# Appendix C-5: Acoustic Bat Survey (March 4, 2013)

March 4, 2013

Ms. Melissa Peterson
Project Manager
EDF Renewable Energy
10 Second Street NE, Suite 400
Minneapolis, Minnesota 55413

Re: *Acoustic Bat Survey*
*Stoneray Wind Project*
*Burns & McDonnell Project No. 62823*

Dear Ms. Peterson:

Burns & McDonnell Engineering Company, Inc. (Burns & McDonnell) is providing environmental support services to EDF Renewable Energy (EDF), formerly enXco Development Corporation, for their proposed 105-megawatt (MW) wind energy facility (Project) to be located in Pipestone and Murray counties in southwestern Minnesota (Appendix A). The Project, known as the Stoneray Wind Project, will consist of up to 62 wind turbine generators (WTGs), access roads, an underground electrical collector system, and a small electrical switchyard situated within the Project area. The Project area is generally located north, east, and southeast of Woodstock, Minnesota, and consists of all or portions of the following Sections.

**Project Location**

| Township (north) | Range (west) | Sections |
|---|---|---|
| 107 | 44 | 7-10, 14-29, 32-36 |
| 107 | 43 | 30, 31 |
| 106 | 44 | 3, 4, 9, 10, 12, 13, 24, 25 |
| 106 | 43 | 6, 7, 17-20, 29, 30 |

Per recommendations of the U.S. Fish and Wildlife Service (USFWS) and Minnesota Department of Natural Resources (MDNR), Burns & McDonnell conducted an acoustic bat survey for three locations within the proposed Project area, which was approximately 22,400 acres in size. The purpose of the acoustic bat survey was to record general bat activity in the vicinity of the Project. According to the USFWS, the northern long-eared myotis (*Myotis septentrionalis*) may be present in the area, has the potential to become federally listed in the near future (USFWS 2012); thus, bat passes potentially belonging to this species were analyzed. This species is listed as Special Concern by the state of Minnesota (Section 84.0895), but not specifically within Pipestone and Murray counties. Other bat species known in the region include:

- Silver-haired bat (*Lasionycteris noctivagans*)
- Hoary bat (*Lasiurus cinereus*)
- Eastern red bat (*Lasiurus borealis*)
- Tri-colored bat (*Perimyotis subflavus*)
- Little brown bat (*Myotis lucifugus*)
- Big brown bat (*Eptesicus fuscus*)

## Methods

To record bat activity at three locations within the Project area, a series of activities were completed, including, but not necessarily limited to the following:

- Identification of monitoring locations
- Deployment of acoustical monitoring
- Routine equipment maintenance and data collection
- Data preparation and analysis

These activities are briefly described below.

### *Monitoring Locations*

Two monitoring locations were chosen that were representative of potential wind turbine locations that were in open, cultivated upland areas, while the third location was along a riparian corridor where wind turbines would likely not be placed (Appendix A), as recommended by MDNR. These monitoring locations and acoustical monitoring methodologies were coordinated with MDNR (November 17, 2011 and March 26, 2012). The two upland monitoring locations were also chosen from existing meteorological (MET) towers at these locations; thus, the monitors and two microphones could be attached to the MET towers. All three locations were also chosen based on having landowner permission to deploy the acoustical monitors.

### *Song Meter Deployment*

On April 9, 2012 Burns & McDonnell biologists deployed temporary installations of two Song Meter II Bat (SM2Bat) recording devices near MET towers 0315 (43.962522, -96.05424) and 0375 (44.050843, -96.131315), and one device at the riparian location (44.023312, -96.147587) (Appendix A, Photos 1-4). For study purposes, MET tower location 0315 was labeled as M1, MET tower 0375 was labeled as M2, and the riparian area was labeled as M3. These monitors were set to start recording the evening of April 9, 2012. Once the MET towers could be accessed (April 23, 2012), the two monitors (M1 and M2) adjacent to the MET towers were relocated to the actual MET towers. Each tower was equipped with one monitor and two microphones. One microphone was placed at a lower elevation at approximately seven feet above ground, while a higher microphone was installed at approximately 145 feet above ground, which would be at a height within a typical commercial scale wind turbine rotor swept area. In addition, two additional microphones and associated information cables were installed on each MET tower for the higher microphone in case of equipment failure. Additional photographs of the typical acoustic equipment set-up are included in Appendix A. Acoustic monitors at these two MET tower locations (M1 and M2) and one riparian area (M3) were used throughout the remaining duration of the study (through October 25, 23, and 31, 2012, respectively).

### *Routine Equipment Maintenance & Data Collection*

Each SM2Bat was programmed to record and store Wac files every half hour from one-half hour before sunset until one-half hour after sunrise for the duration of the study (April 9, 2012 to ~October 31, 2012). The SM2Bat units automatically adjusted to account for changes to nighttime durations. Data collection, data card replacement, and battery replacement for each unit occurred on routine intervals, averaging 10.8 days.

