ID: End Time: 4:59 PM Phone: Wind: breeze at
 Park: KEFJ Time Group: 3 Palm ID: PN70M6W8M Weather: Partly Cloudy
 Comments: NON NAT OTHER - distant engine sounds unknown origin WIND - constant sound from down valley; occasional breezes through survey site SLOUGHING SNOW - constant crackling and falling of old wet sno frozen onto branches BIRD - ravens and chickadees

Session ID: 6553624 Date: 2/2/2013 Name: KEFJ Staff 2
 Site: KEFJ005 Start Time: 2:10 PM Address:
 SubSite ID: exit glacier End Time: 3:10 PM Phone: Wind: calm
 Park: KEFJ Time Group: 2 Palm ID: PN70M6W8M Weather: Light Rain
 Comments: NON NAT OTHER - distant engine sound; unknown origin SKOUGHING SNOW - constant dripping from trees with larger bursts of falling snow every few seconds WIND - constant down-

valley sound

Session ID:	6553627	Date:	2/22/2013	Name:	Kriedeman, Christina
Site:	KEFJ005	Start Time:	11:24 AM	Address:	
SubSite ID:	snow	End Time:	12:24 PM	Phone:	Wind: variable
Park:	KEFJ	Time Group:	0	Palm ID:	PN70M6W8M Weather: Sunny
Comments:					
Session ID:	6553630	Date:	3/16/2013	Name:	KEFJ Staff 1
Site:	KEFJ005	Start Time:	2:10 PM	Address:	
SubSite ID:	EG	End Time:	3:10 PM	Phone:	Wind: CALM
Park:	KEFJ	Time Group:	2	Palm ID:	PN70M6W8M Weather: Sunny
Comments: NON NAT OTHER - indistinct distant engine sounds; subtle, blends with downvalley wind. WIND - subtle wind sound from Res River valley. GEO/MASS - rockfall.					
Session ID:	6553633	Date:	4/4/2013	Name:	Kriedeman, Christina
Site:	KEFJ005	Start Time:	12:46 PM	Address:	
SubSite ID:	snow	End Time:	1:46 PM	Phone:	Wind: calm
Park:	KEFJ	Time Group:	0	Palm ID:	PN70M6W8M Weather: Sunny
Comments: geo/mass is rock slides sled dog kennel is barking sled dog team					
Session ID:	6553634	Date:	4/7/2013	Name:	KEFJ Staff 1
Site:	KEFJ005	Start Time:	11:55 AM	Address:	
SubSite ID:	EXIT	End Time:	12:55 PM	Phone:	Wind: LIGHT
Park:	KEFJ	Time Group:	2	Palm ID:	PN70M6W8M Weather: Sunny
Comments: NON NAT OTHER - distant engine sounds, indistinct GUNSHOTS - distant echoes from Seward shooting range GEO/MASS - rockfall WIND INDUCED NAT - rustling cottonwood bark					
Session ID:	7856131	Date:	11/27/2008	Name:	Christina Kriedeman
Site:	KEFJ005	Start Time:	12:00 PM	Address:	
SubSite ID:		End Time:	1:00 PM	Phone:	Wind:
Park:	KEFJ	Time Group:	0	Palm ID:	PN70UCM7V2 Weather:
Comments:					
Session ID:	7856134	Date:	1/21/2008	Name:	Christina Kriedeman
Site:	KEFJ005	Start Time:	11:00 AM	Address:	
SubSite ID:		End Time:	12:00 PM	Phone:	Wind:
Park:	KEFJ	Time Group:	0	Palm ID:	PN70UCM7V2 Weather:
Comments: nat unknown are all rock slides domestic animal are a dogsled team barking					
Session ID:	7856135	Date:	1/21/2008	Name:	Christina Kriedeman
Site:	KEFJ005	Start Time:	1:00 PM	Address:	
SubSite ID:		End Time:	2:00 PM	Phone:	Wind:
Park:	KEFJ	Time Group:	0	Palm ID:	PN70UCM7V2 Weather:
Comments:					

Sound Source Audibility (PA: Percentage of period audible, Events reported as seconds)

