

Acoustic Bat Survey  
of Conservation Lands  
Rindge (Cheshire County), NH

report prepared by:

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report prepared for:

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## Acoustic Bat Survey of Conservation Lands, Rindge New Hampshire

### PROJECT OVERVIEW

The Rindge Conservation Commission ('RCC') contracted North East Ecological Services ('NEES') to conduct an acoustic monitoring survey at eight sites of conservation concern within the town of Rindge. The goal of the bat survey was to identify the species of bats found throughout each area, with a particular focus on ensuring that any habitat management or development activities in proximity to these areas would not have a negative impact on bat species, including the federally-Threatened northern long-eared bat (*Myotis septentrionalis*, hereinafter referred to as the 'northern myotis').

### METHODOLOGY

NEES utilized a field survey protocol consistent with the Range-Wide Indiana Bat Summer Survey Guidelines ('the Guidelines') produced by the U.S. Fish and Wildlife Service (USFWS, 2016). This Guideline defines the appropriate timing of the survey and minimum sampling effort that would be considered adequate to document the presence of Indiana myotis (*M. sodalis*) at a specific location. Although Indiana myotis are not a species of concern within the state of New Hampshire, the survey protocol in the Guidelines are the recommended methodology for documenting the presence of northern myotis as well. NEES used the Phase 2 Acoustic Survey protocol with the Guidelines to conduct sampling of the project sites using ultrasonic microphones that detect and record the echolocation calls of foraging and commuting bats.

NEES utilized Titley <sup>TM</sup> ultrasonic acoustic monitors (both Anabat II and Anabat SD1 units) with a detached microphone and self-contained power supply. Each unit recorded acoustic calls from 18:00 – 08:00 nightly with the data stored on internal CF-Card memory cards. Each system was deployed in a weather-tight housing with the microphone set up at 1.5m above the ground and facing parallel to the ground. Recorded calls were collected from each system, filtered for noise, and analyzed for species and phonic-group identification using EchoClass v3.1 (Britzke, 2015) as a species identification tool. All potential *Myotis* calls were re-analyzed using BCID v2.7c (Allen, 2015) to validate the classification; calls that were identified as the same species using both software packages were considered validated and other calls were visually analyzed to species or species group using qualitative call parameters. All equipment was calibrated and deployed as outlined in the USFWS Guidelines (USFWS, 2016).

General survey locations were identified by the Rindge Conservation Commission. The RCC arranged for Rick van der Poll to escort NEES to each field location. Placement of monitors ('micrositing') was determined primarily by sampling conditions (proximity to water, forest edge, or trail habitat) and access.

## TARBELL BROOK

### TARBELL BROOK OVERVIEW

The Tarbell Brook Site was characterized by slow moving meandering body of water (Tarbell Brook) that was crossed by two adjacent power lines. Tarbell Brook was surrounded by marsh habitat on either side of the brook, with forested habitat on the eastern and southern edges of the marsh. Access to the site was made via Abel Road off Route 119.

