



February 11, 2019

Mr. Aaron Svedlow
Ranger Solar
60 Forest Falls Drive
Suite 7
Yarmouth, Maine 04096

Project	Northern Long-eared Bat (NLEB) Presence/Absence Survey
Town	Fitzwilliam, New Hampshire
Area of Forest for Clearing	Unknown
Surveyor Name/Firm	Clinton Parrish/Tetra Tech, Inc.
Detector Operation Dates	July 19-21, 2016
Survey Results	NLEB NOT DETECTED

Dear Aaron,

This report contains the results of the northern long-eared bat (*Myotis septentrionalis*, hereafter NLEB) summer presence/absence survey performed for the Chinook Solar Development Project in Fitzwilliam, New Hampshire. Acoustic detectors deployed by Tetra Tech did not detect the presence of NLEB. Thirty-four bat passes were classified as little brown bat (*Myotis lucifugus*) and 27 were determined to be accurately identified during the qualitative assessment.

PROJECT DESCRIPTION

The proposed Project entails solar development in a rural portion of southern New Hampshire near the town of Fitzwilliam, NH on a tract of land that has been managed for timber harvest. The Project is bound by routes 119 and 12 and located approximately 1.5 miles southeast of Fitzwilliam. The initial area considered contained ~595 acres (Project Area) of which ~535 acres is forested and ~60 is open land created by skid roads and log landings that is currently dominated by grasses and forbs (Figure 1). However, the original Project Area layout was updated, and the new, reduced footprint is a more accurate portrayal of areas that may undergo development (Figure 2). Dominant tree species in the mixed, managed forest included red maple (*Acer rubrum*), white pine (*Pinus strobus*), white birch (*Betula papyrifera*), red spruce (*Picea rubens*), and red oak (*Quercus rubra*). The area is surrounded by contiguous forest with light residential development to the north east along Fullam Hill Rd and route 119. The northeast boundary of the Project area straddles an existing utility corridor. Numerous ponds and lakes dot the region and the larger eastern portion of the Project Area is separated from a

smaller western parcel of the Project Area by Scotts Brook. Protected lands in the vicinity include Rhododendron State Park 3 miles to the west and Monadnock State Park 5 miles to the north.

METHODS

The summer presence/absence survey was conducted in accordance with the 2016 U.S. Fish and Wildlife Service *Range-wide Indiana Bat Summer Survey Guidelines for Indiana Bat and Northern Long-eared Bat* (Guidelines). This survey utilized a two-phased approach: Phase 1) desktop and field-based habitat assessments, and Phase 2) acoustic surveys. Full spectrum acoustic detectors were deployed during field assessments and resulting data were processed using Kaleidoscope Pro v 3.1.7. Qualified Tetra Tech personnel carried out all phases of the survey and specific roles are summarized in Table 1; resumes for relevant staff are provided in Appendix C.

Table 1. Personnel involved in NLEB Acoustic Presence/Absence Surveys and analyses for Chinook Solar, July and August 2016.

Personnel	Desktop Analysis	Field Assessment	Detector Deployment	Acoustic Analysis	Qualitative Analysis
Clinton Parrish Wildlife Biologist	X	X	X	X	X
Derek Hengstenberg Wildlife Biologist	X				

HABITAT ASSESSMENT

Desktop Analysis

Prior to conducting field work, a desktop land cover analysis was performed to identify suitable NLEB habitat within the solar development (Figure 1). Specifically, aerial photography and Google Earth imagery were reviewed to determine areas that may be used by NLEB for foraging and roosting during the breeding and migration seasons. Determinations were based on forest patch size, proximity to closed-canopy forests, and landscape features that may be used by bats commuting between roosting and foraging habitats (e.g., forested tracts, wetlands, streams). All relatively contiguous forested lands not highly fragmented by residential or commercial developments were considered suitable NLEB habitat, and all densely populated or developed stretches were determined to be unsuitable (USFWS 2016). All of the Project Area (595 acres) was determined to be possible suitable habitat as it consists forest habitat interspersed with clearings and associated edge habitat that could be utilized as foraging areas by NLEB (Hogberg et al. 2002).

Tetra Tech also reviewed the land cover imagery for the presence of any areas that could potentially support natural hibernacula, including karst or similar geological formations. No



natural hibernacula or abandoned mines were identified in the Project Area. However, abandoned mines are common in New Hampshire with the highest number known to support NLEB occur in Grafton County, north of the Project Area.

Maps and GPS coordinates were produced for use in the field that demarcated suitable habitat within the project area, as well as the number and proposed locations of acoustic detectors required to survey the area.

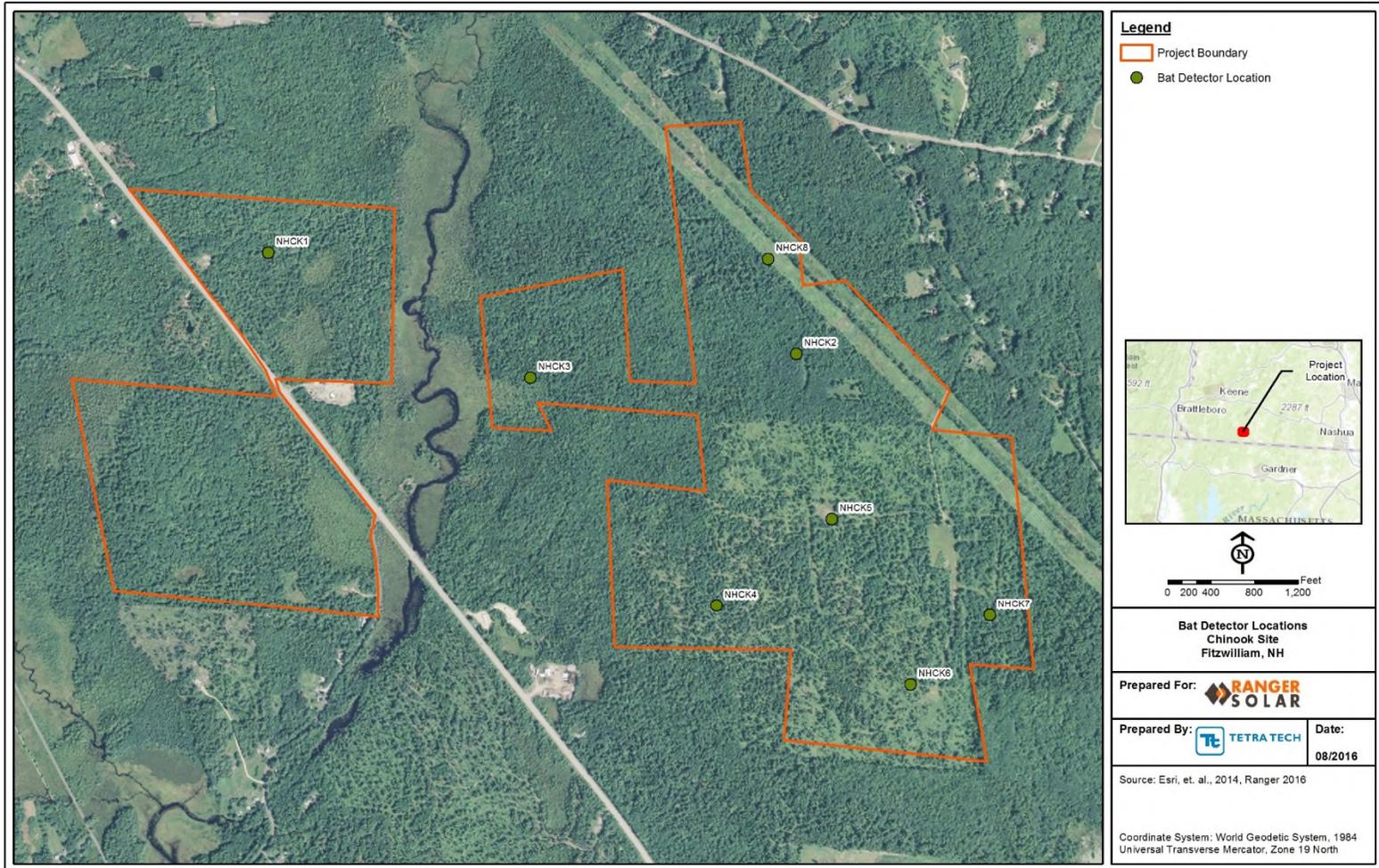


Figure 1. Locations of acoustic detectors deployed at the Project in Fitzwilliam, New Hampshire on the nights of July 19 and 20, 2016.