Sound ID	Sound Source Description	PA	Max Event	Mean Event	Min Event	SD Event	Count
1.1	Jet	1.0	198	105	22	75	5
1.2	Aircraft, Propeller	1.0	266	155	12	124	5
1.3	Helicopter	1.0	384	185	26	184	4
4.1	Snowmobile	17.0	1,995	228	4	369	41
4.2	Snowcoach	0.0	221	75	1	126	3
8	People	0.0	19	9	1	7	7
8.1	People, Voices	1.0	93	21	1	25	31
8.3	Skiing	0.0	4	4	4		1
8.5	Gunshot	1.0	49	15	3	14	19
9	Domestic Animal	0.0	134	42	3	62	4
9.1	Dog	0.0	41	24	7	24	2
9.6	Sled Dog Kennel	8.0	536	82	1	116	53
19	Non-natural Other	20.0	650	107	1	139	100
20	Non-natural Unknown	2.0	324	66	3	98	18
21	Wind	52.0	3,598	432	2	922	65
22.1	Rain/Fog Drip	1.0	514	514	514		1
22.32	Sloughing Snow	14.0	3,586	172	2	749	43
22.4	Waterfall	0.0	2	2	2		1
24.1	Squirrel	0.0	148	35	7	53	7
24.3	Coyote	0.0	2	2	2		1
24.6	Bat	0.0	8	8	8		1
25	Bird	27.0	1,214	35	0	88	416
30	Geothermal / Mass	3.0	190	26	5	28	66
30.1	Avalanche / Rockslide	0.0	11	10	7	2	3
39.1	Natural Other	7.0	326	54	2	73	66
39.2	Cracking or Popping Tree	0.0	13	4	1	2	42
40	Natural Unknown	1.0	44	9	2	7	47
G0100	All Aircraft	3.7					
G0400	All Oversnow Vehicles	17.5					
G2000	All Non-natural Sources	47.6					
G4000	All Natural Sources	72.1					
NFI	Noise Free Interval	54.6	3,601	186	1	468	159

Audibility Report KEFJ006

Sessions: Duration as seconds: 72,032 Duration as minutes: 1,200.53 AudRpt ID: 46

Session ID: 7856132 Date: 1/18/2008 Name: Christina Kriedeman
 Site: KEFJ006 Start Time: 3:02 PM Address:
 SubSite ID: End Time: 4:02 PM Phone: Wind:
 Park: KEFJ Time Group: 0 Palm ID: PN70UCM7V2 Weather:
 Comments: all natural unknown are rock slides during this session

Session ID: 7856136 Date: 1/22/2008 Name: Christina Kriedeman
 Site: KEFJ006 Start Time: 11:00 AM Address:
 SubSite ID: End Time: 12:00 PM Phone: Wind:
 Park: KEFJ Time Group: 0 Palm ID: PN70UCM7V2 Weather:
 Comments: ALL NON-NTURAL UNKNOWN ARE TRAIN HORNS ALL NATURAL UNKNOWN ARE ROCK SLIDES

Session ID: 7856137 Date: 1/22/2008 Name: Christina Kriedeman
 Site: KEFJ006 Start Time: 1:00 PM Address:
 SubSite ID: End Time: 2:00 PM Phone: Wind:
 Park: KEFJ Time Group: 0 Palm ID: PN70UCM7V2 Weather:
 Comments: difficult to tell diff between water and wind

Session ID: 7856138 Date: 1/30/2008 Name: Christina Kriedeman
 Site: KEFJ006 Start Time: 12:00 PM Address:
 SubSite ID: End Time: 1:00 PM Phone: Wind:
 Park: KEFJ Time Group: 0 Palm ID: PN70UCM7V2 Weather:
 Comments: natural unknown is rock slide

Session ID: 7856140 Date: 2/12/2008 Name: Christina Kriedeman
 Site: KEFJ006 Start Time: 11:00 AM Address:
 SubSite ID: End Time: 12:00 PM Phone: Wind:
 Park: KEFJ Time Group: 0 Palm ID: PN70UCM7V2 Weather:
 Comments: non-natural unknown was some type of traffic from highway or snowmobile, but unsure what it was. I heard gunshots out of the park, so it could have been their vehicle, possibly ATV too. more snow avalanches

