Memorandum

To: Glenn Gingras, Sen. Environmental Biologist
Vermont Agency of Transportation
Project Delivery Bureau - Environmental
Highway Division
219 N. Main Street
Barre, VT 05641

Date: September 21, 2023

Project #: 58916.03

From: Meg Lout, CWB®, Senior Bat Biologist

Re: Lyndon IM 091-3(53):
Visual Inspection and Acoustic Surveys for Listed Bats

Introduction

The Vermont Agency of Transportation ("VTrans") is proposing to replace Bridges 96-3N and 96-3S on Interstate 91 (in Lyndon, Vermont ("Project"). Both bridges are corrugated galvanized metal plate pipe culverts under the northbound and southbound interstate lanes, respectively. The Project will require temporary lane crossovers for traffic management, as two-way traffic would have to be maintained while each of the culverts are replaced. On behalf of VTrans, VHB completed visual structural inspections and passive acoustic monitoring to determine the presence/probable absence of the federally and state endangered northern long-eared bat (*Myotis septentrionalis*) and the state endangered tri-colored bat (*Perimyotis subflavus*).[1] The Project is located outside the known summer range of the federally and state endangered Indiana bat (*M. Sodalis*) and is therefore not a species of concern at the Project.

Methods

Visual Inspections

A daytime visual structural inspection was completed by VHB Senior Bat Biologist Meg Lout, and two VTrans Interns on June 20, 2023, following the recommendations in U.S. Fish and Wildlife Service's ("USFWS") APPENDIX D: Bridge/Structure Bat Assessment Form Guidance and APPENDIX D: Bridge/Structure Bat Assessment Form ("Bridge Guidelines"). Biologists searched the structure with the aid of flashlights and binoculars for bats flying or roosting and signs of bat usage (guano or staining from urine or roosting bats). Biologists also listened for high pitched squeaking or chirping, which could also identify the presence of roosting bats.

Passive Acoustic Monitoring

Passive acoustic monitoring was conducted for four nights from June 20 to June 24, 2023 using one Petterson D500x full-spectrum ultrasonic detector ("detector") and an external microphone that was raised to 24 feet (7.3 meters). Surveys began 30 minutes prior to sunset (20:00) and continued until 30 minutes after sunrise (06:00) and were conducted in compliance with the U.S. Fish and Wildlife Service 's ("USFWS") Range-wide Indiana Bat Survey Guidelines ("Bat Guidelines," USFWS 2023) . A map of the detector location is provided in **Figure 1.**

[1] The tri-colored bat is currently undergoing review by the U.S. Fish and Wildlife Service for listing as endangered under the Endangered Species Act.

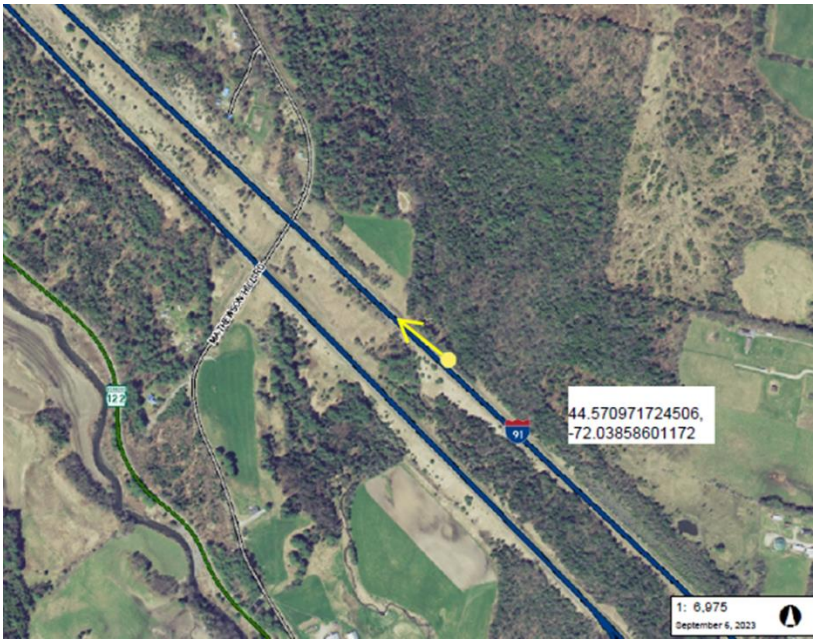

Figure 1. Acoustic monitoring location map indicating the detector location (yellow circle) and the direction of the detection cone (yellow arrow).

