



Fagen, Inc.

Palmer's Creek Wind Farm 2017 Field Season-Interim Acoustic Bat Report

Granit Falls, MN

New Century Environmental
7-11-2017

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Palmer's Creek WRA Acoustic Bat Monitoring Interim Report 2017
Fagen, Inc.
Granite Falls, Minnesota

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July 11, 2017

Executive Summary

In early summer of 2016, Mike Rutledge of Fagen Engineering contacted Mike Gutzmer of New Century Environmental, LLC (NCE) to aid in the effort of completing a bat report that would capture the diversity/abundance of bat species within the study area of Palmer's Creek to meet due diligence with regulatory agencies, which was done through acoustic monitoring. The client proposed to develop a wind farm within the study area of Chippewa County, Minnesota (just north across the Minnesota River from Granite Falls). The study area lies within the Des Moines Lobe Western Corn Belt Plains (47b) ecoregion of Minnesota. Staff of Fagen Engineering deployed four separate ANABAT systems and two SM3 full spectrum systems to record bat activity throughout the study area, the first deployment of the six monitors was done late March, 2017. This report captures data gathered from late March, 2017 through late June, 2017. The data collected from Fagen Engineering was sent to NCE via certified mail. NCE then took the data and processed in zero-crossing through Kaleidoscope version 3.1.8 to confirm presence diversity and abundance of bat species. The software uses a presence/absent indicator by giving each species of bat a p-value. The lower the p-value, the more likely the species of bat is present. Bat presence, in the form of vocalization, was detected, identified by species, and catalogued, thereby allowing us to estimate species occurrences, distribution and relative abundance.

Introduction

In early summer of 2016, Mike Rutledge of Fagen Engineering, LLC contacted Mike Gutzmer of New Century Environmental, LLC (NCE) to aid in the effort of completing a bat report that would capture the diversity/abundance of bat species within the study area of Palmer's Creek to meet due diligence with regulatory agencies. The client proposed to develop a wind farm in Chippewa County, Minnesota (just north across the Minnesota River from Granite Falls). This interim report captures the results from the acoustic monitors from late March, 2017 up to late June, 2017. The full report will be drafted upon completion of the data gathering season.

Study Area

The study area is located within Chippewa County, Minnesota (just north across the Minnesota River from Granite Falls). The study area lies within the Des Moines Lobe Western Corn Belt Plains (47b) ecoregion of Minnesota. This ecoregion consists of fast fertile plain of deep soils dominated by row crops. The boundaries of the Minnesota River Prairie Subsection coincide with large till plains flanking the Minnesota River. The unit is bounded to the southwest by the Prairie Coteau. A series of moraines define the eastern boundary, the Alexandria Moraine to the northeast and the Bemis moraine to the southeast (Minnesota 2016).

The Minnesota River Prairie is a large subsection that includes part of northwestern Iowa and spreads across southwestern Minnesota into eastern South Dakota. The Minnesota River forms a broad valley, dividing the area in half. This valley once had a continuous band of floodplain forest that extended upstream as far as Lac Qui Parle, with highly unique bedrock exposures. There are 150 lakes larger than 160 acres in the subsection, most of which are shallow. Before settlement by people of European descent, the predominant vegetation was tallgrass prairie and wetlands. Fire was once a common natural disturbance and critical to maintaining native prairie communities (Minnesota, 2016).

Today, row-crop agriculture is the predominant land use, and prairie remnants and floodplain forests are rare. A major concern is impacts on water quality from intensive agricultural activities, including use of fertilizers and pesticides, expanding use of pattern tiling, and ditching and draining of small wetlands. Continued loss of the small amount of native upland habitat and over-intensive grazing remain a concern (Minnesota, 2016).



Figure 1: Vicinity map of study area. Chippewa county is located in southwestern Minnesota.

