
To: Lindsay Deane-Mayer
Palmer Capital Corporation
Palmer Management Corporation

From: Laura Berube
Stantec Consulting Services Inc.

File: 195601220

Date: October 28, 2016

Reference: Northern Long-Eared Bat (*Myotis septentrionalis*) Acoustic Survey and Bicknell's Thrush (*Catharus bicknelli*) Survey, Horseshoe Valley Wind Project, Roxbury, Maine

INTRODUCTION

Palmer Management Corporation retained Stantec Consulting Services Inc. (Stantec) to conduct field surveys to determine presence or probable absence of the northern long-eared bat (*Myotis septentrionalis*) and Bicknell's thrush (*Catharus bicknelli*) in areas of potentially suitable habitat associated with the Horseshoe Valley Wind Project (Project) in Roxbury, Maine. Northern long-eared bats are federally threatened¹ and state-listed endangered in Maine and Bicknell's thrush are considered state species of special concern in Maine. Survey methods consisted of ultrasonic acoustic surveys for bats and audio broadcast/listening surveys for Bicknell's thrush.

The Project consists of the installment of 5 wind turbines and associated infrastructure along a 1 kilometer (km) section of North Twin Mountain ridgeline reaching approximately 2,200 feet that runs north to south below and west of Maine State Route 120 in Roxbury, Maine. The Project is assumed to qualify for the small wind certification program under Maine law (less than 3 acres stripped, graded and not revegetated and occupying less than 20 acres. See 35-A §3456 and 38 MRSA §480-II). The Project will result in removal of potential northern long-eared bat habitat totaling approximately 1 km of linear forested habitat along the ridgeline proposed for turbines. Since existing access roads and transmission lines already cross the ridgeline, it is assumed that additional clearing will not be needed in these areas. Habitats within a 5-mile buffer surrounding the Project area include fragmented and contiguous forested areas, agricultural lands and residential homes, and a 920-acre pond (Ellis Pond) approximately 3 miles northwest of the Project. The existing 22-turbine Record Hill Wind Project is located approximately 0.75 miles north of the Project across Maine State Route 120, and Black Mountain Ski Resort is approximately 3 miles south of the Project.

The acoustic bat survey was conducted according to the U.S. Fish and Wildlife Service's (USFWS) 2016 Range-wide Indiana Bat Summer Survey Guidelines (USFWS Guidelines) which the USFWS recommends also be applied to northern long-eared bat surveys throughout the species' range. The goal of the acoustic survey was to determine if this species is actually utilizing areas of potential habitat at the Project during the summer maternity season in 2016. Bicknell's thrush was an identified species for the Project in the Maine Department of Inland Fisheries and Wildlife's (MDIFW) letter to Palmer Management Corporation dated 31 May 2016. Field surveys were conducted based on the MDIFW Curtailment Policy and Wind Power Preconstruction Study Recommendations (MDIFW

¹ The northern long-eared bat, whose range encompasses Roxbury, Maine, where the Project is located, was listed as a federally threatened species on 2 April 2015 under the Endangered Species Act with a final 4(d) Rule effective on 14 January 2016.

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Recommendations) dated June 2015. This report summarizes methods and results of the acoustic bat and Bicknell's thrush surveys.

NORTHERN LONG-EARED BAT ACOUSTIC SURVEY

METHODS

Field Survey

We determined the appropriate number of acoustic bat survey sites based on the USFWS Guidelines, which require 1 survey site (2 detector nights) to be sampled per 1 km of suitable summer habitat for linear projects. For the purposes of this survey, we assumed that all forested areas provide potential roost habitat for northern long-eared bats. As such, we conducted the survey at 1 site within the Project area (Figure 1). The site was surveyed for 2 nights, resulting in 2 detector nights at the Project. We selected the survey site according to the criteria in the USFWS Guidelines, positioning the detector in a potential flight corridor that could be suitable as northern long-eared bat foraging habitat. Once deployed, we photographed the detector and recorded its location using a Garmin™ eTrex GPS unit. Appendix A includes photographs of the detector site.