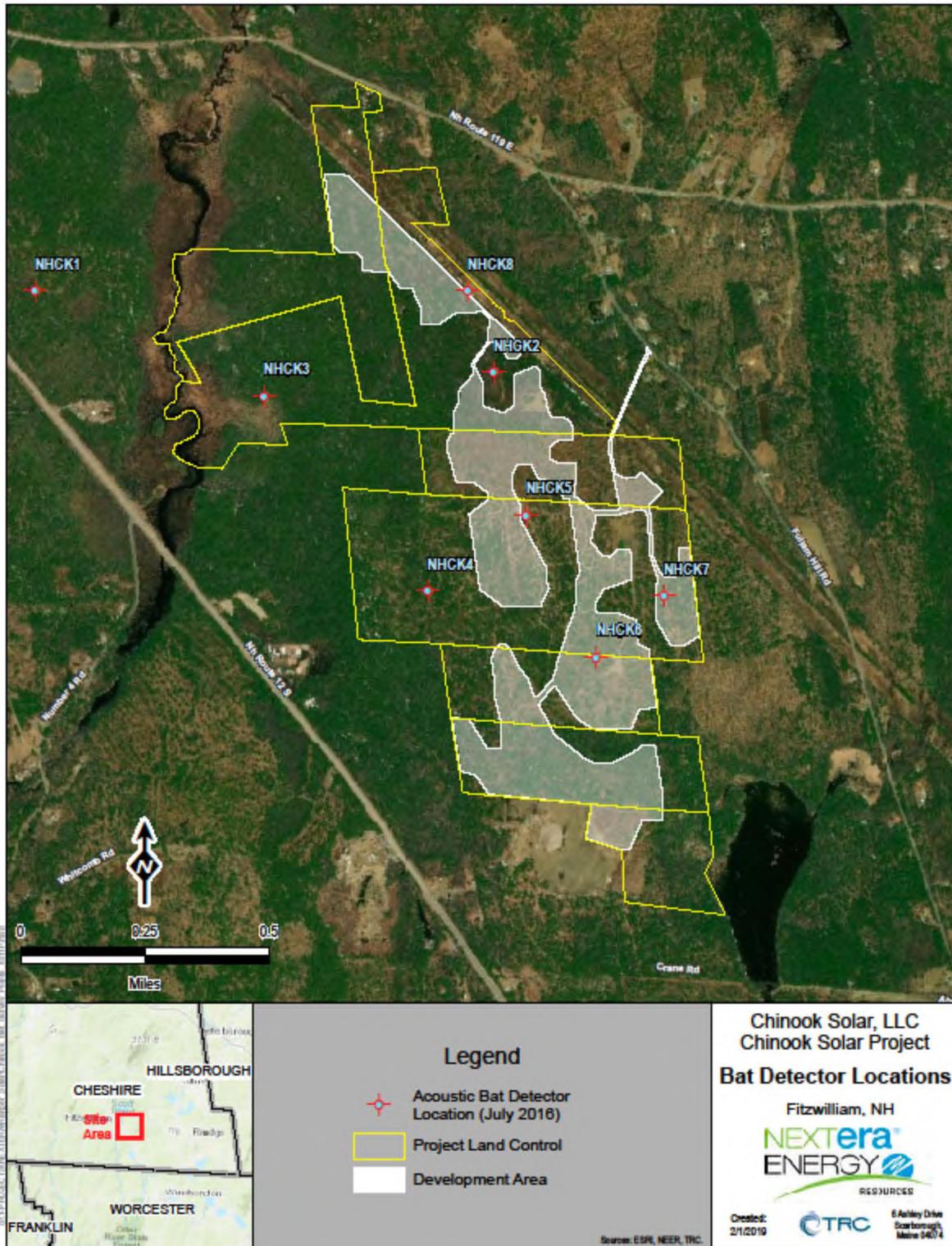


Figure 2. Updated boundary (February 2019) with locations of acoustic detectors deployed at the Project in Fitzwilliam, New Hampshire on the nights of July 19 and 20, 2016

Field Assessment

On July 19, 2016, Tetra Tech conducted a site visit to verify the presence of and describe the NLEB habitat identified during the desktop analysis, and to deploy the acoustic detectors. Detectors were deployed at 8 locations for the nights of July 19 and 20, 2016 (Figure 1). General habitat descriptions are provided below in Table 2. The completed Phase 1 Summer Habitat Assessment is included in Appendix B.

Table 2. Detector station descriptions and survey data at Chinook, NH, July 2016.

Station	Suitable NLEB Habitat	Description	GPS Coordinates (NAD 83 zone 18)		Survey Dates	Survey Hours
			y	x		
NHCK-1	Y	Mid-successional, mixed forest with dense understory. Deployed on edge of an old skid road with mic parallel with edge.	4739634	735213	Nights of July 19 and 20, 2016	Hour before sunset (~7:19 PM) to an hour after sunrise (~6:23 AM)
NHCK-2	Y	Deployed within canopy flyway near intermittent drainage. Open understory with fern ground cover.	4739454	736713		
NHCK-3	Y	Deployed on edge of mature, wet evergreen stand that is also the boundary of extensive wetland area that connects with Scott's Brook.	4739335	735973		
NHCK-4	Y	Mid-successional, mixed forest that has been logged. A matrix of skidder trails and canopy openings are present in the remaining forest.	4738735	736539		
NHCK-5	Y	Station was deployed along a young, mixed forest border of large log landing. Mic oriented over grassy area to sample representative open habitat.	4739000	736845		
NHCK-6	Y	Heavily logged area on the top of hill. Sparse, mature trees with dense forbs and saplings regenerating.	4738551	737098		
NHCK-7	Y	Partially logged over area with skid trails and mid-successional, mixed forest.	4738762	737307		
NHCK-8	Y	On the edge of mixed forest along a large utility line corridor.	4739716	736614		

ACOUSTIC PRESENCE/ABSENCE SURVEYS

Detector Type

Wildlife Acoustics Song Meter-3 BAT (SM3) ultrasonic bat detector/recorders (Wildlife Acoustics, Inc., Massachusetts, USA) equipped with SMM-U1 microphones with windscreens were used for the duration of the survey effort. Detectors were set to record from an hour before sunset to an hour after sunrise in full-spectrum mode and files were saved in .wav format on internal SD cards. Detectors and accessories are fully waterproof and were powered by internal D cell batteries. Each detector and microphone was tested prior to deployment with a Wildlife Acoustics Ultrasonic Calibrator to ensure equipment was functioning properly and sensitivities were within manufacturers suggested thresholds. Once detectors were set, a “snap test” was used to ensure all connections were sound and microphones were registering high frequency noise. Log files were reviewed when units were pulled to verify proper functioning for the duration of the survey.

Detector Deployment

Eight detectors were micro-sited in suitable habitat within the Project Area to ensure that potential habitats were sampled in accordance with the Guidelines. Eight detectors were deployed in the following habitat types:

- Interior forest-canopy openings
- Closed canopy forests
- Near open water
- Open grassland

Microphones were mounted on branches when appropriate or on native poles at a height of 2.5 - 4 meters (8 - 13 feet) to avoid ground vegetation and to elevate the cone. Microphones were oriented in line with suspected flight paths to increase the number of call pulses and quality of recordings. Therefore, specific orientation was determined by microsite conditions. Appendix A includes station conditions and photographs showing detector orientation.

Following is a summary of the acoustic summer presence/absence survey effort:

- The total Project Area was approximately 595 acres
- The area of Project with suitable NLEB habitat was approximately 595 acres
- Eight detectors were deployed on the nights of July 19-20, 2016 for a total of 16 detector-nights

ANALYSIS

Tetra Tech analyzed the recorded data according to the Guidelines. Data was converted to zero-cross, filtered, and analyzed using Kaleidoscope Pro (Wildlife Acoustics, Inc.) version 3.1.7 using the classifier “Bats of North America 3.1.0” for species of bats in New Hampshire at a sensitivity level of “-1 more sensitive liberal”. *Myotis sodalis* was unchecked as a potential species because the known distribution does not extend east beyond the Champlain River valley in Vermont.