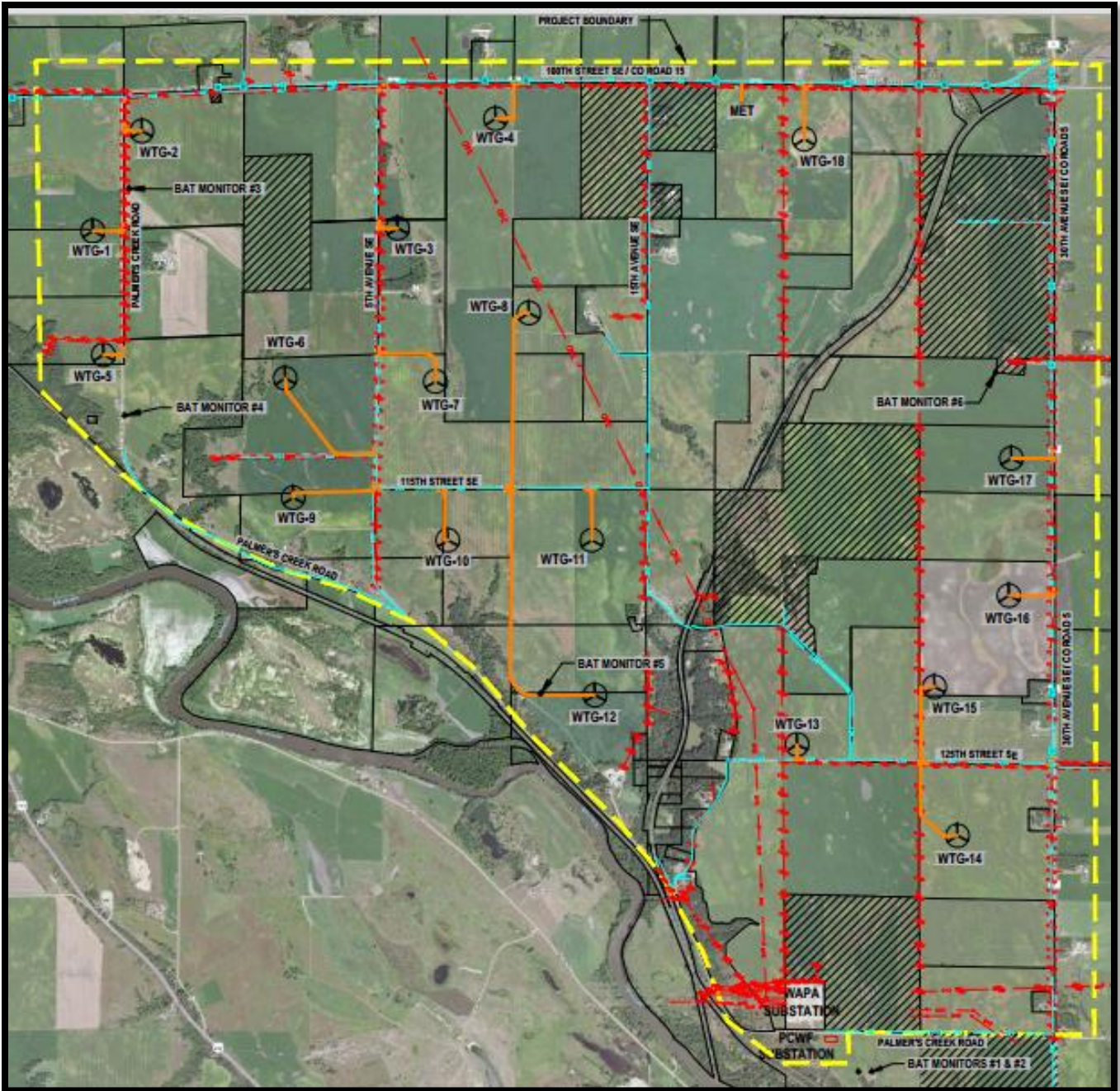


Figure 2. Map of study area showing bat monitor locations.

Methods

Data was gathered in the field by Fagen Engineering, LLC within the study area from four different Anabat acoustic recorders and two SM3 full spectrum monitors (map in Study Area section shows locations of monitors). The monitors gathered data from late March, 2017 and are currently active gathering data.

The memory cards were sent to New Century Environmental staff via certified mail, the data was then downloaded and processed through a program called Kaleidoscope Pro version 3.1.8. The Kaleidoscope classifier uses a source library of user submitted reference calls to compare to recordings. It accepts and displays full-spectrum signals, to match with the calls known bat species. The software uses a presence/absence indicator by giving each species of bat a p-Value of 0 to 1. The lower the P-Value, the more likely the species is present. Variability in the quality of recordings and variations in calls among individual bats creates challenges to acoustic bat classification.

Kaleidoscope Pro has been approved by the U.S. Fish & Wildlife Service for use for presence/absence analysis for Indiana bats (*Myotis sodalis*). Similarly, the approved programs may also be used for presence/absence analysis for northern long-eared bats (*Myotis septentrionalis*). The U.S Geological Survey also tested acoustic matching programs and Kaleidoscope Pro passed their standard validation process (USFWS 2016).

Results

At this point in time the four Anabat and two SM3 full spectrum recording system visual examination and filtering of files to eliminate extraneous noise (e.g., wind, insects, etc.) resulted in a total of 15,511 sound files classified as bat detection passes.

Monitor 1 is located on the lower end of a met tower surrounded by agriculture with some roosting trees nearby. The monitor recorded 1,933 files that Kaleidoscope Pro was able to classify as bat passes. The silver haired bat was the most common species at this site being 57% of total detections. The big brown bat was the second most common being 24% of total detections. The federally threatened northern long-eared myotis was detected 1 time (0.05%), but had a P-value of 1 which almost certainly means it was nonexistent at this site. The eastern pipistrelle had a total of 16 (0.8%) detections.