Stantec used a zero-crossing Anabat detector (Titley Scientific® Anabat SD1) and placed the detector in a customized weatherproof box with a 90-degree angle PVC-elbow to protect the directional microphone. We mounted the detector on a temporary metal pole at a height of approximately 3 meters (m) above ground vegetation height, at least 3 m from vegetation or obstruction in every direction of the microphone, and with minimal vegetation within 10 m from the microphone. The microphone was oriented horizontally (0°) at a magnetic bearing of 67° along the transmission corridor. We programmed the detector to record from 1930 through 0600, thereby sampling the full period from more than 30 minutes before sunset until more than 30 minutes after sunrise. We confirmed proper detector function prior to deployment by conducting a microphone "scratch test" (confirming detection of ultrasound in front of the microphone) and estimated effective detector range in the field using the same method. We set the detector to operate with a sensitivity of 6.5 and a data division ratio of 16.

We left the detector in place until weather conditions as reported by the nearest weather station (KMEWELD2 in Weld, Maine) met the parameters outlined in the USFWS Guidelines for 2 nights: temperatures do not fall below 50°F (10°C) during the first 5 hours of survey period; precipitation, including rain and/or fog, does not exceed 30 minutes or continue intermittently during the first 5 hours of the survey period; and sustained wind speeds are not greater than 9 miles/hour for 30 minutes or more during the first 5 hours of the survey period.

Following the first 2 weather-appropriate nights of data collection, we inspected the detector in the field to confirm that it had operated successfully (i.e., we conducted a microphone "scratch test" and checked the sensitivity, battery, and voltage) and downloaded data using CFCread software (Version 4.4u, Titley Electronics). We inspected nightly folders to see whether they contained files, which typically indicate that a detector was recording bats or other ultrasonic signals. We also reviewed the status file generated by the detector to confirm that the detector recorded between

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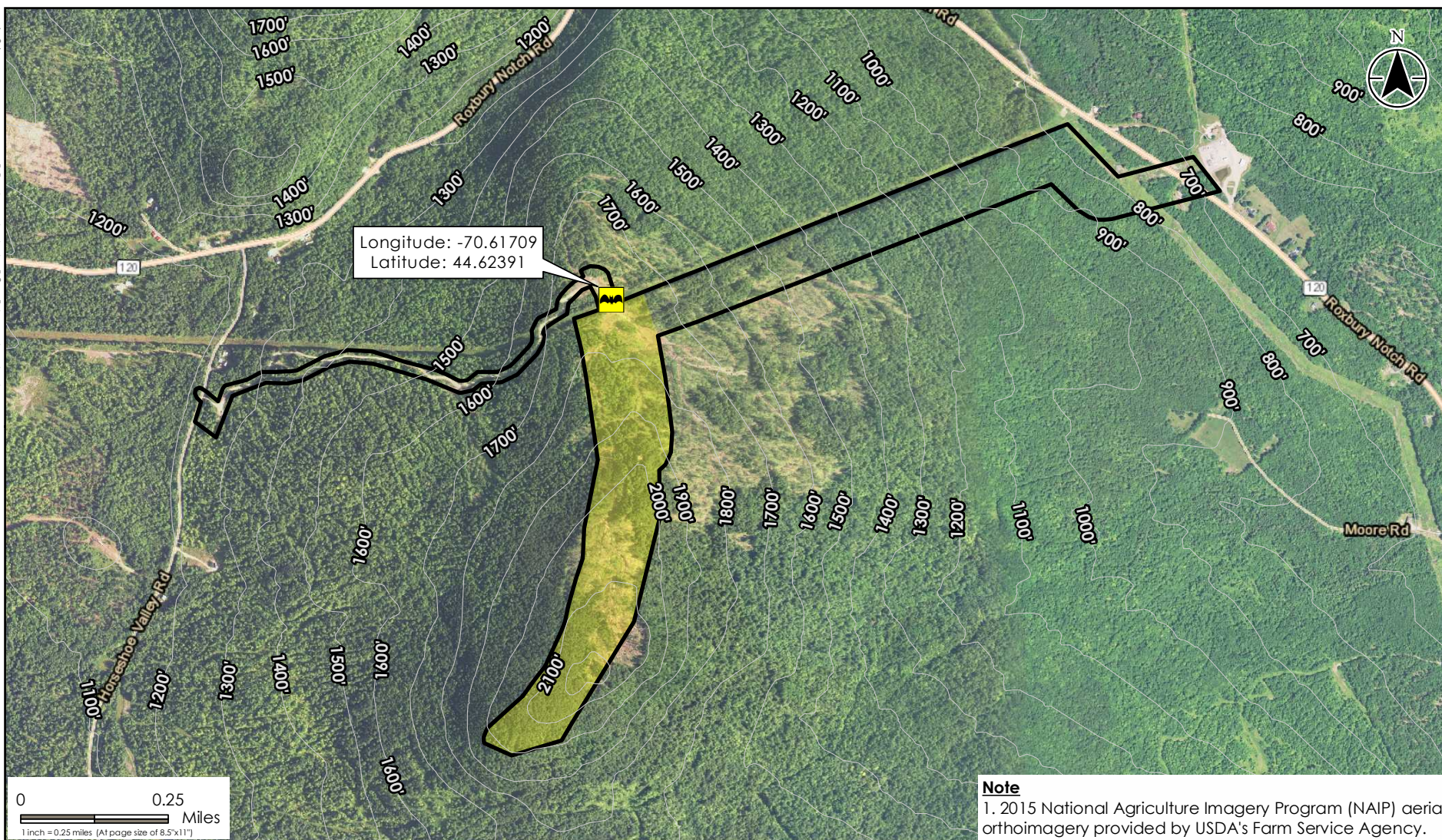
the intended start/stop times and was functioning properly. Once we confirmed that the detector operated properly during 2 nights, we removed the detector from the field.