Signals of interest ranged from 8-120 kHz lasting 2 – 500 ms with a minimum of 2 call pulses. Full spectrum .wav files were converted to ZC using a division ratio of 8. All files auto classified as *Myotis* species were subsequently manually reviewed using SonoBat v 3.2.0. Results were summarized by station and by night.

RESULTS

All weather requirements (including temperature, precipitation, and average wind speed) were met during all nights of the survey. On the night of July 19 the temperature ranged from 49-66 degrees F with calm wind speeds increasing to 3.5 miles per hour in the early morning hours. On the night of July 20 temperatures ranged from 53- 74 degrees F with wind speeds up to 4.6 miles per hour, but predominantly calm (weatherunderground.com).

On the nights of July 19-20, a total of 861 bat passes were recorded at the seven stations (Table 3). Detector NHCK-3 malfunctioned; the unit did wake during the survey period and no data was recorded at this station. No NLEB passes were recorded during the survey period. Thirty-four bat passes were classified as little brown bat by Kaleidoscope Pro, and 27 were determined to be correctly identified when manually reviewed (5 were determined to be high frequency species [but not NLEB] and 2 big brown bat). Maximum Likelihood Estimates (MLEs) indicate that four (big brown bat, eastern red bat, hoary batt, and little brown bat) of the eight bat species occurring in New Hampshire are likely present within the project area (Table 4).

Table 3. Summary of bat passes recorded on the nights of July 19 - 20, 2016 near Fitzwilliam, NH.

Station	Night	Big brown bat	High Freq.	Eastern red bat	Hoary bat	Silver-haired bat	Little brown bat	Northern long-eared bat	Tri-colored bat
NHCK-1	7/19	60	0	0	1	1	3	0	0
	7/20	11	0	0	0	2	1	0	0
NHCK-2	7/19	0	0	0	1	0	1	0	0
	7/20	0	0	1	1	0	0	0	0
NHCK-4	7/19	1	1	0	1	0	0	0	0
	7/20	0	0	0	2	1	2	0	0
NHCK-5	7/19	218	1	3	8	13	1	0	0
	7/20	341	0	5	6	23	5	0	0
NHCK-6	7/19	6	0	2	0	0	0	0	0
	7/20	6	1	0	0	0	1	0	0
NHCK-7	7/19	13	0	1	0	1	0	0	0
	7/20	73	1	0	0	0	4	0	0
NHCK-8	7/19	11	0	2	0	1	6	0	0
	7/20	8	1	5	0	0	3	0	0
Overall		748	5	19	20	42	27	0	0

Table 4. Summary of Maximum Likelihood Estimates (MLEs) for species presence by Kaleidoscope Pro on the nights of July 19 – 20, 2016 near Fitzwilliam, NH.

Station	Night	Big brown bat	Eastern red bat	Hoary bat	Silver-haired bat	Eastern small-footed bat	Little brown bat	Northern long-eared bat	Tri-colored bat
NHCK-1	7/19	0.00	1.00	0.98	1.00	1.00	0.00	1.00	1.00
	7/20	1E-07	1.00	1.00	1.00	1.00	0.09	1.00	1.00
NHCK-2	7/19	1.00	1.00	0.02	1.00	1.00	0.08	1.00	1.00
	7/20	1.00	0.09	0.02	1.00	1.00	1.00	1.00	1.00
NHCK-4	7/19	0.22	1.00	0.05	1.00	1.00	1.00	1.00	0.03
	7/20	1.00	1.00	0.00	0.91	1.00	0.01	1.00	1.00
NHCK-5	7/19	0.00	0.07	0.05	1.00	1.00	0.17	1.00	1.00
	7/20	0.00	0.02	0.80	1.00	1.00	0.00	1.00	1.00
NHCK-6	7/19	2.91E-05	0.01	1.00	1.00	1.00	1.00	1.00	1.00
	7/20	2.18E-05	1.00	1.00	1.00	1.00	0.01	1.00	1.00
NHCK-7	7/19	0.00	0.11	1.00	1.00	1.00	1.00	1.00	1.00
	7/20	0.00	1.00	1.00	1.00	1.00	4.8E-06	1.00	1.00
NHCK-8	7/19	7E-07	0.38	1.00	1.00	1.00	1E-07	1.00	1.00
	7/20	1.1E-06	0.01	1.00	1.00	1.00	0.00	1.00	1.00
Overall		0.00	1E-07	0.02	1.00	1.00	0.00	1.00	1.00

Note: Maximum Likelihood Estimates (MLEs) interpretation – values <0.05 indicates there is 95% confidence that the species is present. **Bold** values indicate significance.

CONCLUSION

No bat passes were classified as NLEB by Kaleidoscope Pro software or during manual review. Shorter, higher frequency call types within the little brown bat call repertoire can overlap with calls of NLEB. Therefore the 34 bat passes classified as little brown bat were manually reviewed to ensure there were no false negative NLEB detections. Most (27) were determined to be correctly identified as little brown bat.

Given that no NLEB were detected following the summer survey protocol and that the forested habitat has been heavily managed, there is no indication that NLEB utilize the Project area in high numbers and the Project would negatively impact the species. However, there is still a moderate likelihood that NLEB may occur within the Project Area given the town of Peterborough (approximately 8 miles to the northeast) is listed as core NLEB range in the New Hampshire’s recently updated Wildlife Action Plan (WAP) (NHFG 2015).

The little brown bat is listed as a Species of Greatest Conservation Need (SGCN) in New Hampshire due to regional population declines caused by White Nose Syndrome with over 99% decline in New Hampshire (NHFG 2015). Little brown bats were not detected in high numbers during the survey (3% of the total bat passes recorded) but they were detected at all sites where



bat passes were recorded. The Project area provides suitable foraging habitat, but the current proposed Project layout is greatly reduced and avoids more favorable habitat along Scott's Brook. Although no structures are present onsite for roosting, it can be assumed that suitable buildings in the surrounding area are present because of the prevalence of old homes and barns in this rural region of New Hampshire. A long studied colony of little brown bats was located in an old barn in the town of Peterborough (Reynolds 2007), but has been nearly wiped out in recent years due to White Nose Syndrome (WMS).

Potential Project impacts such as habitat loss through timber harvest that removes summer and roosting habitat is listed as low ranking threat to northern long-eared bat and little brown bat (NHFG 2015) as WNS has been identified as the primary driver of myotis population declines (USFWS 2016).

Please be in touch if you have any questions about the results described herein: derek.hengstenberg@tetratech.com or (207) 358-2401.

Very truly yours,

A handwritten signature in black ink that reads 'Derek Hengstenberg'.

Derek Hengstenberg
Certified Wildlife Biologist/ Project Manager

CC: Sarah Watts (Tetra Tech)

References

- Frick et al., 2010. An Emerging Disease Causes Regional Population Collapse of a Common North American Bat Species. *Science* 329: 697-682.
- Hogberg, Lauren K., Krista J. Patriquin, and Robert MR Barclay. "Use by bats of patches of residual trees in logged areas of the boreal forest." *The American Midland Naturalist* 148.2 (2002): 282-288.
- New Hampshire Fish and Game (NHFG) 2015. New Hampshire Wildlife Action Plan. 2015 Revised Edition. <http://www.wildlife.state.nh.us/wildlife/wap.html>
- Reynolds, Scott. 2007. Batting 4000. *New Hampshire Wildlife Journal*.
<http://www.wildlife.state.nh.us/nongame/documents/batting-4000-sreynolds-nhwj.pdf>
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https://www.wunderground.com/history/airport/KAFN/2016/7/19/DailyHistory.html?req_city=Fitzwilliam&req_state=NH&req_statename=&reqdb.zip=03447&reqdb.magic=1&reqdb.wmo=99999
- USFWS. 2016. Endangered and Threatened Wildlife and Plants; Threatened Species Status for the Northern Long-Eared Bat with 4(d) Rule. *Federal Register* 80(63): 17974-18033.
Available online at:
<https://www.fws.gov/Midwest/endangered/mammals/nleb/pdf/FRnlebFinal4dRule14Jan2016.pdf>

APPENDIX A.

STATION CONDITIONS AND DETECTOR ORIENTATION PHOTOGRAPHS

PHOTOGRAPHIC RECORD

Company: Ranger Solar
Project: Chinook Solar Development, Fitzwilliam, NH.



Photo No.: 01

Station: NHCK-01

Date: July 19, 2016

Comments: Microphone oriented to the southeast along an old skid road. Forest includes mid-successional white pine, oak, red maple, and white birch.