Code	Common name	Scientific Name	Conservation status	P-Value	# of passes
LANO	Silver-Haired Bat	<i>Lasiorycteris noctivagans</i>	Least concern	0	1093
EPFU	Big-Brown Bat	<i>Eptesicus fuscus</i>	Least concern	0	464
LACI	Hoary Bat	<i>Lasiurus cinereus</i>	Least concern	0	287
LABO	Eastern Red Bat	<i>Lasiurus borealis</i>	Least concern	0	35
MYLU	Little Brown Bat	<i>Myotis lucifugus</i>	Least concern	0	37
MYSE	Northern long-eared myotis	<i>Myotis septentrionalis</i>	Federally threatened	1	1
PESU	Eastern pipistrelle	<i>Perimyotis subflavus</i>	MN species of concern	0	16

Table 1. Results from monitor 1.

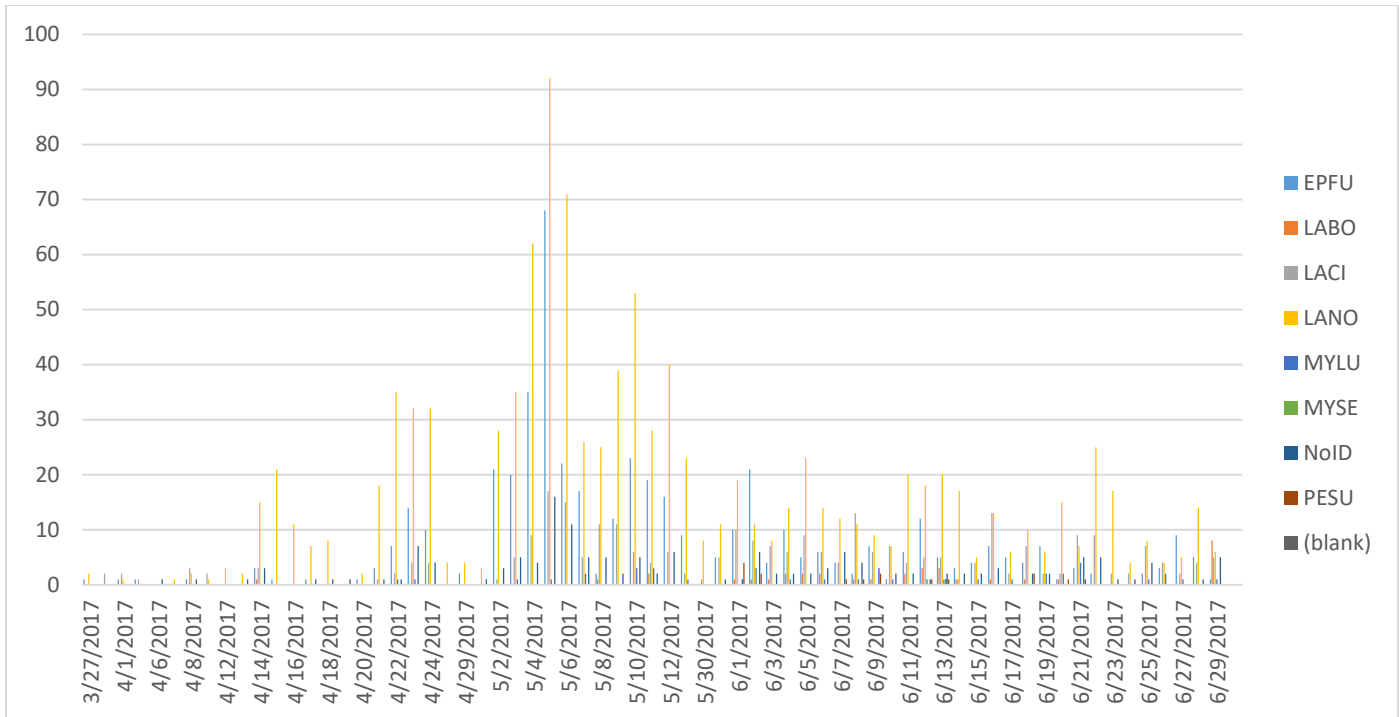


Figure 3. Bar graph of monitor 1 results by date.

Monitor 2 is located on the upper end of the same met tower as monitor 1, total elevation of 55 m. The monitor recorded only 116 files that Kaleidoscope Pro was able to classify as bat passes. The monitor only recorded a total of two species. The Hoary bat was the dominant species at this with 90 (78%) total bat passes. The second species was the big-brown bat with 26 (22%) total bat passes.

Code	Common name	Scientific Name	Conservation status	P-Value	# of passes
EPFU	Big-Brown Bat	<i>Eptesicus fuscus</i>	Least concern	0	26
LACI	Hoary Bat	<i>Lasiurus cinereus</i>	Least concern	0	90

Table 2. Results from monitor 2.

