Appendix 8-A

Brucejack Gold Mine Project: 2012 Noise Baseline Report

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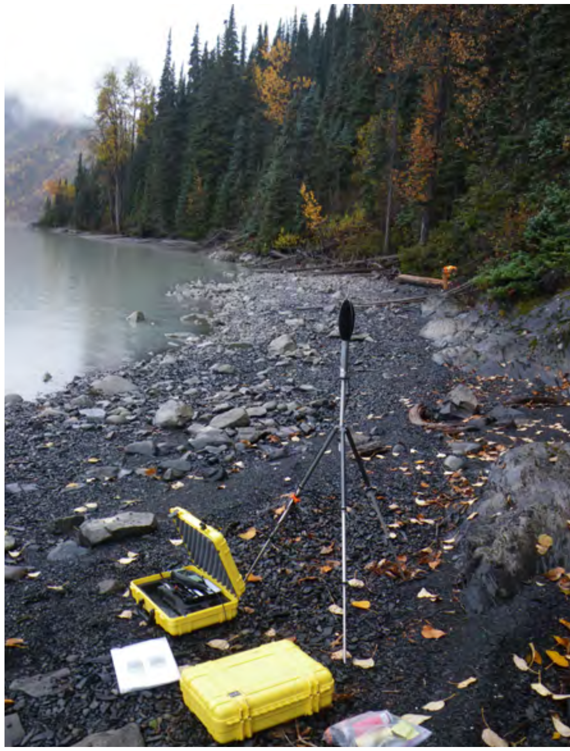
Pretium Resources Inc.

BRUCEJACK GOLD MINE PROJECT
2012 Noise Baseline Report

PRETIVM



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BRUCEJACK GOLD MINE PROJECT
2012 NOISE BASELINE REPORT

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Prepared for:

Pretium Resources Inc.

Prepared by:

Rescan™ Environmental Services Ltd.
Vancouver, British Columbia

Executive Summary

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Executive Summary

The Brucejack Gold Mine Project (the Project) is situated within the Sulphurets District in the Iskut River region, approximately 20 kilometres northwest of Bowser Lake or 65 kilometres north-northwest of the town of Stewart, British Columbia. The present report documents a noise baseline study completed for the study area defined for the Project.

The objective of the noise baseline study was to determine background noise levels at sensitive receptors in the vicinity of the Project to facilitate an environmental effects assessment. Six noise monitoring stations were established in 2012. Noise levels were recorded over 24-hour monitoring periods in March and September/October. The locations were selected to characterize the range of baseline conditions in the region and at locations of sensitive receptors. Minimum, maximum and average noise levels were recorded, as well as audible sound files.

Results from the noise monitoring program captured both the noise levels and the sources of the noise. Natural background noise sources included birds, mammals, waves, and wind, while anthropogenic sources included helicopters, airplanes, vehicles and machinery. Only one station, S6, located near the existing Brucejack Exploration Camp, observed anthropogenic sounds other than aircraft.

Depending on the noise monitoring station location and season, the average, minimum and maximum noise levels ranged from 32.5 to 64.7 dBA, 15.7 to 37.3 dBA and 67.6 to 121.9 dBA, respectively. Anthropogenic noise sources were generally louder than natural background noise levels. L_{90}, the ninetieth percentile level, provides a better indication of the natural noise levels since discrete events that occur from anthropogenic sources are typically not present during 90 percent of the measurement time period. The average L_{90} levels that were measured ranged from 16.1 to 43.8 dBA.

Noise data collected in 2012 was similar to studies done in other remote and undeveloped areas in British Columbia, where L_{eq} values have been observed to range from 40 to 48 dbA. The higher values measured at the Project are predominantly due to the high number of aircraft passing over the area and the occurrence of high winds. The L_{90} results are similar to measurements taken at other proposed mine sites and are below the estimated baseline level for rural areas (Alberta EUB 2007; WHO 1999).

Acknowledgements

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Acknowledgements

This report was produced for Pretium Resources Inc. by Rescan Environmental Services Ltd. It was written by Kiri Heal (M.Sc.) and reviewed by Derek Shaw. Greg Norton (M.Sc.) was the project manager and Nicole Bishop (B.Sc.) the project coordinator. Graphics production was coordinated by Francine Alford (B.F.A.), GIS production was coordinated by Pieter van Leuzen (M.Sc.) and report production was coordinated by Robert Tarbuck (BTECH). Field work was conducted by Daniel Casanova (B.Sc.), Emerson Belland (B.Sc.), Matt MacDonald (B.Sc.) and Jem Morrison (B.Sc.) with assistance from Jordan Hunter of the Skii km Lax Ha.

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BRUCEJACK GOLD MINE PROJECT
2012 NOISE BASELINE REPORT

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Glossary and Abbreviations

Glossary and Abbreviations

Terminology used in this document is defined where it is first used. The following list will assist readers who may choose to review only portions of the document.

ASTM	American Society for Testing and Materials
BC MOE	British Columbia Ministry of Environment
dBA	Sound levels measured with an A-weighted filter, which is within a response frequency range for humans and animals, between 1 kHz to 4 kHz (1,000 to 4,000 vibrations per second)
EC	Environment Canada
Eq	Equivalent (a unit of measurement, defined as the amount of a substance which will react with or supply one mole of hydrogen ions in an acid-base reaction)
GPS	Global Positioning System
Ha	Hectares
L_{90}	Ninetieth percentile level (the A-weighted sound pressure level that is exceeded 90 percent of the time during the measurement period)
L_{eq}	Continuous equivalent sound level over a time period
L_{max}	Maximum recorded sound level during an hourly period
L_{min}	Minimum sound value recorded during a 24-hour monitoring period
QA	Quality Assurance
QC	Quality Control
tpd	Tonne per day
UTM	Universal Transverse Mercator (coordinate system)

1. Introduction

1. Introduction

Noise is generally defined as unwanted sound. It is characterized in terms of the pressure of the sound wave. Human perception of sound pressure is non-linear: a ten-fold increase in sound pressure is perceived as a doubling of the noise level by the average person. This non-linearity is reflected in the use of the decibel (dB), a logarithmic measure of noise level. The dB is the logarithm of the ratio of the root mean square (rms) sound pressure relative to a standard rms sound pressure, usually 20 μPa, the hearing threshold below which sound is not detectable by the human ear.

Some typical noise levels are as follows:

- rustling leaves: 20;
- humming of refrigerator: 40;
- normal conversation: 60;
- business office: 65;
- average city traffic: 80 to 85;
- jackhammer:100;
- jet take-off at 100 m distance: 130; and
- motorcycles, firecrackers, small arms fire: up to 140.

Elevated noise levels can have direct and indirect health effects on wildlife and human populations.

Noise may affect wildlife populations by causing them to avoid important habitats and/or take time away from other key behaviors such as feeding, breeding, or watching for predators, which can ultimately lead to reduced reproductive productivity and/or increased mortality.

There are three main ways that noise can adversely affect humans: through increased annoyance, sleep disturbance, or activity interference such as a reduction in speech intelligibility. Sleep disturbance, including difficulty falling asleep, awakenings, curtailed sleep duration, alterations of sleep stages or depth, and increased body movements during sleep.

Development of the Brucejack Gold Mine Project will result in elevated noise levels in the vicinity of the Project infrastructure and activities. The Project is located in a remote and undeveloped area. While there are no existing human populations in the vicinity of the Project, there are sensitive wildlife receptors, including mountain goat.

This report presents the results of a noise baseline study for the Brucejack Gold Mine Project undertaken in March, September and October of 2012. Monitoring of baseline noise was carried out at six locations for one 24-hour period during the summer and one 24-hour period during the winter. The objective of the study was to collect information on background noise levels in the vicinity of the proposed project for planning of the project, describing the environmental setting, and assessing potential environmental effects as the Project moves through the various design, permitting, and development phases.

2. Project Description

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2. Project Description

Pretium Resources Inc. (Pretivm) proposes to develop the Brucejack Gold Mine Project (the Project) as a 2,700 tonne per day (tpd) underground gold and silver mine. The Brucejack property is located at 56°28′20″ N latitude by 130°11′31″ W longitude, which is approximately 950 km northwest of Vancouver, 65 km north-northwest of Stewart, and 21 km south-southeast of the closed Eskay Creek Mine (Figure 2-1). The Project is located within the Kitimat-Stikine Regional District. Several First Nation and Treaty Nations have traditional territory within the general region of the Project including the Skii km Lax Ha, the Nisga'a Nation, the Tahltan Nation, the Gitxan First Nation, and the Gitanyow First Nation.

The mine site area will be located near Brucejack Lake. Vehicle access to the mine site will be via an existing exploration access road from Highway 37 that will require upgrades to facilitate traffic during mine operations. A transmission line will connect the mine site to the provincial power grid near Stewart or along Highway 37; two options are currently under consideration.

The Project is located within the boundary range of the Coast Mountain Physiographic Belt, along the western margin of the Intermontane Tectonic Belt. The local terrain ranges from generally steep in the western portion of the Project area in the high alpine with substantial glacier cover to relatively subdued topography in the eastern portion of the Project area towards the Bell-Irving River. The Brucejack mine site will be located above the tree line in a mountainous area at an elevation of approximately 1,400 masl; surrounding peaks measure 2,200 m in elevation. The access and transmission corridors will span a range of elevations and ecosystems reaching a minimum elevation near the Bell Irving River of 500 masl. Sparse fir, spruce, and alder grow along the valley bottoms, with only scrub alpine spruce, juniper, alpine grass, moss, and heather covering the steep valley walls.

The general area of the Brucejack Property has been the target of mineral exploration since the 1960s. In the 1980s Newhawk Gold Mines Ltd. conducted advanced exploration activities at the current site of the proposed Brucejack mine site that included 5 km of underground development, construction of an access road along the Bowser River and Knipple Glacier, and resulted in the deposition of 60,000 m^3 of waste rock within Brucejack Lake.

Environmental baseline data was collected from Brucejack Lake and the surround vicinity in the 1980s to support a Stage I Impact Assessment for the Sulphurets Project proposed by Newhawk Gold Mines Ltd. Silver Standard Resources Inc. commenced recent environmental baseline studies specific to the currently proposed Project in 2009 which have been continued by Pretivm, following its acquisition of the Project in 2010. The scope and scale of the recent environmental baseline programs have varied over the period from 2009 to the present as the development plan for the Project has evolved.

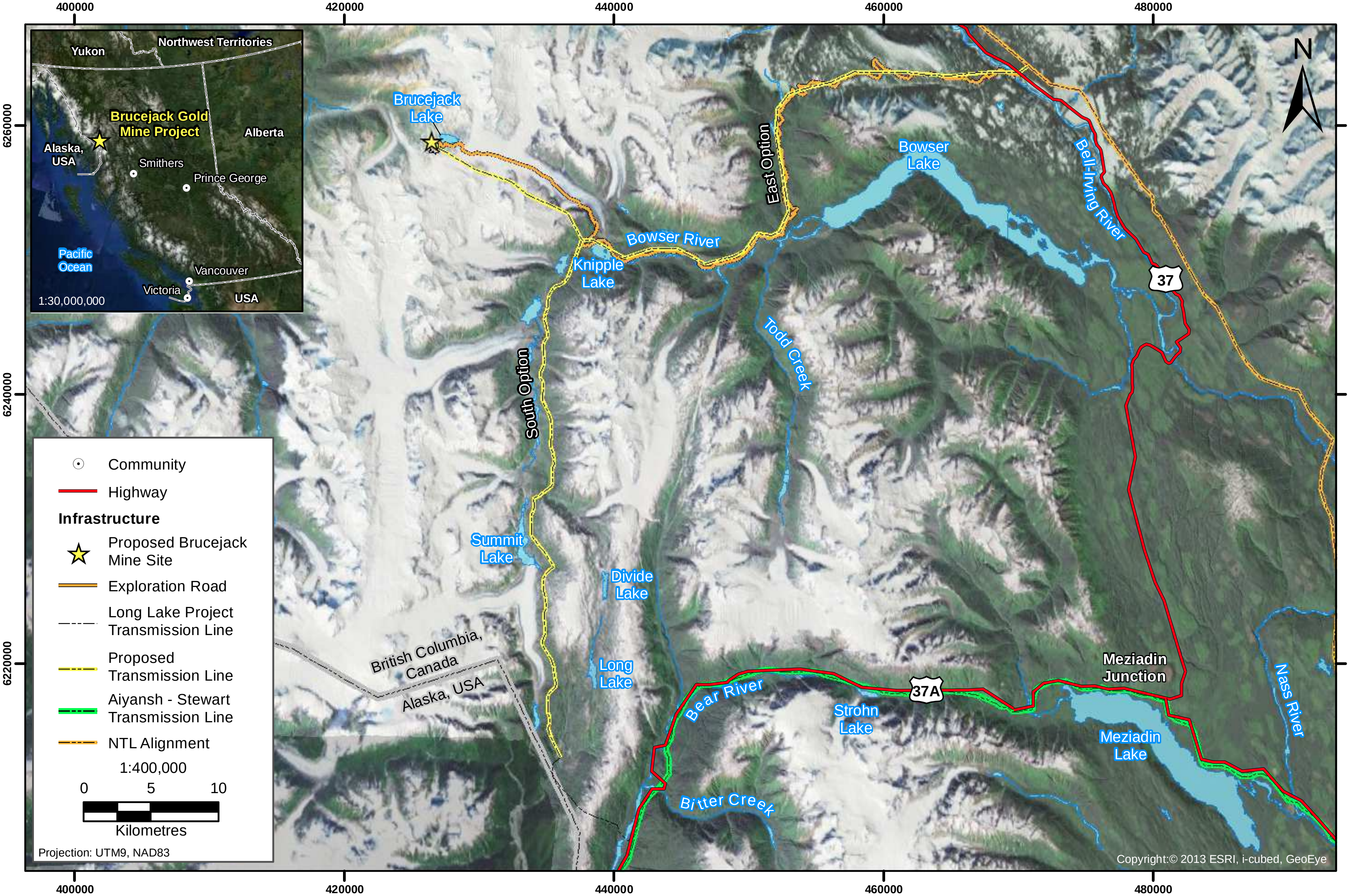

Figure 2-1

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Brucejack Gold Mine Project Overview

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3. Background Information

3. Background Information

3.1 APPLICABLE LEGISLATION (FEDERAL AND PROVINCIAL)

There is currently no federal or provincial legislation that stipulate noise levels for mine development projects. However, the Canadian Environmental Assessment Act (CEAA) requires that the environment is protected from significant adverse environmental effects caused by a designated project (2012). It states that an environmental assessment is required if the activity may cause adverse environmental effects. The British Columbia Environment Assessment Act (BCEAA) states that an environmental assessment is required if a project may have a significant adverse environmental, economic, social, heritage or health effect (2002a).

WHO (1999) has published guidelines on recommended noise levels to minimize sleep disturbance:

- "If negative effects on sleep are to be avoided the equivalent sound pressure level should not exceed 30 dBA indoors for continuous noise"; and
- "For a good sleep, it is believed that indoor sound pressure levels should not exceed approximately 45 dB L_{max} more than 10 - 15 times per night."

Typically, noise effects are assessed for human receptors not employed by the Project, outside of the Project boundaries. However, current best practice is to assess sleep disturbance at onsite mine camps as well.

There are also no legislated noise limits that apply to wildlife, however ungulate winter range U-6-002 (BC Order U-6-002) under the Government Action Regulations (B.C. Reg. 582/2004), states that potential effects on mountain goats should be taken into account when carrying out activities close to the ungulate winter range (2002b). Ungulate winter range U-6-002 intersects several proposed Project infrastructure. While noise thresholds are not identified in relation to ungulate winter range, restrictions on activities (e.g., helicopter and road traffic activity) is due in part to elevated noise levels associated with those activities. There is considerable academic and industrial monitoring research that provides guidance on the types of noise that can cause adverse effects to wildlife.

It is assumed that if the sound pressure level from mining activities exceeds 55 dBA during the day (L_d) and 45 dBA at night (L_n), this may result in loss of habitat for the wildlife receptors at these locations (Environment Canada 2012).

Helicopter noise may also affect mountain goats due to their sensitivity to helicopter disturbance. Based on threshold values identified for wildlife resulting in flight responses, a helicopter noise level threshold of 75 dBA is considered appropriate (Knight and Gutzwiller 1995; Efroymson and Sutter 2001).

Additionally, peak levels (L_{peak}) higher than 108 dB due to instantaneous blasting noise may have an effect on moose, mountain goat, grizzly bear, and black bear during construction and operation. The instantaneous noise level threshold of 108 dB (L_{peak}) was selected based on a range of threshold values (85 to 108 dB) identified for mammals resulting in flight response, freezing, or strong startle response (Manci et al. 1988; Weisenberger et al. 1996; Reimers and Colman 2006). At this level wildlife habitat is considered disturbed due to the behavioural response, while at levels above 120 dB it is considered functionally lost habitat.

3.2 LITERATURE REVIEW

Noise is typically monitored as sound pressure level, in A-weighted decibels (dBA). The A-weighting is designed to match the average frequency response of the human ear. Because of the non-linearity nature of the dB scale, sound levels cannot simply be added. Instead the logarithm has to be inverted before adding and then applied to the sum (Alberta EUB, 2007):

$$L_{total} = 10\log_{10}(10^{\frac{L_1}{10}} + 10^{\frac{L_2}{10}})$$

For example, people talking (50 dBA) in a very calm room (35 dBA) do not bring up the noise level in the room to that close to a major road (85 dBA). In fact, the background noise will no longer be audible once people start talking. Adding the noise levels in this example according to the formula above will raise total noise levels to 50.1 dBA; the 0.1 dBA increase is much lower than the 3 dBA difference required by the average person to notice any alteration in noise level. For the noise source to be audible it has to be at least as loud as the background (i.e., a background noise level of 35 dBA and a 35 dBA noise source have a total noise level of 38 dBA). On the other hand, if the total noise level is 41.2 dBA "switching off" the background noise and leaving only a noise source of 40 dBA (a 1.2 dBA change) will not be audible.