### *Data Analysis*

The full spectrum data from the SM2Bat was analyzed using SonoBat 3.1 Ozark software. To prepare data for analysis, a series of steps were conducted which included:

1. Wac2Wav software was used to convert the collected data files from Wac to Wav format.
    - Split triggers set to 5 (s)
    - Skip noise minimum signal .0015 (s)
    - Minimum frequency 8000 (Hz)

   No filters were set on the conversion of file formats
2. Wav. files were then processed with the SonoBat Batch Scrubber program which eliminating extra noise files not bat related.
3. Remaining data files were then processed through SonoBat auto ID function.
    - Acceptable call quality set at 0.70
    - Acceptable tally quality set to 0.20
    - Decision threshold set to 0.90

   All other setting remained at default
4. Output files were copied and pasted to Excel and further reviewed.

Data was analyzed in order to estimate bat activity at the three monitoring locations. Bat tallies of high and low frequency passes were processed using SonoBat 3.1 Ozark auto identification, attempting to determine the species represented within the Project site. All high frequency tallies were manually inspected for false representation of a bat pass and were eliminated from totals. In addition, all high frequency tallies were reviewed to identify call signatures of the northern long-eared myotis.

## Results

From April 9, 2012, through Oct 31, 2012, the study yielded 4,917 total bat passes from the three monitoring locations, with high frequency bat passes totaling 1,351 and low frequency bat passes totaling 3,566 (Appendix B). The baseline monitoring station (M3) is located near a perennial stream and yielded the greatest amount of total recorded passes at 2,016. M1 was placed within a cornfield surrounded by very little natural vegetation, while M2 was placed within a soybean field surrounded by very little naturally occurring vegetation. These monitoring stations yielded 1,336 and 1,565 passes, respectively. Bat passes per night (bpn) was determined by the total number of recorded passes divided by the total number of nights of the survey. Bpn throughout the entire study (April 9 – October 31) averaged 23.8 bpn. In general, bat activity jumped in early July and slowly returned to pre-July activity levels in late August; similarly, peak activity levels at that time were also recorded at M1 and M2 towers. During the July 13 to July 24 recording period, the total regional bat activity was greatest where peak activity reached 875 bat passes. Throughout the study low frequency bat passes outnumbered high frequency bat passes; however, low frequency bat passes were not further analyzed individually after Sonobat batch processing for added misidentified noise files, which was completed for high frequency bats. During peak activity (mid-July) M1 recorded more overall activity (172 bat passes) from the high microphone as compared to the low microphone (129 bat passes). Conversely, M2 at peak activity recorded less (159 bat passes) at the high microphone than the lower microphone (178 bat passes). For high frequency bats specifically during the peak recording bout, the number of bat passes recorded at M1 high microphone was 61 bat passes and at the low microphone 51 bat passes. M2 tower recorded 54 bat passes at the high microphone and 42 bat passes at the low microphone (Appendix B).

Throughout the entirety of the study, 26 *Myotis* bats were recorded. It is uncertain whether any of these recorded calls were from the northern long-eared bat. No specific call sequences stood out as indicative of this bat, given call sequences provided by Sonobat. The northern long-eared bat uses higher frequency, shorter durations, and broader bandwidth than any other myotis species (Faure et al. 1993). Additionally, based upon the known foraging ecology of the northern myotis as primarily a gleaning bat than an aerial feeder, these recordings may more likely be that of the little brown bat. Towers were all placed in open habits away from large stands of woody vegetation, where forest understory, forest edge, and along water bodies are known foraging areas of the northern long-eared myotis (Caire et al. 1979; Fenton et al. 1983; Caceres and Barclay 2000). Seven of the recorded *Myotis* bat calls were captured at M1 with two of those being recorded at the higher microphone. Seven *Myotis* bats were also recorded at the M2 location with only one pass being captured at the higher microphone. The remaining 12 recorded *Myotis* passes were captured at the M3 riparian location; which is a common foraging area known for most bats including northern myotis and little brown bats. Deployment of acoustic detectors was limited to non-forested habitat due to lack of habitat as well as lack of land access. The site itself is primarily agricultural in nature devoid of large stands of trees, with the exception of stands near sporadic homesteads. Given the relatively low number of *Myotis* calls recorded and open areas where tower construction is targeted, suggests a low risk for these species.

A series of graphs illustrating total bat activity, bat activity per monitor location, and microphone per tower are provided in Appendix C.

## Limitations

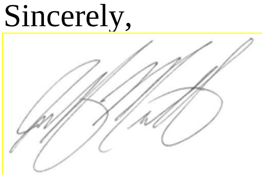
Extremes in weather such as rain and wind can influence bat activity; increases in wind or rain are known to decrease flight activity of bats (Eckert 1982; Erickson and West 2002) Auto identification programs or manual interpretations are not absolute; thus, accuracy limitations are encountered when determining acoustic bat passes or passes belonging to a specific species.

Many factors can influence the interpretation, including but not limited to the quality of the call, length of call, interference, other background recorded sounds, etc. (C. Lausen, Wildlife Acoustics, *personal communication*). The *clutter continuum* is often used to describe environments in which many bat species are required to use higher frequencies for navigation (C. Lausen, Wildlife Acoustics, *pers comm*). When different species use higher frequencies, an overlap of call characteristics can occur, limiting software and manual identification to a species-specific level (*e.g.*, misinterpreting a big brown bat for a silver haired bat). Faint bat passes not fully captured by recording equipment can also be misleading in auto identification. Faint passes can occur when noise or other interruptions are present in the recorded file which can be interpreted as just noise and eliminated during scrubbing data files or auto identification. In order to limit misidentifications of high frequency bats and in addition to the use of the auto identification program, manual review of all high frequency species labeled files were conducted.