Parameters Used for Acoustic Analysis

Detector settings and parameters used for the analysis are provided in **Attachment 1**.

Quantitative Analysis and Manual Vetting

Data analysis was completed using Kaleidoscope Pro ("KPro") software (Version 5.4.7), auto classifier version 5.4.0 (S/A: -1) with the species set selected for Vermont but excluding Indiana bats. Each sound file (.wav format) was attributed with a text file using SonoBat. Sound files were then scrubbed in SonoBat using the recommended default setting to remove noise files. Data determined to be noise were removed from the analysis and copies of the attributed files that had undergone the scrubbing process were auto classified. Species presence each night is based on a maximum likelihood estimate of 0.05 or less, as assigned by KPro, and visual vetting by a highly qualified biologist (see **Attachment 3**).

Results

Visual Inspections

No indications of bat activity or occupancy were observed during the structure inspections (see **Attachment 2**).

Passive Acoustic Monitoring

KPro auto classified 12 hoary bat (*Lasiurus cinereous*) calls. The number of calls and maximum likelihood estimates ("MLE") for the hoary bat are provided for each detector by detector-night in Table 1, and a representative spectrogram is provided in **Figure 2**

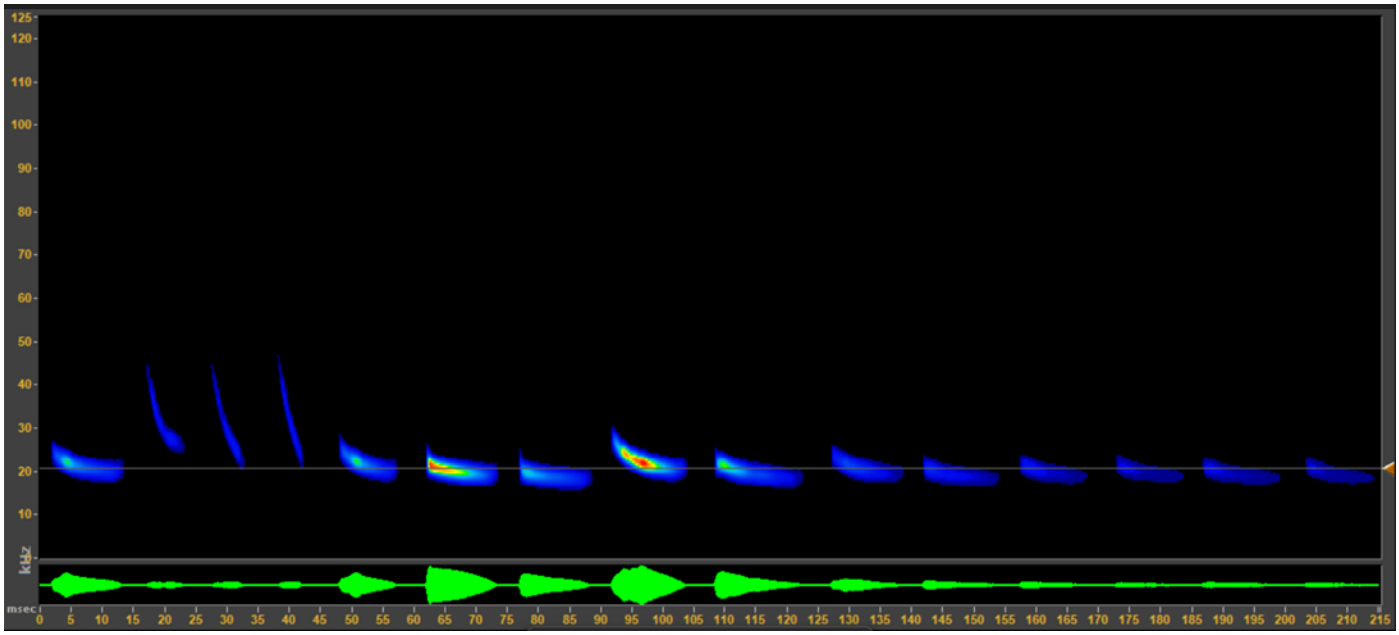

Figure 2. Representative spectrogram of a hoary bat (*Lasiurus cinereus*) call recorded at Site 1 on June 20, 2023, at the Lyndon project.

Table 1 The number of hoary bat (*Lasiurus cinereus*) calls that were recorded by detector-night between June 20 and 24, 2023 in Lyndon.

Date	# Calls Auto Classified	# Calls Vetted	MLE
June 20 and 21	› 4	1	<0.01
June 21 and 22	› 3	0	<0.01
June 22 and 23	› 3	0	<0.01
June 23 and 24	› 2	0	<0.01
Total # Calls	› 12		

Conclusion

A probable absence determination was made for both the northern long-eared bat and tri-colored bat at the Lyndon project. The only species determined to be present is the hoary bat (Table 2). Therefore, it is VHB's understanding that no Time-of-Year restrictions will be required.

Attachments

References

The U.S. Fish and Wildlife Service. Range-wide Indiana Bat Survey Guidelines. 2023. Available on-line at

Range-Wide Indiana Bat & Northern Long-Eared Bat Survey Guidelines (fws.gov).

ATTACHMENT 1

APPENDIX D: Bridge/Structure Bat Assessment Form

Bridge/Structure Bat Assessment Form Instructions