PHOTOGRAPHIC RECORD

Company: Ranger Solar
Project: Chinook Solar Development, Fitzwilliam, NH.



Photo No.: 02

Station: NHCK-01

Date: July 19, 2016

Comments: View east along potential flight path. (Detector is located on oak in left of frame.)

PHOTOGRAPHIC RECORD

Company: Ranger Solar
Project: Chinook Solar Development, Fitzwilliam, NH.



Photo No.: 03

Station: NHCK-02

Date: July 19, 2016

Comments: Microphone oriented to the west along a potential, within canopy flyway.

PHOTOGRAPHIC RECORD

Company: Ranger Solar
Project: Chinook Solar Development, Fitzwilliam, NH.



Photo No.: 04

Station: NHCK-02

Date: July 19, 2016

Comments: Open understory dominated by ferns. Multiple, potential flyways intersect near the detector (on tree in center of frame).

PHOTOGRAPHIC RECORD

Company: Ranger Solar
Project: Chinook Solar Development, Fitzwilliam, NH.



Photo No.: 05

Station: NHCK-03

Date: July 19, 2016

Comments: Microphone oriented southeast towards wetland complex associated with Scotts Brook.

PHOTOGRAPHIC RECORD

Company: Ranger Solar
Project: Chinook Solar Development, Fitzwilliam, NH.



Photo No.: 06

Station: NHCK-03

Date: July 19, 2016

Comments: View southeast towards wetland area.

PHOTOGRAPHIC RECORD

Company: Ranger Solar
Project: Chinook Solar Development, Fitzwilliam, NH.



Photo No.: 07

Station: NHCK-04

Date: July 19, 2016

Comments: Microphone oriented east towards an opening with young regeneration.

PHOTOGRAPHIC RECORD

Company: Ranger Solar
Project: Chinook Solar Development, Fitzwilliam, NH.



Photo No.: 08

Station: NHCK-04

Date: July 19, 2016

Comments: View facing east towards previously logged area dominated by shrubs and forbs. Microphone is visible in far right of frame.

PHOTOGRAPHIC RECORD

Company: Ranger Solar
Project: Chinook Solar Development, Fitzwilliam, NH.



Photo No.: 09

Station: NHCK-05

Date: July 19, 2016

Comments: View to the west towards large clearing that was previously used as a log landing. Multiple open habitats such as are present within the Project Area.

PHOTOGRAPHIC RECORD

Company: Ranger Solar
Project: Chinook Solar Development, Fitzwilliam, NH.



Photo No.: 10

Station: NHCK-05

Date: July 19, 2016

Comments: View to the southeast along forest edge. Opening surrounded by a mature, mixed forest.

PHOTOGRAPHIC RECORD

Company: Ranger Solar
Project: Chinook Solar Development, Fitzwilliam, NH.



Photo No.: 11

Station: NHCK-06

Date: July 19, 2016

Comments: View of station to the northeast.

PHOTOGRAPHIC RECORD

Company: Ranger Solar
Project: Chinook Solar Development, Fitzwilliam, NH.



Photo No.: 12

Station: NHCK-06

Date: July 19, 2016

Comments: View to the northwest of habitat surrounding station (Microphone is visible in the right of frame). Mixed, mature forest backs the station and the microphone is oriented towards a previously logged area with dense shrub/forb regeneration.

PHOTOGRAPHIC RECORD

Company: Ranger Solar
Project: Chinook Solar Development, Fitzwilliam, NH.



Photo No.: 13

Station: NHCK-07

Date: July 19, 2016

Comments: View to the southeast with microphone oriented along an old skid road and canopy opening.

PHOTOGRAPHIC RECORD

Company: Ranger Solar
Project: Chinook Solar Development, Fitzwilliam, NH.



Photo No.: 14

Station: NHCK-07

Date: July 19, 2016

Comments: View of station to the north. This area was previously logged and abundant skid trails are present within a patchwork of mixed forest that remains.

PHOTOGRAPHIC RECORD

Company: Ranger Solar
Project: Chinook Solar Development, Fitzwilliam, NH.



Photo No.: 15

Station: NHCK-08

Date: July 19, 2016

Comments: The microphone was oriented north along the forest edge adjacent to a large utility corridor that passes through the northern portion of the Project Area.

PHOTOGRAPHIC RECORD

Company: Ranger Solar
Project: Chinook Solar Development, Fitzwilliam, NH.



Photo No.: 15

Station: NHCK-08

Date: July 19, 2016

Comments: View to the southeast along forest edge. The microphone is visible in the upper right of frame.

APPENDIX B.

COMPLETED PHASE 1 SUMMER HABITAT ASSESSMENT

APPENDIX A
PHASE 1 SUMMER HABITAT ASSESSMENTS

INDIANA BAT HABITAT ASSESSMENT DATASHEET

Project Name: CHINOOK SOLAR Date: 7/19/12
 Township/Range/Section: _____
 Lat Long/UTM Zone: 12T 73S213 4739635 Surveyor: CRP

Brief Project Description NHCK-1
 PROPOSED SOLAR FACILITY TO BE DEVELOPED ON PRIMARILY UPLAND HABITATS THAT WE PREVIOUSLY LOADED.

Project Area	Total Acres	Forest Acres		Open Acres
Project	595	MOSTLY FORESTED. PREVIOUSLY LOADED, ~90% = 535 ac		~60 ac
Proposed Tree Removal (ac)	Completely cleared	Partially cleared (will leave trees)	Preserve acres- no clearing	
	UNK	UNK	UNK	

Vegetation Cover Types	Pre-Project	Post-Project
	FORESTED LANDS, THE MAJORITY OF THE PROJECT AREA WAS PREVIOUSLY LOADED, MIXED-MID SUCCESSIONAL FOREST REMAINS AND IS BROKEN BY NUMEROUS SKID TRAILS, AREAS AND LOG LANDINGS	

Landscape within 5 mile radius
 Flight corridors to other forested areas?
YES. NEARLY ENTIRE LANDSCAPE IS FORESTED
 Describe Adjacent Properties (e.g. forested, grassland, commercial or residential development, water sources)
FORESTED, RIPARIAN, LIGHT RESIDENTIAL DEVELOPMENT

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)?
RHODODENDRON STATE PARK IS LOCATED ~3 MILES TO THE WEST
MT MONADNOCK STATE PARK IS LOCATED ~5 MI TO NORTH

INFORMATION PERTAINS TO ALL 8 STATION LOCATIONS WITHIN PROJECT AREA

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>NHLE-1</u> MID-SUCCESSIONAL, MIXED FOREST. STATION DEPLOYED ALONG AN OLD SKID ROAD & CANOPY OPENS DENSE UNDERSTORY

Water Resources at Sample Site			
Stream Type (# and length)	Ephemeral <u>NA</u>	Intermittent	Perennial
Pools/Ponds (# and size)	<u>NA</u>	Open and accessible to bats?	
Wetlands (approx. ac.)	Permanent <u>NA</u>	Seasonal	
Describe existing condition of water sources: <u>SCOTT'S BROOK IS LOCATED ~500M EAST OF SAMPLE LOCATION</u> <u>NO OBVIOUS WATER BODIES OR WETLANDS IN VICINITY</u>			

Forest Resources at Sample Site			
Closure/Density	Canopy (>50%) <u>1 / 5%</u>	Midstory (20-50%) <u>3 / 35%</u>	Understory (<20%) <u>2 / 20%</u>
1=1-10%, 2=11-20%, 3=21-40%, 4=41-60%, 5=61-80%, 6=81-100% =60% TOTAL			
Dominant Species of Mature Trees	<u>RED MAPLE, RED OAK, WHITE BIRCH, WHITE PINE (SPRUCE FIR IN UNDERSTORY)</u>		
% Trees w/ Exfoliating Bark	<u>0%</u>	<u>0%</u>	<u>0%</u>
Size Composition of Live Trees (%)	Small (3-8 in) <u>6 / 96%</u>	Med (9-15 in) <u>1 / 1%</u>	Large (>15 in) <u>1 / 3%</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.