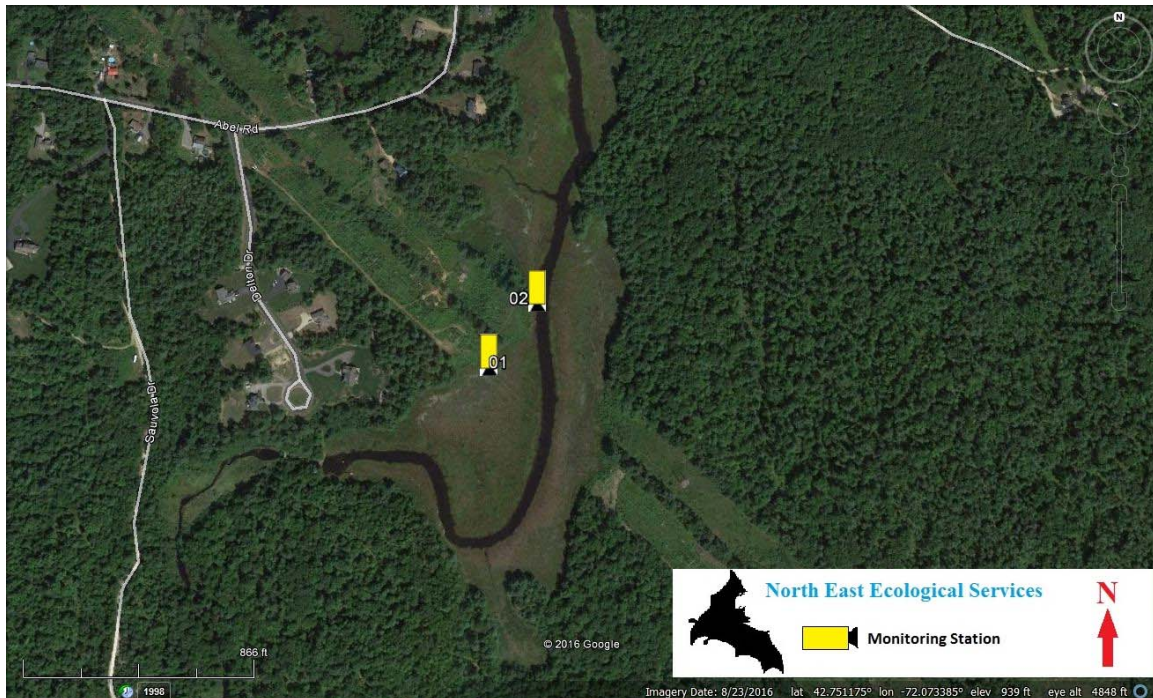


Figure 1. Tarbell Brook Survey Site, Rindge, NH

### TARBELL BROOK SURVEY RESULTS

NEES collected on-site acoustic data on 02 August, 2016. A total of two detectors were used within the site (Figure 1). Each detector was deployed for a single night (Table 1).

**Table 1. Description of Acoustic Monitoring Locations at the Tarbell Brook Site**  
(denotes orientation of microphone)

SITE ID	LAT	LONG	HABITAT DESCRIPTION
01	42.751133N	72.074750W	overlooking marsh habitat by stone wall (SE)
02	42.751833N	72.074050W	next to Tarbell Brook facing power lines (S)

Total sampling effort at the Project Site was two detector-nights. A total of 69 files were recorded, with 56 of these files were determined to contain bat calls. Site 01 (facing over the marsh) did not document any bat activity. Site 02 (over Tarbell Brook) documented calls from four species (Table 2). The majority of identified bat activity came from the eastern red bat (*Lasiurus borealis*: 81%). One call was tentatively assigned to the genus *Myotis* based on EchoClass but not verified by BCID, nor did it meet the MLE threshold.

**Table 2. Summary of Acoustic Monitoring Data from the Tarbell Brook Site**

<b>SITE ID</b>	<b>Sampling Date</b>	<b>TOTAL FILES</b>	<b>Files with bat calls</b>	<b>Total Species <sup>1</sup></b>	<b>Little Brown Myotis</b>	<b>Northern Myotis</b>	<b>Other Myotis <sup>2</sup></b>	<b>Big Brown Bat</b>	<b>Silver-haired Bat</b>	<b>Tri-colored Bat</b>	<b>Eastern Red Bat</b>	<b>Hoary Bat</b>	<b>Unidentified Species</b>
<b>01</b>	<b>02 Aug 16</b>	<b>0</b>	0	0									
<b>02</b>	<b>02 Aug 16</b>	<b>69</b>	56	4	1	0	0	0	<b>2</b>	0	<b>17</b>	1	35
		<b>69</b>	56	4	1	0	0	0	2	0	17	1	35

<sup>1</sup>. Possible species presence based on tentative identification using EchoClass v3.1. Species in red bold were verified as present based on Maximum Likelihood Estimates < 0.05 from both software packages.

<sup>2</sup>. Other myotis includes eastern small-footed myotis or Indiana myotis

#### **DATA SUMMARY FOR THE TARBELL BROOK SITE**

Bat activity was detected at only one site within Tarbell Brook, with as many as four species documented at this site over the course of a single evening. The Tarbell Brook site had a relatively low level of bat activity (28.0 calls per detector-night, c/dn), with 62.5% of the calls being Unidentified. The absence of bat activity at Site 01 is most likely due to the dry conditions of the marsh at the time of sampling and the lack of open water within the sampling cone of the microphone. Site 02 had a higher level of bat activity that was predominantly attributed to the eastern red bat. The low level of identified calls is likely the result of the open habitat, with many of the calls low in quality and truncated due to long-range sampling.