L_{eq} values include noise from anthropogenic sources such as helicopters and aircraft movement; therefore, not typically reflecting the natural noise level conditions in the area. L_{90} values provide a better indication of the natural noise levels since discrete events that occur from anthropogenic sources will not be part of 90% of the measurement time period. Additionally, the sound level meters recorded audible sound files, which were used for the analysis of the baseline data to identify the peak events and the associated noise sources.

Background noise monitoring has been conducted for several other mineral development projects in the region including the Kitsault Mine Project and the Schaft Creek Mine Project. Noise monitoring was conducted for Kitsault Mine Project in February, May, July and September 2009 at six locations. The overall L_{90} was 40 dBA (AMEC 2011). Background noise monitoring was conducted for the Schaft Creek Project in June and July 2007. The overall L_{eq} ranged from 40 to 48 dBA and the L_{90} values ranged from 31 to 39 dBA (Rescan RTEC 2008). These levels are comparable to estimated baseline levels for rural areas as given in the EUB Directive 038, which considers a rural area with night time sound levels to be 35 dBA (Alberta EUB 2007). Daytime ambient sound levels are commonly 10 dBA Leq higher than night time levels (WHO 1999), therefore daytime sound levels value are considered to be approximately 45 dBA. There are no baseline levels established for rural areas in British Columbia.

4. Objectives

4. Objectives

The objective of the 2012 noise baseline monitoring program was to collect information on baseline noise conditions in the vicinity of the proposed project before project commencement. The data will be used for planning of the project, describing the environmental setting, and assessing potential environmental effects of the Project as it moves through the various design phases.

To achieve this objective the following tasks were completed:

- identify primary locations of anticipated Project related noise sources;
- collect field measurements during snow-free and snow-cover periods; and
- identify periods of background noise from recorded data.

5. Study Area

5. Study Area

The noise baseline study area coincides with the local study area used for terrestrial ecosystem and wildlife baseline programs (Rescan 2013a; Rescan 2013b) for the Project (Figure 5-1). The monitoring program focused on the primary noise emission sources of the Project anticipated to be the mine site area near Brucejack Lake and the access road. Additional monitoring was completed in the Wildlife Creek area near the site of the previously proposed infrastructure. The results from these stations will be used to provide baseline information on ambient air conditions in an area free of the influence of Project activities.

Noise effects generally diminish with distance from a source. Most human generated noise has been found to be undetectable within 5 km for a large industrial source (Rescan 2013c). The noise background monitored at Snap Lake Mine in the Northwest Territories NWT (De Beers 2002) showed that the 24-hour L_{eq} for traffic and construction noise are predicted to be close to average background levels at a distance of 1.5 km from the road (35.1 dBA and 38.4 dBA, respectively). Noise from aircrafts will be audible at a greater distance. The effects of wind and terrain on outdoor sound propagation will, however, cause variation in sound levels at a distance from the noise sources.

The LSA extends approximately 1 km along the access road and the proposed transmission line. Around Brucejack Lake the LSA extends approximately 1 km to the northeast to approximately 9 km to the southwest. The terrain was also used to define study areas.

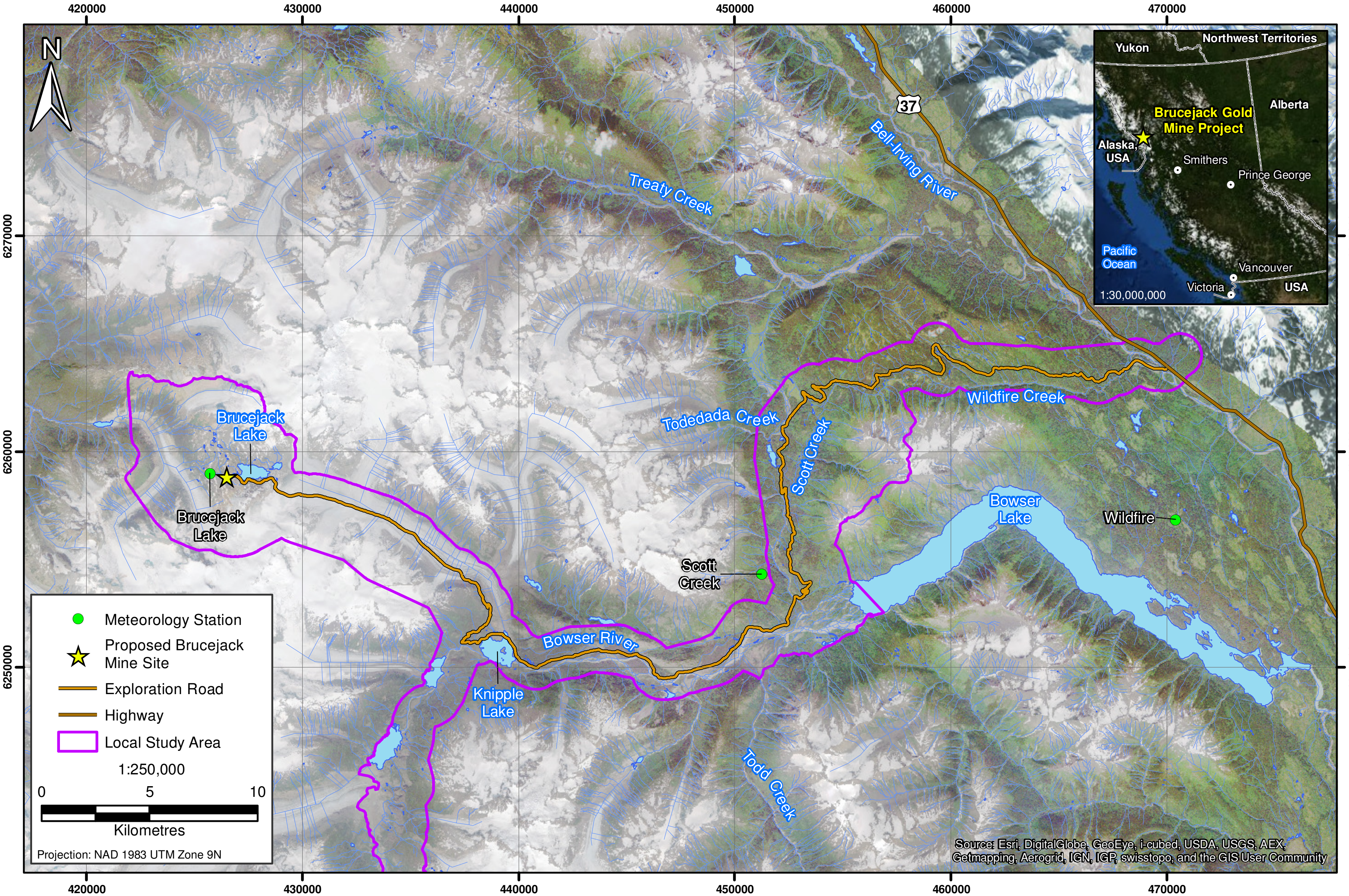

Figure 5-1

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Noise Baseline Study Area

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Figure 5-1

6. Methodology

6. Methodology

6.1 MONITORING LOCATIONS

Table 6.1-1 provides the UTM locations of the sampling sites. The locations were selected to characterize the range of baseline conditions in the region, based on their proximity to proposed infrastructure and mine area where future mining activities are expected. The time periods were chosen to encompass winter, when ground is covered by snow, and summer conditions. Winter monitoring was completed in March. Summer monitoring was completed in September and October, dependent on station. Monitoring locations are shown in Figure 6.1-1 and Appendix 1.

Table 6.1-1. Locations of Noise Monitoring Stations

Monitoring Station	UTM			Site Rationale	Monitoring Period
	Zone	Easting (m)	Northing (m)		
S1	9V	468411	6259447	Previously proposed infrastructure plus grizzly bear habitat and an area used by moose during the rut.	Mar 22 to Mar 23 Sep10 to Sep 11
S2	9V	463641	6258185	Proximity to previously proposed infrastructure in the Wildlife Creek area, plus goat habitat.	Mar 22 to Mar 23 Oct 16 to Oct 17
S3	9V	457241	6263412	Proximity to Access Road plus grizzly bear habitat and an area used by moose during summer and fall for the rut.	Mar 24 to Mar 25 Sep11 to Sep 12
S4	9V	445844	6251190	Proximity to Access Road plus goat habitat.	Mar 24 to Mar 25 Sep11 to Sep 12
S5	9V	438020	6252954	Proximity to Access Road plus goat kidding habitat.	Mar 23 to Mar 24 Sep13 to Sep 14
S6	9V	428139	6259792	Proximity to Mine Site area plus goat habitat.	Mar 23 to Mar 24 Sep13 to Sep 14

Note: UTM coordinates refer to NAD 83.

6.1.1 Station S1

Noise monitoring station S1 was located to the south of the study area, near the location of the previously proposed infrastructure (Plates 6.1-1 and 6.1-2). While station S1 is no longer located near any proposed infrastructure, it does provide background noise levels expected to be representative of forested areas in the region.

The microphone was set up in a relatively flat, open area, with the closest group of trees approximately 20 m to the north, west and east. For the March sampling, the noise monitoring station was set up in the snow. The station was accessed by helicopter in both seasons.

During the winter, noise monitoring started on March 22. In the summer, the station was set up on September 10. For each monitoring period, the stations were collected the following day, after recording for at least 24 hours. A slight amount of snow was observed on the microphone cover after the March monitoring period. Light precipitation occurred for short periods of time during both monitoring periods. In March there was less than 2 mm of precipitation and in September there was less than 2.5 mm.

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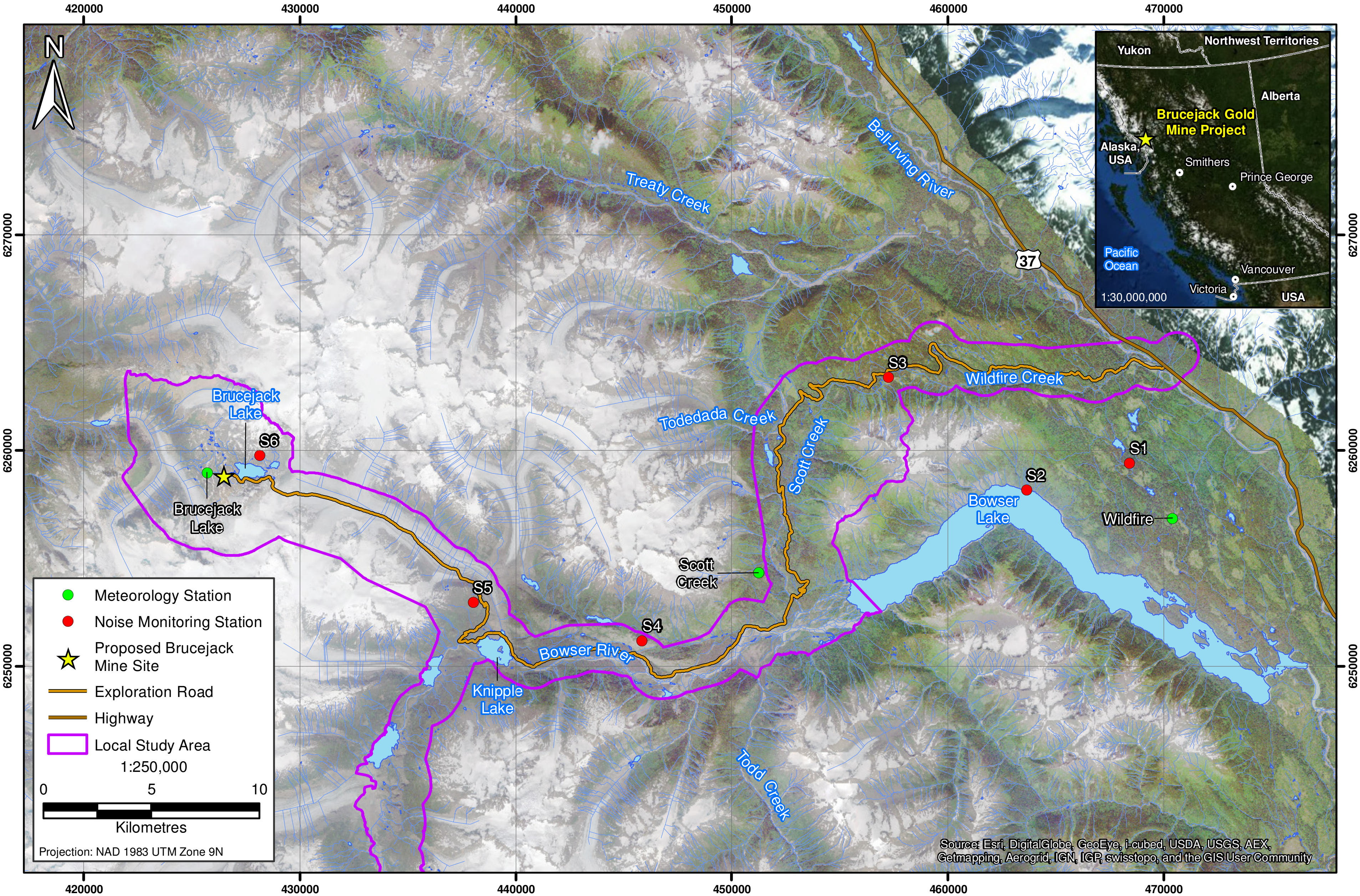

Figure 6.1-1

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2012 Noise Monitoring Locations

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Plate 6.1-1. Noise monitoring station S1, facing northwest (March 23, 2012).

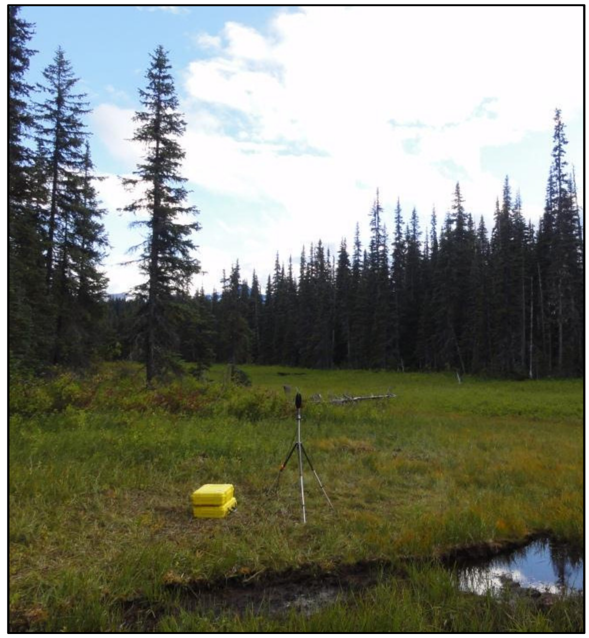

Plate 6.1-2. Noise monitoring station S1, facing south (September 10, 2012).

6.1.2 Station S2

Noise monitoring station S2 was located to the south of the study area, on the north shore of Bowser Lake, near the location of previously proposed infrastructure in the Wildfire Creek area. The site was also identified as mountain goat habitat. While Station S2 is not located near any proposed infrastructure (Plates 6.1-3 and 6.1-4), it does provide background noise levels expected to be representative of forested areas in the region.

Plate 6.1-3. Noise monitoring station S2, facing west (March 22, 2012).

Plate 6.1-4. Noise monitoring station S2, facing northwest (October 16, 2012).

The microphone was set up on the edge of the lake, with the closest group of trees approximately 20 m to the north. For the March sampling, the noise monitoring equipment was set up in the snow. The station was accessed by helicopter in both seasons.

During the winter, noise monitoring started on March 22. In the summer, the station was set up on October 16. For each monitoring period, the stations were collected the following day, in both March and October monitoring was carried out for approximately 24 hours due to time constraints associated with helicopter support. Light precipitation occurred for short periods of time during both monitoring periods. In March there was less than 2 mm of precipitation and in October there was approximately 5 mm.

6.1.3 Station S3

Noise monitoring station S3 was located in the north of the study area, near the existing exploration road (Plates 6.1-5 and 6.1-6).

Plate 6.1-5. Noise monitoring station S3, facing south (March 24, 2012).

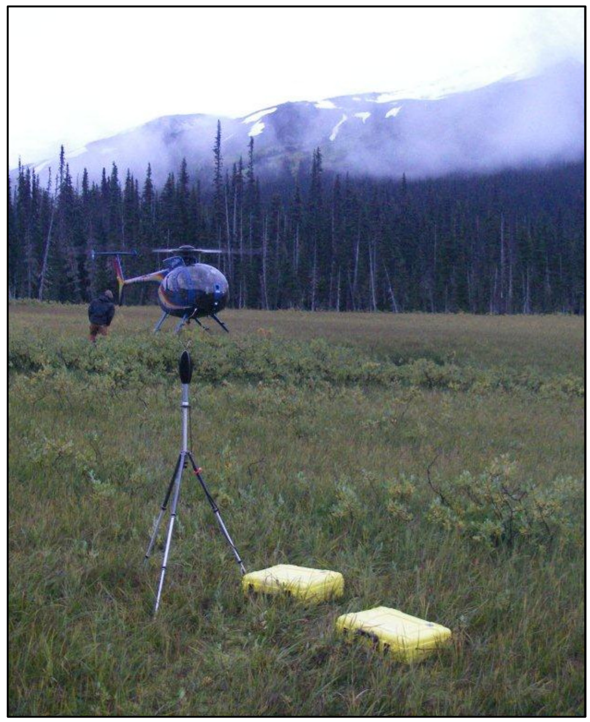

Plate 6.1-6. Noise monitoring station S3, facing south (September 11, 2012).

The microphone was set up on fen, with conifers in the distance (approximately 100 m). The microphone was set up on an exposed ridge, with the closest group of trees approximately 20 m to the north. For the March sampling, the noise monitoring equipment was set up in the snow. The station was accessed by helicopter in both seasons.

During the winter, noise monitoring started on March 24. In the summer, the station was set up on September 11. For each monitoring period, the stations were collected the following day, in March the monitoring was carried out for less than 24 hours (21 hours, 56 minutes) due to time constraints related to helicopter support, in September 24 hours of monitoring were completed.

6.1.4 Station S4

Noise monitoring station S4 was located in the center of the study area, near the exploration road (Plates 6.1-7 and 6.1-8).

Plate 6.1-7. Noise monitoring station S4, facing north (March 24, 2012).