Partial recording times also occurred on three occasions during the survey due to equipment and battery failure, which are identified in the table in Appendix B. These interruptions did not appear to significantly influence the results of the survey.

If you have questions or need additional information, please contact Jeffrey Miller at (816) 349-6893 or jeffmiller@burnsmcd.com or Robert Everard at (816) 363-7251 or reverard@burnsmcd.com.

Sincerely,



Jeffrey C. Miller

Environmental Scientist/Wildlife Biologist

Enclosures

cc: Robert Everard, Burns & McDonnell
Andy Kim, EVS

## Literature Cited

Caceres, M. C., and R. M. R. Barclay. 2000. *Myotis septentrionalis*. Mammalian species 634:1–4.

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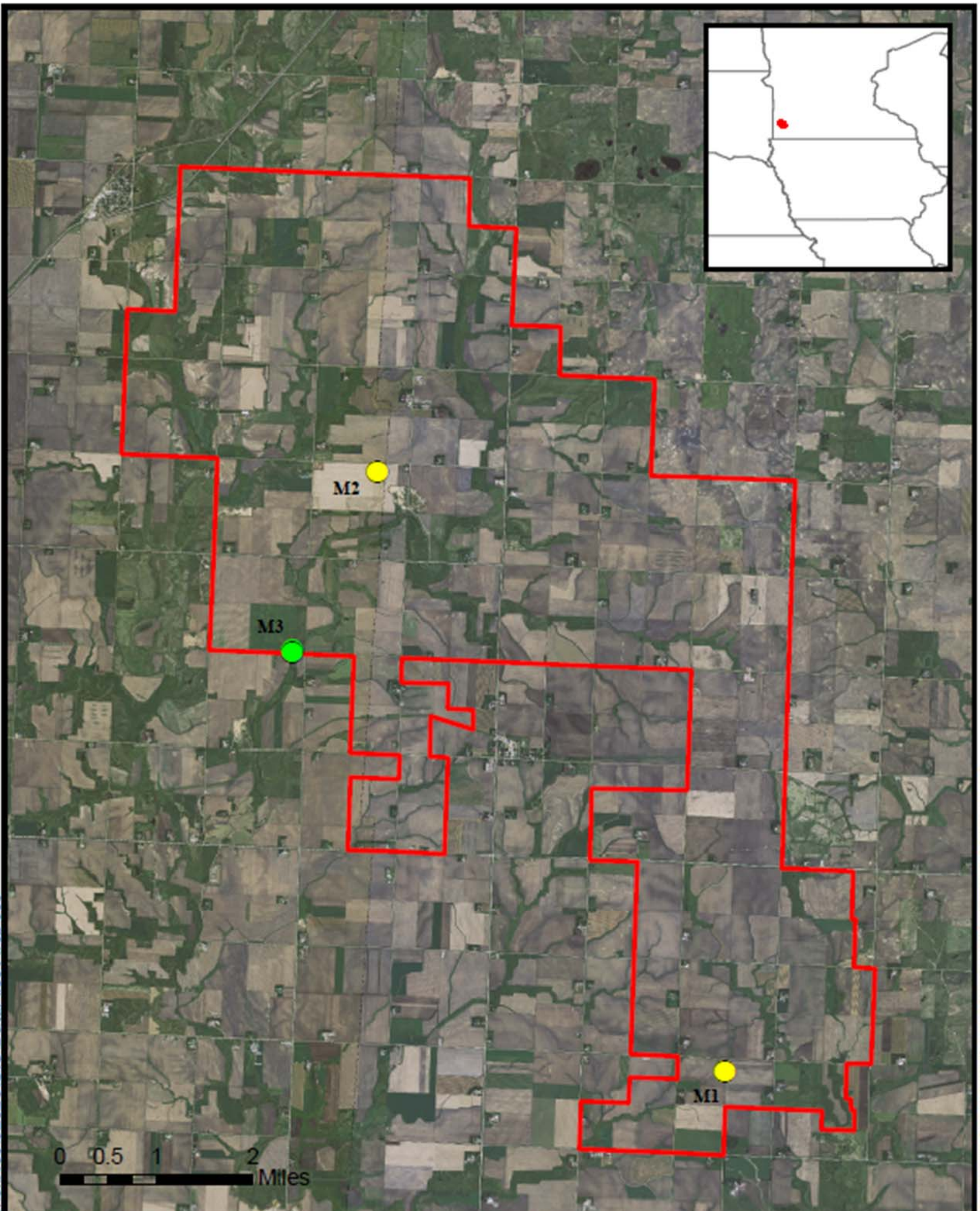
# APPENDIX A

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**Legend**

- Additional Acoustic Bat Survey Point
- MET Tower Used for Bat Survey
- Proposed Project Boundary

NORTH

Burns & McDonnell SINCE 1898

Figure 1
Vicinity Map
Stoneray Bat Survey
Murray and Pipestone, MN

Source: Street Atlas (2010), NAIP (2010), MN DNR (2011), ESRI (2012), and Burns & McDonnell (2012)

Photo 1: View of low microphone temporary installation near MET tower.