The one potential myotine call (Q8022234.28#) was attributed to the little brown myotis by EchoClass. Manual vetting of the call to confirm species identification has not been completed to date.



## SUNRIDGE MARSH

### SUNRIDGE MARSH SITE OVERVIEW

The Sunridge Marsh Site was an open reed grass marsh with a meandering stream that had standing water but no visible flow. The Site was bisected by two sets of power lines that had a small hemlock grove between them. Access to the site was via Sunridge Road, walking down the transmission corridor from the service gate.

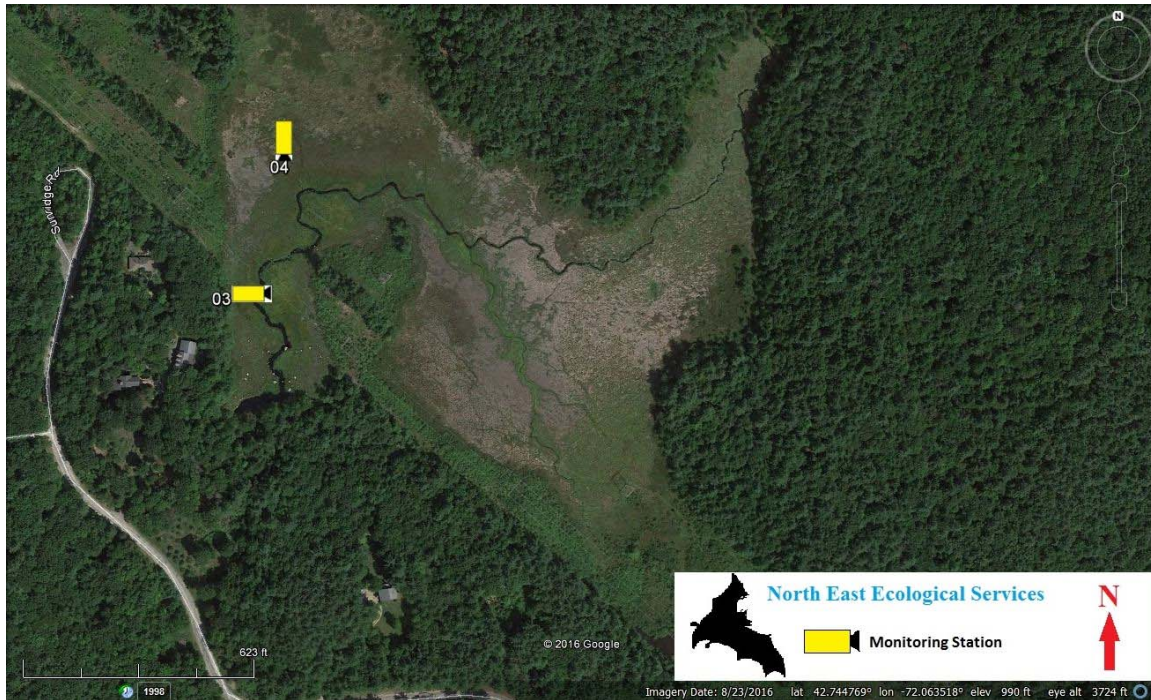


Figure 2. Sunridge Marsh Site, Rindge NH

### SUNRIDGE MARSH SURVEY RESULTS

NEES collected acoustic data on 02 August, 2016. A total of two locations were sampled at the Site (Figure 2). Each of the sampling locations was sampled for a single night, with both locations in open marsh habitat (Table 3).

**Table 3. Description of Acoustic Monitoring Locations at the Sunridge Marsh Site**  
(denotes orientation of microphone)

SITE ID	LAT	LONG	HABITAT DESCRIPTION
03	42.745300N	72.066867W	along stream meandering through marsh (E)
04	42.746433N	72.066483W	reed grass habitat facing transmission corridor (S)

Total sampling effort at the Sunridge Marsh site was two detector-nights. A total of 32 files were recorded, but only 19 of these files were determined to contain bat calls. Site 03 (facing open water) had higher total bat activity than Site 04 (reed grass marsh). There was tentative identification for multiple species, but the only species confirmed by both analyses packages was the big brown bat (Table 4).