Data Analysis

Stantec performed a coarse visual analysis of the data and confirmed that bats were recorded. Through visual analysis it did not appear that any high frequency bats were recorded. We proceeded to analyze the data using Kaleidoscope Pro Software (Kaleidoscope) version 3.1.7 (classifier version 3.1.0), which has been approved by the USFWS as suitable for analyzing zero-crossing data. We used default software settings as recommended by the manufacturer and selected Maine as the region for analysis. We based presence or probable absence of northern long-eared bats on the maximum likelihood estimate (MLE) generated by Kaleidoscope for each detector night. A MLE of less than 0.05 indicates probable presence and a MLE greater than 0.05 indicates unlikely presence². Data files have been archived electronically and are available upon request.

² According to USFWS Guidelines, a maximum likelihood estimator (MLE) created by any of the approved acoustic identification programs at a given site on a given night that is less than 0.05 indicates probable presence of the species.

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 Revised: 2016-08-10 by: postpember



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Prepared by DLJ on 2016-07-06
 Quality Review by GAC on 2016-07-07
 Independent Review by LSB on 2016-07-07

01220_01_Acoustic.mxd



- Legend**
- Acoustic Detector
 - Approximate Project Area
 - Approximate Proposed Turbine
 - Area/Bicknell's Thrush Survey Area
 - USGS Contour

Client/Project
 195601220
 8/10/2016
 Palmer Management Corporation
 Horseshoe Valley Wind Project
 Roxbury, Maine

Figure No.
 1

Title
 Northern Long-eared Bat
 Bicknell's Thrush Survey
 Location Map

Reference: Northern Long-Eared Bat (*Myotis septentrionalis*) Acoustic Survey and Bicknell's Thrush (*Catharus bicknelli*) Survey, Horseshoe Valley Wind Project, Roxbury, Maine

RESULTS

Habitat Survey

The Project area consists of primarily forested habitat along the North Twin Mountain ridgeline with a transmission corridor bisecting the northern portion of the ridgeline and a dirt road from Horseshoe Valley Road to the west to where the transmission corridor bisects the ridgeline. Dominant tree species in the forested habitat includes red maple (*Acer rubrum*), American beech (*Fagus grandifolia*) and paper birch (*Betula papyrifera*). We observed trees exceeding 3" diameter breast height containing exfoliating bark and no snags near where the detector was placed. As such, the Project area includes forested habitat that could provide potential roosting habitat for northern long-eared bats, although forest clearing associated with the Project will be confined to the upper elevations along the top of the ridge, where conditions are presumably harsher than the lower elevation surrounding areas. The understory in the forested habitat near where the detector was placed contained approximately 30% closure (Appendix B). The detector was placed parallel to forested habitat in the transmission corridor which was dominated by grass and sedge species.