Photo 2: View of low microphone and SM2Bat permanent MET tower installation.

| Stoneray Wind Project<br>Murray and Pipestone Counties, MN | Burns & McDonnell SINCE 1898 | Site Photographs<br>April 2012 |
|---|---|---|

Photo 3: View of high microphone MET tower attachment.

Photo 4: Riparian bat detector installation.

# APPENDIX B

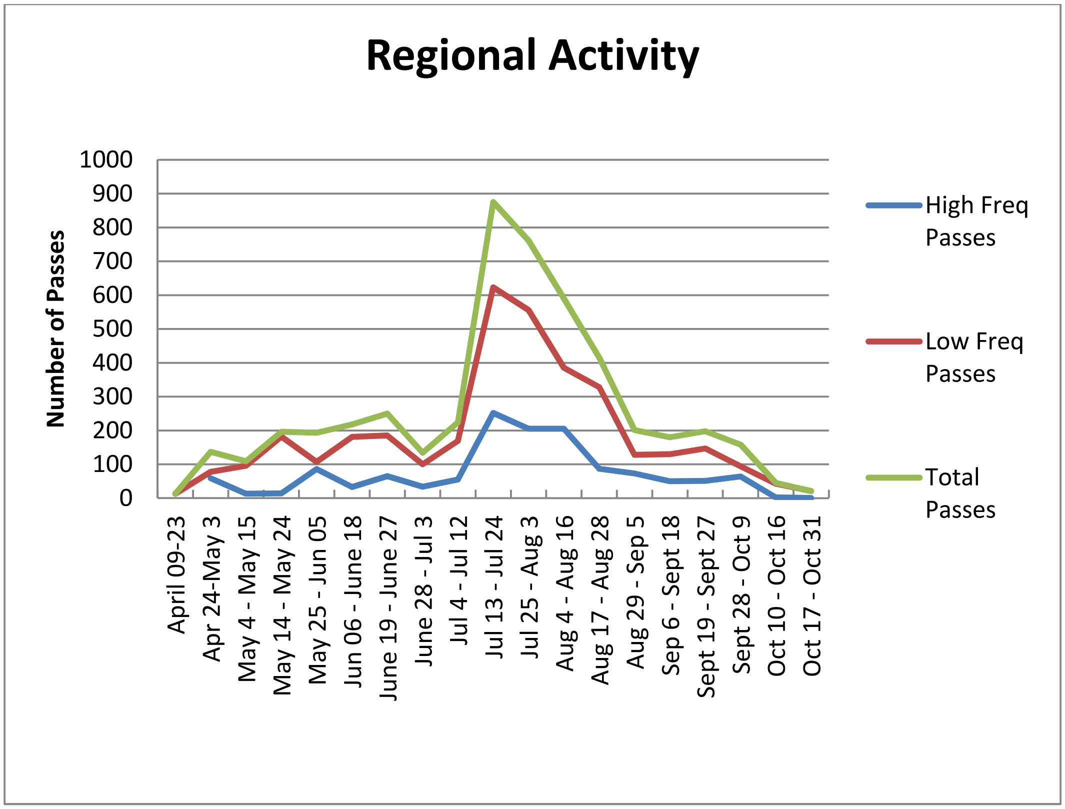
## Summary Table

| Date[1] | 4/9[2] | 4/24 | 5/4 | 5/15 | 5/25 | 6/6 | 6/19 | 6/28 | 7/4 | 7/13 | 7/25 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **M1 - High Mic** | NA | 8 | 3 | 1 | 2 | 4 | 10 | 32 | 76 | 172 | 89 | |
| **M1 - Low Mic** | 5 | 18 | 6 | 8 | 0 | 44 | 82 | 32 | 62 | 129 | 94 | |
| **M2 - High Mic** | NA | 14 | 18 | 5 | 19[3] | 29 | 24 | 16 | 3 | 159 | 102 | |
| **M2 - Low Mic** | 3 | 65 | 22 | 24 | 11 | 13 | 26 | 22 | 2 | 178 | 146 | |
| **M3** | 5 | 32 | 60 | 158 | 161 | 124 | 108[4] | 32 | 81 | 237 | 330 | |
| **Total Activity** | 13 | 137 | 109 | 196 | 193 | 214 | 250 | 134 | 224 | 875 | 761 | |