**Table 4. Summary of Acoustic Monitoring Data from the Sunridge Marsh Site**

<b>SITE ID</b>	<b>Sampling Date</b>	<b>TOTAL FILES</b>	<b>Files with bat calls</b>	<b>Total Species <sup>1</sup></b>	<b>Little Brown Myotis</b>	<b>Northern Myotis</b>	<b>Other Myotis <sup>2</sup></b>	<b>Big Brown Bat</b>	<b>Silver-haired Bat</b>	<b>Tri-colored Bat</b>	<b>Eastern Red Bat</b>	<b>Hoary Bat</b>	<b>Unidentified Species</b>
<b>03</b>	<b>02 Aug 16</b>	<b>23</b>	14	3	0	0	1	<b>4</b>	0	0	1	0	8
<b>04</b>	<b>02 Aug 16</b>	<b>9</b>	5	4	0	0	0	1	1	0	1	1	1
		<b>32</b>	19	4	0	0	1	5	1	0	2	1	9

<sup>1</sup>. Possible species presence based on tentative identification using EchoClass v3.1. Species in red bold were verified as present based on Maximum Likelihood Estimates < 0.05 from both software packages.

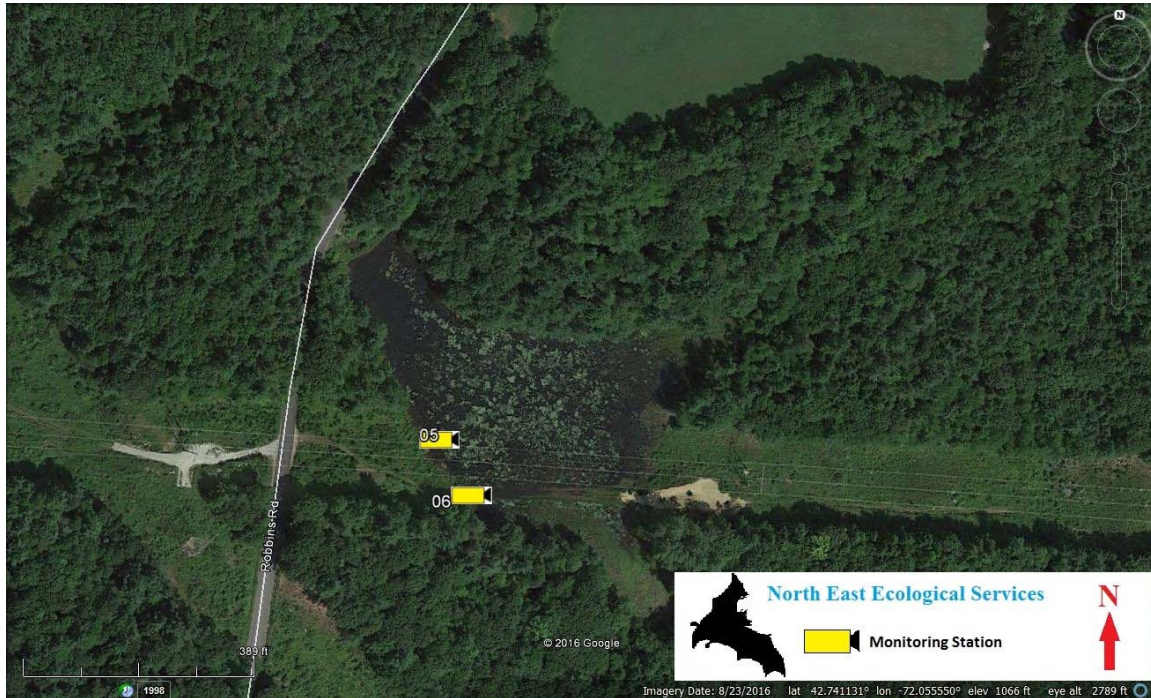
<sup>2</sup>. Other myotis includes eastern small-footed myotis or Indiana myotis

#### **DATA SUMMARY FOR THE SUNRIDGE MARSH SITE**

Bat activity was detected at both sampling sites within Sunridge Marsh, with as many as four species documented across both sampling sites. The Sunridge Marsh site had a relatively low level of bat activity (16.0 calls per detector-night, c/dn), with 28.1% of the calls being Unidentified. The higher level of bat activity from Site 03 was not surprising given the placement of the detector across open water habitat. The one potential myotine call (Q8022253.33#) was attributed to the Indiana myotis by EchoClass; this species does not occur in New Hampshire. Manual vetting of the call to confirm species identification has not been completed to date.