Plate 6.1-8. Noise monitoring station S4, facing north (September 11, 2012).

The microphone was set up on alpine meadow on an exposed ridge, with the closest group of trees approximately 20 m to the north. For the March sampling, the noise monitoring equipment was set up in the snow. The station was accessed by helicopter in both seasons.

During the winter, noise monitoring started on March 24. In the summer, the equipment was set up on September 11. For each monitoring period, the equipment was collected the following day, in March the monitoring was carried out for less than 24 hours (22 hours) due to time constraints, in September 24 hours of monitoring were carried out. Heavy rain occurred during the September monitoring period, no precipitation occurred during the March monitoring period.

6.1.5 Station S5

Noise monitoring station S5 was located in the southwest of the study area, near the exploration road (Plates 6.1-9 and 6.1-10).

The microphone was set up on an exposed ridgeline adjacent to the Knipple Glacier. For the March sampling, the noise monitoring equipment was set up in the snow. The station was accessed by helicopter in both seasons.

During the winter, noise monitoring started on March 23. In the summer, the station was set up on September 13. For each monitoring period, the stations were collected the following day, in March the monitoring was carried out for 24 hours, in September less than 24 hours (23 hours, 20 minutes) of monitoring were carried out due to time constraints.

Plate 6.1-9. Noise monitoring station S5, looking northwest (March 23, 2012).

Plate 6.1-10. Noise monitoring station S5, facing north (September 13, 2012).

6.1.6 Station S6

Noise monitoring station S6 was located in the west of the study area, near the exploration road and existing Brucejack Exploration Camp (Plates 6.1-11 and 6.1-12). The site was located northeast of the camp where there was machinery operating throughout the monitoring period.

Plate 6.1-11. Noise monitoring station S6, facing west (March 23, 2012).

Plate 6.1-12. Noise monitoring station S6, facing north (September 13, 2012).

The microphone was set up in an alpine area with no surrounding vegetation. For both the March and September sampling, the noise monitoring station was set up in the snow. The station was accessed by helicopter in both seasons.

During the winter, noise monitoring started on March 23. In the summer, the station was set up on September 13. For each monitoring period, the stations were collected the following day, in March the monitoring was carried out for 24 hours. In September less than 24 hours (23 hours, 5 minutes) of monitoring were carried out due to time constraints related to helicopter support. Precipitation occurred during both the March and September monitoring period. In March there was less than 0.5 mm of precipitation and in September there was approximately 14 mm.

6.2 MONITORING METHODOLOGY

Baseline noise samples were collected using two Brüel & Kjær Model 2250 sound level meters capable of logging data. These instruments have operating ranges from 16.7 to 140 dBA (at 1 kHz pure tone signal) that captures low sound levels, which are typical for undisturbed wilderness areas, as well as high sound levels. Each instrument's microphone was protected by a wind screen/weather shield and bird spikes. Other than the ground, all surfaces or obstacles were at least 3 m away from the stations. A weather resistant case protected the meter and battery pack and provided a stable base for each kit. The average, minimum and maximum peak sound levels were measured using the "A" standardized frequency rating (dBA), designed to match the frequency response of the human ear. Each sound level meter was calibrated before sampling. Noise measurements were made once every 0.1 seconds, approximately 1 metre above ground. Each monitoring period was at least 21 consecutive hours.

The first survey was conducted from March 22 – 24, 2012, and the second survey took place from September 10 - 14, 2012. At S2 during the September monitoring period, the noise microphone on the tripod was knocked over by wildlife and therefore an additional monitoring survey took place from October 16 - 17, 2012. The winter and summer monitoring periods had a wide range of environmental conditions, such as changing wind speeds, and varying levels of noise from precipitation, birds, mammals, and anthropogenic activity.

Data parameters logged during these survey periods included L_{eq}, L_{90}, L_{max}, and absolute L_{min}.

- L_{eq} is the continuous equivalent sound level over a time period.
- L_{90} is the ninetieth percentile level (the sound pressure level that is exceeded 90 percent of the time during the measurement period). For example, L_{90} = 80 dBA means that the sound pressure level exceeded 80 dBA during 90% of the measurement period. L_{90} is usually regarded as the residual level or the background noise level without discrete events (e.g., helicopters, fixed wing aircraft).
- L_{max} is the maximum value recorded during an hourly period.
- Absolute L_{min} is the minimum value recorded during the monitoring period (24 hours).

The following weather parameters were recorded by three automated meteorological stations operating near the noise baseline study area during each noise measurement time period:

- relative humidity (%);
- wind speed (km/h or m/s);
- wind direction (degrees from true north);

- precipitation (mm); and
- temperature (°C).

The preferred weather conditions for noise monitoring are:

- relative humidity of less than 90%;
- wind speeds of less than 20 km/h;
- no active precipitation (rain or snow); and
- temperatures that allow the meter body to be maintained within manufacturer's specifications.

The following information was recorded in the field during the noise monitoring program:

- descriptions of the monitoring site using pictures;
- time of set up and tear down;
- time of calibration;
- type of surface the meter is placed on;
- observed audible noise sources;
- distance from all obstacles in the area (cannot be closer than 3 m to any surface except the ground);
- global position system (GPS) location;
- serial number of the meter being used; and
- weather conditions at each site at the time of set up and tear down, including precipitation and cloud cover.

The noise meters were set up and operated in such a manner as to obtain reliable data given the on-site conditions. The noise meters cannot operate reliably at air temperatures below -20°C. Typical battery power for these instruments does not last long (usually less than 24 hours) in extreme cold, so a spare battery was taken into the field to be certain that the sound level meters were fully operational during the monitoring period. A housing or protection mechanism for the cable wire was used, and the tripod was secured to the ground to prevent tampering by wildlife.

Recorded sound level and audio sound were downloaded to a computer for analysis with the Brüel & Kjær 7820 Evaluator® software program. The sound recordings were reviewed to identify noise sources, such as technician activities, wind, rain, construction and helicopter noise. Hourly values were then calculated for the 24-hour measurements from the 1-minute data. Other indicators used to identify sources of noise were time of day and field observations.

6.3 QA/QC

Noise monitoring site visits were conducted by experienced technicians to ensure proper documentation and field observations. Detailed field notes were taken during the monitoring period to record the state of the equipment and any audible noises. Once each noise monitoring station was set up, a calibration was performed in accordance to the calibration procedure found in the instrument's manual. This involves using a separate device that produces reference sounds that are used to calibrate the noise monitor. These calibration results are presented in Appendix 2.

When each monitoring session/period was completed, a preliminary quality check was performed in order to determine if the monitoring needed repeating. After recording the noise levels in the field, the data was reviewed to look for any erroneous noise data, and to check data integrity and continuity. The data from the September S6 monitoring site, which had been knocked over, was checked for any erroneous data, the recording was completed successfully and the data was considered to be acceptable for analysis and was therefore used in this assessment. Other than the required measurement repeat at station S2 and the precipitation at S1, S2 and S6 in March, S1, S4 and S6 in September and S2 in October, no other issues were encountered.

7. Results

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7. Results

7.1 STATION SPECIFIC RESULTS

7.1.1 Station S1

One-minute L_{eq} sound levels recorded during the two sampling periods are shown in Figure 7.1-1. Station S1's monitoring period started at 9:33 am on March 22, and continued until 9:33 am the following day. The September monitoring period started at 6:12 pm on September 10, and continued until 6:12 pm the following day. General sources of noise observed were aircraft, animals, wind and rain. In September the sound of a large animal was also observed. The only anthropogenic noise sources in both March and September were aircraft.

During March, the average L_{eq} sound level was 32.5 dBA. The L_{90} was substantially lower at 16.5 dBA, this is representative of the low background noise without the aircraft sounds. The L_{eq} and L_{90} was higher in September (38.5 and 20.8 dBA respectively), mainly due to the increase in aircraft and wind and rain during the September sampling date and also due to the fact that during the March monitoring period the ground was covered in snow. There were only a limited number of times that the wind was audible during the March monitoring period. The minimum sound levels were 15.9 and 13.6 dBA in March and September, respectively, and maximum sound levels were 67.6 and 80.4 dBA respectively. The maximum sound levels during both monitoring periods were due to aircraft.

7.1.2 Station S2

One-minute L_{eq} sound levels recorded during the two sampling periods are shown in Figure 7.1-2. Station S2's monitoring period started at 9:54 am on March 22, and continued until 9:45 am the following day. The October monitoring period started at 10:40 am on October 16, and continued until 10:39 am the following day. General sources of noise observed were aircraft, animals, wind and rain. In October, waves from the lake were also audible. The only anthropogenic noise sources in both March and October were aircraft.

During March, the average L_{eq} sound level was 38.1 dBA, primarily due helicopters that were audible throughout the day. The L_{90} was substantially lower at 17.0 dBA, this is representative of the low background noise level without aircraft sounds. The L_{eq} and L_{90} was higher in September (49.4 and 43.8 dBA respectively), mainly due to the rain and waves audible during the monitoring period and due to the fact that during the March period the ground was covered in snow. Rain was only audible once during March and no wave action was audible. The minimum sound levels were 16.5 and 37.3 dBA in March and September, respectively, and maximum sound levels were 74.6 and 71.1 dBA respectively. The maximum sound levels during both monitoring periods were due to aircraft.

7.1.3 Station S3

One-minute L_{eq} sound levels recorded during the two sampling periods are shown in Figure 7.1-3. Station S1's monitoring period started at 11:56 am on March 24, and continued until 9:56 am the following day. A 24-hour monitoring period was not available due to time constraints. The September monitoring period started at 7:57 pm on September 11, and continued until 7:57 pm the following day. General sources of noise observed in March were aircraft and animals, whereas in September the general sources of noise observed were wind and rain as well as aircraft. The only anthropogenic noise sources in both March and September were aircraft.

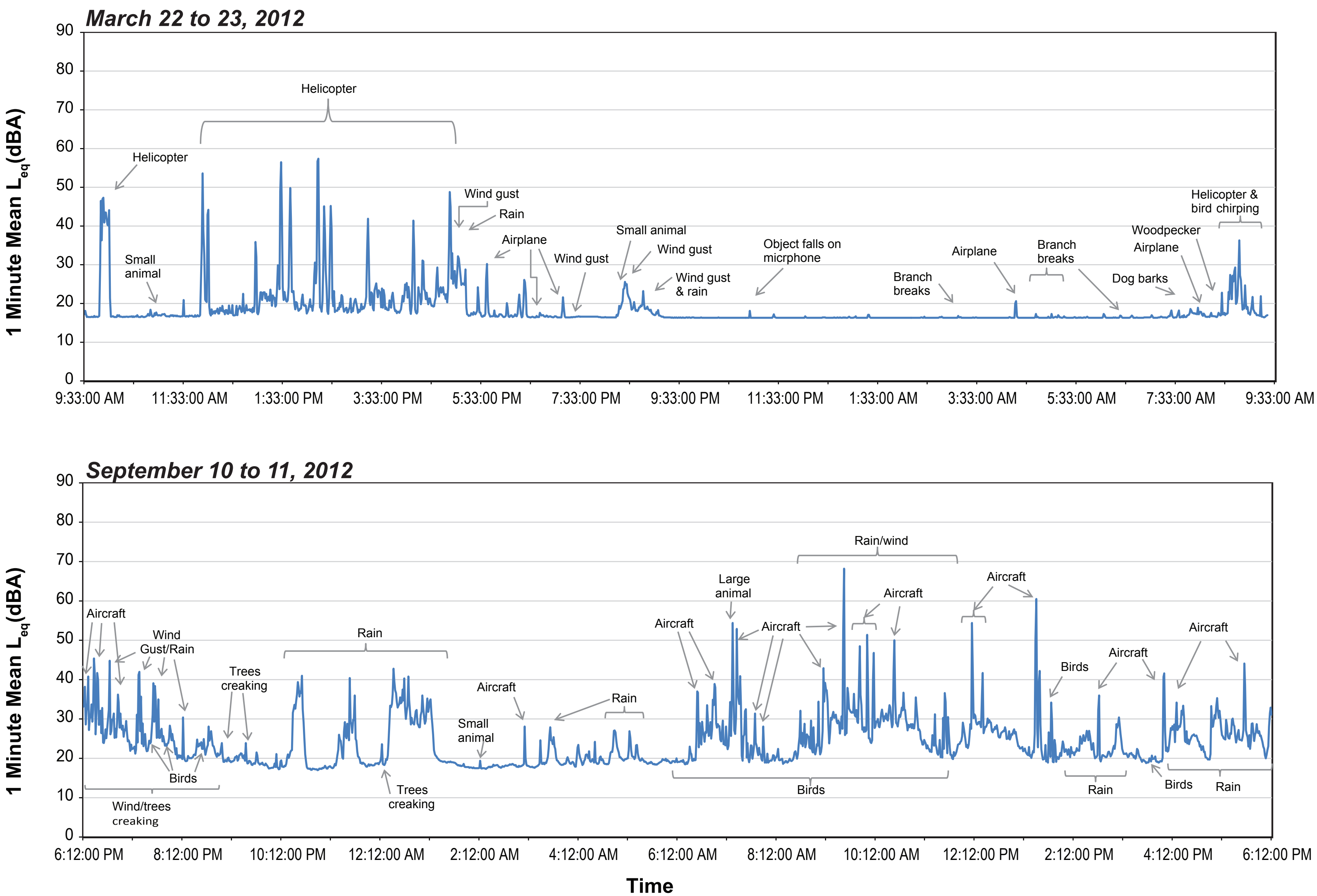

Figure 7.1-1

Noise Monitoring Station S1 Results, March and September 2012

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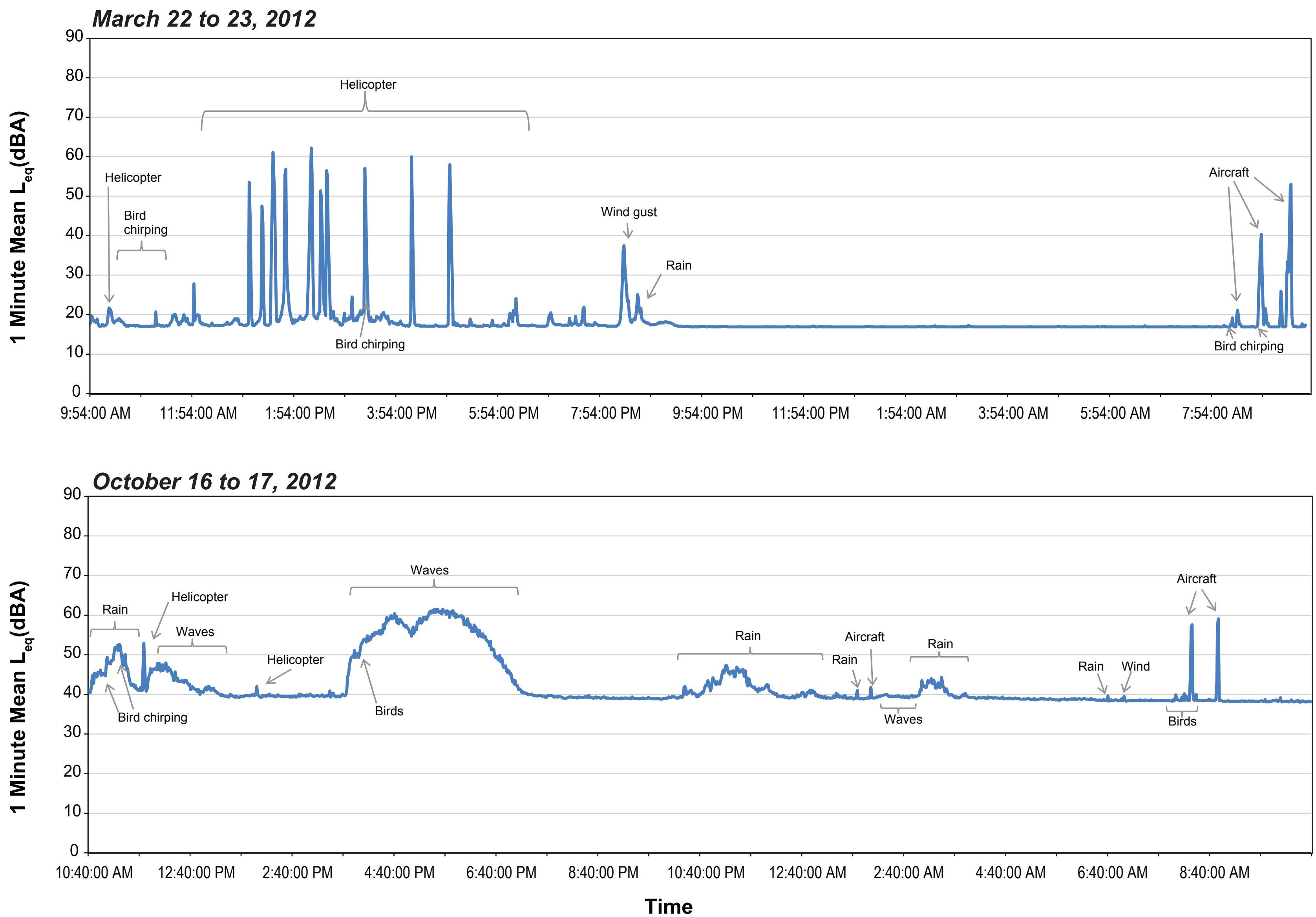