Session ID: 7856141 Date: 2/12/2008 Name: Christina Kriedeman
 Site: KEFJ006 Start Time: 1:00 PM Address:
 SubSite ID: End Time: 2:00 PM Phone: Wind:
 Park: KEFJ Time Group: 0 Palm ID: PN70UCM7V2 Weather:
 Comments: natural unknown is snow avalanche unless specified as rock slide non-natural unknown is mostly low level motor or highway sounds not sure, also train engine and train horn

Session ID: 7856142 Date: 2/18/2008 Name: Christina Kriedeman
 Site: KEFJ006 Start Time: 11:00 AM Address:
 SubSite ID: End Time: 12:00 PM Phone: Wind:
 Park: KEFJ Time Group: 0 Palm ID: PN70UCM7V2 Weather:
 Comments:

Session ID: 7856143 Date: 2/18/2008 Name: Christina Kriedeman
 Site: KEFJ006 Start Time: 1:00 PM Address:
 SubSite ID: End Time: 2:00 PM Phone: Wind:
 Park: KEFJ Time Group: 0 Palm ID: PN70UCM7V2 Weather:
 Comments:

Session ID: 897043 Date: 1/18/2013 Name: KEFJ Staff 1
 Site: KEFJ006 Start Time: 1:30 PM Address:
 SubSite ID: End Time: 2:30 PM Phone: Wind: calm
 Park: KEFJ Time Group: 2 Palm ID: PN70M6W8M Weather: Cloudy
 Comments: NON NAT OTHER: distant engine sounds, unknown origin NON NAT UNKNOWN: initial
 impression of distant machine impact; final impression of shooting echos from the shooting range
 AIRCRAFT UNKNOWN: likely a propeller airplane BIRD: chickadees

Session ID: 897044 Date: 2/5/2013 Name: KEFJ Staff 1
 Site: KEFJ006 Start Time: 10:50 AM Address:
 SubSite ID: EDGE OF End Time: 11:50 AM Phone: Wind: CALM
 Park: KEFJ Time Group: 1 Palm ID: PN70M6W8M Weather: Partly Cloudy
 Comments: NON NAT OTHER - distant engine sounds; unknown or indistinct origin AVAL/SLIDE -
 snow, ice, and rockfall north of Exit G1 parking lot

Session ID: 6553625 Date: 2/10/2013 Name: KEFJ Staff 1
 Site: KEFJ006 Start Time: 1:27 PM Address:
 SubSite ID: EDGE OF End Time: 2:27 PM Phone: Wind: INTERMITTE
 Park: KEFJ Time Group: 2 Palm ID: PN70M6W8M Weather: Sleet / hail
 Comments: NON NAT UNKNOWN - loud boom from naturecenter area PEOPLE - voices and/or yelling
 WIND INDUCED NATURE - rustling alder leaves

Session ID: 6553626 Date: 2/21/2013 Name: KEFJ Staff 1
 Site: KEFJ006 Start Time: 2:00 PM Address:
 SubSite ID: EDGE OF End Time: 3:00 PM Phone: Wind: CALM
 Park: KEFJ Time Group: 2 Palm ID: PN70M6W8M Weather: Partly Cloudy
 Comments: NON NAT OTHER - distant engine sounds; unknown origin GUNSHOTS - distant, downvalley
 reports from the firing range

Session ID: 6553628 Date: 2/23/2013 Name: KEFJ Staff 1
 Site: KEFJ006 Start Time: 11:35 AM Address:
 SubSite ID: EDGE OF End Time: 12:35 PM Phone: Wind: LIGHT
 Park: KEFJ Time Group: 2 Palm ID: PN70M6W8M Weather: Snowing
 Comments: NON NAT OTHER - distant engine sounds; unknown origin PEOPLE - noon-alarm from

Session ID: 6553629 Date: 3/4/2013 Name: KEFJ Staff 1
 Site: KEFJ006 Start Time: 12:45 PM Address:
 SubSite ID: EDGE OF End Time: 1:45 PM Phone: Wind: LIGHT
 Park: KEFJ Time Group: 2 Palm ID: PN70M6W8M Weather: Cloudy
 Comments: NON NAT OTHER - indistinct distant engine sound GEO/MASS - rockfall AVAL/SLIDE -
 snow and ice fall WIND-INDUCED NAT - rustling leaves