- This form will be completed to document bat occupancy or bat use of bridges, culverts, and other structures. This form shall be submitted to the appropriate personnel within the DOT and USFWS for recordkeeping (or uploaded into the Information, Planning, and Consultation (IPaC) Determination Key for use of the Programmatic Biological Opinion for Transportation Projects in the Range of the Indiana Bat and Northern Long-Eared Bat) prior to conducting: any activities below the deck surface either from the underside or from above the deck surface that bore down to the underside; any activities that could impact expansion joints; any activities involving deck removal on bridges; or any activities involving structure demolition for bridges, culverts, and/or other structures.
- Assessments must be completed within two (2) years of conducting any work (see the above bullet), regardless of whether assessments have been conducted in the past. Assessments must be completed in appropriate weather conditions, suitable for the assessor to observe common signs of bat use.
- Evidence of bat use may include visual observation (live and/or dead), presence of guano, presence of staining, audible observation, and/or odor observation. Presence of one or more indicators is sufficient evidence that bats may be using the bridge, culvert, and/or other structure.
- If bat use of a bridge, culvert, and/or other structure is noted, additional studies may be undertaken during bat active season to identify the specific bat species utilizing the structure, or protected bat species presence can be assumed, in order to comply with threatened and endangered species regulations. Bat active season dates, typically between April and November, vary regionally and by species, so assessors should consult with their local USFWS Field Office for more specific active season dates.
- For use of the Programmatic Biological Opinion for Transportation Projects in the Range of the Indiana Bat and Northern Long-Eared Bat – If the bridge/structure is 1,000 feet or more from suitable bat habitat[1] (e.g., an urban or agricultural area without suitable foraging habitat or corridors linking the bridge to suitable foraging habitat), check the appropriate box and fill out the table below. **No further assessment is required.**

Date & Time of Assessment	**DOT Project #**	**Route/Facility Carried**	**County**
June 20, 2023		I91	Caledonia
Federal Structure ID 300091963N03071, 300091963S03071	**Structure Coordinates** (latitude and longitude) 44.57097172450682, -72.03858601172278	☐ This bridge/structure is 1,000 feet or more from suitable bat habitat[2] Name: Meg Lout Signature: Meg Lout	

- Any questions pertaining to assessments or this form should be directed to the local USFWS Field Office.