Figure 7.1-2

PRETIVM

Noise Monitoring Station S2 Results, March and October 2012

Rescan Engineers & Scientists

Figure 7.1-2

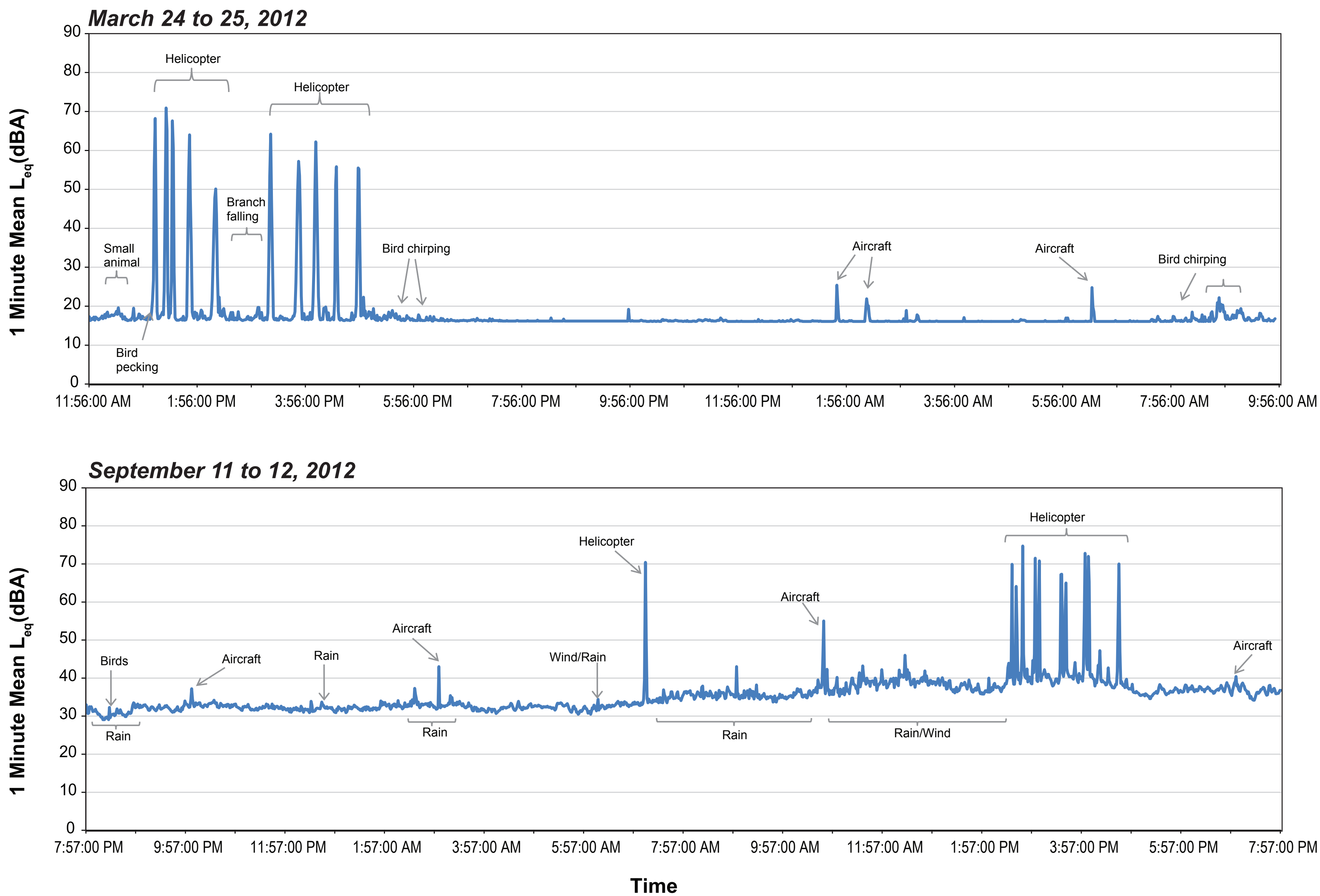

Figure 7.1-3

Noise Monitoring Station S3 Results, March and September 2012

PRETIVM

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During March, the average Leq sound level was 44.8 dBA, primarily due to aircraft that were audible throughout the day. The L_{90} was substantially lower at 16.1 dBA, which is representative of the low background noise without the aircraft sounds. The L_{eq} and L_{90} was higher in September (50.5 and 34.1 dBA respectively), mainly due to the increase in wind and rain during the monitoring period but also due to the snow cover present in March. No wind or rain was audible during the March monitoring period. The minimum sound levels were 15.7 and 27.9 dBA in March and September, respectively, and maximum sound levels were 82.6 and 91.0 dBA respectively. The maximum sound levels during both monitoring periods were due to aircraft.

7.1.4 Station S4

One-minute L_{eq} sound levels recorded during the two sampling periods are shown in Figure 7.1-4. Station S4's monitoring period started at 11:37 am on March 24, and continued until 9:37 am the following day. A 24-hour monitoring period was not available due to time constraints. The September monitoring period started at 7:41 pm on September 11, and continued until 7:41 pm the following day. General sources of noise observed were aircraft, animals and wind. In September the sound of rain was also audible throughout the day. There was no precipitation during the March monitoring period. The only anthropogenic noise sources in both March and September were aircraft.

During March, the average L_{eq} sound level was 45.7 dBA, primarily due to aircraft and wind that was audible throughout the day. The L_{90} was substantially lower at 17.5 dBA, which is representative of the low background noise without the sounds associated with aircraft and the wind. The L_{eq} and L_{90} was higher in September (46.4 and 37.7 dBA respectively), mainly because there were more wind and rain during the monitoring period and also due to the snow cover present during the March period. The minimum sound levels were 16.1 and 32.4 dBA in March and September, respectively, and maximum sound levels were 82.5 and 97.1 dBA respectively. The maximum sound levels during both monitoring periods were due to aircraft.

7.1.5 Station S5

One-minute L_{eq} sound levels recorded during the two sampling periods are shown in Figure 7.1-5. Station S5's monitoring period started at 10:25 am on March 23, and continued until 10:25 am the following day. The September monitoring period started at 8:35 am on September 13, and continued until 7:55 am the following day, due to time constraints. General sources of noise observed were aircraft and wind. In March there was also a loud noise made by an object falling onto the microphone and in September there was strong winds and heavy rain audible throughout the monitoring period. There was no precipitation during the March monitoring period. The only anthropogenic noise sources in both March and September were aircraft.

During March, the average L_{eq} sound level was 33.6 dBA, primarily due to helicopters that were audible throughout the day. The L_{90} was substantially lower at 16.3 dBA, which is representative of the low background noise without the aircraft sounds. The L_{eq} and L_{90} was higher in September (41.9 and 36.3 dBA respectively), mainly because there were more wind and rain during the monitoring period and also due to the snow cover present in March. There was no rain and only a limited number of times that the wind was audible during March. The minimum sound levels were 15.8 and 30.8 dBA in March and September, respectively, and maximum sound levels were 67.6 and 79.0 dBA respectively. The maximum sound levels during both monitoring periods were due to helicopters.

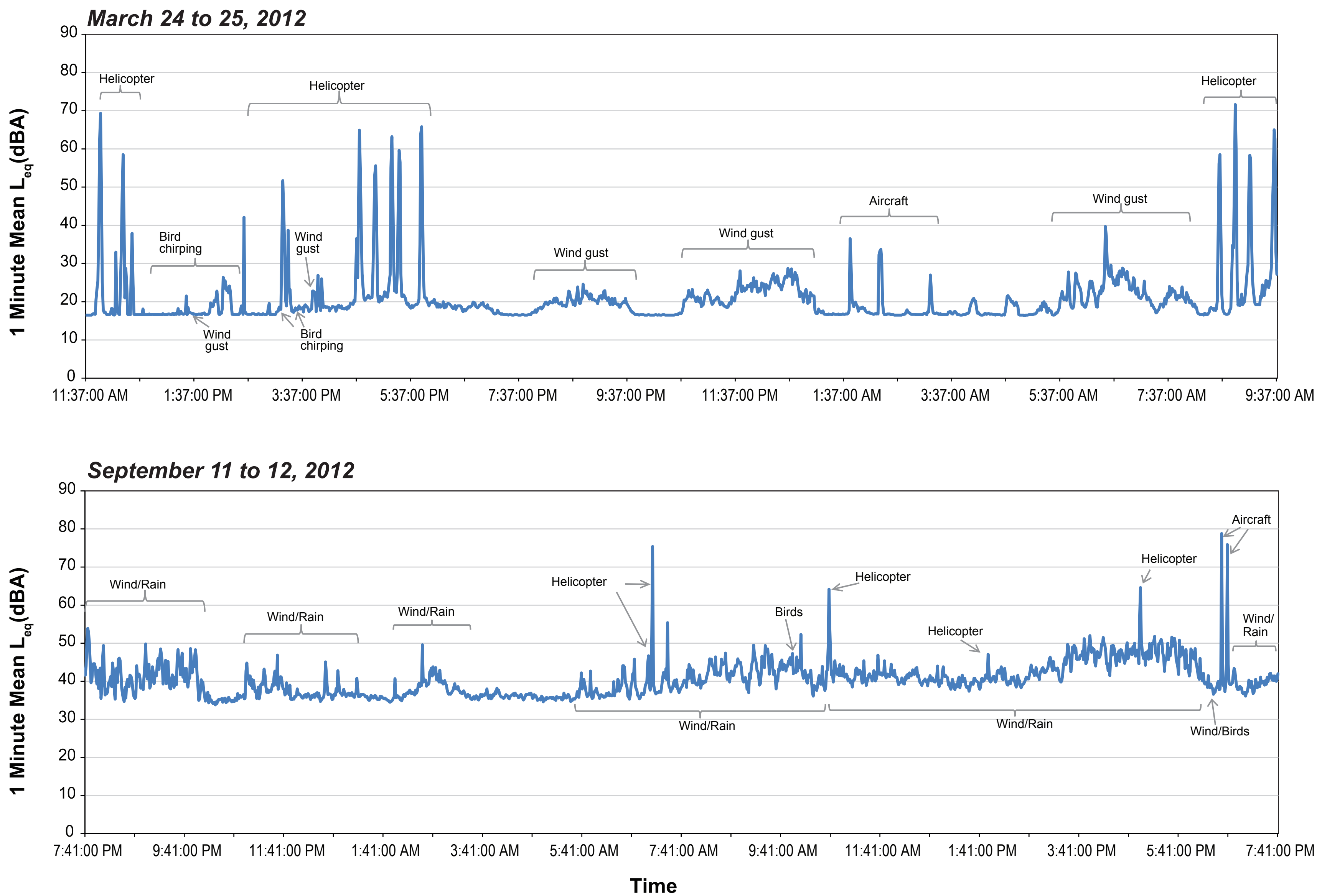

Figure 7.1-4

PRETIVM

Noise Monitoring Station S4 Results, March and September 2012

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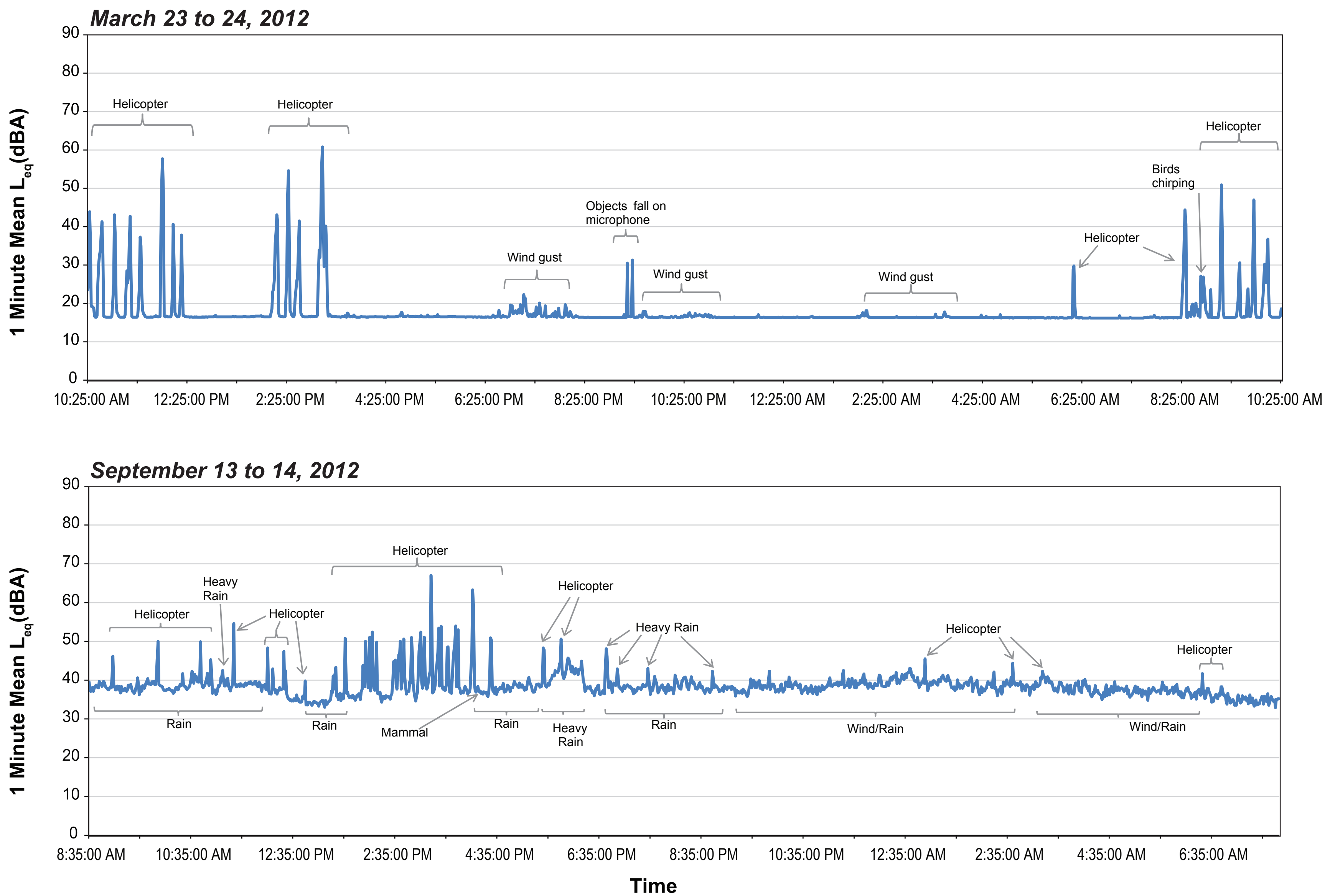

Figure 7.1-5

PRETIVM

Noise Monitoring Station S5 Results, March and September 2012

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7.1.6 Station S6

One-minute L_{eq} sound levels recorded during the two sampling periods are shown in Figure 7.1-6. Station S6's monitoring period started at 10:38 am on March 23, and continued until 10:38 am the following day. The September monitoring period started at 9:00 am on September 13, and continued until 8:05 am the following day. The microphone and tripod had been knocked over during the September monitoring period due to high winds, however the recording was completed successfully and data was considered to be acceptable for analysis. General sources of noise observed in March were aircraft and construction equipment. In September the general sources of noise observed were aircraft, wind and rain. It is likely that the equipment was knocked over around 10 pm when there were high winds and a large spike in the readings. The majority of anthropogenic noise sources in March were aircraft; however, there were a couple occurrences where the reversing alarm of a truck, saw cutting, an engine and hammering could be heard in the distance. The station is located close to the existing Brucejack Exploration Camp and therefore anthropogenic sounds are to be expected. The only anthropogenic noises in September were from aircraft.

During March, the average L_{eq} sound level was 40.8 dBA, primarily due to aircraft that were audible throughout the day. The L_{90} was lower at 20.4 dBA, which is representative of the background noise without the wind and aircraft sounds. The L_{eq} and L_{90} was higher in September (64.7 and 39.5 dBA), mainly because there were more wind and rain during the monitoring period and also during the March monitoring period the ground was covered in snow. There were only a limited number of times that the wind was audible during March. The minimum sound levels were 16.6 and 29.0 dBA in March and September, respectively, and maximum sound levels were 75.8 and 121.9 dBA respectively. The maximum sound levels in March were due to aircraft, the maximum sound level in September was likely due to the equipment falling over during high winds.

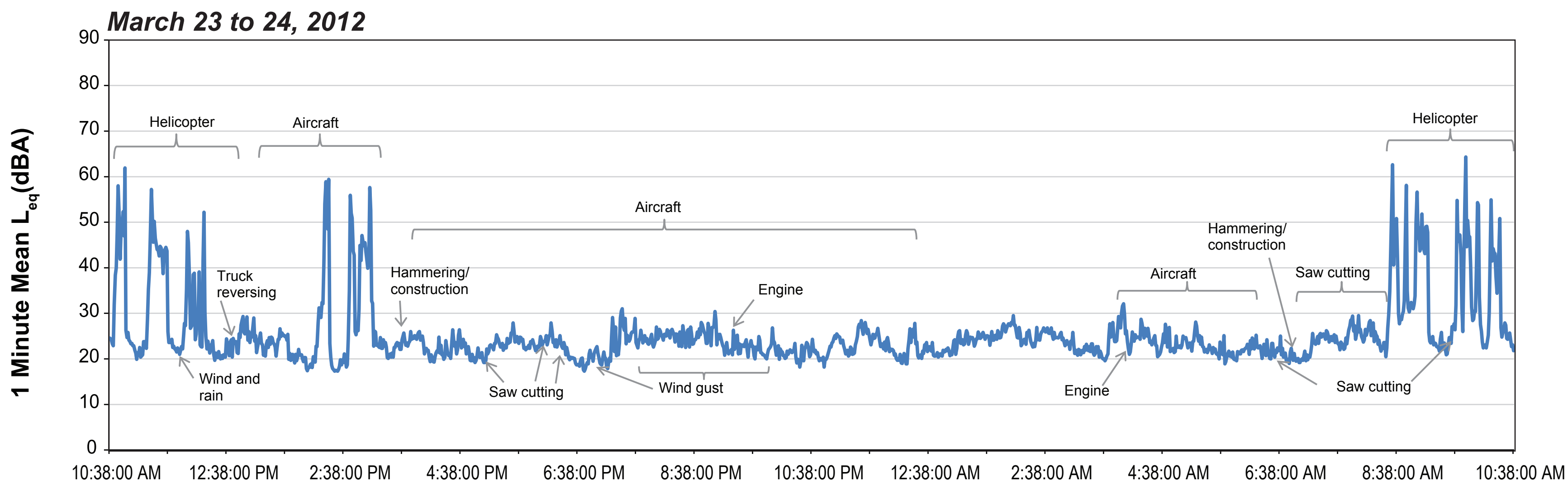
7.2 SUMMARY AND COMPARISON

Background maximum, minimum, and logarithmic average L_{eq}, L_{max}, L_{min} and L_{90} results of the 24-hour March and September/October 2012 monitoring periods are shown in Table 7.2-1. Hourly results can be found in Appendix 3.