Session ID: 897049 Date: 3/19/2013 Name: KEFJ Staff 1
 Site: KEFJ006 Start Time: 11:00 AM Address:
 SubSite ID: End Time: 12:00 PM Phone: Wind: lught breeze
 Park: KEFJ Time Group: 2 Palm ID: PN70M6W8M Weather: Sunny
 Comments:

Session ID: 6553631 Date: 3/23/2013 Name: KEFJ Staff 1
 Site: KEFJ006 Start Time: 1:36 PM Address:
 SubSite ID: GLCR End Time: 2:36 PM Phone: Wind: INTERMITTE
 Park: KEFJ Time Group: 2 Palm ID: PN70M6W8M Weather: Cloudy
 Comments: WIND INDUCED NAT - rustling alder GEO/MASS - rock and ice fall AVAL/ - snowslide

Session ID: 6553632 Date: 3/31/2013 Name: KEFJ Staff 1

Site: KEFJ006 Start Time: 11:01 AM Address:
SubSite ID: EDGE OF End Time: 12:01 PM Phone: Wind: CALM
Park: KEFJ Time Group: 2 Palm ID: PN70M6W8M Weather: Partly Cloudy
Comments: NON NAT OTHER - distant engine sounds GEO/MASS - rockfall AVAL/SIDE - wet snow

Session ID: 897051 Date: 4/1/2013 Name: KEFJ Staff 1
Site: KEFJ006 Start Time: 12:48 PM Address:
SubSite ID: EDGE OF End Time: 1:48 PM Phone: Wind: BREEZY
Park: KEFJ Time Group: 2 Palm ID: PN70M6W8M Weather: Partly Cloudy
Comments: NON NAT OTHER - DISTANT ENGINE SOUND GEO/MASS - ROCKFALL WIND
INDUCED NAT - RUSTLING ALDERS

Session ID: 897052 Date: 4/4/2013 Name: Kriedeman, Christina
Site: KEFJ006 Start Time: 10:45 AM Address:
SubSite ID: upper loop End Time: 11:45 AM Phone: Wind: none
Park: KEFJ Time Group: 0 Palm ID: PN70M6W8M Weather: Sunny
Comments: geo/mass is rock slides human causes unknown was the snowcoach in the distance before i knew
what it was

Session ID: 897053 Date: 4/9/2013 Name: KEFJ Staff 1
Site: KEFJ006 Start Time: 11:02 AM Address:
SubSite ID: EDGE OF End Time: 12:02 PM Phone: Wind: BREEZY
Park: KEFJ Time Group: 2 Palm ID: PN70M6W8M Weather: Sunny
Comments: WIND INDUCED NAT - rustling alders, blowing ice crystals NON NAT OTHER - indistinct
engine sounds GEO/MASS - rockfall

Sound Source Audibility (PA: Percentage of period audible, Events reported as seconds)

Sound ID	Sound Source Description	PA	Max Event	Mean Event	Min Event	SD Event	Count
1	Aircraft	0.0	119	54	6	50	6
1.1	Jet	0.0	35	32	29	3	3
1.2	Aircraft, Propeller	1.0	309	162	15	154	4
1.3	Helicopter	0.0	183	183	183		1
2.5	Heavy Equipment	8.0	3,170	1,968	33	1,692	3
4.1	Snowmobile	18.0	2,054	204	2	390	63
4.2	Snowcoach	1.0	695	228	39	314	4
8	People	0.0	48	12	2	12	14
8.1	People, Voices	3.0	219	25	0	34	97
8.5	Gunshot	1.0	158	35	3	46	11
9.1	Dog	0.0	18	8	3	5	7
9.6	Sled Dog Kennel	5.0	811	143	1	204	24
19	Non-natural Other	11.0	624	110	1	139	73
20	Non-natural Unknown	9.0	1,262	122	2	232	51
21	Wind	47.0	3,623	253	2	745	134
22	Water	27.0	3,599	481	0	934	41
22.1	Rain/Fog Drip	0.0	0	0	0		1
22.2	Flowing Water	20.0	3,596	2,015	515	1,499	7
22.3	Snowfall	4.0	2,615	1,596	578	1,440	2
22.4	Waterfall	17.0	3,599	547	15	1,024	22
24.1	Squirrel	0.0	8	8	8		1
25	Bird	42.0	2,529	72	0	234	415
25.178340	Alder Flycatcher	0.0	3	3	3		1
28	Insect	0.0	3	3	3		1
30	Geothermal / Mass	3.0	219	18	2	24	111
30.1	Avalanche / Rockslide	2.0	157	24	1	28	65
39.1	Natural Other	10.0	983	170	6	230	44
40	Natural Unknown	5.0	133	16	0	17	233
G0100	All Aircraft	1.7					
G0200	All Road Vehicles	8.2					
G0400	All Oversnow Vehicles	19.1					
G2000	All Non-natural Sources	52.7					
G4000	All Natural Sources	93.0					