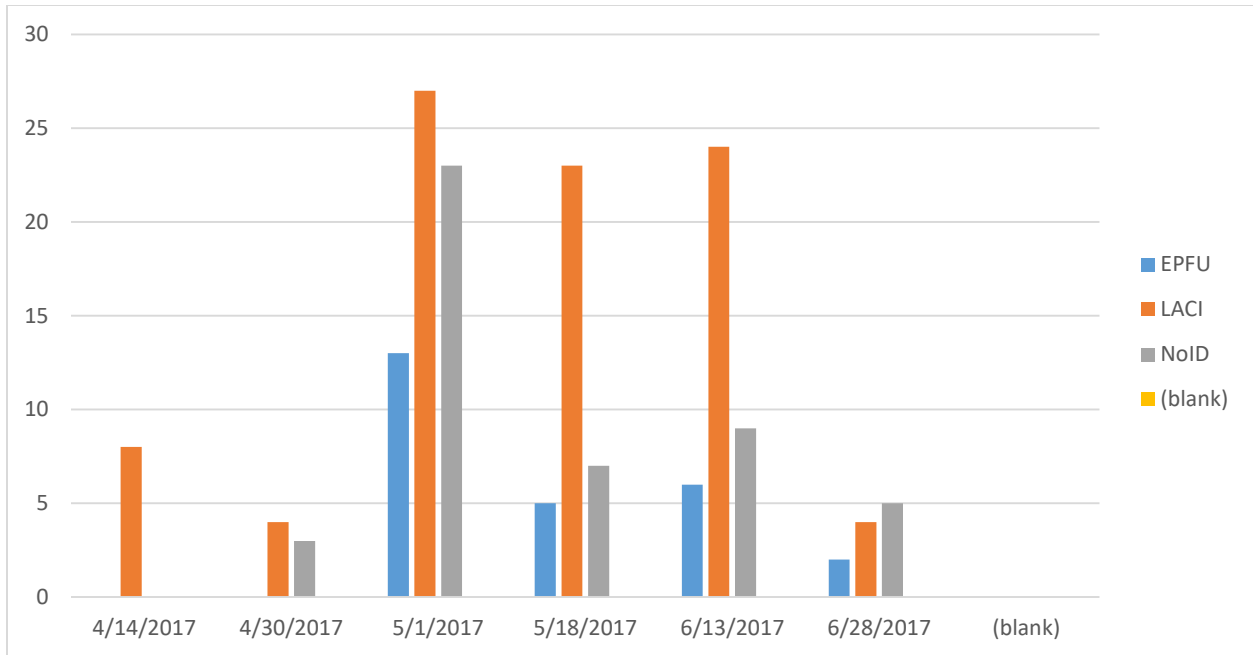


Figure 4. Bar graph of results from monitor 2 by date.

Monitor 3 is one of two SM3 ultrasonic detector which is located along a creek bank just off of the road surrounded by a combination of agriculture and roosting tree habitat. The monitor recorded 3,231 files that Kaleidoscope Pro was able to classify as bat passes. The silver haired bat was the most common species at this site being 35% of total detections. The big brown bat was the second most common being 26% of total detections. The federally threatened northern long-eared myotis was detected 1 time (0.0003%), but had a P-value of 1 which almost certainly means it was nonexistent at this site. The eastern pipistrelle had a total of 16 (0.5%) detections.

Code	Common name	Scientific Name	Conservation status	P-Value	# of passes
LANO	Silver-Haired Bat	<i>Lasionycteris noctivagans</i>	Least concern	0	1144
EPFU	Big-Brown Bat	<i>Eptesicus fuscus</i>	Least concern	0	850
LACI	Hoary Bat	<i>Lasiurus cinereus</i>	Least concern	0	703
LABO	Eastern Red Bat	<i>Lasiurus borealis</i>	Least concern	0	137
MYLU	Little Brown Bat	<i>Myotis lucifugus</i>	Least concern	0	380
MYSE	Northern long-eared myotis	<i>Myotis septentrionalis</i>	Federally threatened	1	1
PESU	Eastern pipistrelle	<i>Perimyotis subflavus</i>	MN species of concern	0.000111	16

Table 3. Results from monitor 3.