**ROBINSON POND****ROBINSON POND SITE OVERVIEW**

The Robinson Pond Site was a small open water pond and marsh habitat surrounded by forests and bisected by a power line transmission corridor. Access to the site was gained via Robbins Road, walking from the service gate down to the edge of the pond.



*Figure 3. Robinson Pond Sampling Site, Rindge, NH*

**ROBINSON POND SURVEY RESULTS**

NEES collected acoustic data on 03 August, 2016 from two sampling locations (Figure 3). Each of the sampling locations was sampled for a single night, within Site 05 sampling over open water and Site 06 sampling over open marsh habitat (Table 5).

**Table 5. Description of Acoustic Monitoring Locations at the Robinson Pond Site**  
(denotes orientation of microphone)

SITE ID	LAT	LONG	HABITAT DESCRIPTION
05	42.740700N	72.056470W	along edge of open water (Robinson Pond) (E)
06	42.740440N	72.056250W	marsh habitat within transmission corridor (E)

Total sampling effort at the Robinson Pond site was two detector-nights. A total of 672 files were recorded, with 659 of these files were determined to contain bat calls. Site 05 (facing open water) had substantially lower total bat activity than Site 06 (marsh). There was tentative identification for up to six species of bats, with five of these species confirmed by both analysis packages (Table 6). The majority of identified bat activity came from the eastern red bat (81%), with bats from the genus *Myotis* accounting for an additional 11.9%.



Table 6. Summary of Acoustic Monitoring Data from the Robinson Pond Site

SITE ID	Sampling Date	TOTAL FILES	Files with bat calls	Total Species <sup>1</sup>	Little Brown Myotis	Northern Myotis	Other Myotis <sup>2</sup>	Big Brown Bat	Silver-haired Bat	Tri-colored Bat	Eastern Red Bat	Hoary Bat	Unidentified Species
05	03 Aug 16	67	65	5	1	0	0	<b>1</b>	1	0	<b>30</b>	1	29
06	03 Aug 16	605	594	6	<b>26</b>	<b>2</b>	<b>11</b>	<b>1</b>	0	0	<b>242</b>	3	308
		<b>672</b>	659	6	27	2	11	2	1	0	<b>272</b>	4	337

<sup>1</sup> Possible species presence based on tentative identification using EchoClass v3.1. Species in red bold were verified as present based on Maximum Likelihood Estimates < 0.05 from both software packages.

<sup>2</sup> Other myotis includes eastern small-footed myotis or Indiana myotis.

#### DATA SUMMARY FOR THE ROBINSON POND SITE

Bat activity was detected at both sampling sites within Robinson Pond, with as many as six species documented over the course of a single evening. The Robinson Pond site had a relatively high level of bat activity (329.5 calls per detector-night, c/dn), with 51.1% of the calls being Unidentified. The high level of bat activity at Site 06 relative to Site 05 was surprising given that the latter site was perpendicular to open water and prime foraging habitat. Site 06 was sampling across wetland habitat with emergent vegetation, but was directly in line with the transmission corridor. The high level of bat activity may reflect foraging at the pond, or commuting activity along the forest and pond edge habitat created by the transmission corridor.

Potential myotine activity was documented from both sampling points, with 26 calls from Site 06 attributed to little brown myotis. An additional 13 files were attributed to other myotine bats at Site 06. Although EchoClass confirmed the presence of little brown myotis at this site, manual vetting of the call to confirm species identification has not been completed to date.



## MacGREGOR MARSH SITE

### MacGREGOR MARSH SITE OVERVIEW

The MacGregor Marsh Site is a large reed grass and open water marsh that is surrounded by a mixed forest habitat. To the west of the marsh, running parallel with the length of the open habitat, is a large power transmission corridor. Access to the site was via Route 119 north of Atlantic Drive. The sampling sites were accessed by walking down the power line easement. Site 07 was set up at the western edge of the marsh, far enough out in the marsh to get beyond the emergent reed grass to sample open habitat. This site was just north of an elevated hunting blind. Site 08 was directly in the power line easement, facing northeast parallel to the trail.