[1] Refer to the USFWS's summer survey guidance for the definition of suitable habitat (http://www.fws.gov/midwest/endangered/mammals/inba/inbasummersurveyguidance.html).

[2] This condition is only for use of the Programmatic Biological Opinion for Transportation Projects in the Range of the Indiana Bat and Northern Long-Eared Bat

Bridge/Structure Bat Assessment Form

Date & Time of Assessment	DOT Project Number	Route/Facility Carried	County
June 20, 2023		I91	Caledonia
Federal Structure ID 300091963N03071, 300091963S03071	**Structure Coordinates (latitude and longitude)** 44.57097172450682, -72.03858601172278	**Structure Height (approximate)**	**Structure Length**

Structure Type (check one)

Bridge Construction Style

- ○ Cast-in-place
- ○ Flat Slab/Box
- ○ Truss (Side View)
- ○ Parallel Box Beam
- ○ Pre-stressed Girder
- ○ Steel I-beam
- ○ Covered
- ○ Other:

Culvert Type

- ◉ Box
- ◉ Pipe/Round
- ○ Other:

Other Structure

- ○

Structure Material (check all that apply)

Deck Material	*Beam Material*	*End/Back Wall Material*
☐ Metal	☐ None	☐ Concrete
☐ Concrete	☐ Concrete	☐ Timber
☐ Timber	☐ Steel	☐ Stone/Masonry
☐ Open grid	☐ Timber	☐ Other:
☐ Other:	☐ Other:	

Creosote Evidence

- ○ Yes ◉ No
- ○ Unknown

Culvert Material

- ☒ Metal
- ☐ Concrete
- ☐ Plastic
- ☐ Stone/Masonry
- ☐ Other:

Notes:

Crossings Traversed (check all that apply)

☐ Bare ground	☐ Open vegetation
☐ Rip-rap	☐ Closed vegetation
☒ Flowing water	☐ Railroad
☐ Standing water	☐ Road/trail - Type:
☐ Seasonal water	☐ Other:

Surrounding Habitat (check all that apply)

☐ Agricultural	☐ Grassland
☐ Commercial	☐ Ranching
☐ Residential-urban	☐ Riparian/wetland
☐ Residential-rural	☐ Mixed use
☐ Woodland/forested	☐ Other:

Areas Assessed (check all that apply)

Check all areas that apply. If an area is not present in the structure, check the "not present" box.
Document all bat indicators observed during the assessment. Include the species present, if known, and provide photo documentation as indicated.

Area (check if assessed)	**Assessment Notes**	**Evidence of Bats** (include photos if present)
☐ All crevices and cracks: **Bridges/culverts:** rough surfaces or imperfections in concrete **Other structures:** soffits, rafters, attic areas	☒ Not present	☐ Visual - live # dead # ☐ Guano ☐ Staining ☐ Audible ☐ Odor ☐ Photos ☐ Species
☐ Concrete surfaces (open roosting on concrete)	☒ Not present	☐ Visual - live # dead # ☐ Guano ☐ Staining ☐ Audible ☐ Odor ☐ Photos ☐ Species
☐ Spaces between concrete end walls and the bridge deck	☒ Not present	☐ Visual - live # dead # ☐ Guano ☐ Staining ☐ Audible ☐ Odor ☐ Photos ☐ Species
☐ Crack between concrete railings on top of the bridge deck (Gap / Railing)	☒ Not present	☐ Visual - live # dead # ☐ Guano ☐ Staining ☐ Audible ☐ Odor ☐ Photos ☐ Species
☐ Vertical surfaces on concrete I-beams	☒ Not present	☐ Visual - live # dead # ☐ Guano ☐ Staining ☐ Audible ☐ Odor ☐ Photos ☐ Species
☐ Spaces between walls, ceiling joists	☒ Not present	☐ Visual - live # dead # ☐ Guano ☐ Staining ☐ Audible ☐ Odor ☐ Photos ☐ Species
☐ Weep holes, scupper drains, and inlets/pipes	☒ Not present	☐ Visual - live # dead # ☐ Guano ☐ Staining ☐ Audible ☐ Odor ☐ Photos ☐ Species
☒ All guiderails	☐ Not present	☐ Visual - live # dead # ☐ Guano ☐ Staining ☐ Audible ☐ Odor ☐ Photos ☐ Species
☐ All expansion joints	☒ Not present	☐ Visual - live # dead # ☐ Guano ☐ Staining ☐ Audible ☐ Odor ☐ Photos ☐ Species