NFI	Noise Free Interval	55.8	3,625	189	1	481	213
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Appendix C. Detailed site maps

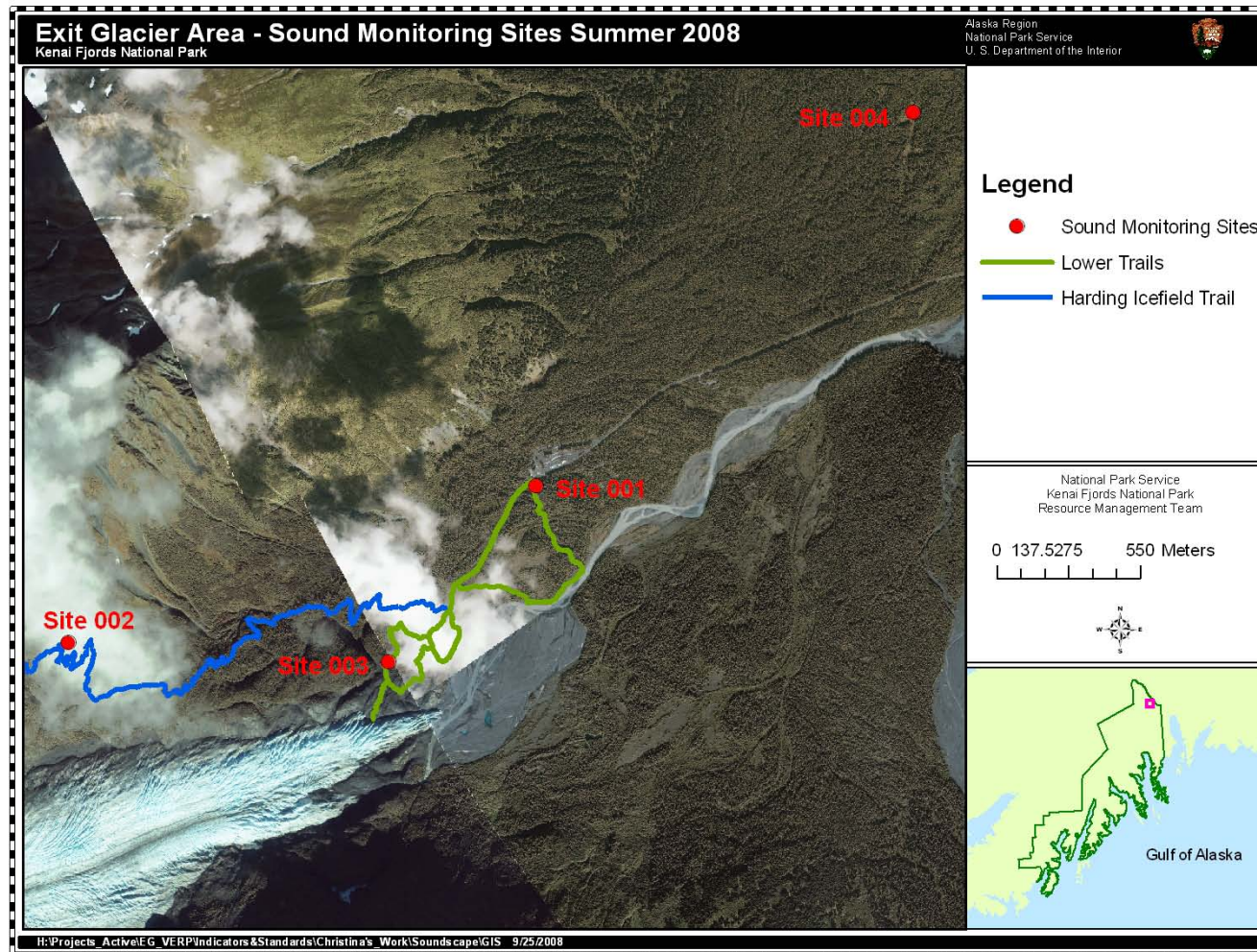


Figure 14. Location of summer monitoring sites

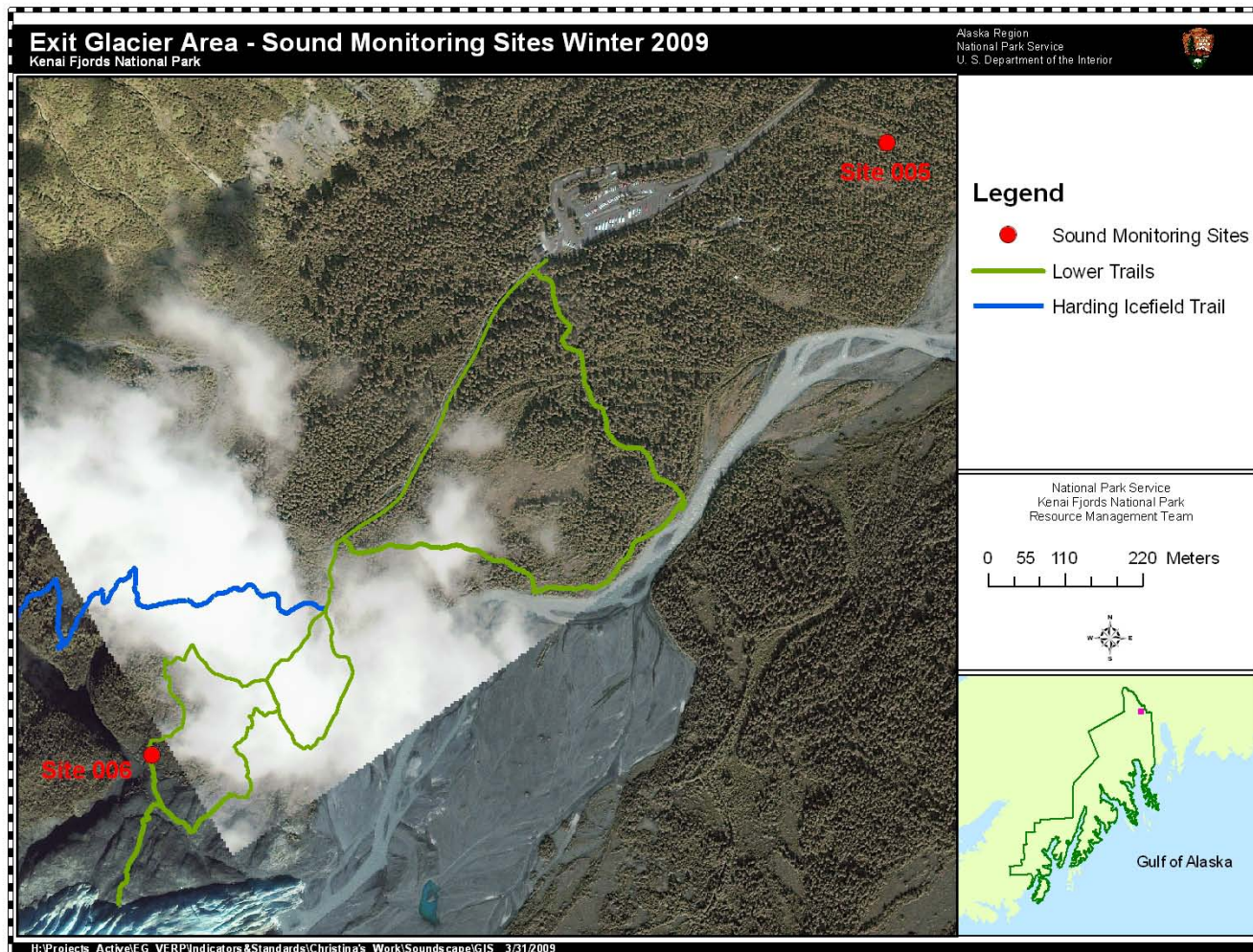


Figure 15. Location of winter monitoring sites

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 186/122447, September 2013

National Park Service
U.S. Department of the Interior



Natural Resource Stewardship and Science

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