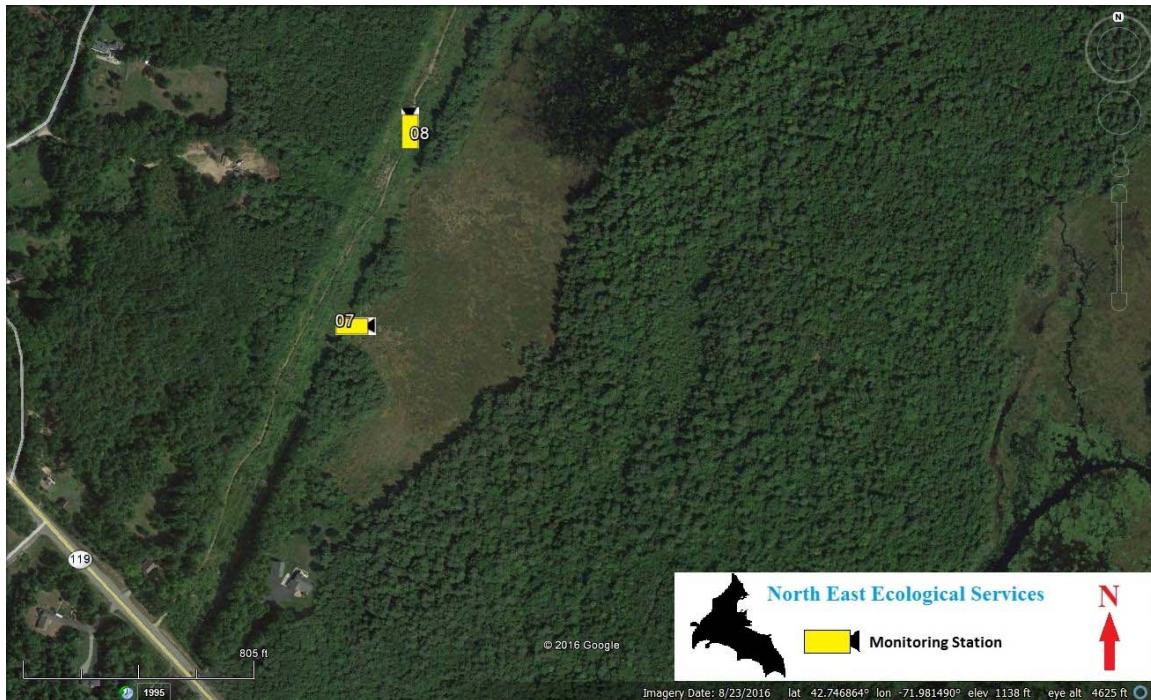


Figure 4, MacGregor Marsh Sampling Site, Rindge, NH

### MacGREGOR MARSH SURVEY RESULTS

NEES collected on-site acoustic data on 03 August, 2016 from two sampling sites (Figure 4). Each of the sampling locations was sampled for a single night, within one monitor in open marsh habitat (Site 07) and the second monitor in forest edge habitat (Site 08) that had abundant shrub and disturbance vegetation (Table 7).

**Table 7. Description of Acoustic Monitoring Locations at the MacGregor Marsh Site**  
(denotes orientation of microphone)

SITE ID	LAT	LONG	HABITAT DESCRIPTION
07	42.747190N	71.984450W	along edge of MacGregor Marsh behind blind ( <b>E</b> )
08	42.749071N	71.983649W	along transmission corridor facing trail ( <b>NE</b> )

Total sampling effort at the MacGregor Pond site was two detector-nights. A total of 133 files were recorded, with 88 of these files were determined to contain bat calls. Site 07 (reed marsh) had no evidence of bat activity. Site 08 (transmission corridor) had tentative identification for up to four species of bats, with three of these species confirmed by both analysis packages (Table 8). The majority of identified bat activity came from the big brown bats (78%) and the eastern red bat (13%).

**Table 8. Summary of Acoustic Monitoring Data from the MacGregor Marsh Site**

SITE ID	Sampling Date	TOTAL FILES	Files with bat calls	Total Species <sup>1</sup>	Little Brown Myotis	Northern Myotis	Other Myotis <sup>2</sup>	Big Brown Bat	Silver-haired Bat	Tri-colored Bat	Eastern Red Bat	Hoary Bat	Unidentified Species
07	03 Aug 16	0	0	0									
08	03 Aug 16	133	88	4	2	0	0	36	2	0	6	0	42
		133	88	4	2	0	0	36	2	0	6	0	42

<sup>1</sup>: Possible species presence based on tentative identification using EchoClass v3.1. Species in red bold were verified as present based on Maximum Likelihood Estimates < 0.05 from both software packages.