Name: Meg Lout

Signature: Meg Lout

ATTACHMENT 2

Bat Acoustic Monitoring Data Form

Project:	Lyndon IM 091-3(53)			**Site#:**	1	**Site Name:**	Lyndon
Municipality:		**County:**	Caledonia	**State:**	VT	**Survey Contact**	mlout@vhb.com
Latitude:	44.5694518	**Longitude:**	-72.03894277		**Datum:**	WGS 84	**Elevation (meters):** 257.2
Surveyed By:	MSL				**Setup**	06/20/2023 19:30	**Retrieval** 06/27/2023 06:30

Land Use:	Mixed Forest	**Mic Test**	Setup	Yes	**Battery Capacity (v)**	Setup	6	**CF Card Capacity (GB)**	Setup	96
			Retrieval	Yes		Retrieval	5.9		Retrieval	95

BD #	Latitude	Longitude	Trigger Sensitivity	Mic	Mic Orientation	HT [1]	Clutter	Gain	Trigger	Interval	Recording Start Time	Recording End Time
50253	44.569451800	-72.038942770	Low	Directional Horned	N	6.096	LOW	45	160	5	19:00	06:00

Site Description

Along interstate 91

Site sketch

[1] *Height of microphone above ground level (in meters)*

1 – URBAN OR BUILT-UP		2 – AGRICULTURAL		3 – RANGELAND		4 – FOREST LAND		5 – WATER		6 – WETLAND		7 – BARREN LAND	
11	Residential	21	Cropland/Pasture	31	Herbaceous	41	Deciduous	51	Streams / Canals	61	Forested	71	Dry Salt Flats
12	Commercial Services	22	Orchards, Groves	32	Shrub and Brush	42	Evergreen	52	Lakes	62	Non-forested	72	Beaches
13	Industrial	23	CFO's	33	Mixed	43	Mixed	53	Reservoirs			73	Non-beach Dunes
14	Transport, Utilities	24	Other					54	Bays / Estuaries			74	Bare Exposed Rock
15	Industrial Complex											75	Quarries / Gravel Pits
16	Mixed Urban/Built-up											76	Transitional Areas
17	Other Urban/Built-up											77	Mixed Barren

Bat Acoustic Monitoring Data Form

ATTACHMENT 3

Meghan S. Lout, CWB

Senior Bat Biologist

Certifications

Certified Wildlife Biologist

Approved Bat Surveyor in Vermont

Memberships

The Wildlife Society; Northeast Bat Working Group (PP)

Bat Capture and Acoustic Analysis Training

Acoustic Identification of Eastern Bat Species, Vesper Bat Detection Services, LLC., 2022;

Advanced Acoustics Master Class (bats) with Joe Szweczak, 2021;

Combined Field Techniques-Bat Survey Solutions, 2017;

Bat Acoustic Data Management Course, Bat Surveys Solutions, 2016

The VT Bat Center

Board Member, Satellite Rehab Facility

Permits

TE64393C-0

Meghan recently rejoined VHB after three years as a Senior Bat Biologist with the Vermont Agency of Transportation. Meghan has extensive experience in the design and conduct of field monitoring projects associated with environmental compliance under the National Environmental Policy Act (NEPA) and Sections 7 and 10 of the Endangered Species Act (ESA) as they relate to rare, threatened, and endangered bats. Meghan is a federally permitted bat biologist (TE64393C-0), a Certified Wildlife Biologist, and a board member of Vermont's Mammals Scientific Advisory Group. In addition, she serves as Past President of The Northeast Bat Working Group after fulfilling roles as both President and President-elect of the organization.