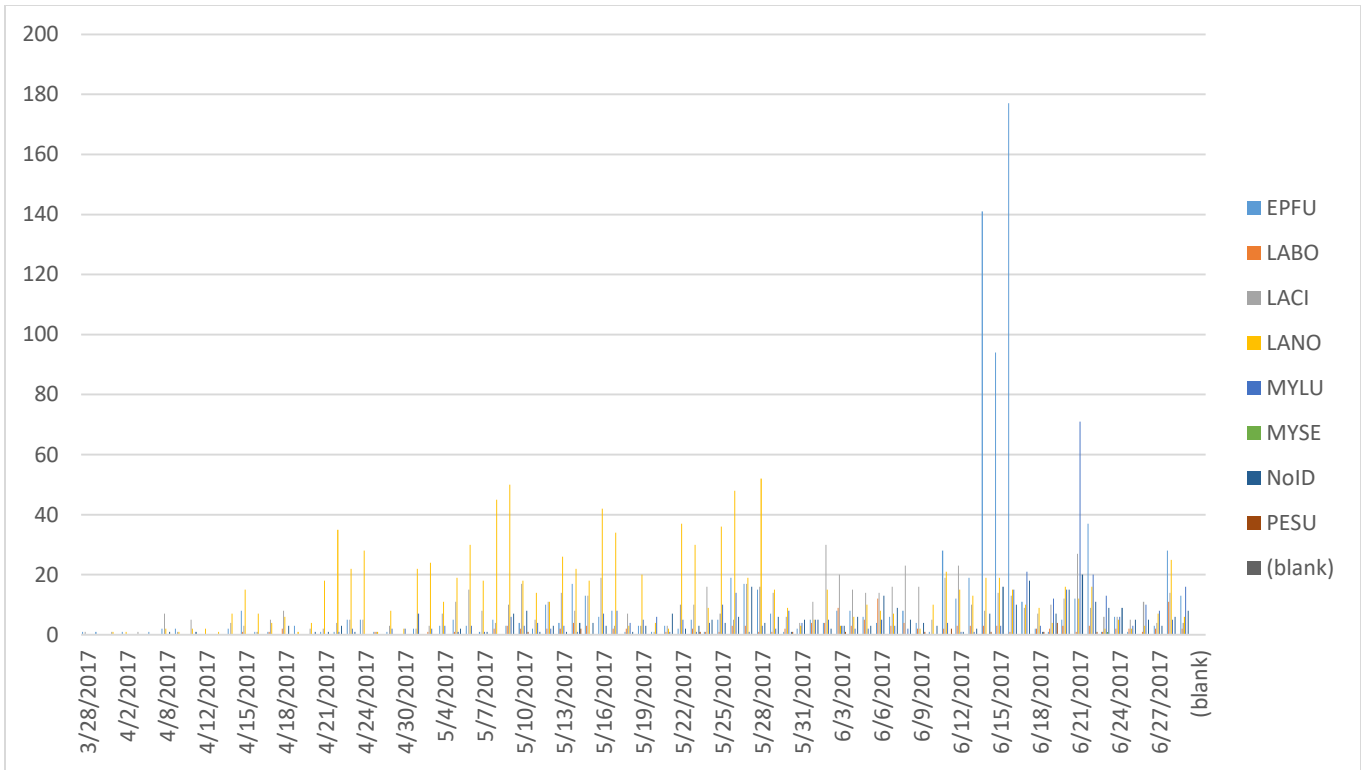


Figure 5. Bar graph of results for monitor 3 by date.

Monitor 4 is located in a corn field and is surrounded by agriculture, with a creek with roosting habitat located near the site, the monitor recorded 1,127 files Kaleidoscope Pro classified as bat passes. The most common species at this site was the hoary bat being 49% of total detections. The second most common was the silver-haired bat being 40% of total detections. The northern long-eared myotis was not recorded at this site. The eastern pipistrelle had a total of 10 (0.9%) detections.

Code	Common name	Scientific Name	Conservation status	P-Value	# of passes
LANO	Silver-Haired Bat	<i>Lasionycteris noctivagans</i>	Least concern	0	455
EPFU	Big-Brown Bat	<i>Eptesicus fuscus</i>	Least concern	0	54
LACI	Hoary Bat	<i>Lasiurus cinereus</i>	Least concern	0	553
LABO	Eastern Red Bat	<i>Lasiurus borealis</i>	Least concern	0	24
MYLU	Little Brown Bat	<i>Myotis lucifugus</i>	Least concern	0	31
MYSE	Northern long-eared myotis	<i>Myotis septentrionalis</i>	Federally threatened	1	0
PESU	Eastern pipistrelle	<i>Perimyotis subflavus</i>	MN species of concern	0	10

Table 4. Results from monitor 4.