<sup>2</sup>: Other myotis includes eastern small-footed myotis or Indiana myotis.

#### DATA SUMMARY FOR THE MACGREGOR MARSH SITE

Bat activity was not detected at Site 07, facing out into a reedy marsh habitat that was seasonally dry. A total of 88 files containing bat activity was documented from Site 08, facing along the footpath within the electrical transmission easement. According to both EchoClass and BCID analysis, little brown myotis were documented commuting down the transmission corridor. Manual vetting of the call to confirm species identification has not been completed to date.

## PROJECT OVERVIEW AND DISCUSSION

NEES relied on the EchoClass analysis software as the primary tool for species identification. In my experience, this software has a lower rate of error for northeastern bat species than the BCID software. Both systems are highly conservative, but the EchoClass software was designed for northeastern bat species and is intentionally biased towards Type I errors (generating false positive identifications) rather than Type II errors (missing potential endangered bat species: Eric Britze, *pers. comm*). The BCID software has a lower quality threshold for species identification and therefore typically documents more total calls but, in my opinion, is more likely to misidentify calls. Regardless of which software package one relies upon, there are bound to be errors and ambiguities that require a qualitative inspection to resolve. The ambiguity of the acoustic signatures within the myotine bats requires a high volume of data to increase species identity with any confidence. However, much of the ambiguity is the result of a convergence of echolocation calls under similar ecological conditions. Therefore, it is unlikely that future versions of these software packages will dramatically reduce the rate of misidentification. Although more data can increase the confidence of species identification (Britzke, 2005), resolution of acoustic calls within the genus *Myotis* represents the most problematic task among all the temperate bats (Jones et al., 2004).

All of the sampling sites had bat activity, although two individual sampling points did not detect any bats. Bat activity was generally highest when sampling over water, but detectors placed along transmission corridors also showed high levels of bat activity. The wetlands sites generally had the lowest level of bat activity, but these surveys were conducted during an unseasonably dry period, and the two wetland sites with no bat activity lacked surface water at the time of the survey.

All four sites had at least one call attributed to the genus *Myotis*, which includes the federally Threatened northern myotis. Multiple sites (Robinson Pond and MacGregor Marsh) had myotine bat activity that met the threshold for confirmed presence of little brown myotis set by both analysis packages. Robinson Pond also met the threshold for confirmed presence for the northern myotis. Further work at these two sites would be needed to confirm the presence of the little brown myotis and the northern myotis prior to implementing any habitat management guidelines. However, construction activities at either of these sites has the potential for take of endangered or threatened bat species.

The consistent presence of potential myotine bat activity was surprising given the decline these populations have experienced following the impact of White-Nose Syndrome throughout the eastern United States in general (Schirmacher, 2010) and New Hampshire in particular (Moosman et al., 2013). Of the three species of myotis which could have been found in New Hampshire, there were no data to suggest the presence of eastern small-footed myotis (*M. leibii*) at any of the project sites. My review of the area and on-site surveys of each of the project sites suggests there is no roosting habitat consistent with this species; specifically, I found no evidence of rocky outcrops, talus slopes, or other rock debris habitat that are characteristic roosts of this species (Czaplewski et al., 1979; Fenton et al., 1980; Johnson et al., 2011). Northern myotis were indicated as

possibly present at the Robinson Pond Site, but none of these calls have been manually vetted to confirm identification. Northern myotis are generally associated with intact forested habitat, particularly upland habitats and forested hillsides (Owen et al., 2003; Lacki et al., 2009), but they can also be captured near riparian habitat and along forested trails (Broders et al., 2003).

#### **PROJECT MANAGEMENT IMPLICATIONS**

In general, the current survey suggests that the habitat management activities (successional management, prescribed burns, and habitat recovery) and construction projects have the potential to negatively impact myotis bats, including the northern myotis. Based on the U.S. Fish and Wildlife Service Guideline document, the next step would be the manual vetting of the existing acoustic data from all four sites by a qualified bat biologist to confirm the likely presence of northern myotis. If confirmed, the USFWS recommends mist-netting (capturing of bats using nets) to validate the presence of northern myotis and use radiotelemetry to identify potential roost trees (USFWS, 2016).



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