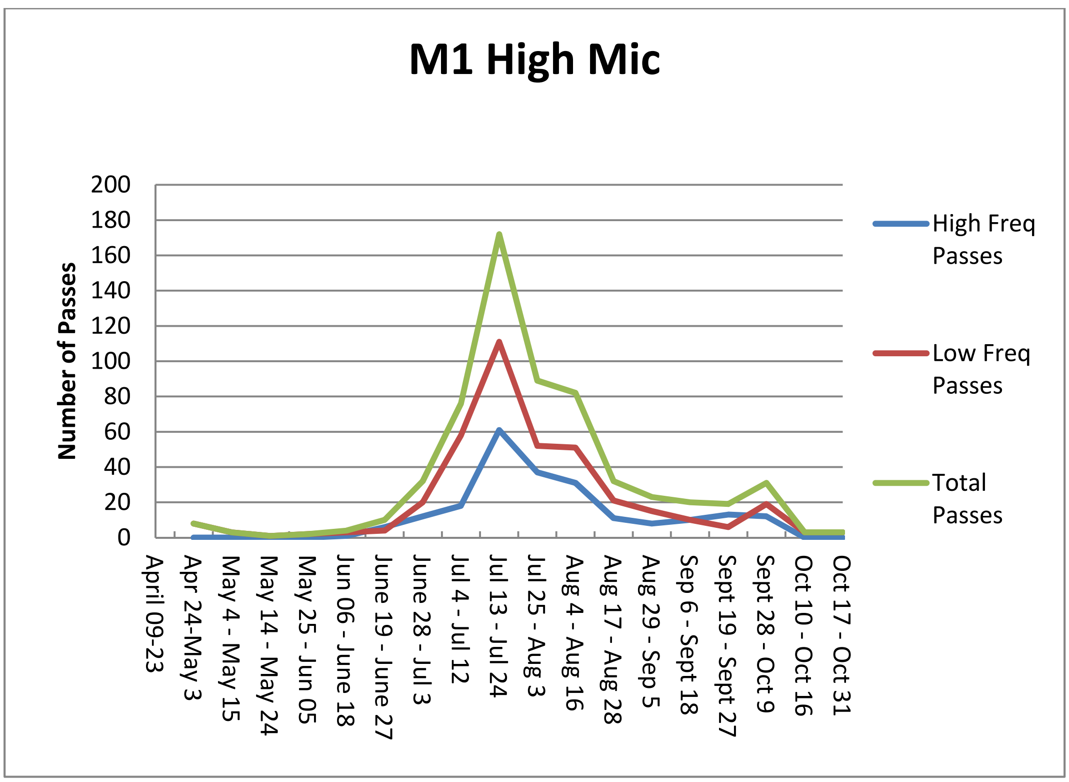
| Date[1] | 8/4 | 8/17 | 8/29 | 9/6 | 9/19 | 9/28 | 10/10 | 10/17 | | TPM[6] | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **M1 - High Mic** | 82 | 32 | 23 | 20 | 19 | 31 | 3 | 3[5] | | 610 | 1336 |
| **M1 - Low Mic** | 62 | 67 | 65 | 12 | 12 | 17 | 7 | 4[5] | | 726 | |
| **M2 - High Mic** | 65 | 91 | 18 | 39 | 28 | 26 | 2 | 6[5] | | 664 | 1565 |
| **M2 - Low Mic** | 110 | 105 | 29 | 35 | 51 | 26 | 32 | 1[5] | | 901 | |
| **M3** | 271 | 120 | 66 | 74 | 88 | 58 | 4 | 7 | | 2016 | 2016 |
| **Total Activity** | 590 | 415 | 201 | 180 | 198 | 158 | 48 | 21 | | 4917 | 4917 |

[1]Beginning of recording dates; [2] Recording prior to MET tower attachment; [3]Shortened recording time due to equipment failure (5 days); [4]Shortened recording times or equipment failure (2 days); [5] Shortened recording time due equipment failure (6 days and 8 days); [6] Total passes per microphone.