NLES
 IS THE HABITAT SUITABLE FOR ~~INDIANA~~ BATS? YES

Additional Comments:
<u>MIL ORIENTED ALONG POTENTIAL FLIGHT PATH ALONG OLD SKID RD. CANOPY OPENS SLIGHTLY @ STATION, DENSE UNDERSTORY - LITTLE FORAGING O.P. W/IN CANOPY.</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

PHOTOS 1-4

APPENDIX A
PHASE 1 SUMMER HABITAT ASSESSMENTS

INDIANA BAT HABITAT ASSESSMENT DATASHEET

Project Name: CHINDOK SOURCE Date: 7/19/2016
 Township/Range/Section: _____
 Lat Long/UTM/Zone: 736713 4759455 Surveyor: CRP

Brief Project Description	<u>NHCK-27</u>

Project Area				
Project	Total Acres	Forest Acres		Open Acres
Proposed Tree Removal (ac)	Completely cleared	Partially cleared (will leave trees)	Preserve acres- no clearing	

Vegetation Cover Types	
Pre-Project	Post-Project

Landscape within 5 mile radius
Flight corridors to other forested areas?
Describe Adjacent Properties (e.g. forested, grassland, commercial or residential development, water sources)

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)?

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

18T

736713
4739455

Sample Site Description	
Sample Site No.(s):	NHCH-2 STATION LOCATED NEAR INTERMITTENT DRAINAGE. OPEN, FERN UNDERSTORY. W/N CANOPY FLYWAY WITHIN CANOPY

Water Resources at Sample Site				Describe existing condition of water sources: STATION LOCATED NEAR A WET SWALE, BUT NO WATER CURRENTLY FLOWING
Stream Type (# and length)	Ephemeral	Intermittent	Perennial	
		✓		
Pools/Ponds (# and size)	Open and accessible to bats?			
	NA			
Wetlands (approx. ac.)	Permanent	Seasonal		
	NA			

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%
	3 / 30%	4 / 55%	1 / 10%	= 95%
Dominant Species of Mature Trees	RED MAPLE, WHITE BIRCH, BLACK CUTLER, WHITE ASH			
% Trees w/ Exfoliating Bark	1%	0%	0%	
Size Composition of Live Trees (%)	Small (3-8 in)	Med (9-15 in)	Large (>15 in)	
	54 / 60%	3 / 36%	1 / 4%	
No. of Suitable Snags	1			

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

NLSB

IS THE HABITAT SUITABLE FOR INDIANA BATS? YES

Additional Comments:	LIKELY W/N CANOPY FORAGING AREA. WET SWALE AREA W/ FERN DOMINATED GROUND COVER & OPEN UNDERSTORY
-----------------------------	--

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

PHOTOS 1-4 / STATION, ORIENTATION, HABITAT

APPENDIX A
PHASE 1 SUMMER HABITAT ASSESSMENTS

INDIANA BAT HABITAT ASSESSMENT DATASHEET

Project Name: CITINZOR SOLAR Date: 7/19/2016

Township/Range/Section: _____

Lat Long/UTM Zone: 18T 735973 4789336

Surveyor: CRP

Brief Project Description	<u>NHCK-3</u>

Project Area				
Project	Total Acres	Forest Acres		Open Acres
Proposed Tree Removal (ac)	Completely cleared	Partially cleared (will leave trees)	Preserve acres- no clearing	

Vegetation Cover Types	
Pre-Project	Post-Project

Landscape within 5 mile radius
Flight corridors to other forested areas?
Describe Adjacent Properties (e.g. forested, grassland, commercial or residential development, water sources)

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)?

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

'8T
735973
473933C

Sample Site Description

Sample Site No.(s): NHCK-J

ON THE BOUNDARY OF WETLAND AREA THAT CONVERGES W/ SCOTT'S BROOK & MATURE, ^{WET} EVERGREEN STANJ

Water Resources at Sample Site

Stream Type (# and length)	Ephemeral	Intermittent	Perennial
Pools/Ponds (# and size)	Open and accessible to bats?		
Wetlands (approx. ac.)	Permanent	Seasonal	

Describe existing condition of water sources: STATION LOCATED ON THE EDGE OF A LARGE RIPARIAN/WETLAND COMPLEX ASSOCIATED W/ SCOTT'S BROOK. SCOTT'S BROOK IS LOCATED < 250M TO THE WEST OF STATION

Forest Resources at Sample Site

Closure/Density	Canopy (> 50')	Midstory (20-50')	Understory (<20')
Dominant Species of Mature Trees	LED MAPLE, RED OAK, ITEMLOCK, FIR		
% Trees w/ Exfoliating Bark	0%	0%	0%
Size Composition of Live Trees (%)	Small (3-8 in)	Med (9-15 in)	Large (>15 in)
No. of Suitable Snags	1		

1=1-10%, 2=11-20%, 3=21-40%, 4=41-60%, 5=61-80%, 6=81-100%
= 30%

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? ^{NLES} YES

Additional Comments:
AMPLE FORAGING OPPS. ON WETLAND EDGE. THIS AREA TIES IN W/ RIPARIAN HABITAT ALONG SCOTT'S BROOK

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

PHOTOS 1-4

APPENDIX A
PHASE 1 SUMMER HABITAT ASSESSMENTS

INDIANA BAT HABITAT ASSESSMENT DATASHEET

Project Name: CHINOOK SOLAR Date: 7/17/2016

Township/Range/Section: _____

Lat Long/UTM Zone: 736539 47 38736

Surveyor: CRP

Brief Project Description	<u>NHCK-4</u>

Project Area				
Project	Total Acres	Forest Acres		Open Acres
Proposed Tree Removal (ac)	Completely cleared	Partially cleared (will leave trees)	Preserve acres- no clearing	

Vegetation Cover Types	
Pre-Project	Post-Project

Landscape within 5 mile radius
Flight corridors to other forested areas?
Describe Adjacent Properties (e.g. forested, grassland, commercial or residential development, water sources)

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)?

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

BT
 136539
 4138736

Sample Site Description	
Sample Site No.(s):	WACK-4 1000 MID-SUCCESSORAL, MIXED FOREST THAT HAS BEEN LOGGED
MATRIX OF SIDDER TRAILS / CANOPY OPENINGS W/ REMAINING FOREST	

Water Resources at Sample Site				Describe existing condition of water sources: SCOTS BROOK ~ 800m TO WEST NONE IN IMMEDIATE VICINITY
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%
	0%	2/25%	2/20%	= 45%
Dominant Species of Mature Trees				
% Trees w/ Exfoliating Bark				
Size Composition of Live Trees (%)	Small (3-8 in)	Med (9-15 in)	Large (>15 in)	
	69%	30%	1/1%	
No. of Suitable Snags	0			

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:

MIC ORIENTED TOWARDS GRASSY / SHRUB CLEARING SURROUNDED BY MIXED - MATURE TREES

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

1-4

APPENDIX A
PHASE 1 SUMMER HABITAT ASSESSMENTS

INDIANA BAT HABITAT ASSESSMENT DATASHEET

Project Name: CHINDOCK SOLAR Date: 7/19/2016
 Township/Range/Section: _____
 Lat Long/UTM/Zone: 18T 736845 4739009 Surveyor: CRP

Brief Project Description

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Project Area

Project	Total Acres	Forest Acres		Open Acres
Proposed Tree Removal (ac)	Completely cleared	Partially cleared (will leave trees)	Preserve acres- no clearing	

Vegetation Cover Types

Pre-Project	Post-Project

Landscape within 5 mile radius

Flight corridors to other forested areas?

Describe Adjacent Properties (e.g. forested, grassland, commercial or residential development, water sources)

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)?