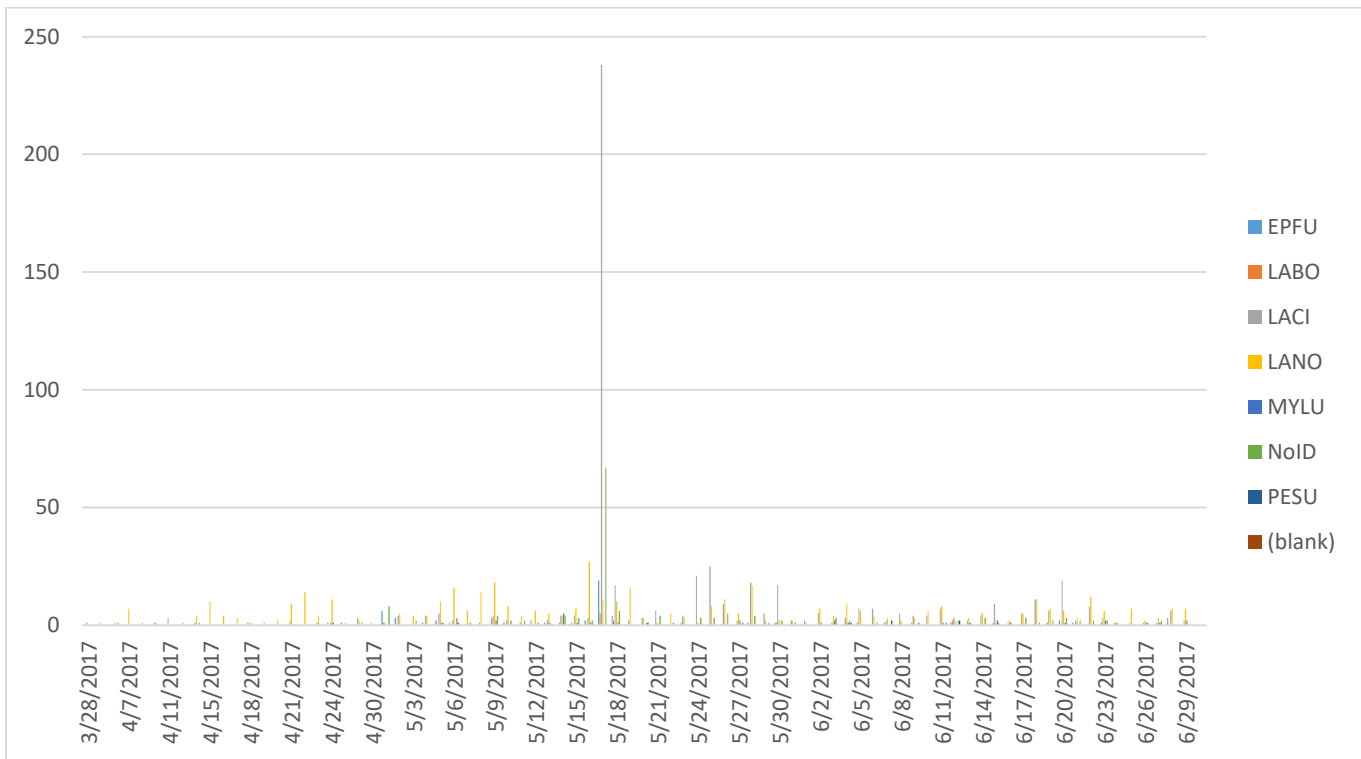


Figure 6. Bar graph of results for monitor 4 by date.

Monitor 5 is located along the roadside in agriculturally dominated landscape, the monitor recorded 763 files Kaleidoscope Pro classified as bat passes. The most common species at this site was the silver haired bat being 67% of total detections. The second most common was the hoary bat with being 24% of total detections. The northern long-eared myotis was not detected at this site. The eastern pipistrelle had a total of 8 (1%) detections.

Code	Common name	Scientific Name	Conservation status	P-Value	# of passes
LANO	Silver-Haired Bat	<i>Lasionycteris noctivagans</i>	Least concern	0	514
EPFU	Big-Brown Bat	<i>Eptesicus fuscus</i>	Least concern	1	16
LACI	Hoary Bat	<i>Lasiurus cinereus</i>	Least concern	0	185
LABO	Eastern Red Bat	<i>Lasiurus borealis</i>	Least concern	0	27
MYLU	Little Brown Bat	<i>Myotis lucifugus</i>	Least concern	0.0000607	13
MYSE	Northern long-eared myotis	<i>Myotis septentrionalis</i>	Federally threatened	1	0
PESU	Eastern pipistrelle	<i>Perimyotis subflavus</i>	MN species of concern	0.0000124	8

Table 4. Results from monitor 5.