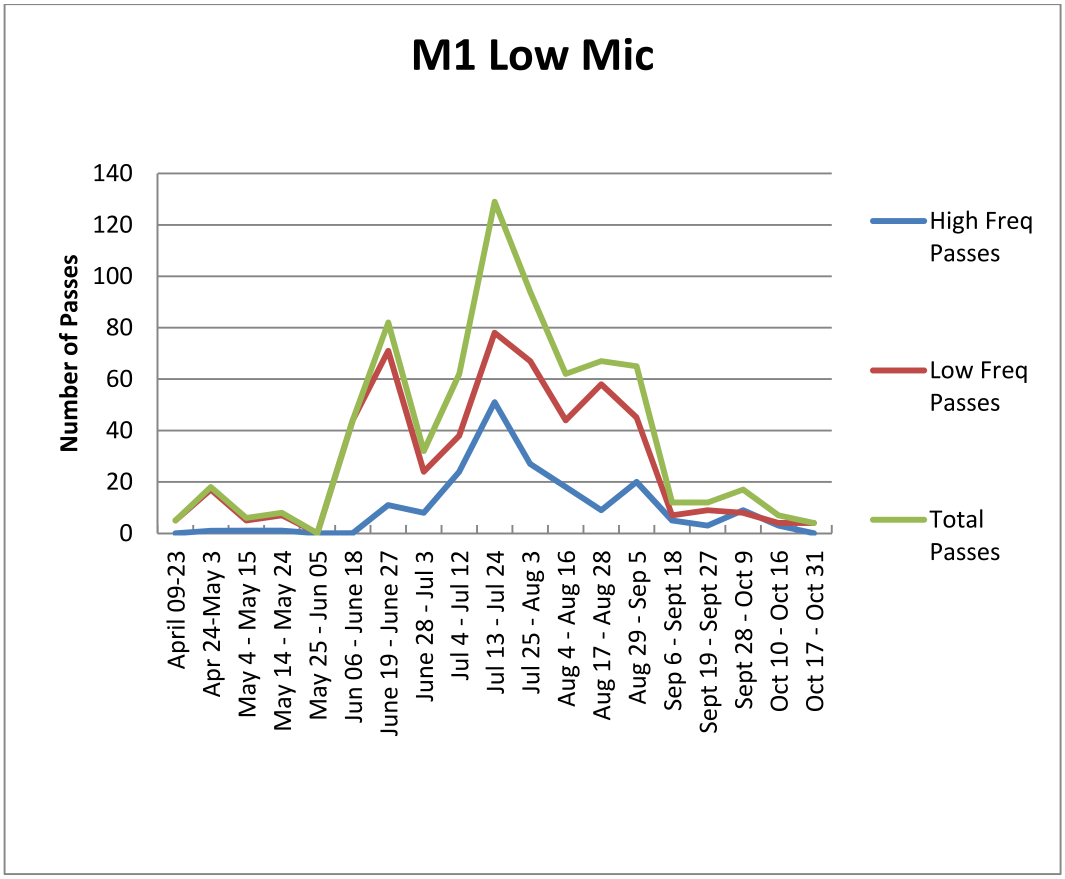
# APPENDIX C



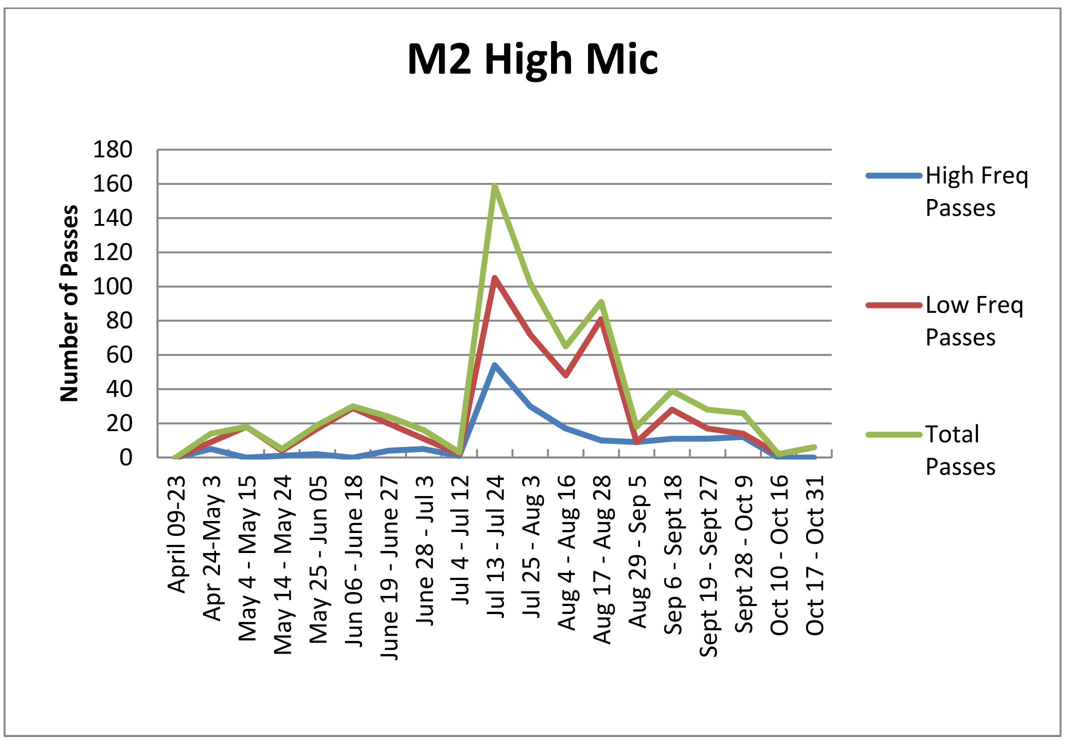

Graph depicting total bat activity at Stoneray Project site 2012



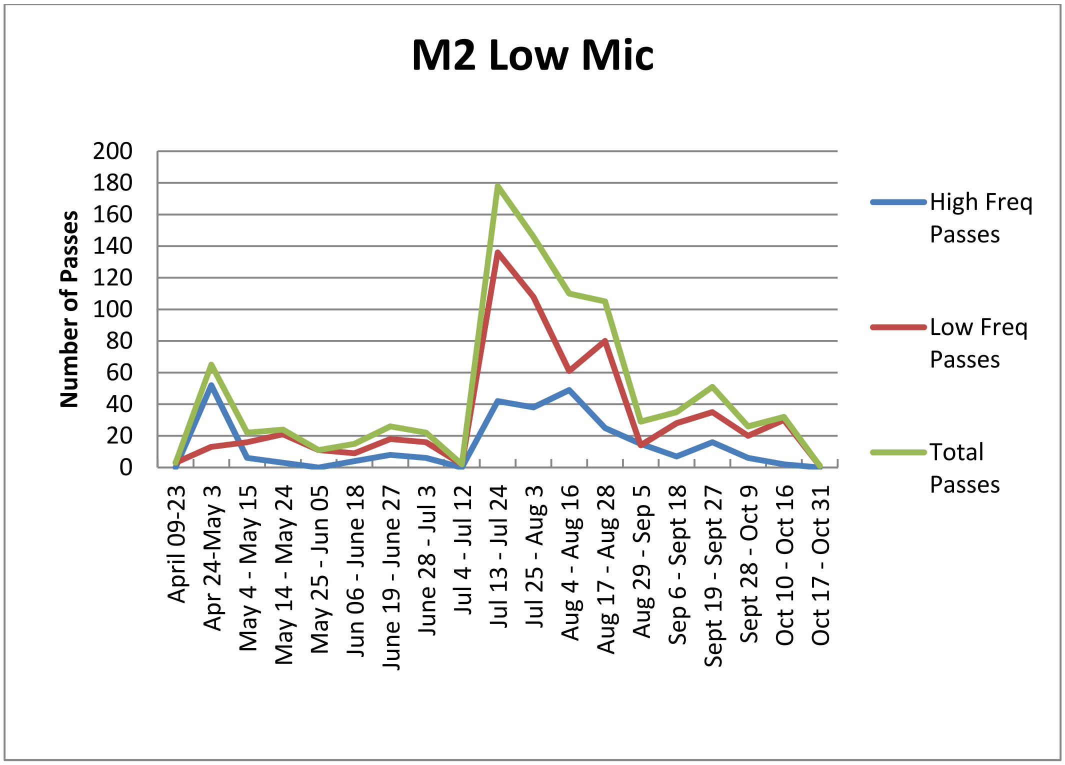

Graph depicting M1 high microphone bat activity at Stoneray Project site 2012