Meghan's professional experience includes managing and implementing hundreds of surveys for bats, including hibernaculum, mist-netting, and harp trapping; tracking bats with transmitters; and conducting emergence surveys. Meghan is also a regionally recognized leader in acoustic monitoring and the associated analyses.

22 years of professional experience

Education

Applied Biostatistics, University of Massachusetts, 2011

M.S. Ecology, Evolution and Population Biology, Purdue University, 2009
Thesis: Species Interactions at Range Boundaries Along a Tropical Elevational Gradient. Meghan studied patterns in the song differentiation of congeneric bird species at range boundaries in a tropical montane cloud forest to compliment extinction rate predictions of endemic birds through computer modeling.

B.S. Wildlife and Fisheries Conservation, University of Massachusetts, 2003.

Certificate in Tropical Reforestation, The School for Field Studies (Australia), 2002

Capture Experience

VT Fish and Wildlife Department – Vermont, 2022

Mist-netting little brown bat maternity colonies and processing and banding approximately 100 individuals.

VT Fish and Wildlife Department—Vermont, 2019
Mist-netting, affixing transmitters and tracking easternsmall-footed bats a slate quarry.

VT Fish and Wildlife Department—Vermont, 2018
Meghan was responsible for siting and deploying mist-nets with the VFWD for the VT BioBlitz at North Branch Nature Center. She monitored nets and processed the one bat captured (silver-haired bat).

VT Fish and Wildlife Department—Vermont, 2017
Siting, deploying and checking mists with Vermont Fish & Wildlife Department (VFWD) for the VT BioBlitz at Mercy Farm.

VT Agency of Transportation—Vermont, 2017
Lead biologist for a Section 7 Consultation that included mist- netting *Myotis* bats at a bridge replacement project. Her responsibilities included siting and deploying mist-nets, processing bats, outfitting four northern long-earedbats with transmitters, tracking individuals to roosts, and conducting exit surveys atroost locations.

VT Fish and Wildlife Department, New York State Department of Environmental Conservation (NYSDEC), U.S. Fish and Wildlife Service—Vermont, 2017
Meghan assisted with tracking of five Indiana bats (transmitters affixed by the NYSDEC) as they emerged from Barton Hill Mine and flew to Vermont.

National Parks Service—Kentucky, 2017

Meghan attended a field course as an assistant and advanced student that included the capture of bats at Mammoth Cave National Park using harp traps and mist-nets (see table on page 4 for species captured).

VT Fish and Wildlife Department—Vermont, 2017

Meghan and the VFWD deployed mist-nets and a harp trap at newly discovered northern long-eared bat and little brown bat maternity colonies (due to Meghan's capture and tracking efforts). A total of 39 little brown bats and one eastern red bat were captured within 30 minutes of opening nets, which required rapid and appropriate handling of bats. All little brown bats were processed and banded

Wind Energy Developments—Maryland and New York, 2011-2016
Meghan coordinated and assisted with mist-netting surveys and transmittering and tracking at least four Indiana and northern long-eared bats each at proposed and operational wind energy facilities.

University of Kentucky, Idaho, 2005
Meghan was the field crew leader who sited mist-net locations, captured, transmittered and tracked 30 northern long-legged myotis. She tracked tagged bats to day roost locations and conducted night-time telemetry on transmittered individuals.

Fur and Tissue Sampling (live bats only)

Robertson Mill Pond Preserve—North Carolina, 2019

Meghan collected fur and tissue samples from two southeastern myotis bats and one eastern red bat that were captured in in mist-netting surveys for the State of Georgia. (See table on page 4 for a list of fur and tissue samples taken from bat casualties recovered at wind energy facilities for research being conducted by Frostburg State University.)