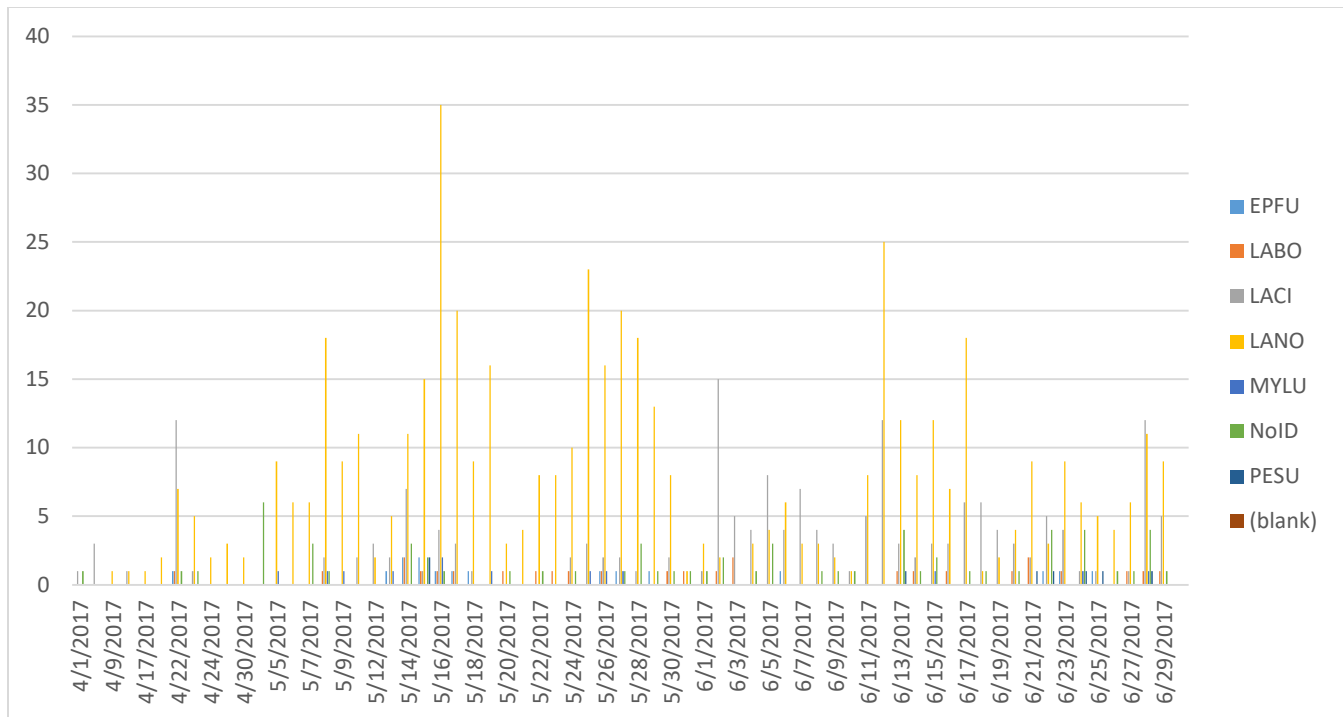


Figure 7. Bar graph of results for monitor 5 by date.

Monitor 6 is located in a tree line near a farm house, this is the second of the SM3 full spectrum devices. The monitor recorded a total of 8,341 files Kaleidoscope Pro classified as bat passes. The most common species at this site was the silver haired bat being 42% of total detections. The second most common was the big brown bat with being 35% of total detections. The northern long-eared myotis was detected 1 time (0.01%), but had a P-value of 1 which almost certainly means it was nonexistent at this site. The eastern pipistrelle had a total of 16 (0.2%) detections.

Code	Common name	Scientific Name	Conservation status	P-Value	# of passes
LANO	Silver-Haired Bat	<i>Lasionycteris noctivagans</i>	Least concern	0	3470
EPFU	Big-Brown Bat	<i>Eptesicus fuscus</i>	Least concern	0	2934
LACI	Hoary Bat	<i>Lasiurus cinereus</i>	Least concern	0	1612
LABO	Eastern Red Bat	<i>Lasiurus borealis</i>	Least concern	0	204
MYLU	Little Brown Bat	<i>Myotis lucifugus</i>	Least concern	0	104
MYSE	Northern long-eared myotis	<i>Myotis septentrionalis</i>	Federally threatened	1	1
PESU	Eastern pipistrelle	<i>Perimyotis subflavus</i>	MN species of concern	0.707657	16

Table 5. Results from monitor 6.