Acoustic Analysis

The acoustic bat survey occurred on the nights of 27 and 30 June 2016, when weather conditions met the criteria specified by the USFWS (listed above), yielding 2 detector nights at the Project. Appendix B includes completed datasheets for the detector site.

The detector recorded bats during both nights of survey. Kaleidoscope did not identify any calls as northern long-eared bats. Even when no calls are identified as a certain species, Kaleidoscope still calculates nightly MLEs for that species. Kaleidoscope computed a MLE of greater than 0.05 for northern long-eared bats during both nights, indicating that this species was not likely present at the Project area during the survey period per the USFWS Guidelines (Table 1). Kaleidoscope did identify calls of big brown bat, hoary bat, and silver-haired bat, none of which are federally or state-listed species. Kaleidoscope computed a MLE of less than 0.05 for hoary bat only, on the night of 27 June, indicating that this species was likely present at the Project area during the survey period per the USFWS Guidelines (Table 1).

Table 1. Number of files identified to species and maximum likelihood estimator (in parentheses) calculated by Kaleidoscope Pro Software 3.1.7 (classifier version 3.1.0) during the 2016 acoustic bat survey at the Horseshoe Valley Wind Project in Roxbury, Maine.

Night of	big brown bat	silver-haired bat	hoary bat	eastern red bat	tri-colored bat	eastern small-footed bat	little brown bat	northern long-eared bat
27-Jun-16	0 (1)	1 (0.69)	1 (0.03)	0 (1)	0 (1)	0 (1)	0 (1)	0 (1)
30-Jun-16	1 (0.69)	2 (0.16)	0 (1)	0 (1)	0 (1)	0 (1)	0 (1)	0 (1)

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CONCLUSIONS

The acoustic bat survey conducted at the Horseshoe Valley Wind Project followed USFWS Guidelines. The detector operated successfully for 2 nights and bat activity occurred on both nights. No northern long-eared bat calls were identified and the nightly MLE for northern long-eared bats was greater than 0.05 for each detector night indicating that northern long-eared bats were not likely present at the Project during the survey period.

BICKNELL'S THRUSH SURVEY

METHODS

To determine possible presence of Bicknell's thrush at the Project, a Stantec biologist conducted surveys by meandering along the North Twin Mountain ridgeline where turbine locations are proposed. At approximately every 200 m to 300 m along the ridgeline, the biologist broadcasted Bicknell's thrush calls and listened for approximately 1 to 2 minutes for response calls. The biologist also documented any birds seen or heard while onsite at the Project during the northern long-eared bat survey and the Bicknell's thrush survey.

RESULTS

The survey was conducted between 0430 and 1000 on the morning on 28 June 2016. Elevations at the Project reach approximately 2,200 feet and no preferred Bicknell's thrush habitat (stunted spruce-fir forest at elevations above 2,700 feet) was observed during the field survey. Also, no Bicknell's thrush responded to broadcasts or were observed visually or audibly while at the Project. Bird species that were observed incidentally during the surveys at the Project are presented in Table 1.

Table 1. Incidental bird species observed during surveys at the Horseshoe Valley Wind Project, June 2016.

Species Common Name	Species Scientific name
American crow	<i>Corvus brachyrhynchos</i>
American robin	<i>Turdus migratorius</i>
black-and-white warbler*	<i>Mniotilta varia</i>
black-capped chickadee	<i>Poecile atricapillus</i>
black-throated blue warbler	<i>Setophaga caerulescens</i>
blue-headed vireo	<i>Vireo solitarius</i>
chestnut-sided warbler*	<i>Setophaga pensylvanica</i>
common raven	<i>Corvus corax</i>
common yellowthroat	<i>Geothlypis trichas</i>
dark-eyed junco	<i>Junco hyemalis</i>
golden-crowned kinglet	<i>Regulus satrapa</i>
great crested flycatcher	<i>Myiarchus crinitus</i>

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Species Common Name	Species Scientific name
hermit thrush	<i>Catharus guttatus</i>
indigo bunting	<i>Passerina cyanea</i>
mourning dove	<i>Zenaida macroura</i>
mourning warbler	<i>Geothlypis philadelphia</i>
northern flicker	<i>Colaptes auratus</i>
northern parula	<i>Setophaga americana</i>
pileated woodpecker	<i>Dryocopus pileatus</i>
red-eyed vireo	<i>Vireo olivaceus</i>
scarlet tanager	<i>Piranga olivacea</i>
veery*	<i>Catharus fuscescens</i>
white-throated sparrow*	<i>Zonotrichia albicollis</i>
winter wren	<i>Troglodytes hiemalis</i>
yellow-rumped warbler	<i>Setophaga coronata</i>
* Maine state species of special concern.	