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

736845
4739007

Sample Site Description
Sample Site No.(s): <u>NHCK-5</u>
<u>STATION DEPLOYED ON EDGE OF GRASSY LOG LANDING / REMAINING TREE COVERAGE ~ 20%</u>

Water Resources at Sample Site				Describe existing condition of water sources: <u>NONE / ON TOP OF HILL, WELL DRAINED RAISED UPLAND</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>2 / 12%</u>	<u>1 / 8%</u>	<u>20%</u>
Dominant Species of Mature Trees	<u>RED OAK, WHITE BIRCH, RED MAPLE, WHITE PINE</u>			
% Trees w/ Exfoliating Bark	<u>0%</u>	<u>0%</u>	<u>0%</u>	
Size Composition of Live Trees (%)	Small (3-8 in)	Med (9-15 in)	Large (>15 in)	
	<u>97%</u>	<u>1 / 3%</u>	<u>0%</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 ^{NLEB}INDIANA BATS? ? LIKELY

Additional Comments:
<u>MIC ORIENTED OVER GRASSY LOG LANDING. WANTED TO DIVERSIFY SAMPLING LOCATIONS & CAPTURE OTHER SP REPRESENTATIVE SP. IN AREA</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

1-43

APPENDIX A
PHASE 1 SUMMER HABITAT ASSESSMENTS

INDIANA BAT HABITAT ASSESSMENT DATASHEET

Project Name: CHANOOK SUMMER Date: 7/19/16
 Township/Range/Section: _____
 Lat Long/U/TM/Zone: 18T 737099 4738552 Surveyor: CRP

Brief Project Description

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Project Area

	Total Acres	Forest Acres	Open Acres
Project			
Proposed Tree Removal (ac)	Completely cleared	Partially cleared (will leave trees)	Preserve acres- no clearing

Vegetation Cover Types

Pre-Project	Post-Project

Landscape within 5 mile radius

Flight corridors to other forested areas?

Describe Adjacent Properties (e.g. forested, grassland, commercial or residential development, water sources)

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)?

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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

RT
737099
#38552

Sample Site Description
Sample Site No.(s): <u>NHCK-6</u>
<u>HEAVILY LOGGED AREA ON TOP OF HILL, SPARSE MATURE TREES REMAIN, HEAVY FERBS & SPROUTING REGEN MOSTLY OPEN CANOPY</u>

Water Resources at Sample Site			
Stream Type (# and length)	Ephemeral	Intermittent	Perennial
Pools/Ponds (# and size)	Open and accessible to bats?		
Wetlands (approx. ac.)	Permanent	Seasonal	
Describe existing condition of water sources: <u>POND LOCATED ~ 550m to SOUTH EAST</u> <u>NONE NEAR STATION</u>			

Forest Resources at Sample Site			
Closure/Density	Canopy (> 50')	Midstory (20-50')	Understory (<20')
	<u>0</u>	<u>1/2%</u>	<u>1/5% = 7%</u>
Dominant Species of Mature Trees	<u>RED OAK, RED SPRUCE, WHITE PINE</u>		
% Trees w/ Exfoliating Bark	<u>0%</u>	<u>0%</u>	<u>0%</u>
Size Composition of Live Trees (%)	Small (3-8 in)	Med (9-15 in)	Large (>15 in)
	<u>9%</u>	<u>2%</u>	<u>0%</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 ^{NLEB}INDIANA BATS? ? MARGINAL

Additional Comments:
<u>AREA HEAVILY LOGGED BUT EARLY SUCCESSIONAL FERBS AND SPROUTS ARE GROWING IN HEAVILY. BAT ACTIVITY WILL LIKELY DEPEND ON AMOUNT OF PREY UTILIZING THIS HABITAT. AMPLE OPEN CANOPY FORAGING OPPORTUNITIES</u>
<u>COYE EATO SINGING</u> <u>WTS P</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

APPENDIX A
PHASE 1 SUMMER HABITAT ASSESSMENTS

INDIANA BAT HABITAT ASSESSMENT DATASHEET

Project Name: CHANDOOK SOLAR Date: 7/19/2016
 Township/Range/Section: _____
 Lat Long UTM Zone: 18T 737307 4738763 Surveyor: CRP

Brief Project Description

Project Area				
	Total Acres	Forest Acres		Open Acres
Project				
Proposed Tree Removal (ac)	Completely cleared	Partially cleared (will leave trees)	Preserve acres- no clearing	

Vegetation Cover Types	
Pre-Project	Post-Project

Landscape within 5 mile radius
Flight corridors to other forested areas?
Describe Adjacent Properties (e.g. forested, grassland, commercial or residential development, water sources)

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)?

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

81
737307
738763

Sample Site Description
Sample Site No.(s): <u>NHCK-7</u>
<u>PARTIALLY LOGGED OVER AREA W/ SKID TRAILS & MID-SUCCESSIONAL MIXED FOREST</u>

Water Resources at Sample Site			
Stream Type (# and length)	Ephemeral	Intermittent	Perennial
Pools/Ponds (# and size)	Open and accessible to bats?		
Wetlands (approx. ac.)	Permanent	Seasonal	

Describe existing condition of water sources: POND LOCATED ~0.50M TO SE
NONE IN IMMEDIATE VICINITY

Forest Resources at Sample Site			
Closure/Density	Canopy (> 50%)	Midstory (20-50%)	Understory (<20%)
	<u>0%</u>	<u>2/22%</u>	<u>1/8%</u>
Dominant Species of Mature Trees	<u>WHITE PINE, RED MAPLE, RED OAK</u>		
% Trees w/ Exfoliating Bark	<u>0%</u>	<u>0%</u>	<u>0%</u>
Size Composition of Live Trees (%)	Small (3-8 in)	Med (9-15 in)	Large (>15 in)
	<u>6/95%</u>	<u>1/5%</u>	<u>0%</u>
No. of Suitable Snags			

1=1-10%, 2=11-20%, 3=21-40%, 4=41-60%, 5=61-80%, 6=81-100%

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

NLEB

IS THE HABITAT SUITABLE FOR INDIANA BATS? YES

Additional Comments:

ABUNDANT FLIWAYS ALONG OLD SKIDDER TRAILS, OVERALL AREA = 50% CUT (SKIDDER) + 50% DENSE, YOUNG PINE, YOUNG

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

1-3

APPENDIX A
PHASE 1 SUMMER HABITAT ASSESSMENTS

INDIANA BAT HABITAT ASSESSMENT DATASHEET

Project Name: CHINOOK SOLAR

Date: 7/19/2016

Township/Range/Section: _____

Lat Long/UTM Zone: 18T 736614 4739717

Surveyor: CRP

Brief Project Description

Project Area				
	Total Acres	Forest Acres		Open Acres
Project				
Proposed Tree Removal (ac)	Completely cleared	Partially cleared (will leave trees)	Preserve acres- no clearing	

Vegetation Cover Types	
Pre-Project	Post-Project

Landscape within 5 mile radius
Flight corridors to other forested areas?
Describe Adjacent Properties (e.g. forested, grassland, commercial or residential development, water sources)

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)?

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

18T
736614
4739717

Sample Site Description	
Sample Site No.(s):	<u>WHCK-8</u>
	<u>UTILITY LINE CORRIDOR EDGE (OPENING ~ 50m)</u>

Water Resources at Sample Site				Describe existing condition of water sources: <u>SMALL POND LOCATED W/IN FOREST ~ 200m TO SOUTH WEST</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				1=1-10%, 2=11-20%, 3=21-40%, 4=41-60%, 5=61-80%, 6=81-100%
Closure/Density	Canopy (> 50')	Midstory (20-50')	Understory (<20')	
	<u>3 / 30%</u>	<u>2 / 20%</u>		<u>50%</u>
Dominant Species of Mature Trees	<u>RED OAK, WHITE PINE, SORBUS, BIRCH</u>			
% Trees w/ Exfoliating Bark	<u>0%</u>	<u>0%</u>	<u>0%</u>	
Size Composition of Live Trees (%)	Small (3-8 in)	Med (9-15 in)	Large (>15 in)	
	<u>3 / 30%</u>	<u>4 / 50%</u>	<u>2 / 20%</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.

YES

IS THE HABITAT SUITABLE FOR INDIANA BATS? YES

Additional Comments:

MIXED-MATURE FOREST ALONG POWERLINE EDGE

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

APPENDIX C.
RELEVANT STAFF RESUMES

Experience Summary

Mr. Parrish has more than seven years of experience conducting wildlife and habitat projects in the Northeast, California, and Idaho. His responsibilities have been distributed over a wide variety of terrestrial and aquatic projects with a particular emphasis on avian ecology, avian response to wind development, avian and bat acoustic monitoring, physical and biological stream surveys, habitat assessment and management, and carnivore monitoring. Most recently, Mr. Parrish lead a multiyear investigation in northern New Hampshire on the impacts of wind development on high-elevation avian species with a focus on Bicknell's Thrush, a federal species of concern. Mr. Parrish is an experienced field biologist who has served as project lead as a consultant for New Hampshire Department of Fish and Game and as an employee for state and federal agencies. Mr. Parrish is proficient with data management and analysis using MS Access, GIS, and the program R.