The summer monitoring period had higher noise levels than the winter monitoring period. This is due to the combination of ground cover conditions as well as increased wind and rain. In March the ground was covered in snow which would reduce noise. The exception to this was station S2 that had a slightly higher L_{max} average during March than in September attributed to frequent helicopter fly-bys during that sampling period. However the L_{90} for the same period was substantially lower.

The L_{eq} logarithmic average values ranged from 32.5 dBA at S1 to 64.7 dBA. The highest logarithmic average, measured at station S6 during September, was due to the high winds, rain and aircraft recorded during the monitoring period. The L_{90} logarithmic average values ranged from 16.1 dBA at S3 to 43.8 dBA at S2.

The L_{eq} values recorded were similar to those reported for other remote undeveloped areas, where values have been observed to range from 40 to 48 dBA. The higher values measured at the Project are predominantly due to the high number of aircraft flying over the monitors and the strong wind and rain measured in September. The L_{90} results are similar to background noise levels recorded at two other mineral development projects in the region, the Kitsault Mine Project (overall L_{90} of 40 dBA) and at the Schaft Creek Mine Project (L_{90} values ranged from 31 to 39 dBA). The L_{90} values are also below the Alberta and WHO estimate baseline level of 45 dBA for rural areas (Alberta EUB 2007; WHO 1999).



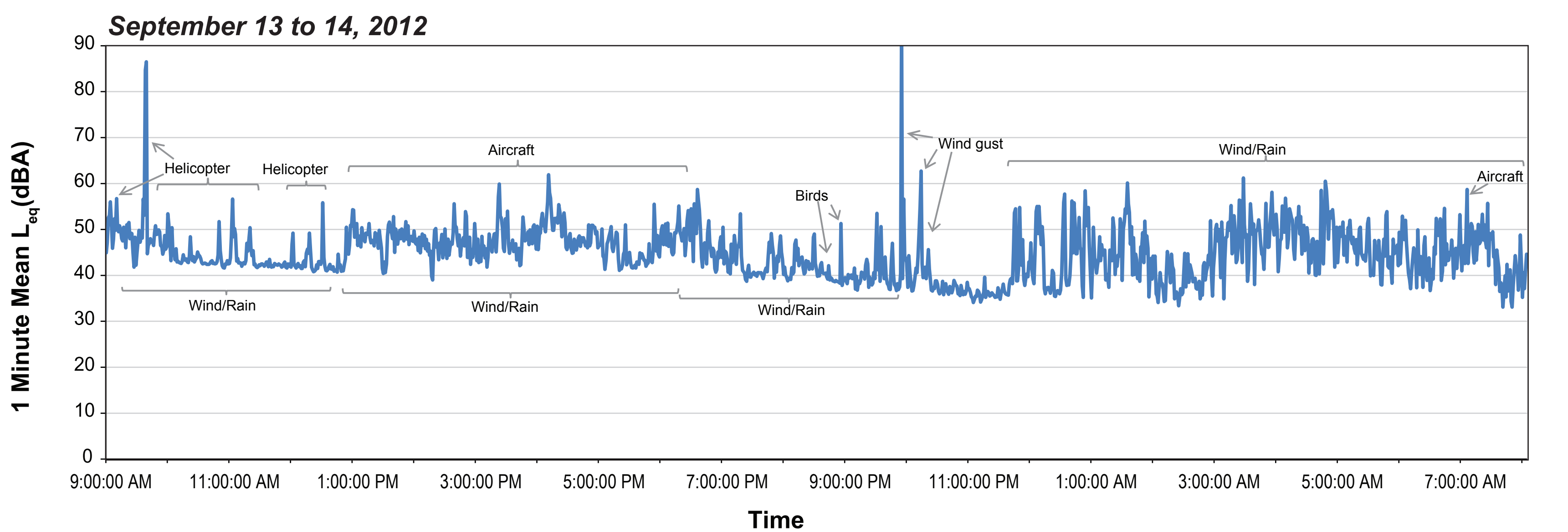


Figure 7.1-6

PRETIVM

Noise Monitoring Station S6 Results, March and September 2012

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Table 7.2-1. Summary of 24-Hour Sound Levels

		Winter (March)					Summer (September/October)				
		Wind Speed (m/s)	Total Sound Level[a] (dBA)				Wind Speed (m/s)	Total Sound Level[a] (dBA)			
			L_{eq}	L_{max}	L_{min}	L_{90}		L_{eq}	L_{max}	L_{min}	L_{90}
Station S1[c]	Maximum	2.2	43.1	67.6	16.7	17.5	2.2	50.7	80.4	22.2	26.5
	Minimum	0.3	16.3	20.2	15.9	16.2	0.5	18.7	37.1	16.6	17.1
	Logarithmic average[b]	1.2	32.5	57.9	16.1	16.5	1.5	38.5	69.1	18.6	20.8
Station S2[c]	Maximum	2.2	47.5	74.6	17.2	17.9	4.0	59.2	71.1	48.2	54.2
	Minimum	0.3	16.9	18.0	16.5	16.8	0.6	38.3	40.5	37.3	38.0
	Logarithmic average[b]	1.2	38.1	64.6	16.7	17.0	2.4	49.4	63.0	39.9	43.8
Station S3[d]	Maximum	2.4	57.3	82.6	16.0	16.3	3.1	59.2	91.0	36.9	38.4
	Minimum	0.6	16.1	26.6	15.7	16.0	0.6	31.0	35.8	27.9	29.3
	Logarithmic average[b]	1.2	44.8	69.9	15.8	16.1	2.0	50.5	81.0	32.6	34.1
Station S4[d]	Maximum	2.4	55.6	82.5	18.0	21.5	3.1	62.9	97.1	38.6	43.4
	Minimum	0.6	16.8	21.5	16.1	16.4	0.6	36.0	43.2	32.4	34.1
	Logarithmic average[b]	1.2	45.7	70.9	16.4	17.5	2.0	46.4	79.9	35.0	37.7
Station S5[d]	Maximum	1.8	45.2	67.6	16.2	16.4	6.0	50.9	79.0	35.6	37.8
	Minimum	0.5	16.2	18.0	15.8	16.1	1.7	35.0	43.4	30.8	33.1
	Logarithmic average[b]	0.9	33.6	56.0	16.0	16.3	3.0	41.9	67.0	33.8	36.3
Station S6[e]	Maximum	5.2	49.0	75.8	19.4	22.7	12.2	77.6	121.9	40.0	43.4
	Minimum	1.4	21.9	32.7	16.6	17.5	2.8	41.0	56.0	29.0	32.1
	Logarithmic average[b]	3.3	40.8	64.6	17.9	20.4	7.7	64.7	108.1	36.3	39.5

Notes:
n/a = not available
[a] Values are calculated from hourly data; see Appendix 3 for more details.
[b] Arithmetic mean was used to calculate mean wind speed.
[c] Wind speed data from Wildfire meteorology station.
[d] Wind speed data from Scott Creek meteorology station.
[e] Wind speed data from Brucejack Lake meteorology station.

8. Conclusions

8. Conclusions

Six noise monitoring stations were set up within the study area in 2012. Noise levels were recorded over a 24-hour period in March and September/October 2012. The locations were selected to characterize the range of baseline conditions in the region.

Natural background noise sources observed included birds, waves, mammals, wind and rain. Anthropogenic noise sources that were observed included helicopters, airplanes, vehicles and machinery. Only one station, located near the proposed mine site, recorded sounds from anthropogenic sources other than aircraft. From the background data collected at the monitoring station during the two monitoring periods:

- the average noise (L_{eq}) levels that were measured ranged from 32.5 to 64.7 dBA;
- the average noise (L_{90}) levels that were measured ranged from 16.1 to 43.8 dBA
- the absolute minimum (L_{min}) noise levels ranged from 15.7 to 37.3 dBA; and
- the absolute maximum (L_{max}) noise levels ranged from 67.6 to 121.9 dBA.

The L_{eq} data is similar to those reported for other background studies done in remote and undeveloped areas, where values have been observed to range from 40 to 48 dbA. The higher values measured at the Project are predominantly due to the high number of aircraft passing over the area and the high winds and rain. The L_{90} results, which are considered to be more representative of background noise levels are similar to measurements taken at other proposed mine sites and are below the Alberta and WHO estimate baseline level for rural areas (Alberta EUB 2007; WHO 1999).

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Definitions of the acronyms and abbreviations used in this reference list can be found in the Glossary and Abbreviations section.

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Appendix 1
Noise Monitoring Sites

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Appendix 1. Noise Monitoring Sites

Plate A.1-1. Noise monitoring station S1, facing north (March 22, 2012).

Plate A.1-2. Noise monitoring station S2, facing west (March 22, 2012).

Plate A.1-3. Noise monitoring station S3, facing southwest (March 24, 2012).

Plate A.1-4. Noise monitoring station S4, facing northeast (March 24, 2012).

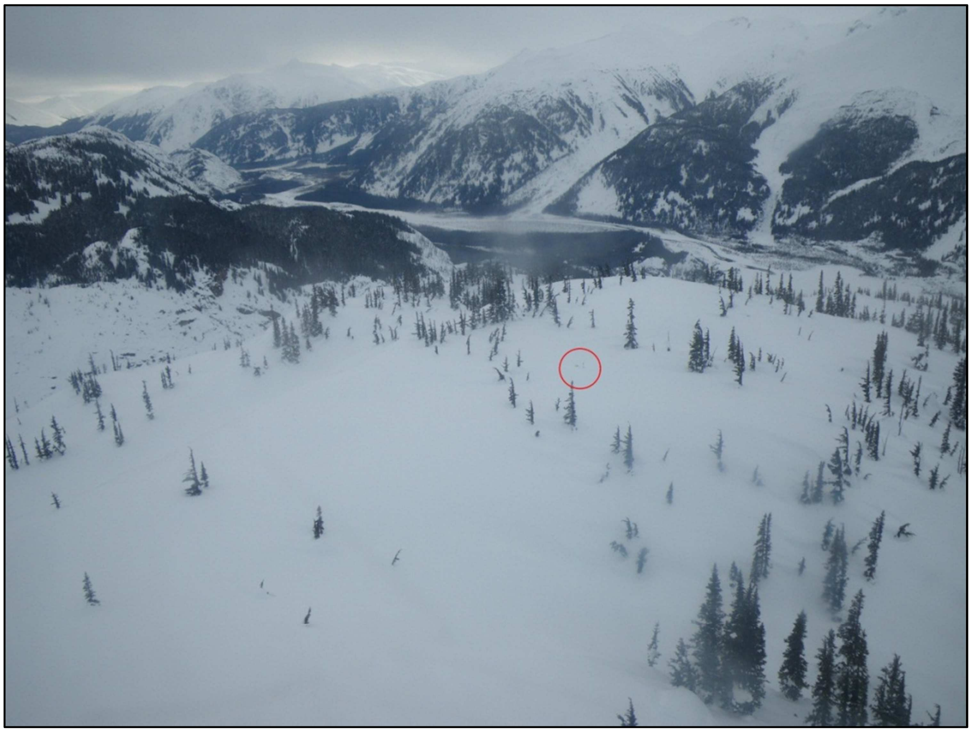

Plate A.1-5. Noise monitoring station S5, facing southeast (March 23, 2012).

Plate A.1-6. Noise monitoring station S5, facing north (March 23, 2012).

Appendix 2
Noise Field Sheets

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Noise Baseline Study - Field Data Sheet

Sampler Location:

Project Name: Brucejack 2012 Noise

Project #: 1042-008-14-98

ID (*e.g.* S1): S1

9V UTM Coordinates: 468411 E 6259447 N

UTM Datum: NAD 83

Ground Cover (*e.g.* soil/vegetation type): Snow

Start Date/Time: March 22, 9:25 am

Terrain (*e.g.* flat, hills, mountains): ~~Flat~~ Hills

Finish Date/Time: March 23, 9:34 am

Weather:

Temperature (°C): -1 °C

Cloud Cover ~~(%)~~: 8/8

Precipitation: ☐ Heavy ☐ Moderate ☑ Mild ☐ None

☑ Snow ☐ Rain ☐ Other

Wind: Speed ☐ Strong ☐ Moderate ☐ Light ☑ None

Direction

Instrument:

Type: 2250 Brüel & Kjaer

Serial #: 2505982

Calibration: ☑ Before ☐ After

Method: 4231 Calibrator (s/n 4231-1) 49.89649

Weighting (*i.e.* A): A

Response (*i.e.* fast/slow): fast

Other Settings: New sensitivity: ~~49.54958~~ mV/Pa
deviation from last: ~~0.056 dB~~ -0.008 dB

Observations: ***Include directions and estimated distances to the instrument in this section***

Audible noise observed: Helicopters

Potential noise sources: Helicopters, Wind, Birds

Obstacles (*e.g.* trees, buildings): Trees ~ 20 m N, ~~S~~ W, E

Notes: Slight amount of snow on microphone cover when we came to pick it up. This snow should have limited impact on measurements.

Please be sure to take a few photos of the instrument and the surrounding area (*i.e.* one in each direction) and put them in the project folder with appropriate labels upon return to the office!

Noise Baseline Study - Field Data Sheet

Sampler Location:

Project Name: Brucejack 2012 Noise
Project #: 1042-008.14-98
ID (*e.g.* S1): S2
UTM Coordinates: 463641 E 6258185 N
UTM Datum: NAD83
Ground Cover (*e.g.* soil/vegetation type): Snow
Start Date/Time: March 22, 9:44am
Terrain (*e.g.* flat, hills, mountains): ~~flat~~ Mountains
Finish Date/Time: March 23, 9:49am

Weather:

Temperature (°C): -1
Cloud Cover (%): 6/8
Precipitation: ☐ Heavy ☐ Moderate ☐ Mild ☑ None
☐ Snow ☐ Rain ☐ Other ________
Wind: Speed ☐ Strong ☐ Moderate ☐ Light ☑ None
Direction ______

Instrument:

Type: 2250 Bruel & Kjaer
Serial #: 2575763
Calibration: ☑ Before ☐ After
Method: 4231 Calibrator (s/n) 4231-1
Weighting (*i.e.* A): A
Response (*i.e.* fast/slow): fast
Other Settings: New sensitivity: 48.3494 mV/Pa
deviation from last: -0.0126 dB

Observations: ***Include directions and estimated distances to the instrument in this section***

Audible noise observed: Helicopters

Potential noise sources: Helicopters, Wind, Birds

Obstacles (*e.g.* trees, buildings): Trees ~20m north,

Notes:
· Original location was proposed to be on the mountain slope. This was not possible due to helicopter access. Next best spot was along the shore of Bowser Lake

Please be sure to take a few photos of the instrument and the surrounding area (*i.e.* one in each direction) and put them in the project folder with appropriate labels upon return to the office!

Noise Baseline Study - Field Data Sheet

Sampler Location:

Project Name: Brucejack 2012 Noise

Project #: 1042-008-14-98

ID (*e.g.* S1): S3

UTM Coordinates: 457241 E 6263412 N 9V

UTM Datum: NAD83

Ground Cover (*e.g.* soil/vegetation type): Snow

Start Date/Time: March 24, 11:50 am

Terrain (*e.g.* flat, hills, mountains): ~~Flat~~ Mountains

Finish Date/Time: March 25, 9:56 am

Weather:

Temperature (°C): -1 °C

Cloud Cover (%): 5/8

Precipitation: ☐ Heavy ☐ Moderate ☐ Mild ☑ None

☐ Snow ☐ Rain ☐ Other ______

Wind: Speed ☐ Strong ☐ Moderate ☐ Light ☑ None

Direction ______

Instrument:

Type: 2250 Bruël & Kjaer

Serial #: 2505982

Calibration: ☑ Before ☐ After

Method: 4231 Calibrator (S/n 4231-1)

Weighting (*i.e.* A): A

Other Settings: New sensitivity: 50.6734 mV/Pa deviation from last: 0.1342 dB

Response (*i.e.* fast/slow): fast

Observations: ***Include directions and estimated distances to the instrument in this section***

Audible noise observed: Helicopter

Potential noise sources: Helicopter, wind, birds

Obstacles (*e.g.* trees, buildings): Trees ~ 20m North

Notes:

Please be sure to take a few photos of the instrument and the surrounding area (*i.e.* one in each direction) and put them in the project folder with appropriate labels upon return to the office!

Noise Baseline Study - Field Data Sheet

Sampler Location:

Project Name: Brucejack 2012 Noise
Project #: 1042-008-14-98

ID (*e.g.* S1): S4

UTM Coordinates: 445844 E 6251190 N 9V UTM Datum: NAD83

Ground Cover (*e.g.* soil/vegetation type): Snow
Start Date/Time: March 24, 11:29am

Terrain (*e.g.* flat, hills, mountains): Mountains
Finish Date/Time: March 25, 9:43am

Weather:

Temperature (°C): -2°C
Cloud Cover (%): 3/8

Precipitation: ☐ Heavy ☐ Moderate ☐ Mild ☑ None

☐ Snow ☐ Rain ☐ Other ______

Wind: Speed ☐ Strong ☐ Moderate ☐ Light ☑ None Direction ______

Instrument:

Type: 2250 Bruel & Kjaer
Serial #: 2575763

Calibration: ☑ Before ☐ After

Method: 4231 Calibrator s/n 4231-1

Weighting (*i.e.* A): A
Other Settings: New Sensitivity: 49.2663 mV/Pa
deviation from last: -0.0498 dB

Response (*i.e.* fast/slow): fast

Observations: ***Include directions and estimated distances to the instrument in this section***

Audible noise observed: Helicopters

Potential noise sources: Helicopters, Wind, Birds

Obstacles (*e.g.* trees, buildings): ______

Notes:

- Helicopter could not land on original proposed location
- S4 set up ~3 Km south of original proposed location

Please be sure to take a few photos of the instrument and the surrounding area (*i.e.* one in each direction) and put them in the project folder with appropriate labels upon return to the office!