CONCLUSIONS

Bicknell's thrush are typically found in stunted spruce-fir forest at elevations above 2,700 feet. Elevations at the Project reach approximately 2,200 feet, however, based on comments made by MDIFW in their letter on 31 May 2016, we surveyed for Bicknell's thrush at the Project for possible presence. No suitable forest characteristics were identified during the field survey and no Bicknell's thrush responded to broadcasts or were observed visually or audibly while at the Project indicating that Bicknell's thrush were not likely present at the Project during surveys.

STANTEC CONSULTING SERVICES INC.



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Attachment: Appendix A – Detector Setup Photographs
 Appendix B – Acoustic Survey Datasheets



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APPENDIX A – DETECTOR SETUP PHOTOGRAPHS

Reference: Northern Long-Eared Bat (*Myotis septentrionalis*) Acoustic Survey and Bicknell's Thrush (*Catharus bicknelli*) Survey, Horseshoe Valley Wind Project, Roxbury, Maine



Photo 1: Anabat SD1 detector in weather proof casing deployed in the transmission corridor at the Horseshoe Valley Wind Project for northern long-eared bat surveys in June 2016. The detector is located approximately 3 m above vegetation height, oriented horizontally to the ground, and facing 67°. A 3-ring binder is placed at the bottom of the detector for scale.

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Photo 2: Anabat SD1 detector in weather proof casing deployed in the transmission corridor at the Horseshoe Valley Wind Project for northern long-eared bat surveys in June 2016. The arrow indicates the 90-degree angle PVC-elbow attached to the weather proof casing over the detector, protecting to microphone from adverse weather conditions and funneling sound from the potential flight corridor to the microphone.



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APPENDIX B – ACOUSTIC SURVEY DATASHEETS

APPENDIX A
PHASE 1 SUMMER HABITAT ASSESSMENTS

INDIANA BAT HABITAT ASSESSMENT DATASHEET

Project Name: Horseshoe Valley Wind Date: 6/27/16
 Township/Range/Section: Roxbury, Maine
 Lat Long/UTM/Zone: 44.62391, -70.61909 Surveyor: Joel Perkins

Brief Project Description

Proposed small wind project on North Twin Mountain Ridge line in Roxbury, Maine.

Project Area

Project	Total Acres	Forest Acres		Open Acres
Project	~121	~ 113		~ 8
Proposed Tree Removal (ac)	Completely cleared	Partially cleared (will leave trees)	Preserve acres- no clearing	
	~ 1 km	0	0	

(linear project)

Vegetation Cover Types

Pre-Project	Post-Project
Hardwood and mixed forest w/ a transmission corridor dominated by grass/sedge species	N/A

Landscape within 5 mile radius

Flight corridors to other forested areas?
yes

Describe Adjacent Properties (e.g. forested, grassland, commercial or residential development, water sources)
 Mostly forested. Some agricultural and residential development, Record Hill wind project, Ellis Pond, Black Mountain Ski resort, Rt. 120 and 17.

Proximity to Public Land

What is the distance (mi.) from the project area to forested public lands (e.g., national or state forests, national or state parks, conservation areas, wildlife management areas)?
 Approximately 8 miles west of Mount Blue State Park, 15 miles east of Grafton Notch State Park, and 8 miles southwest of Bureau of Parks and Lands property at Tumbledown Mountain.