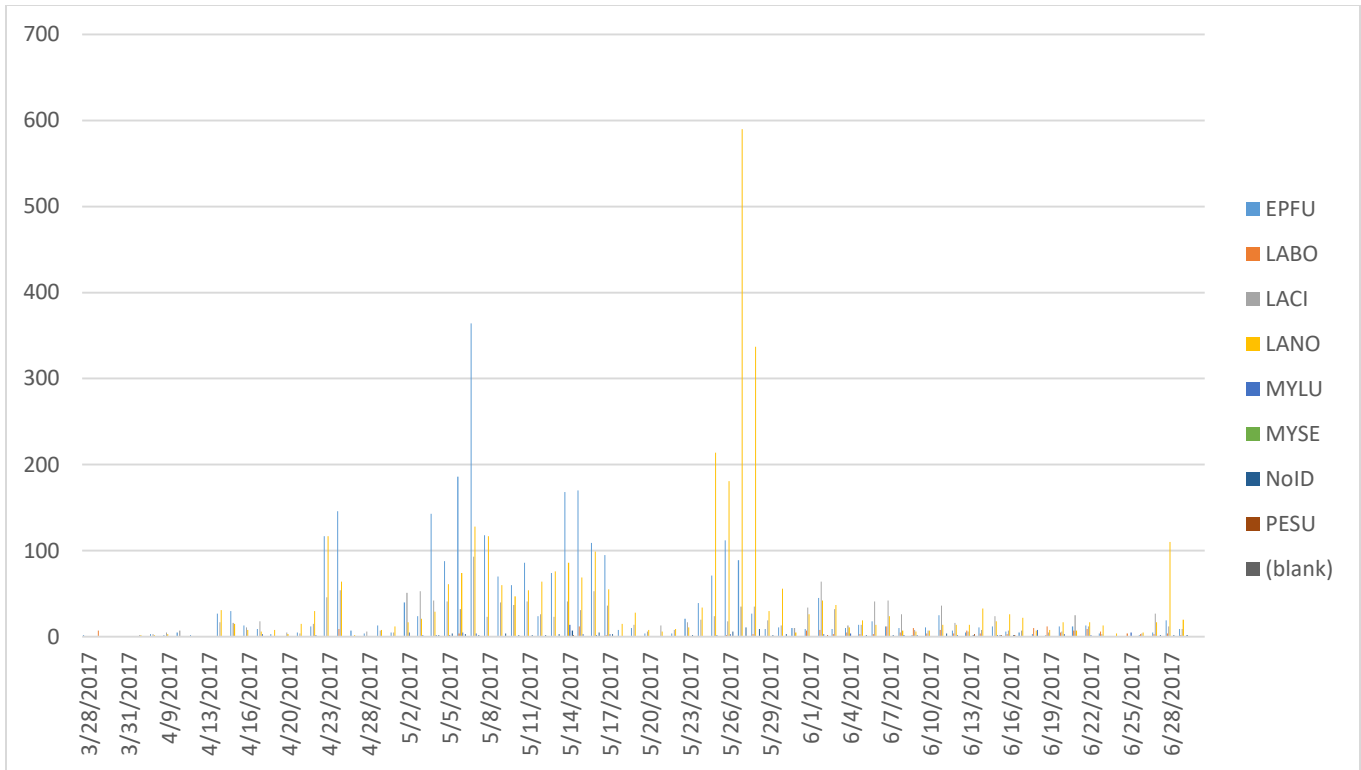


Figure 8. Bar graph of results for monitor 6 by date.

Discussion

There are seven species of bats that occur regularly in Minnesota; our most common species, the little brown myotis, occurs over most of North America. Along with the Northern myotis and big brown bat, it hibernates in Minnesota caves and mines. In summer, they roost in caves, mines, hollow trees, and buildings. Large groups of these bats hang upside-down in caves. The eastern pipistrelle is the smallest species, weighing only two-tenths of an ounce. It is found in the same Minnesota caves and mines, though it is less common and in fewer numbers.

The silver-haired bat and Eastern red bad are forest dwellers that usually live near water and feed among the trees. Usually a red bat pair will repeatedly fly the same route in search of food. Another woodland species is the hoary bat. It is the largest Minnesota bat, weighing an ounce or more. All three species are somewhat solitary, roost in trees, and migrate south for the winter (Minnesota, 2016).

All seven bat species that occur in Minnesota may be found throughout the state.

Common name	Scientific Name	State Status	Federal Status
Northern long-eared myotis	<i>Myotis septentrionalis</i>	Threatened	Threatened
Eastern Pipistrelle	<i>Pipistrellus subflavus</i>	MN species concern	Not listed
Little brown bat	<i>Myotis lucifugus</i>	Not listed	Not listed
Big brown bat	<i>Eptesicus fuscus</i>	Not listed	Not listed
Silver-haired bat	<i>Lasionycteris noctivagans</i>	Not listed	Not listed
Eastern red bat	<i>Lasiurus borealis</i>	Not listed	Not listed
Hoary bat	<i>Lasiurus cinereus</i>	Not listed	Not listed
Evening bat	<i>Nycticeius humeralis</i>	Newly discovered	Not listed

Figure 9. Bat species found in Minnesota with federal and state conservation status.

There were a total of six bat species documented at this point in time during the course of the study (late March, 2017-late June, 2017). The eastern pipistrelle (*Pipistrellus subflavus*) was documented at this site and is listed as a species of concern in the state of Minnesota. It was detected in small numbers but was found at every monitor except for monitor 2. The northern long-eared myotis (*Myotis septentrionalis*) is a federally threatened species whose home range lies within the study site. However no confirmed documentation was recorded here. Even though a total of three passes of which Kaleidoscope classified as MYSE (northern long-eared myotis) the P-value was given a 1 for every monitor indicating the likelihood of presence is near non-existent. All other species documented are of least concern. Of the six species documented the silver-haired bat (*Lasionycteris noctivagans*), hoary bat (*Lasiurus cinereus*) and big brown bat (*Eptesicus fuscus*) were among the most common followed by the little brown bat (*Myotis lucifugus*) and eastern red bat (*Lasiurus borealis*).

In our general opinion, the towers near the river present the greatest level of risk as the habitat is more diverse and will have an increased potential for foraging behavior, roosting, etc. As you proceed further from the river into agricultural development, which constitutes the bulk of the project area, the risk appears to lessen.

The project seems to impact primarily common and representative species of bats, but not a large number of rare and/or sensitive species. This fact alludes to a moderate risk in a general worst case. Additionally, the literature suggests bats adjust to towers and infrastructure over time and impacts are less over time.

References

Minnesota Department of Natural Resources, 2006. Tomorrow's Habitat for the Wild and Rare: An Action Plan for Minnesota Wildlife, Comprehensive Wildlife Conservation Strategy. Division of Ecological Services, Minnesota Department of Natural Resources.

US Fish and Wildlife Service. 2016. Endangered Species Midwest Region. Accessed on 10 July 2017 at <<https://www.fws.gov/midwest/Endangered/mammals/inba/surveys/inbaAcousticSoftware.html>>.