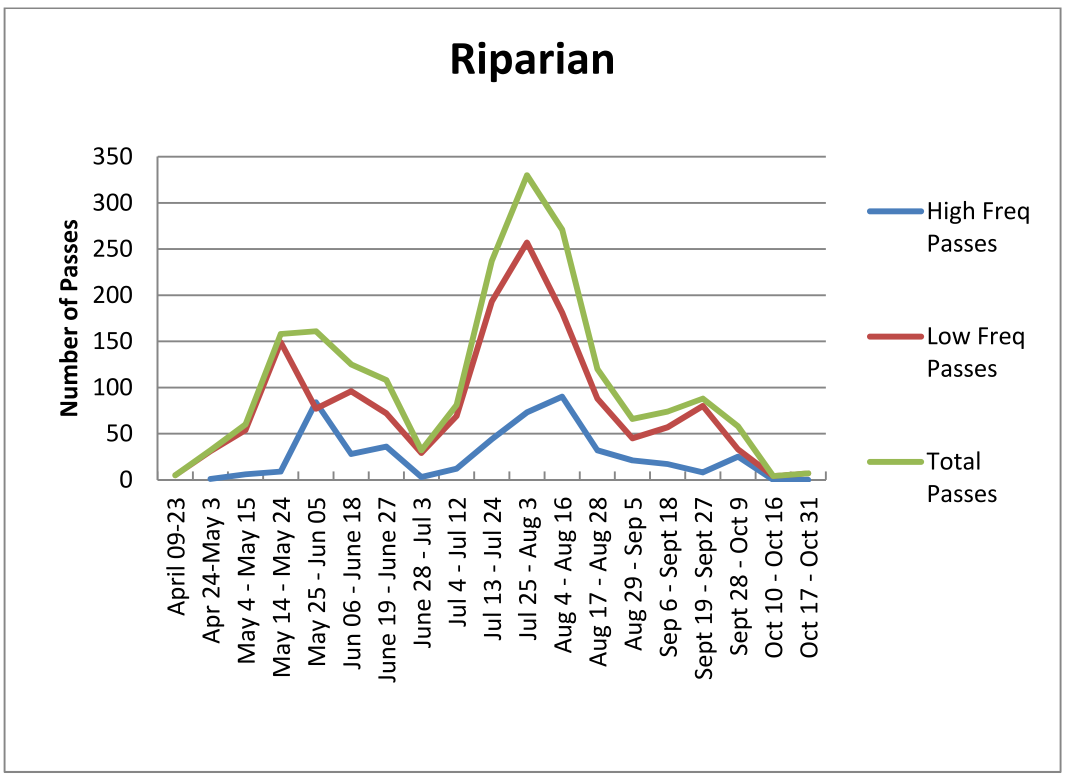

Graph depicting M1 low microphone bat activity at Stoneray Project site 2012



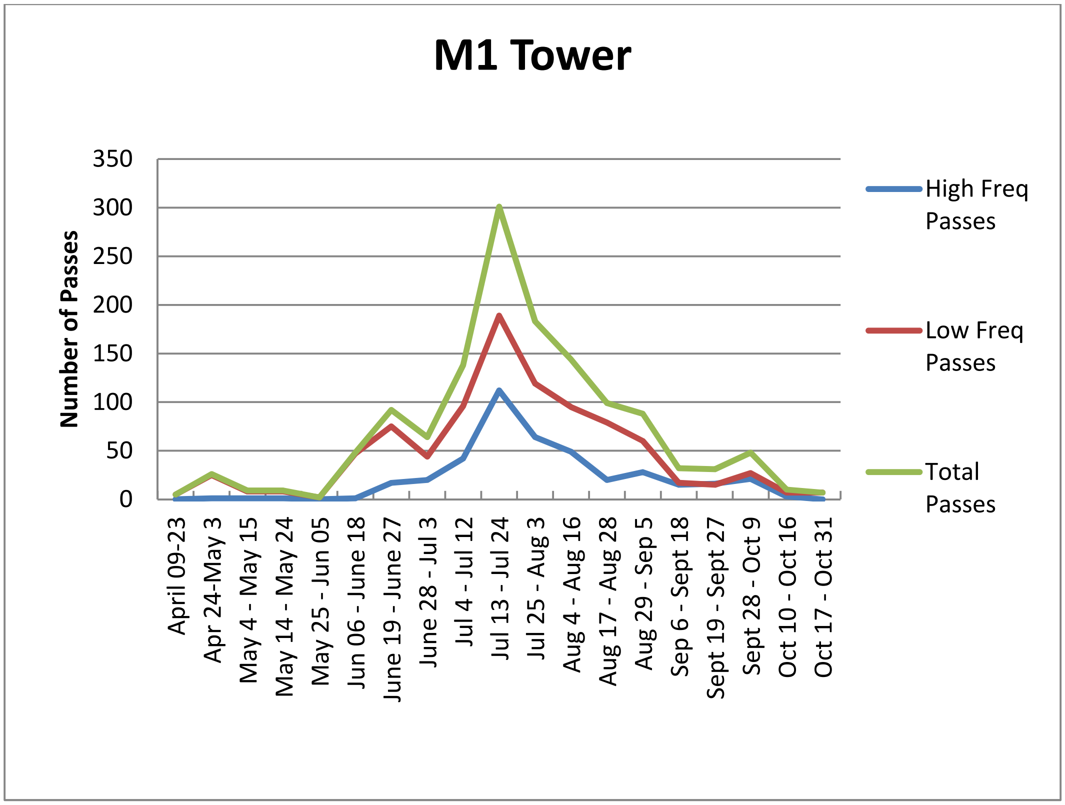

Graph depicting M2 high microphone bat activity at Stoneray Project site 2012



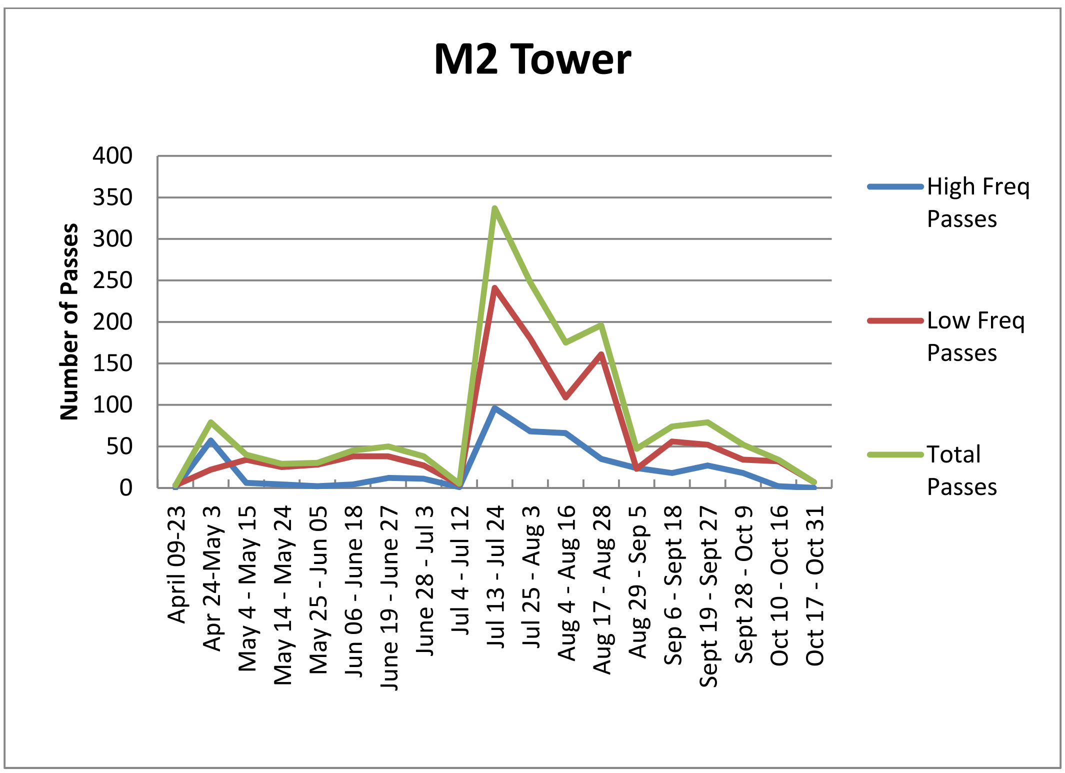

Graph depicting M2 low microphone bat activity at Stoneray Project site 2012




Graph depicting riparian microphone bat activity at Stoneray Project site 2012




Graph depicting M1 bat activity at Stoneray Project site 2012




Graph depicting M2 bat activity at Stoneray Project site 2012