APPENDIX A
PHASE 1 SUMMER HABITAT ASSESSMENTS

Use additional sheets to assess discrete habitat types at multiple sites in a project area
Include a map depicting locations of sample sites if assessing discrete habitats at multiple sites in a project area
A single sheet can be used for multiple sample sites if habitat is the same

Sample Site Description
Sample Site No.(s): <u>1</u>
<u>Transmission corridor over ridge w/ recently logged area</u>

Water Resources at Sample Site				Describe existing condition of water sources: <u>None</u>
Stream Type (# and length)	Ephemeral	Intermittent	Perennial	
Pools/Ponds (# and size)	Open and accessible to bats?			
Wetlands (approx. ac.)	Permanent	Seasonal		

Forest Resources at Sample Site				
Closure/Density	Canopy (> 50')	Midstory (20-50')	Understory (<20')	1=1-10%, 2=11-20%, 3=21-40%, 4=41-60%, 5=61-80%, 6=81-100%
	<u>1</u>	<u>3</u>	<u>3</u>	
Dominant Species of Mature Trees	<u>Maple - Beech - Birch</u>			
% Trees w/ Exfoliating Bark	<u>1 (for all trees combined)</u>			
Size Composition of Live Trees (%)	Small (3-8 in)	Med (9-15 in)	Large (>15 in)	
	<u>5</u>	<u>3</u>	<u>1</u>	
No. of Suitable Snags	<u>0</u>			

Standing dead trees with exfoliating bark, cracks, crevices, or hollows. Snags without these characteristics are not considered suitable.

IS THE HABITAT SUITABLE FOR INDIANA BATS? NLEB Yes

Additional Comments:
<u>The area was recently logged w/in last 18 months.</u>

Attach aerial photo of project site with all forested areas labeled and a general description of the habitat

Photographic Documentation: habitat shots at edge and interior from multiple locations; understory/midstory/canopy; examples of potential suitable snags and live trees; water sources

NLEB Presence/Absence Acoustic Survey Datasheet - Stantec

Project Name MORSESHOE VALLEY Site ID MS-01 Weather Station Provider WEATHER UNDERGROUND
 Surveyor Initials JSP Lat. (+/- error) N 44.62391 +/- 16 FT Weather Station ID KNEWELD2
 Deployment Date 20160628 Long. (+/- error) W070.61709 +/- 16 FT

Sampling Location Specific Characteristics - Check all that apply

- Forest Canopy Opening
- Near water
- Recently logged with remaining potential roost trees
- Road and/or stream corridor with open tree canopy or canopy height > 10m
- Woodland edge
- Other - Describe TRANSMISSION CORRIDOR

Additional Habitat Notes
 RECENTLY LOGGED w/ LAST 18 MONTHS.
 DOMINANT SPECIES:
 MAPLE
 BEECH
 BIRCH

Unit Specific Deployment Characteristics - Must meet all criteria

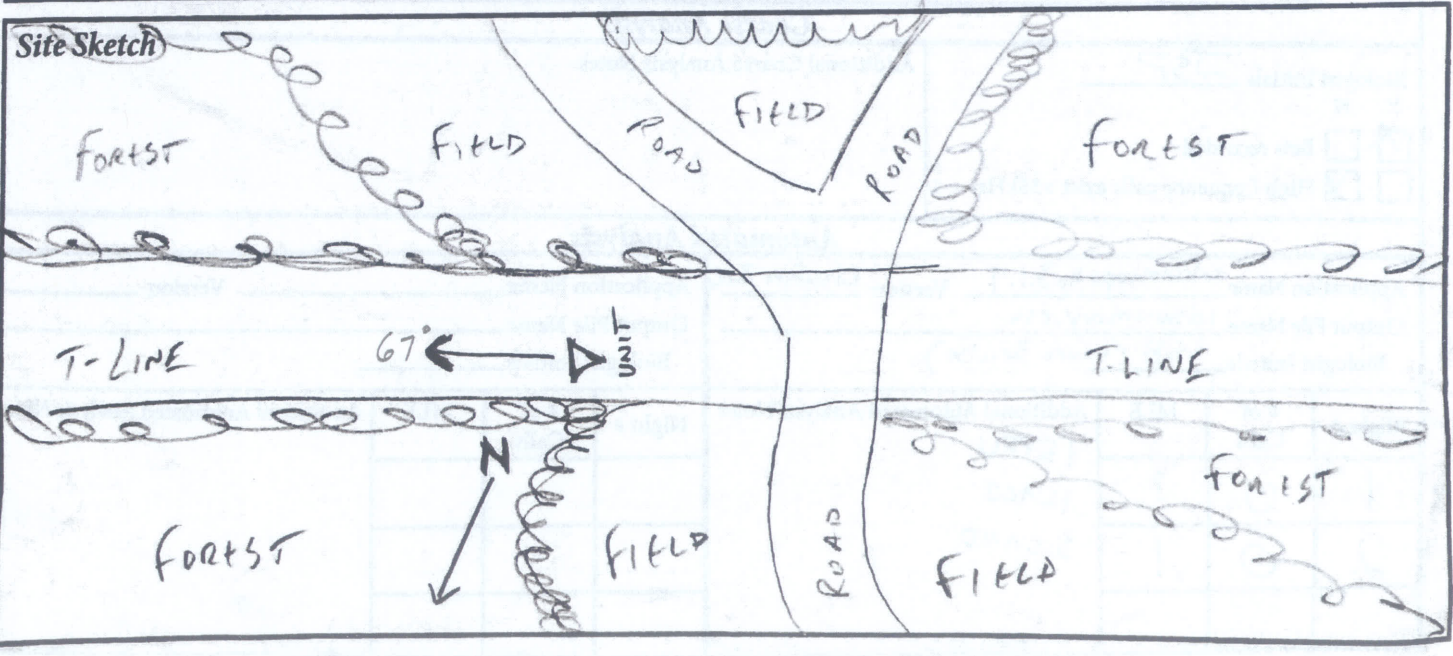
Y	N	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	> 3 m in any direction from vegetation or other obstructions
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Minimal or no vegetation within 10m in front of microphone
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Parallel to woodland edge
<input checked="" type="checkbox"/>	<input type="checkbox"/>	>15m from known or suitable roosts
<input checked="" type="checkbox"/>	<input type="checkbox"/>	>3 m above ground level
<input checked="" type="checkbox"/>	<input type="checkbox"/>	>200m from adjacent acoustic sampling location
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Within expected flight height