Noise Baseline Study - Field Data Sheet

Sampler Location:

Project Name: Brucejack 2012 Noise   Project #: 1042-008-14-98

ID (*e.g.* S1): S5

UTM Coordinates: 438020 E 6252954 N 9V   UTM Datum: NAD83

Ground Cover (*e.g.* soil/vegetation type): Snow   Start Date/Time: March 23, 10:17 am

Terrain (*e.g.* flat, hills, mountains): Mountains   Finish Date/Time: March 24, 10:51 am

Weather:

Temperature (°C): -2°C   Cloud Cover (%): 7/8

Precipitation: ☐ Heavy ☐ Moderate ☐ Mild ☑ None
☐ Snow ☐ Rain ☐ Other ______

Wind: Speed ☐ Strong ☐ Moderate ☑ Light ☐ None   Direction ______

Instrument:

Type: 2250 Bruel & Kjaer   Serial #: 2575763

Calibration: ☑ Before ☐ After

Method: 4231 Calibrator (s/n 4231-1)

Weighting (*i.e.* A): A   Other Settings: New Sensitivity: 49.54958 mV/Pa

Response (*i.e.* fast/slow): fast   deviation from last: 0.0564 dB

Observations: ***Include directions and estimated distances to the instrument in this section***

Audible noise observed: · Helicopters

Potential noise sources: · Helicopters, Wind, Birds

Obstacles (*e.g.* trees, buildings): · Scattered trees ~20m in all directions

Notes:

Please be sure to take a few photos of the instrument and the surrounding area (*i.e.* one in each direction) and put them in the project folder with appropriate labels upon return to the office!

Noise Baseline Study - Field Data Sheet

Sampler Location:

Project Name: Brucejack 2012 Noise

Project #: 1042-008-14-98

ID (*e.g.* S1): S6

UTM Coordinates: 428139 E 6259792 N qv

UTM Datum: NAD83

Ground Cover (*e.g.* soil/vegetation type): Snow

Start Date/Time: March 23, 10:32 am

Terrain (*e.g.* flat, hills, mountains): mountains

Finish Date/Time: March 24, 11:02 am

Weather:

Temperature (°C): -7°C

Cloud Cover (%): 7/8

Precipitation: ☐ Heavy ☐ Moderate ☐ Mild ☑ None

☐ Snow ☐ Rain ☐ Other ______

Wind: Speed ☐ Strong ☐ Moderate ☑ Light ☐ None

Direction ______

Instrument:

Type: 2250 Bruel & Kjaer

Serial #: 2505982

Calibration: ☑ Before ☐ After

Method: 4231 Calibrator (s/n 4231-1)

Weighting (*i.e.* A): A

Other Settings: new sensitivity: 49.896 mV/Pa; deviation from last: -0.0084 dB

Response (*i.e.* fast/slow): fast

Observations: ***Include directions and estimated distances to the instrument in this section***

Audible noise observed: · Helicopters

Potential noise sources: · Helicopters, Camp generators, wind

Obstacles (*e.g.* trees, buildings): · Mountain face to the north of mic.

Notes:

Please be sure to take a few photos of the instrument and the surrounding area (*i.e.* one in each direction) and put them in the project folder with appropriate labels upon return to the office!

Noise Baseline Study - Field Data Sheet

Sampler Location:

Project Name: Brucejack — Project # 1042-008

ID (*e.g.* S1): Brucejack S1

elev 629 m — UTM Coordinates: 468 411 E 6 259 447 N 9V — UTM Datum: NAD83

Ground Cover (*e.g.* soil/vegetation type): marsh-like, wet mossy, 10-20m trees — Start Date/Time: 6:08 PM 9/10/2012

Terrain (*e.g.* flat, hills, mountains): flat open — Finish Date/Time: 7:01 PM 9/11/2012

Weather:

Temperature (°C): 8.5 °C — Cloud Cover (%): 60

Precipitation: ☐ Heavy ☐ Moderate ☐ Mild ☑ None

☐ Snow ☐ Rain ☐ Other ______

Wind: Speed ☐ Strong ☐ Moderate ☑ Light ☐ None — Direction SW

Instrument:

Type B&K 2250 — Serial # 250 5861

Calibration: ☑ Before ☐ After

Method w/ 4321 Calibrator

Weighting (*i.e.* A): AC, C, Z — Other Settings: New Sensitivity 54.91 mV/Pa

Response (*i.e.* fast/slow): fast — Deviation from Last 0.11 dB

Observations: ***Include directions and estimated distances to the instrument in this section***

Audible noise observed: Relatively quiet site, rain overnight

Potential noise sources: Frequent helicopter fly overs, wildlife (bear, moose)

Obstacles (*e.g.* trees, buildings): 10-20m trees 20+ meters away

Notes:

Please be sure to take a few photos of the instrument and the surrounding area (*i.e.* one in each direction) and put them in the project folder with appropriate labels upon return to the office!

Noise Baseline Study - Field Data Sheet

Sampler Location:

Project Name: Brucejack   Project # 1042-008

ID (*e.g.* S1): S2

elev   UTM Coordinates: 465 276 E 6 258 964 N 9V   UTM Datum: NAD 83

Ground Cover (*e.g.* soil/vegetation type): short brush, distant conifers   Start Date/Time: 6:23 PM 9/10/2012

Terrain (*e.g.* flat, hills, mountains): along exposed ridge overlooking lake   Finish Date/Time: 7:18 PM 9/11/2012

Weather:

Temperature (°C): 8   Cloud Cover (%): 60

Precipitation: ☐ Heavy ☐ Moderate ☐ Mild ☑ None

☐ Snow ☐ Rain ☐ Other ______

Wind: Speed ☐ Strong ☐ Moderate ☑ Light ☐ None   Direction: SW

Instrument:

Type: B&K 2250   Serial #: 2548163

Calibration: ☐ Before ☐ After N/A

Method: Calibrator was left at other site

Weighting (*i.e.* A): C   Other Settings: ______

Response (*i.e.* fast/slow): fast

Observations: ***Include directions and estimated distances to the instrument in this section***

Audible noise observed: ______

Potential noise sources: Frequent helicopter fly-by's, wildlife

Obstacles (*e.g.* trees, buildings): ______

Notes: Microphone + tri-pod was knocked over by wildlife during recording as we found it lying on the ground at retrieval

Please be sure to take a few photos of the instrument and the surrounding area (*i.e.* one in each direction) and put them in the project folder with appropriate labels upon return to the office!

Noise Baseline Study - Field Data Sheet

Sampler Location:

Project Name: Brucejack

Project # 1042-008

ID (*e.g.* S1): S3

UTM Coordinates: 457 241 E 6 263 412 N 9V

UTM Datum: NAD 83

Ground Cover (*e.g.* soil/vegetation type): long grass w/distant conifers

Start Date/Time: 7:53 PM 9/11/2012

Terrain (*e.g.* flat, hills, mountains): flat marsh

Finish Date/Time: 8:53 PM 9/12/2012

Weather:

Temperature (°C): 4.0°C

Cloud Cover (%): 90

Precipitation: ☐ Heavy ☐ Moderate ☑ Mild ☐ None

☐ Snow ☑ Rain+ ☑ Other drizzle

Wind: Speed ☐ Strong ☐ Moderate ☑ Light ☐ None

Direction: SE

Instrument:

Type: B&K 2250

Serial #: 254 8163

Calibration: ☑ Before ☐ After

Method: w/ 4321 Calibrator

Weighting (*i.e.* A): C

Other Settings: New Sensitivity 47.60 mV/Pa

Response (*i.e.* fast/slow): fast

Departure from Last 0.02 dB

Observations: ***Include directions and estimated distances to the instrument in this section***

Audible noise observed: a few birds, insects

Potential noise sources: helicopters, wildlife

Obstacles (*e.g.* trees, buildings): long grassy marsh w/ distant conifers

Notes:

Please be sure to take a few photos of the instrument and the surrounding area (*i.e.* one in each direction) and put them in the project folder with appropriate labels upon return to the office!

Noise Baseline Study - Field Data Sheet

Sampler Location:

Project Name: Brucejack — Project # 1042-008

ID (*e.g.* S1): S4

UTM Coordinates: 445 844 E 6251190 N 9V. — UTM Datum: NAD 83

Ground Cover (*e.g.* soil/vegetation type): Short shrubs, small trees. — Start Date/Time: 7:37 PM 9/11/2012

Terrain (*e.g.* flat, hills, mountains): Exposed ridge — Finish Date/Time: 8:37 PM 9/12/2012

Weather:

Temperature (°C): 7.0 °C — Cloud Cover (%): 90%

Precipitation: ☐ Heavy ☐ Moderate ☑ Mild ☐ None
☐ Snow ☐ Rain ☑ Other drizzle

Wind: Speed ☐ Strong ☐ Moderate ☑ Light ☐ None — Direction SE

Instrument:

Type B&K 2250 — Serial # Z50 5861

Calibration: ☑ Before ☐ After

Method w/ B&K 4321 Callibrator

Weighting (*i.e.* A): C — Other Settings: New Sensitivity 54.22 mV/Pa

Response (*i.e.* fast/slow): fast — Departure from last -0.11 dB

Observations: ***Include directions and estimated distances to the instrument in this section***

Audible noise observed: light wind

Potential noise sources: Helicopter, wild life

Obstacles (*e.g.* trees, buildings):

Notes:

Please be sure to take a few photos of the instrument and the surrounding area (*i.e.* one in each direction) and put them in the project folder with appropriate labels upon return to the office!

Noise Baseline Study - Field Data Sheet

Sampler Location:

Project Name: Brucejack — Project # 1042-008

ID (*e.g.* S1): S5

UTM Coordinates: 437 898 E 6253 193 N 9V — UTM Datum: NAD 83

Ground Cover (*e.g.* soil/vegetation type): shale rock + short shrubs — Start Date/Time: AM 9/13/201

Terrain (*e.g.* flat, hills, mountains): exposed ridgeline adjacent to glacier — Finish Date/Time: AM 9/14/201

Weather:

Temperature (°C): 2.0°C — Cloud Cover (%): 100

Precipitation: ☐ Heavy ☑ Moderate ☐ Mild ☐ None
☐ Snow ☑ Rain ☐ Other fog

Wind: Speed ☐ Strong ☑ Moderate ☐ Light ☐ None — Direction SE

Instrument:

Type B&K 2250 — Serial # 250 5861

Calibration: ☑ Before ☐ After

Method: B&K 4321 Callibrator

Weighting (*i.e.* A): C — Other Settings: New Sensitivity 55.54 mV/Pa

Response (*i.e.* fast/slow): fast — Departure from Last 0.21dB

Observations: ***Include directions and estimated distances to the instrument in this section***

Audible noise observed: Wind

Potential noise sources: Machinery working on glacier
Helicopters

Obstacles (*e.g.* trees, buildings): nil

Notes:

Please be sure to take a few photos of the instrument and the surrounding area (*i.e.* one in each direction) and put them in the project folder with appropriate labels upon return to the office!

Noise Baseline Study - Field Data Sheet

Sampler Location:

Project Name: Brucejack — Project # 1042-008

ID (*e.g.* S1): S6

UTM Coordinates: 428 191 E 6 259 861 N 9V — UTM Datum: NAD 83

Ground Cover (*e.g.* soil/vegetation type): rock covered in snow, no veg. — Start Date/Time: 8:54 AM 9/13/2012

Terrain (*e.g.* flat, hills, mountains): alpine w/ surrounding peaks — Finish Date/Time: 8:08 AM 9/14/2012

Weather:

Temperature (°C): 0.0°C — Cloud Cover (%): 100

Precipitation: ☐ Heavy ☑ Moderate ☐ Mild ☐ None

☑ Snow ☑ Rain ☑ Other sleet

Wind: Speed ☐ Strong ☑ Moderate ☐ Light ☐ None — Direction SE

Instrument:

Type B&K 2250 — Serial # 2548163

Calibration: ☑ Before ☐ After

Method B&K 4321 Callibrator

Weighting (*i.e.* A): C — Other Settings: New Sensitivity 48.16 mV/Pa

Response (*i.e.* fast/slow): fast — Departure from last 0.10 dB

Observations: ***Include directions and estimated distances to the instrument in this section***

Audible noise observed: Wind, helicopter

Potential noise sources: Adjacent mining camp w/ abundant machinery operating

Dynamite blasting

Obstacles (*e.g.* trees, buildings): nil

Notes:

Please be sure to take a few photos of the instrument and the surrounding area (*i.e.* one in each direction) and put them in the project folder with appropriate labels upon return to the office!

Noise Baseline Study - Field Data Sheet

Sampler Location:

Project Name: Bruce Jack — Project #: 1042-008-14

ID (*e.g.* S1): S2

UTM Coordinates: 463657 E 6258197 N — UTM Datum: NAD83

Ground Cover (*e.g.* soil/vegetation type): Rocky — Start Date/Time: Oct 16th/

Terrain (*e.g.* flat, hills, mountains): Edge of Lake, sloped on NE side — Finish Date/Time: Oct 17th/

Weather:

Temperature (°C): 0°C — Cloud Cover (%): 70%

Precipitation: ☐ Heavy ☐ Moderate ☒ Mild ☐ None

☐ Snow ☐ Rain ☐ Other ____

Wind: Speed ☐ Strong ☐ Moderate ☒ Light ☐ None — Direction SE

Instrument:

Type: 2250 Bruel & Kjaer — Serial #: 2575763

Calibration: ☒ Before ☐ After

Method: 4231 calibrator

Weighting (*i.e.* A): A — Other Settings: New Sensitivity 54.62 mV/Pa; Deviation from last 0.20 dB

Response (*i.e.* fast/slow): fast

Observations: ***Include directions and estimated distances to the instrument in this section***

Audible noise observed: Nearby Stream ~100m

Potential noise sources: Stream, Wind, Rain

Obstacles (*e.g.* trees, buildings): ____

Notes:

Please be sure to take a few photos of the instrument and the surrounding area (*i.e.* one in each direction) and put them in the project folder with appropriate labels upon return to the office!

Appendix 3

Noise Monitoring Hourly Results

Rescan
Engineers and Scientists

Appendix 3. Noise Monitoring Hourly Results

Table 1. Hourly Sound Levels, Station S1, March 2012

	Start Time	End Time	Wind Speed (m/s)[a]	Wind Direction (degrees from true north)[a]	Total Sound Level (dBA)			
					L_{eq}	L_{max}	L_{min}	L_{90}
22-Mar-12	9:33 AM	10:33 AM	0.31	259.6	36.6	58.2	16.1	16.4
22-Mar-12	10:33 AM	11:33 AM	0.50	197.3	16.9	36.0	16.1	16.4
22-Mar-12	11:33 AM	12:33 PM	0.71	214.5	36.8	67.1	16.2	16.5
22-Mar-12	12:33 PM	1:33 PM	0.77	195.8	39.6	63.5	16.3	16.9
22-Mar-12	1:33 PM	2:33 PM	0.66	157.9	43.1	67.6	16.6	17.5
22-Mar-12	2:33 PM	3:33 PM	1.70	109.7	26.4	50.0	16.7	17.4
22-Mar-12	3:33 PM	4:33 PM	1.24	126.0	26.5	49.6	16.7	17.5
22-Mar-12	4:33 PM	5:33 PM	2.04	22.5	33.3	57.7	16.4	17.1
22-Mar-12	5:33 PM	6:33 PM	1.21	19.9	19.6	39.2	16.1	16.4
22-Mar-12	6:33 PM	7:33 PM	1.28	10.5	16.8	30.7	16.1	16.3
22-Mar-12	7:33 PM	8:33 PM	1.69	121.4	18.8	34.8	16.1	16.3
22-Mar-12	8:33 PM	9:33 PM	0.58	353.0	18.0	36.8	16.0	16.3
22-Mar-12	9:33 PM	10:33 PM	0.51	78.7	16.3	20.2	16.0	16.2
22-Mar-12	10:33 PM	11:33 PM	0.63	26.4	16.4	39.7	15.9	16.2
22-Mar-12	11:33 PM	12:33 AM	0.92	20.6	16.3	22.2	16.0	16.2
23-Mar-12	12:33 AM	1:33 AM	1.35	344.4	16.4	24.7	15.9	16.2
23-Mar-12	1:33 AM	2:33 AM	1.43	325.0	16.3	29.3	15.9	16.2
23-Mar-12	2:33 AM	3:33 AM	2.21	2.6	16.3	32.0	16.0	16.2
23-Mar-12	3:33 AM	4:33 AM	1.99	351.9	16.5	28.2	15.9	16.2
23-Mar-12	4:33 AM	5:33 AM	2.01	4.4	16.4	36.3	15.9	16.2
23-Mar-12	5:33 AM	6:33 AM	2.01	6.4	16.4	28.1	16.0	16.2
23-Mar-12	6:33 AM	7:33 AM	1.70	0.9	16.5	28.9	16.0	16.2
23-Mar-12	7:33 AM	8:33 AM	1.42	354.8	17.3	42.9	16.0	16.4
23-Mar-12	8:33 AM	9:25 AM[b]	1.03	7.6	23.9	47.7	16.1	16.6
Maximum			**2.2**	-	**43.1**	**67.6**	**16.7**	**17.5**
Minimum			**0.3**	-	**16.3**	**20.2**	**15.9**	**16.2**
Logarithmic average[c]			**1.2**	-	**32.5**	**57.9**	**16.1**	**16.5**

[a] *Wind speed and direction data from Wildfire meteorology station.*
[b] *52 minutes rather than one hour.*
[c] *Arithmetic mean was used to calculate mean wind speed and direction.*