Bat Habitat Assessments

Meghan has conducted habitat assessments consistent with the U.S. Fish and Wildlife Service's current guidance of a given year for the Indiana bat, northern long-eared bat, Virginia big-eared bat, and/or eastern small-footed bat. Her project responsibilities included the identification of potential roosts (trees or structures),

photo documentation and reporting at the following projects:

- All Structure Projects while working for VTrans – 2020-2023
- Various VTrans Projects (as a consultant) – 2020-2022
- Burlington Parks and Recreation, Burlington Bike Path, Phase 4—VT, 2019
- VTrans, Coggman Bridge Rehabilitation Project—VT, 2018
- Massachusetts Department of Transportation (MassDOT) and Federal Railroad Administration (FRA), Patriot Corridor Rail Project—MA, 2018
- Mount Snow, Mount Snow Phase 1 Project—VT, 2018
- Green Mountain Power, Lake Dunmore Dam—VT, 2018
- VTrans & FRA, Leicester Wye Project—VT, 2017
- Encore Renewables, Magee Hill Solar Project—VT, 2017
- VTrans & FRA, Middlebury Bridge and Rail Project—VT, 2016 and 2017
- City of Saint Albans & VTrans, Saint Albans Multi-Modal Connector Project—VT, 2016
- Vermont Gas, Gas Pipeline Project—VT, 2016
- VTrans, Bridge 77 Project—VT, 2016
- Babson College, The Innovation Center Project—MA, 2016
- VTrans, Bridge No. 7, 11 and 46—VT, 2016
- Invenergy, Beech Ridge Expansion Wind Project—WV, 2015
- EDP Renewables North America, Confidential Wind Project—MD, 2014
- Private Developer, Confidential Wind Project—PA, 2012

Bridge Inspections

- Dozens of bridge inspections while with VTrans – 2020-2023
- Various VTrans Projects (as a consultant) – VT, 2020
- VTrans, Coggman Bridge Rehabilitation Project—VT, 2018
- VTrans, Westminster Bridge Rehabilitation Project—VT, 2018
- VTrans & FRA, Middlebury Bridge and Rail Project—VT, 2017
- VTrans, Bridge No. 7, 11 and 46—VT, 2016
- VTrans, Bridge 77 Project—VT, 2016

Bat-Handling and Survey Experience by Species

APPROXIMATE NUMBER OF BATS HANDLED (LOCATIONS)								
SPECIES	# CAPTURED (LOCATIONS/YEARS)	# BATS TRANS-MITTERED/ TRACKED	# BATS BANDED	#BATS WITH FUR AND TISSUES SAMPLED	# BATS GUANO COLLECTED	APPROXIMATE # BAT CARCASSES IDED AT WIND PROJECTS (LOCATIONS/YRS)[1]	AREAS SURVEYED (FOR LIVE CAPTURES ONLY)	APPROXIMATE # HOURS WITH SPECIES
Eptesicus fuscus	70 (VT, 2017; KY, 2017)	-	70	-	-	100 (WV, MD, NY, ME, NH, PA), 2012-2016	Structures, flight corridors near water	19
Lasiurus borealis	51 (ID, 2004; NY/PA, 2014; VT/KY, 2017; NC, 2019)	-	20	1	-	1,000 (WV, MD, NY, ME, NH, PA), 2012-2016	Wooded areas	122
Myotis leibii	36 (KY, 2017); 2 (2019)	2	30	-	-	-	Cave entrances	0.5
Nycticeius humeralis	33 (KY, 2017)	-	0	-	-	-	Wooded areas, cave entrances	1
Myotis grisescens	41 (KY, 2017)	-	0	-	-	-	Cave entrances	5
Lasiurus cinereus	91 (ID, 2004; NY/PA, 2012-2015; KY, 2017)	-	10	-	-	600 (WV, MD, NY, ME, NH, PA), 2012-2016	Open areas, some near water	75
Myotis Austroriparius	2 (NC, 2019)	-	2	2	2		Wooded swamp	0.5
Myotis sodalis	22 (KY, 2017)	8	22	-	8	3 (IN, 2014; VT, 2017)	Cave entrances, forested clearings	11
Myotis lucifugus	260 (VT, 2016/2017/ 2022; KY, 2017)	-	206	-	40	550 (MD, PA) 2010-2012	Houses, structures	65
Myotis septentrionalis	14 (VT, 2017/2019; KY, 2019)	12	57	-	-	5 (MD/PA, 2013; VT, 2019)	Flight corridor, cave entrances	7
Myotis volans	30 (ID, 2004)	30	30	-	30	-	Forested areas near water	5
Corynorhinus rafinesquii	18 (KY, 2017)	-	30	-	-	-	Wooded areas, cave entrances	3.5
Lasiurus seminolus	-	-	-	-	-	10 (WV and MD) 2012-2016	High elevations, wooded clearings	2
Lasionycteris noctivagans	28 (ID, 2004; OH, 2010; NY/PA 2014/2015; KY, 2017; VT, 2017/2018; NC, 2019)	-	-	-	-	250 (WV, MD, NY, ME, NH, PA) from 2012-2016	Wooded areas near water	5
Perimyotis subflavus	26 (KY, 2017)	-	50	-	-	5 (NH, WV), 2015	Cave entrances	6.5