Education

MS, Biology, Plymouth State University, 2013

BS, Environmental Biology, Magna Cum Laude, Plymouth State University, 2003

Registrations/Certifications

Geographic Information Systems; University of Idaho; 2012

Training

Aquatic Invasive Species Detection and Prevention; 2010

National Environmental and Policy Act (NEPA); 2010

CPR/ First Aid; 2015

Corporation Project Experience

Wildlife Biologist, July 2014–Present

US Navy, Shorebird Monitoring, Naval Station Cutler, ME

Mr. Parrish is conducting bi-monthly shorebird surveys in accordance with International Shorebird Survey (ISS) protocol. Several habitats adjacent to the project area have been identified as Important Bird Areas (IBAs) by Maine Audubon for contributions as critical migration stop-over habitats and warrant standardized long-term monitoring to contribute to migratory bird population data.

Data Analyst and Reviewer, January 2013–Present

U.S. Fish and Wildlife Service (USFWS), Acoustic Bat Monitoring, East Coast

Mr. Parrish was one of two Tetra Tech employees responsible for managing, processing, and reviewing acoustic bat recordings for up to 32 National Wildlife Refuges (NWR) on the east coast from 2012 and 2013. File formats and level of organization varied depending on refuge, and was arranged in standardized directories prior to processing using either full spectrum (Sonobat) or zero cross (BCID) classification software. Automated classifications were then summarized and qualitatively vetted (i.e., manually reviewed on a spectrogram) to determine accuracy of automated classification. Mr. Parrish will be processing acoustic data for 8 NWRs and qualitatively reviewing data for a total of 32 NWRs in 2015.

Wildlife Biologist, March 2015–Present

NAVFAC, Acoustic Bat Monitoring, VA and NJ

Mr. Parrish deployed a total of 16 acoustic bat detectors at three naval stations in the Norfolk, VA area and on one installation in NJ. Detector set ups will operate through the fall to collect information on species composition, and activity levels across and entire warm season. Mr. Parrish is responsible for managing all incoming acoustic recordings and will be the lead data analyst as well as generating reports on survey results.

Wildlife Biologist, April 2015–Present
Nextera Energy, Acoustic Bat Monitoring, ND

As a wildlife biologist, Mr. Parrish conducted a pre-construction bat acoustic survey at a proposed large-scale wind power project in North Dakota. Mr. Parrish deployed five ground based acoustic detectors to determine the presence/absence of the Federally Threatened northern long-eared bat. In addition, acoustic data was used to determine the species composition and level of temporal activity of bats during the entire warm season in 2015.

Wildlife Biologist, March 2014–February 2015
EOILAN Renewable Energy, Eagle use and nest surveys, ME

Mr. Parrish carried out independent, bi-monthly eagle and raptor surveys for a potential small scale wind project in Downeast Maine. In addition to use surveys, Mr. Parrish conducted spring bald eagle nest surveys as a passenger in a small, fixed-wing aircraft in the greater project area to determine the number of resident eagles and assess potential risk of a wind facility.

Wildlife Biologist, August 2014–February 2015
Massachusetts Army National Guard (Camp Edwards), Acoustic Bat Monitoring, MA

Due to the proposed listing of northern long-eared bat as endangered under the Endangered Species Act (ESA) by the United States Fish and Wildlife Service (USFWS) and the documented declines of bats from white-nosed syndrome, there is growing concern regarding negative impacts on this increasingly vulnerable species. Mr. Parrish was part of a project to collect information on the species richness, activity levels, and spatio-temporal use patterns of bats (Microchiroptera) during the late-summer and fall period. Passive acoustic bat monitors were used to record calls which were then analyzed by Mr. Parrish using two software programs. Mr. Parrish then conducted statistical analysis examining spatial and temporal relationships and presented results in a final report.

Wildlife Biologist, August 2014–February 2015
Nextera Energy, Acoustic Bat Monitoring, SD

As a wildlife biologist, Mr. Parrish conducted a pre-construction bat acoustic survey at a proposed large-scale wind power project in South Dakota. The objective of this project was to determine the presence or absence of the Federally Threatened Northern Long-eared bat and Mr. Parrish deployed acoustic monitors throughout project area within suitable habitats and performed a habitat assessment for potential occurrence of bat species using 2013 USFWS Indiana Bat survey guidelines. Prepared reports on habitat suitability for bat species within project area, analyzed all acoustic data, and presented results in a report of the results from acoustic monitoring during the fall migration period in 2014.

Wildlife Biologist, April 2014–February 2015
Nextera Energy, Acoustic Bat Monitoring, ND

As a wildlife biologist, Mr. Parrish conducted a pre-construction bat acoustic survey at a proposed large-scale wind power project in North Dakota. Mr. Parrish deployed three ground based acoustic detectors and two detectors in meteorological towers to determine the species composition and level of temporal activity of bats during the entire warm season in 2014. Mr. Parrish used two software programs to analyze acoustic data and then summarized results for reporting.

Wildlife Biologist, November–January 2015
BH2M Civil Engineering, New England Cottontail survey, ME

To determine the presence or absence of the New England Cottontail (a candidate species to be included on the Federal ESA and Endangered Species in Maine), Mr. Parrish is conducted a remote camera survey in plot adjacent to a suburban area in Maine.

Experience Summary

Mr. Hengstenberg is a Certified Wildlife Biologist with 18 years of experience in wildlife biology, wind energy ecology, natural resource assessment, aero-ecology studies, tropical field studies, and project management. Mr. Hengstenberg has extensive knowledge of wildlife studies and is well versed in scientific techniques and equipment including bat acoustic surveys, raptor migration studies, breeding bird surveys, avian radar ornithology, threatened & endangered species surveys, seabird & shorebird surveys, grassland bird surveys, tropical flora and fauna, and mist-netting of birds and bats. Mr. Hengstenberg has worked on natural resources projects across the country and throughout Latin America.

Mr. Hengstenberg has extensive range of field experience throughout New England, the Mid-Atlantic, the Northwest, the Southwest, Puerto Rico, and Mexico. Mr. Hengstenberg is a proficient technical writer and has extensive knowledge of various word processing, presentation, and statistical analysis applications. Mr. Hengstenberg is also experienced with endangered species and has worked closely with both state and federal agencies during the permitting process of wind energy and natural resource projects.

Education

MS, Wildlife & Fisheries Science, Mississippi State University, 2003

BS, Interdisciplinary Studies/Wilderness Research Administration, Plymouth State University, 1998

Registrations/Certifications

Certified Wildlife Biologist- The Wildlife Society; 2011

Training

Bat Acoustic Data Management; 2015

CPR and First Aid Certification; 2015

Airport Wildlife Hazard Management Workshop; 2010

OSHA HAZWOPER Certification and Refresher; 2008

Basic and Advanced Erosion & Sediment Control Course; 2008

Red Card Certification (Wildland Firefighter); 1997

Corporation Project Experience

Lead Project Biologist- July 2014 to Present

Northern Long-Eared Bat Surveys at multiple United States Department of the Navy Installations – Naval Facilities Engineering Command, Mid-Atlantic

Managing and providing field support for completion of presence/absence surveys for northern long-eared bat (*Myotis septentrionalis*) at multiple Naval installations located along the east coast of the United States. Field surveys include bat acoustic and mist netting surveys in accordance with federal protocols established by the United States Fish and Wildlife Service (USFWS) and detailed in USFWS' 2015 Northern Long-Eared Bat Interim Conference and Planning Guidance and USFWS' 2015 Range-Wide Indiana Bat Summer Survey Guidelines. Information collected will be used by natural resources managers to make informed decisions at the eight Installations where these surveys are being conducted to avoid negative impacts to this vulnerable species from Naval activities. Tetra Tech has teamed with Biodiversity Research Institute to complete the field work and data analysis.

Lead Project Biologist – May 2015 – Present**State of Maine Department of Transportation (MaineDOT), Two Stand-Alone State-Wide Multi-PIN Project Contracts: Natural Resources and Underwater Sound Monitoring, Maine**

Wildlife biologist for Endangered Species Act (ESA) Biological Assessments, consultation, and conferencing support for northern long-eared bat and bat habitat assessment and presence/absence acoustic monitoring. Recent listing of northern long-eared bat has increased the focus on evaluating potential impacts of MaineDOT projects on the species through habitat assessments and presence/absence surveys in accordance with recommended guidance from USFWS: the Northern Long-Eared Bat Interim Conference and Planning Guidance: USFWS Regions 2, 3, 4, 5 & 6 (NLEB Guidance) and the 2015 Range-Wide Indiana Bat Summer Survey Guidelines (Indiana Bat Guidelines).