Table 2. Hourly Sound Levels, Station S1, September 2012

	Start Time	End Time	Wind Speed (m/s)[a]	Wind Direction (degrees from true north)[a]	Total Sound Level (dBA)			
					L_{eq}	L_{max}	L_{min}	L_{90}
10-Sep-12	6:12 PM	7:12 PM	2.74	123.4	34.6	62.2	20.2	23.8
10-Sep-12	7:12 PM	8:12 PM	2.57	122.9	30.8	59.9	18.4	20.8
10-Sep-12	8:12 PM	9:12 PM	2.63	120.8	22.5	47.5	18.1	19.3
10-Sep-12	9:12 PM	10:12 PM	1.25	139.6	19.3	37.1	16.7	17.5
10-Sep-12	10:12 PM	11:12 PM	1.31	131.6	30.1	65.5	16.6	17.1
10-Sep-12	11:12 PM	12:12 AM	1.03	149.6	26.6	67.0	17.0	17.9
11-Sep-12	12:12 AM	1:12 AM	1.07	147.2	33.8	68.2	17.6	19.6
11-Sep-12	1:12 AM	2:12 AM	1.09	150.1	23.3	57.9	16.9	17.5
11-Sep-12	2:12 AM	3:12 AM	1.24	148.1	18.7	41.3	16.7	17.4
11-Sep-12	3:12 AM	4:12 AM	0.94	190.7	20.6	50.7	17.1	17.8
11-Sep-12	4:12 AM	5:12 AM	1.28	221.8	21.1	40.9	17.6	18.6
11-Sep-12	5:12 AM	6:12 AM	2.32	247.2	20.2	41.4	17.6	18.5
11-Sep-12	6:12 AM	7:12 AM	2.07	252.1	29.0	51.9	17.7	18.7
11-Sep-12	7:12 AM	8:12 AM	1.86	260.8	39.4	77.0	17.8	18.9
11-Sep-12	8:12 AM	9:12 AM	1.21	261.5	28.9	57.6	17.7	19.0
11-Sep-12	9:12 AM	10:12 AM	0.98	246.0	50.7	80.4	22.2	25.0
11-Sep-12	10:12 AM	11:12 AM	0.58	270.4	34.8	62.1	21.9	26.5
11-Sep-12	11:12 AM	12:12 PM	1.00	81.2	37.2	62.9	18.7	20.2
11-Sep-12	12:12 PM	1:12 PM	0.49	230.3	29.2	50.8	20.8	23.1
11-Sep-12	1:12 PM	2:12 PM	1.53	68.3	43.2	70.1	17.5	18.8
11-Sep-12	2:12 PM	3:12 PM	1.55	109.0	25.3	48.1	18.5	20.2
11-Sep-12	3:12 PM	4:12 PM	1.88	100.7	27.6	48.7	18.1	19.0
11-Sep-12	4:12 PM	5:12 PM	1.85	114.8	28.3	57.5	18.8	20.6
11-Sep-12	5:12 PM	6:12 PM	2.09	111.1	30.0	53.4	19.1	22.4
Maximum			**2.2**	-	**50.7**	**80.4**	**22.2**	**26.5**
Minimum			**0.5**	-	**18.7**	**37.1**	**16.6**	**17.1**
Logarithmic average[a]			**1.5**	-	**38.5**	**69.1**	**18.6**	**20.8**

[a] *Wind speed and direction data from Wildfire meteorology station.*
[b] *Arithmetic mean was used to calculate mean wind speed and direction.*

Table 3. Hourly Sound Levels, Station S2, March 2012

	Start Time	End Time	Wind Speed (m/s)[a]	Wind Direction (degrees from true north)[a]	Total Sound Level (dBA)			
					L_{eq}	L_{max}	L_{min}	L_{90}
22-Mar-12	9:54 AM	10:54 AM	0.31	259.6	18.2	31.3	16.7	17.0
22-Mar-12	10:54 AM	11:54 AM	0.50	197.3	17.9	44.6	16.6	17.0
22-Mar-12	11:54 AM	12:54 PM	0.71	214.5	18.5	37.8	16.8	17.1
22-Mar-12	12:54 PM	1:54 PM	0.77	195.8	47.0	74.6	16.8	17.3
22-Mar-12	1:54 PM	2:54 PM	0.66	157.9	47.5	74.1	16.9	17.8
22-Mar-12	2:54 PM	3:54 PM	1.70	109.7	40.0	66.4	17.2	17.9
22-Mar-12	3:54 PM	4:54 PM	1.24	126.0	42.5	66.8	16.7	17.0
22-Mar-12	4:54 PM	5:54 PM	2.04	22.5	41.2	65.9	16.7	17.0
22-Mar-12	5:54 PM	6:54 PM	1.21	19.9	18.0	29.0	16.8	17.0
22-Mar-12	6:54 PM	7:54 PM	1.28	10.5	18.0	32.4	16.8	17.2
22-Mar-12	7:54 PM	8:54 PM	1.69	121.4	24.8	40.8	16.7	17.1
22-Mar-12	8:54 PM	9:54 PM	0.58	353.0	17.4	27.2	16.6	16.9
22-Mar-12	9:54 PM	10:54 PM	0.51	78.7	17.0	18.3	16.5	16.8
22-Mar-12	10:54 PM	11:54 PM	0.63	26.4	16.9	18.3	16.6	16.8
22-Mar-12	11:54 PM	12:54 AM	0.92	20.6	16.9	23.4	16.5	16.8
23-Mar-12	12:54 AM	1:54 AM	1.35	344.4	16.9	18.3	16.5	16.8
23-Mar-12	1:54 AM	2:54 AM	1.43	325.0	16.9	23.8	16.6	16.8
23-Mar-12	2:54 AM	3:54 AM	2.21	2.6	16.9	18.4	16.5	16.8
23-Mar-12	3:54 AM	4:54 AM	1.99	351.9	16.9	18.0	16.6	16.8
23-Mar-12	4:54 AM	5:54 AM	2.01	4.4	16.9	19.1	16.5	16.8
23-Mar-12	5:54 AM	6:54 AM	2.01	6.4	16.9	22.3	16.5	16.8
23-Mar-12	6:54 AM	7:54 AM	1.70	0.9	16.9	18.1	16.5	16.8
23-Mar-12	7:54 AM	8:54 AM	1.42	354.8	25.7	46.6	16.5	16.8
23-Mar-12	8:54 AM	9:45 AM[b]	1.03	7.6	38.7	58.7	16.5	16.8
Maximum			**2.2**	-	**47.5**	**74.6**	**17.2**	**17.9**
Minimum			**0.3**	-	**16.9**	**18.0**	**16.5**	**16.8**
Logarithmic average[c]			**1.2**	-	**38.1**	**64.6**	**16.7**	**17.0**

[a] *Wind speed and direction data from Wildfire meteorology station.*
[b] *51 minutes rather than one hour.*
[c] *Arithmetic mean was used to calculate mean wind speed and direction.*

Table 4. Hourly Sound Levels, Station S2, October 2012

	Start Time	End Time	Wind Speed (m/s)[a]	Wind Direction (degrees from true north)[a]	Total Sound Level (dBA)			
					L_{eq}	L_{max}	L_{min}	L_{90}
16-Oct-12	10:40 AM	11:40 AM	n/a	n/a	47.4	60.9	39.7	41.2
16-Oct-12	11:40 AM	12:40 PM	n/a	n/a	45.5	62.1	39.3	40.9
16-Oct-12	12:40 PM	1:40 PM	n/a	n/a	40.5	53.5	38.5	39.3
16-Oct-12	1:40 PM	2:40 PM	n/a	n/a	39.7	50.9	38.6	39.3
16-Oct-12	2:40 PM	3:40 PM	n/a	n/a	39.7	45.2	38.4	39.3
16-Oct-12	3:40 PM	4:40 PM	n/a	n/a	55.0	67.3	38.8	43.7
16-Oct-12	4:40 PM	5:40 PM	n/a	n/a	59.2	67.8	48.2	54.2
16-Oct-12	5:40 PM	6:40 PM	n/a	n/a	57.9	67.8	42.5	50.8
16-Oct-12	6:40 PM	7:40 PM	n/a	n/a	44.2	56.1	38.5	39.4
16-Oct-12	7:40 PM	8:40 PM	n/a	n/a	39.3	41.5	38.4	39.0
16-Oct-12	8:40 PM	9:40 PM	n/a	n/a	39.1	40.5	38.2	38.8
16-Oct-12	9:40 PM	10:40 PM	n/a	n/a	39.6	50.6	38.2	38.8
16-Oct-12	10:40 PM	11:40 PM	n/a	n/a	44.5	55.9	38.9	40.9
16-Oct-12	11:40 PM	12:40 AM	n/a	n/a	40.5	57.6	38.3	39.0
17-Oct-12	12:40 AM	1:40 AM	n/a	n/a	39.7	54.3	38.2	38.9
17-Oct-12	1:40 AM	2:40 AM	n/a	n/a	39.5	56.9	38.0	38.8
17-Oct-12	2:40 AM	3:40 AM	n/a	n/a	41.4	56.1	38.1	39.1
17-Oct-12	3:40 AM	4:40 AM	n/a	n/a	39.3	53.1	38.1	38.8
17-Oct-12	4:40 AM	5:40 AM	n/a	n/a	38.8	52.0	37.9	38.5
17-Oct-12	5:40 AM	6:40 AM	n/a	n/a	38.7	51.3	37.7	38.4
17-Oct-12	6:40 AM	7:40 AM	n/a	n/a	38.5	52.8	37.7	38.2
17-Oct-12	7:40 AM	8:40 AM	n/a	n/a	44.0	70.4	37.6	38.2
17-Oct-12	8:40 AM	9:40 AM	n/a	n/a	44.8	71.1	37.6	38.1
17-Oct-12	9:40 AM	10:39 AM[b]	n/a	n/a	38.3	50.5	37.3	38.0
Maximum			**n/a**	-	**59.2**	**71.1**	**48.2**	**54.2**
Minimum			**n/a**	-	**38.3**	**40.5**	**37.3**	**38.0**
Logarithmic average[c]			**n/a**	-	**49.4**	**63.0**	**39.9**	**43.8**

n/a = not available
[a] Wind speed and direction data from Wildfire meteorology station.
[b] 59 minutes rather than one hour.
[c] Arithmetic mean was used to calculate mean wind speed and direction.

Table 5. Hourly Sound Levels, Station S3, March 2012

	Start Time	End Time	Wind Speed (m/s)[a]	Wind Direction (degrees from true north)[a]	Total Sound Level (dBA)			
					L_{eq}	L_{max}	L_{min}	L_{90}
24-Mar-12	11:56 AM	12:56 PM	1.53	143.0	17.3	34.3	15.9	16.2
24-Mar-12	12:56 PM	1:56 PM	1.69	146.1	57.3	82.6	16.0	16.3
24-Mar-12	1:56 PM	2:56 PM	2.22	164.8	35.2	58.1	16.0	16.3
24-Mar-12	2:56 PM	3:56 PM	2.36	188.4	48.0	72.0	16.0	16.3
24-Mar-12	3:56 PM	4:56 PM	2.34	203.6	47.2	72.4	16.0	16.3
24-Mar-12	4:56 PM	5:56 PM	2.00	210.9	20.5	48.4	15.9	16.3
24-Mar-12	5:56 PM	6:56 PM	1.56	237.1	16.4	31.1	15.9	16.1
24-Mar-12	6:56 PM	7:56 PM	0.63	321.2	16.3	26.6	15.8	16.1
24-Mar-12	7:56 PM	8:56 PM	0.95	329.0	16.2	35.1	15.8	16.0
24-Mar-12	8:56 PM	9:56 PM	0.95	256.7	16.2	42.8	15.8	16.0
24-Mar-12	9:56 PM	10:56 PM	1.11	213.9	16.2	30.4	15.8	16.0
24-Mar-12	10:56 PM	11:56 PM	0.83	2.4	16.3	32.5	15.8	16.0
24-Mar-12	11:56 PM	12:56 AM	0.57	342.5	16.2	33.2	15.7	16.0
25-Mar-12	12:56 AM	1:56 AM	1.15	11.1	16.8	34.6	15.8	16.0
25-Mar-12	1:56 AM	2:56 AM	1.15	333.5	16.6	28.9	15.8	16.0
25-Mar-12	2:56 AM	3:56 AM	0.82	153.1	16.3	42.3	15.8	16.0
25-Mar-12	3:56 AM	4:56 AM	1.22	323.7	16.1	36.7	15.7	16.0
25-Mar-12	4:56 AM	5:56 AM	0.74	41.9	16.2	29.4	15.8	16.0
25-Mar-12	5:56 AM	6:56 AM	0.69	18.5	16.7	36.5	15.8	16.0
25-Mar-12	6:56 AM	7:56 AM	0.75	7.8	16.2	29.9	15.7	16.0
25-Mar-12	7:56 AM	8:56 AM	0.85	101.1	17.4	39.4	15.8	16.0
25-Mar-12	8:56 AM	9:52 AM[b]	1.27	147.3	17.1	30.1	15.8	16.1
Maximum			**2.4**	-	**57.3**	**82.6**	**16.0**	**16.3**
Minimum			**0.6**	-	**16.1**	**26.6**	**15.7**	**16.0**
Logarithmic average[c]			**1.2**	-	**44.8**	**69.9**	**15.8**	**16.1**

[a] *Wind speed and direction data from Scott Creek meteorology station.*
[b] *Only 21 hours, 56 minutes available.*
[c] *Arithmetic mean was used to calculate mean wind speed and direction.*

Table 6. Hourly Sound Levels, Station S3, September 2012

	Start Time	End Time	Wind Speed (m/s)[a]	Wind Direction (degrees from true north)[a]	Total Sound Level (dBA)			
					L_{eq}	L_{max}	L_{min}	L_{90}
11-Sep-12	7:57 PM	8:57 PM	0.92	130.9	31.0	49.5	27.9	29.3
11-Sep-12	8:57 PM	9:57 PM	0.61	120.9	32.2	35.8	30.1	31.2
11-Sep-12	9:57 PM	10:57 PM	1.23	161.3	33.1	42.9	30.7	32.2
11-Sep-12	10:57 PM	11:57 PM	2.10	158.8	32.3	41.9	30.1	31.4
11-Sep-12	11:57 PM	12:57 AM	2.56	161.4	31.9	46.5	29.6	31.0
12-Sep-12	12:57 AM	1:57 AM	2.79	175.4	32.1	55.6	29.3	31.1
12-Sep-12	1:57 AM	2:57 AM	2.88	190.5	33.2	61.6	30.8	32.0
12-Sep-12	2:57 AM	3:57 AM	3.07	192.6	33.4	53.8	30.0	31.3
12-Sep-12	3:57 AM	4:57 AM	2.09	176.2	32.1	38.6	29.7	31.1
12-Sep-12	4:57 AM	5:57 AM	2.39	180.1	32.4	47.7	29.6	31.1
12-Sep-12	5:57 AM	6:57 AM	2.53	183.9	32.7	49.6	29.4	31.3
12-Sep-12	6:57 AM	7:57 AM	2.21	185.7	52.7	81.3	31.0	32.9
12-Sep-12	7:57 AM	8:57 AM	1.97	186.2	35.9	56.6	32.5	34.2
12-Sep-12	8:57 AM	9:57 AM	2.02	177.7	35.7	68.1	32.3	34.0
12-Sep-12	9:57 AM	10:57 AM	1.49	169.9	40.1	67.7	32.9	34.5
12-Sep-12	10:57 AM	11:57 AM	1.52	167.9	38.6	65.4	33.8	35.6
12-Sep-12	11:57 AM	12:57 PM	1.40	165.9	39.8	71.0	35.8	37.4
12-Sep-12	12:57 PM	1:57 PM	1.83	192.7	38.0	60.6	34.5	36.0
12-Sep-12	1:57 PM	2:57 PM	1.82	184.4	58.5	91.0	34.7	35.9
12-Sep-12	2:57 PM	3:57 PM	1.71	179.0	58.4	86.0	36.9	38.4
12-Sep-12	3:57 PM	4:57 PM	1.96	172.7	59.2	89.9	36.2	37.4
12-Sep-12	4:57 PM	5:57 PM	2.40	176.5	36.3	59.4	33.6	35.2
12-Sep-12	5:57 PM	6:57 PM	2.54	172.1	37.1	43.0	34.9	36.2
12-Sep-12	6:57 PM	7:57 PM	2.71	164.1	36.8	48.6	33.3	35.0
Maximum			**3.1**	-	**59.2**	**91.0**	**36.9**	**38.4**
Minimum			**0.6**	-	**31.0**	**35.8**	**27.9**	**29.3**
Logarithmic average[b]			**2.0**	-	**50.5**	**81.0**	**32.6**	**34.1**

[a] *Wind speed and direction data from Scott Creek meteorology station.*
[a] *Arithmetic mean was used to calculate mean wind speed and direction.*

Table 7. Hourly Sound Levels, Station S4, March 2012

	Start Time	End Time	Wind Speed (m/s)[a]	Wind Direction (degrees from true north)[a]	Total Sound Level (dBA)			
					L_{eq}	L_{max}	L_{min}	L_{90}
24-Mar-12	11:37 AM	12:37 PM	1.53	143.0	52.7	76.9	16.1	16.5
24-Mar-12	12:37 PM	1:37 PM	1.69	146.1	17.0	36.7	16.2	16.5
24-Mar-12	1:37 PM	2:37 PM	2.22	164.8	25.5	55.3	16.2	16.5
24-Mar-12	2:37 PM	3:37 PM	2.36	188.4	35.0	60.1	16.3	16.6
24-Mar-12	3:37 PM	4:37 PM	2.34	203.6	20.2	38.8	16.5	17.2
24-Mar-12	4:37 PM	5:37 PM	2.00	210.9	51.2	70.1	16.9	19.3
24-Mar-12	5:37 PM	6:37 PM	1.56	237.1	50.2	75.2	16.5	17.7
24-Mar-12	6:37 PM	7:37 PM	0.63	321.2	17.9	23.8	16.2	16.5
24-Mar-12	7:37 PM	8:37 PM	0.95	329.0	19.0	27.4	16.2	16.5
24-Mar-12	8:37 PM	9:37 PM	0.95	256.7	20.9	31.2	16.8	18.6
24-Mar-12	9:37 PM	10:37 PM	1.11	213.9	16.8	21.5	16.2	16.4
24-Mar-12	10:37 PM	11:37 PM	0.83	2.4	20.5	30.1	16.4	18.3
24-Mar-12	11:37 PM	12:37 AM	0.57	342.5	24.8	34.3	18.0	21.5
25-Mar-12	12:37 AM	1:37 AM	1.15	11.1	21.6	34.0	16.2	16.6
25-Mar-12	1:37 AM	2:37 AM	1.15	333.5	24.2	45.9	16.2	16.6
25-Mar-12	2:37 AM	3:37 AM	0.82	153.1	17.8	33.2	16.1	16.5
25-Mar-12	3:37 AM	4:37 AM	1.22	323.7	17.3	26.0	16.2	16.4
25-Mar-12	4:37 AM	5:37 AM	0.74	41.9	18.2	28.7	16.2	16.5
25-Mar-12	5:37 AM	6:37 AM	0.69	18.5	26.8	50.5	16.6	18.6
25-Mar-12	6:37 AM	7:37 AM	0.75	7.8	23.8	35.3	16.5	17.9
25-Mar-12	7:37 AM	8:37 AM	0.85	101.1	42.8	63.0	16.2	16.6
25-Mar-12	8:37 AM	9:37 AM[b]	1.27	147.3	55.6	82.5	16.4	17.0
Maximum			**2.4**	-	**55.6**	**82.5**	**18.0**	**21.5**
Minimum			**0.6**	-	**16.8**	**21.5**	**16.1**	**16.4**
Logarithmic average[c]			**1.2**	-	**45.7**	**70.9**	**16.4**	**17.5**