Horizontal Mic DIRECTION 67°
 Vertical mic Orientation ≈ 0°

If any criteria are answered 'NO' justification is required

Unit Information

Make/Model ANABAT SDZ Data Division Ratio 16 Recording Schedule START 1930
 Serial Number 80903 Sensitivity 6.5 Detection Range (m) 30 STOP 0600
 Housing/Weatherproofing description PVC Box w/ PVC 90° ELBOW



Daily Survey Data

Sampling Night # 1 Survey Date 20160627

Y N

- Microphone operating normally
- Other unit operations normal
- Nightly temperatures >50F for first 5 hours
- No fog/rain that exceeds 30 minutes or continues intermittently for first 5 hours
- Sustained wind speeds not >9mph for 30 min for first 5 hrs

Additional Survey Notes

Daily Survey Data

Sampling Night # 2 Survey Date 20160630

Y N

- Microphone operating normally
- Other unit operations normal
- Nightly temperatures >50F for first 5 hours
- No fog/rain that exceeds 30 minutes or continues intermittently for first 5 hours
- Sustained wind speeds not >9mph for 30 min for first 5 hrs

Additional Survey Notes

Daily Survey Data

Sampling Night # _____ Survey Date _____

Y N

- Microphone operating normally
- Other unit operations normal
- Nightly temperatures >50F for first 5 hours
- No fog/rain that exceeds 30 minutes or continues intermittently for first 5 hours
- Sustained wind speeds not >9mph for 30 min for first 5 hrs

Additional Survey Notes

Daily Survey Data

Sampling Night # _____ Survey Date _____

Y N

- Microphone operating normally
- Other unit operations normal
- Nightly temperatures >50F for first 5 hours
- No fog/rain that exceeds 30 minutes or continues intermittently for first 5 hours
- Sustained wind speeds not >9mph for 30 min for first 5 hrs

Additional Survey Notes

Coarse Analysis

Biologist Initials JSP

Y N

- Bats recorded
- High frequency calls exist >35kHz

Additional Coarse Analysis Notes

Automated Analysis

Application Name Kaleidoscope Pro 3.1.7 Version Classifier 3.1.D

Output File Name ids.summary.csv

Biologist Initials LSB (Laura Berube)

Application Name _____ Version _____

Output File Name _____

Biologist Initials _____

Night #	# of Calls	MLE	Additional Automated Analysis Notes
1	0	1	1EPFU 1LACI
2	0	1	3 LAND

Night #	# of Calls	MLE	Additional Automated Analysis Notes