Lead Project Biologist, May 2015 – Present**Northern Long-Eared Bat Support Services for the State of Massachusetts Department of Transportation (MassDOT), Massachusetts**

Wildlife biologist for all northern long-eared bat support services for MassDOT, performing a variety of tasks related to the understanding the potential impacts to the species following its listing under the ESA. Projects are expected to include habitat assessments and presence/absence surveys in accordance with recommended guidance from USFWS: NLEB Guidance and the Indiana Bat Guidelines.

Lead Project Biologist- January 2009 to Present**Spruce Mountain Wind Project, Maine – Patriot Renewables.**

Managed and conducted pre-construction and post-construction survey including a bird and bat mortality surveys, avian radar survey, bat acoustic survey, raptor migration survey, migrant stopover survey, RTE species survey, and breeding bird survey as part of the permitting process. Developed and negotiated pre and post-construction monitoring plans with state and federal agencies, authored proposals, designed field studies, and prepared reports and memos. Provided the client advice on erosion and sediment control measures at the newly constructed site so that they comply with permit conditions.

Lead Project Biologist- January 2009 to Present**Saddleback Ridge Wind Project, Maine – Patriot Renewables.**

Managed and conducted pre-construction avian surveys including a spring and fall avian radar survey, bat acoustic survey, raptor migration survey, migrant stopover survey, RTE species survey, and breeding bird survey as part of the permitting process. Developed and negotiated pre and post-construction monitoring plans, bird and bat conservation strategy plans with state and federal agencies, authored proposals, designed field studies, and prepared reports and memos.

Lead Project Biologist- January 2010 to 2012**Canton Mountain Wind Project, Maine – Patriot Renewables.**

Managed and conducted pre-construction avian surveys including a spring and fall avian radar survey, bat acoustic survey, raptor migration survey, eagle aerial survey, migrant stopover survey, RTE species survey, and breeding bird survey as part of the permitting process. Developed and negotiated pre and post-construction monitoring plans with state and federal agencies, authored proposals, designed field studies, and prepared reports and memos.

Experience Summary

Ms. Craven has over four years of experience as a wildlife biologist conducting natural resource projects in Colorado, Wyoming, and the Northeast. She has a broad background in environmental science and wildlife biology. Her responsibilities have been distributed over a wide variety of wildlife species including endangered and invasive species. She has particular emphasis in mammals and more specifically in bat biology. She has extensive knowledge of bat acoustic monitoring, data management, and data analysis. Ms. Craven has been involved with acoustic bat monitoring projects throughout the country and is an experienced field biologist having played a lead role in organizing and conducting the NABat Program for the state of Maine, an acoustic bat monitoring program across the state. Most recently she has provided data analysis, according to U.S. Fish and Wildlife Service policy and protocols, for Navy facilities across the Northeast and commercial energy facilities in the Midwest and incorporated the data into summary reports.

Education

MS, Biology, University of Northern Colorado, 2013
BS, Environmental Science, Colorado College, 2007

Training

Bat Acoustic Data Management Workshop, Bat Conservation and Management, Harrisburg, Pennsylvania
Cultural and Natural Resource Management, Sibley Group, Olympia, Washington
NEPA Process and Endangered Species Act, Sibley Group, Olympia, Washington
Wildland Fire Training S-103/ S-109/L-180, National Wildlife Coordinating Group, Wyoming
40-Hour OSHA Hazardous Waste Health and Safety Training, OSHA, Denver, Colorado
Wilderness First Responder, Colorado Springs, CO
Wilderness First Aid and CPR, Portland, ME

Corporation Project Experience

Wildlife Biologist, United States Navy Facilities, Bat Acoustic Detector Deployment, Data Survey Analysis and Reporting, Various Installations, Eastern U.S.

Deployed Wildlife Acoustic SM3 acoustic detectors and acoustically surveyed Installations according to USFWS 2016 Indiana Bat Summer Survey Analysis Guidelines. Analyzed data for both baseline surveys and presence absence surveys for the federally threatened northern long-eared bat. Analyzed bat calls using Kaleidoscope Pro and manually vetted species of interest and spot checked for accuracy with Sonobat 3.3.2. Summarized mist-netting survey data, emergence counts, and interpreted northern long-eared bat radio-tracking results. Compiled data into summary reports.

Wildlife Biologist, United States Navy Facilities, Bat Mist-netting, Radio Tracking, and Roost Emergence Surveys, Various Installations, Virginia

Mist-netted, radio tracked, and conducted roost emergence counts according to USFWS 2016 Indiana Bat Summer Survey Analysis Guidelines. Experience handling the federally threatened northern long-eared bat and various northeastern bat species.

Wildlife Biologist, United States Fish and Wildlife Service, Wildlife Refuge System, Bat Acoustic Monitoring Analysis, Various refuges, Eastern U.S.

Analyzed bat acoustic data with Sonobat 3.2.2 and manually vetted *Myotis* spp. calls. Summarized data.

Wildlife Biologist, United States Navy Facilities, Fatality Surveys, Searcher Efficiency Trials, and Bat Detector Deployment, Cutler, Maine

Conducted fatality survey sweeps of plots preparing for fatality surveys. Conducted three searcher efficiency trials during fatality surveys. Deployed five Wildlife Acoustic SM3 bat acoustic detectors, checked detectors bi-weekly, downloaded and managed data, and repaired any detector system issues.

Wildlife Biologist, NextEra and Capital Power, Bat Detector Deployment, Various Commercial Wind Energy Projects, North Dakota

Deployed Wildlife Acoustics SM3 detectors at three commercial wind energy projects.

Wildlife Biologist, Sempra, Bat Data Analysis and Interim Reports, Broken Bow II, Nebraska

Analyzed bat acoustic data with Kaleidoscope Pro and Manually vetted *Myotis* spp. calls. Summarized data for report. Determined species from photos of bat fatalities.

Wildlife Biologist, Kinder Morgan, Ecological Assessment of Bats, Birds, and Small Mammals, Bearfort Mountain Natural Area, New Jersey

Analyzed bat calls from four detectors recording from May – Oct using Kaleidoscope Pro and manually vetting species of interest and spot checking for accuracy with Sonobat 3.3.2. Wrote report on findings. Conducted fall small mammal surveys with Sherman traps and edited small mammal report. Co-wrote report on avian surveys including point counts, raptor migration, and nocturnal predator surveys.

Wildlife Biologist, Bat Acoustic Data Analysis, Na Pua Makani Wind Project, Hawaii

Analyzed data using Kaleidoscope Pro and manually vetted unclassified calls in Sonobat 4.0.6 for presence of the federally endangered species, Hawaiian hoary bat. Summarized results and created figures for report.

Wildlife Biologist, Maine Department Of Transportation, Bat Acoustic Data Survey Reporting, Various Projects, Maine

Responded to comments on six bat acoustic data survey reports including creating screen shots of representative MYSE calls for the report in Sonobat 3.3.2. Converted data from full spectrum to zero-crossing.

Wildlife Biologist, NextEra, Northern Long-eared Bat Habitat Assessment Reporting, Crowned Ridge, South Dakota

Wrote report assessing the likelihood of northern long-eared bat presence in the area chosen for a pipeline and the suitability of habitat to be removed for the federally threatened northern long-eared bat and compiled photo-log.

Relevant Previous Experience

Master's Student, University of Northern Colorado, Research and Thesis, Colorado

Designed and implemented research over three field seasons on habitat use by bats in forested, edge, and masticated Ponderosa pine forest in Boulder County, Colorado. Used mist nets to capture bats for determination of species, weight, sex, age, and reproductive status. Used Pettersson D240x for acoustic recording and determined call to species with Sonobat 3.0 and manual vetting. Insect sampling with black light traps and keying to order.

Contracted Wildlife Biologist, Maine Inland Fisheries and Wildlife, NA Bat Program, Maine

Provided planning assistance for NA Bat monitoring program for the state of Maine. Planned road driving transects, assisted volunteers with stationary detector placement, and acquiring land owner permission. Processed, analyzed, and managed incoming data using Kaleidoscope Pro software. Gained experience with both full spectrum and zero crossing detectors including Anabat, EM3+, and SM2+ detectors.