[a] *Wind speed and direction data from Scott Creek meteorology station.*
[b] *Only 22 hours available.*
[c] *Arithmetic mean was used to calculate mean wind speed and direction.*

Table 8. Hourly Sound Levels, Station S4, September 2012

	Start Time	End Time	Wind Speed (m/s)[a]	Wind Direction (degrees from true north)[a]	Total Sound Level (dBA)			
					L_{eq}	L_{max}	L_{min}	L_{90}
11-Sep-12	7:41 PM	8:41 PM	0.92	130.9	44.0	65.6	32.4	35.0
11-Sep-12	8:41 PM	9:41 PM	0.61	120.9	43.3	62.0	33.3	36.1
11-Sep-12	9:41 PM	10:41 PM	1.23	161.3	40.0	72.4	32.4	34.1
11-Sep-12	10:41 PM	11:41 PM	2.10	158.8	39.5	73.0	33.0	35.2
11-Sep-12	11:41 PM	12:41 AM	2.56	161.4	37.1	62.1	33.4	35.1
12-Sep-12	12:41 AM	1:41 AM	2.79	175.4	36.8	57.7	33.8	35.3
12-Sep-12	1:41 AM	2:41 AM	2.88	190.5	38.8	76.0	33.0	34.9
12-Sep-12	2:41 AM	3:41 AM	3.07	192.6	38.5	59.7	33.7	35.4
12-Sep-12	3:41 AM	4:41 AM	2.09	176.2	36.4	43.2	33.5	35.4
12-Sep-12	4:41 AM	5:41 AM	2.39	180.1	36.0	53.2	33.1	34.8
12-Sep-12	5:41 AM	6:41 AM	2.53	183.9	38.3	68.1	33.9	35.4
12-Sep-12	6:41 AM	7:41 AM	2.21	185.7	57.8	92.8	34.2	36.4
12-Sep-12	7:41 AM	8:41 AM	1.97	186.2	42.4	71.7	36.4	38.6
12-Sep-12	8:41 AM	9:41 AM	2.02	177.7	44.2	69.6	35.0	38.2
12-Sep-12	9:41 AM	10:41 AM	1.49	169.9	48.4	78.6	33.4	37.6
12-Sep-12	10:41 AM	11:41 AM	1.52	167.9	42.1	72.1	36.3	39.1
12-Sep-12	11:41 AM	12:41 PM	1.40	165.9	41.4	67.1	36.9	39.2
12-Sep-12	12:41 PM	1:41 PM	1.83	192.7	40.1	67.7	36.1	38.0
12-Sep-12	1:41 PM	2:41 PM	1.82	184.4	40.9	71.6	36.3	38.7
12-Sep-12	2:41 PM	3:41 PM	1.71	179.0	44.7	66.2	37.8	40.6
12-Sep-12	3:41 PM	4:41 PM	1.96	172.7	47.7	74.2	38.6	43.4
12-Sep-12	4:41 PM	5:41 PM	2.40	176.5	50.9	72.5	36.6	42.8
12-Sep-12	5:41 PM	6:41 PM	2.54	172.1	62.9	97.1	35.5	37.4
12-Sep-12	6:41 PM	7:41 PM	2.71	164.1	39.8	53.8	34.4	36.7
Maximum			**3.1**	-	**62.9**	**97.1**	**38.6**	**43.4**
Minimum			**0.6**	-	**36.0**	**43.2**	**32.4**	**34.1**
Logarithmic average[b]			**2.0**	-	**46.4**	**79.9**	**35.0**	**37.7**

[a] *Wind speed and direction data from Scott Creek meteorology station.*
[b] *Arithmetic mean was used to calculate mean wind speed and direction.*

Table 9. Hourly Sound Levels, Station S5, March 2012

	Start Time	End Time	Wind Speed (m/s)[a]	Wind Direction (degrees from true north)[a]	Total Sound Level (dBA)			
					L_{eq}	L_{max}	L_{min}	L_{90}
23-Mar-12	10:25 AM	11:25 AM	0.71	52.1	32.7	52.5	16.1	16.3
23-Mar-12	11:25 AM	12:25 PM	1.12	153.0	41.4	63.2	16.1	16.4
23-Mar-12	12:25 PM	1:25 PM	1.78	182.1	16.5	20.4	16.1	16.3
23-Mar-12	1:25 PM	2:25 PM	1.46	181.8	29.1	53.2	16.2	16.4
23-Mar-12	2:25 PM	3:25 PM	1.33	183.7	45.2	67.6	16.1	16.4
23-Mar-12	3:25 PM	4:25 PM	1.55	171.8	16.5	21.9	16.1	16.3
23-Mar-12	4:25 PM	5:25 PM	1.20	157.2	16.6	34.1	16.1	16.4
23-Mar-12	5:25 PM	6:25 PM	1.11	109.4	16.5	22.7	16.1	16.4
23-Mar-12	6:25 PM	7:25 PM	0.90	58.3	17.6	32.0	16.1	16.4
23-Mar-12	7:25 PM	8:25 PM	1.04	355.1	17.1	42.9	16.0	16.3
23-Mar-12	8:25 PM	9:25 PM	0.87	355.2	19.2	57.7	16.0	16.2
23-Mar-12	9:25 PM	10:25 PM	0.87	293.7	16.5	23.5	16.0	16.2
23-Mar-12	10:25 PM	11:25 PM	0.71	333.6	16.6	23.6	16.0	16.2
23-Mar-12	11:25 PM	12:25 AM	0.95	1.9	16.3	28.8	15.9	16.2
24-Mar-12	12:25 AM	1:25 AM	0.47	271.6	16.3	18.0	15.9	16.2
24-Mar-12	1:25 AM	2:25 AM	1.01	287.1	16.5	29.5	15.9	16.2
24-Mar-12	2:25 AM	3:25 AM	0.58	65.5	16.3	18.8	15.8	16.1
24-Mar-12	3:25 AM	4:25 AM	0.66	96.2	16.4	35.8	15.8	16.2
24-Mar-12	4:25 AM	5:25 AM	0.67	155.9	16.3	36.2	15.9	16.1
24-Mar-12	5:25 AM	6:25 AM	0.62	60.3	18.5	38.3	15.9	16.1
24-Mar-12	6:25 AM	7:25 AM	0.52	61.9	16.2	34.3	15.9	16.1
24-Mar-12	7:25 AM	8:25 AM	0.66	42.1	16.3	20.2	15.9	16.1
24-Mar-12	8:25 AM	9:25 AM	0.74	100.3	35.0	55.7	16.0	16.2
24-Mar-12	9:25 AM	10:25 AM	1.02	70.9	30.7	55.0	16.0	16.3
Maximum			**1.8**	-	**45.2**	**67.6**	**16.2**	**16.4**
Minimum			**0.5**	-	**16.2**	**18.0**	**15.8**	**16.1**
Logarithmic average[b]			**0.9**	-	**33.6**	**56.0**	**16.0**	**16.3**

[a] *Wind speed and direction data from Scott Creek meteorology station.*
[b] *Arithmetic mean was used to calculate mean wind speed and direction.*

Table 10. Hourly Sound Levels, Station S5, September 2012

	Start Time	End Time	Wind Speed (m/s)[a]	Wind Direction (degrees from true north)[a]	Total Sound Level (dBA)			
					L_{eq}	L_{max}	L_{min}	L_{90}
13-Sep-12	8:35 AM	9:35 AM	1.66	194.3	38.6	54.2	34.5	36.8
13-Sep-12	9:35 AM	10:35 AM	1.68	192.5	39.5	59.6	34.8	37.0
13-Sep-12	10:35 AM	11:35 AM	1.67	177.3	41.9	63.8	34.5	37.4
13-Sep-12	11:35 AM	12:35 PM	1.84	210.2	39.3	58.6	32.9	35.6
13-Sep-12	12:35 PM	1:35 PM	2.48	148.7	35.8	49.1	30.8	33.4
13-Sep-12	1:35 PM	2:35 PM	2.33	159.1	42.3	61.6	32.7	35.0
13-Sep-12	2:35 PM	3:35 PM	2.27	175.2	50.9	79.0	32.9	36.5
13-Sep-12	3:35 PM	4:35 PM	2.01	186.2	48.5	74.1	33.8	36.0
13-Sep-12	4:35 PM	5:35 PM	1.77	172.0	39.5	59.7	34.2	36.9
13-Sep-12	5:35 PM	6:35 PM	1.97	166.5	42.0	60.7	34.2	37.2
13-Sep-12	6:35 PM	7:35 PM	3.44	142.1	39.5	60.7	34.6	36.6
13-Sep-12	7:35 PM	8:35 PM	4.28	154.1	38.8	54.3	34.8	36.8
13-Sep-12	8:35 PM	9:35 PM	6.01	209.3	37.8	52.7	33.9	36.3
13-Sep-12	9:35 PM	10:35 PM	5.41	201.0	38.6	53.5	34.9	36.9
13-Sep-12	10:35 PM	11:35 PM	4.17	208.3	38.6	56.9	34.5	36.7
13-Sep-12	11:35 PM	12:35 AM	4.10	212.8	39.6	63.3	35.6	37.8
14-Sep-12	12:35 AM	1:35 AM	5.24	230.2	40.2	64.3	34.8	37.8
14-Sep-12	1:35 AM	2:35 AM	3.55	216.8	38.7	53.5	34.1	36.5
14-Sep-12	2:35 AM	3:35 AM	2.04	195.6	39.2	53.4	34.3	37.0
14-Sep-12	3:35 AM	4:35 AM	3.07	216.5	37.8	53.0	33.2	35.5
14-Sep-12	4:35 AM	5:35 AM	3.91	217.0	37.3	47.9	32.3	35.5
14-Sep-12	5:35 AM	6:35 AM	3.29	216.0	37.2	48.1	33.1	35.2
14-Sep-12	6:35 AM	7:35 AM	2.03	209.6	35.2	43.4	31.1	33.4
14-Sep-12	7:35 AM	7:55 AM[b]	2.09	203.0	35.0	44.5	31.1	33.1
Maximum			**6.0**	-	**50.9**	**79.0**	**35.6**	**37.8**
Minimum			**1.7**	-	**35.0**	**43.4**	**30.8**	**33.1**
Logarithmic average[c]			**3.0**	-	**41.9**	**67.0**	**33.8**	**36.3**

[a] *Wind speed and direction data from Scott Creek meteorology station.*
[b] *20 minutes rather than one hour.*
[c] *Arithmetic mean was used to calculate mean wind speed and direction.*

Table 11. Hourly Sound Levels, Station S6, March 2012

	Start Time	End Time	Wind Speed (m/s)[a]	Wind Direction (degrees from true north)[a]	Total Sound Level (dBA)			
					L_{eq}	L_{max}	L_{min}	L_{90}
23-Mar-12	10:38 AM	11:38 AM	3.61	100.9	48.2	75.8	17.9	21.1
23-Mar-12	11:38 AM	12:38 PM	2.63	95.0	37.3	59.0	17.1	19.9
23-Mar-12	12:38 PM	1:38 PM	2.13	97.1	24.7	38.7	17.8	20.0
23-Mar-12	1:38 PM	2:38 PM	1.58	96.0	45.5	67.1	16.6	17.5
23-Mar-12	2:38 PM	3:38 PM	1.38	96.3	44.7	63.5	17.2	20.1
23-Mar-12	3:38 PM	4:38 PM	1.85	96.7	23.3	32.7	18.1	19.9
23-Mar-12	4:38 PM	5:38 PM	2.69	103.7	22.9	33.1	17.9	19.5
23-Mar-12	5:38 PM	6:38 PM	2.06	98.3	23.3	33.4	17.5	19.9
23-Mar-12	6:38 PM	7:38 PM	2.26	88.9	24.0	53.6	16.7	18.0
23-Mar-12	7:38 PM	8:38 PM	3.51	85.6	24.9	37.7	18.4	21.8
23-Mar-12	8:38 PM	9:38 PM	3.75	87.5	24.7	49.5	18.0	20.7
23-Mar-12	9:38 PM	10:38 PM	3.42	86.6	21.9	37.7	17.3	19.4
23-Mar-12	10:38 PM	11:38 PM	3.92	87.2	23.8	39.5	17.0	19.6
23-Mar-12	11:38 PM	12:38 AM	2.50	86.9	23.2	33.7	17.4	19.3
24-Mar-12	12:38 AM	1:38 AM	3.00	84.9	23.5	32.7	17.5	20.4
24-Mar-12	1:38 AM	2:38 AM	4.05	86.5	25.7	37.5	19.4	22.5
24-Mar-12	2:38 AM	3:38 AM	4.16	85.5	23.6	34.4	18.7	20.5
24-Mar-12	3:38 AM	4:38 AM	3.83	86.5	25.7	36.9	18.0	20.6
24-Mar-12	4:38 AM	5:38 AM	4.12	88.3	23.7	37.4	17.9	20.5
24-Mar-12	5:38 AM	6:38 AM	4.07	89.0	22.0	34.4	17.2	19.4
24-Mar-12	6:38 AM	7:38 AM	4.33	85.4	23.0	39.6	17.1	19.0
24-Mar-12	7:38 AM	8:38 AM	4.95	104.3	45.5	68.5	18.8	21.7
24-Mar-12	8:38 AM	9:38 AM	5.16	104.0	45.3	65.8	18.8	21.6
24-Mar-12	9:38 AM	10:38 AM	4.80	108.0	49.0	70.9	19.0	22.7
Maximum			**5.2**	-	**49.0**	**75.8**	**19.4**	**22.7**
Minimum			**1.4**	-	**21.9**	**32.7**	**16.6**	**17.5**
Logarithmic average[b]			**3.3**	-	**40.8**	**64.6**	**17.9**	**20.4**

[a] *Wind speed and direction data from Brucejack Lake meteorology station.*
[b] *Arithmetic mean was used to calculate mean wind speed and direction.*

Table 12. Hourly Sound Levels, Station S6, September 2012

	Start Time	End Time	Wind Speed (m/s)[a]	Wind Direction (degrees from true north)[a]	Total Sound Level (dBA)			
					L_{eq}	L_{max}	L_{min}	L_{90}
13-Sep-12	9:00 AM	10:00 AM	8.69	98.1	71.0	97.1	39.9	43.4
13-Sep-12	10:00 AM	11:00 AM	9.95	94.3	45.0	65.4	39.7	42.1
13-Sep-12	11:00 AM	12:00 PM	10.70	86.6	45.2	69.0	40.0	41.5
13-Sep-12	12:00 PM	1:00 PM	10.69	90.7	45.1	67.3	38.4	40.6
13-Sep-12	1:00 PM	2:00 PM	9.70	94.0	49.0	67.7	38.1	42.7
13-Sep-12	2:00 PM	3:00 PM	9.97	102.6	48.0	66.1	37.0	41.4
13-Sep-12	3:00 PM	4:00 PM	9.03	102.2	49.4	71.3	36.6	41.2
13-Sep-12	4:00 PM	5:00 PM	10.71	87.7	51.6	72.2	38.5	43.3
13-Sep-12	5:00 PM	6:00 PM	12.24	87.7	46.2	66.9	39.2	41.2
13-Sep-12	6:00 PM	7:00 PM	11.67	87.6	50.1	68.8	38.4	40.7
13-Sep-12	7:00 PM	8:00 PM	8.88	97.2	44.5	76.7	36.9	39.1
13-Sep-12	8:00 PM	9:00 PM	6.16	119.5	42.6	69.7	36.4	38.4
13-Sep-12	9:00 PM	10:00 PM	6.40	124.5	77.6	121.9	35.0	36.8
13-Sep-12	10:00 PM	11:00 PM	5.75	130.5	46.6	75.4	33.5	35.5
13-Sep-12	11:00 PM	12:00 AM	4.80	272.0	43.1	70.4	32.3	34.5
14-Sep-12	12:00 AM	1:00 AM	5.60	266.0	49.6	72.6	32.8	35.7
14-Sep-12	1:00 AM	2:00 AM	4.54	279.7	48.7	74.7	32.1	35.6
14-Sep-12	2:00 AM	3:00 AM	6.63	284.3	41.2	64.3	30.3	33.2
14-Sep-12	3:00 AM	4:00 AM	6.75	294.1	51.2	77.7	31.3	36.5
14-Sep-12	4:00 AM	5:00 AM	5.98	293.9	51.7	74.8	32.4	37.6
14-Sep-12	5:00 AM	6:00 AM	7.71	290.0	47.3	69.6	31.5	36.0
14-Sep-12	6:00 AM	7:00 AM	6.32	300.3	47.0	71.1	29.9	34.6
14-Sep-12	7:00 AM	8:00 AM	2.81	290.7	47.6	71.9	29.0	33.1
14-Sep-12	8:00 AM	8:05 AM[b]	3.70	264.0	41.0	56.0	29.8	32.1
Maximum			**12.2**		**77.6**	**121.9**	**40.0**	**43.4**
Minimum			**2.8**		**41.0**	**56.0**	**29.0**	**32.1**
Logarithmic average[c]			**7.7**		**64.7**	**108.1**	**36.3**	**39.5**

[a] *Wind speed and direction data from Brucejack Lake meteorology station.*
[b] *5 minutes rather than one hour.*
[c] *Arithmetic mean was used to calculate mean wind speed and direction.*