[1] *Meghan collected fur and tissue samples from all bat carcasses recorded at the listed wind energy projects. Samples were mailed to researchers at Frostburg State's Appalachian Lab in Maryland.*

Bat Fatality Monitoring

West Virginia, Maryland, New Hampshire, Pennsylvania, New York, 2011-2015
Meghan was project manager/field coordinator for or monitor at more than 20 post-construction fatality monitoring studies at wind energy facilities from 2010 through 2015 (see the table below). Meghan confirmed the identification of hundreds of injured and dead bats, including *Myotis*, *Perimyotis* and migratory tree bats (see table that follows.)

Representative wind energy projects where Meghan was the technical lead in avian and bat identification either visually and/or acoustically.

WIND ENERGY FACILITY	DEVELOPER	LOCATION	YEARS	SURVEY TYPE[1]
Jericho Rise Wind Project	EDP Renewables North America	Lewis County, NY	2015	P/A, LTA
Quilt Block Wind Project	EDP Renewables North America	Lafayette County, WI	2015	other
Kimberly Run Wind Project	Everpower Wind Holdings	Somerset County, PA	2016	LTA
Mason Dixon Wind Project	Everpower Wind Holdings	Somerset County, PA	2017	LTA
Highland North Wind Project	Everpower Wind Holdings	Somerset County, PA	2018	P/A, LTA
Stiles Brook Wind Project	Avangrid (Iberdrola Renewables)	Windham and Grafton Counties, NH	2015	P/A, LTA
Groton Wind Project	Avangrid (Iberdrola Renewables)	Grafton County, NH	2012-2015	LTA
Pinewood Wind Project	Apex Clean Energy LLC	Pulaski County, NC	2012-2015	LTA
Rocky Forge Wind Project	Apex Clean Energy LLC	Botetourt County, NC	2012-2015	LTA
Beech Ridge Wind Project	Invenergy LLC	Greenbrier and Nicholas Counties, WV	2011-2015	LTA, FM
Beech Ridge Expansion	Invenergy LLC	Greenbrier and Nicholas Counties, WV	2015	other
Arkwright Summit Wind Project	EDP Renewables North America	Freedonia County, NY	2015-2016	P/A, LTA
Marble River Wind Project	EDP Renewables North America	Clinton County, NY	2014-2015	MN, P/A, LTA, FM
Maple Ridge I and II Wind Projects	EDP Renewables North America	Lewis County, NY	2014	P/A, LTA, FM
Fair Winds Wind Project	Exelon Generation LLC	Garrett County, MD	2014	P/A, LTA, FM
Spruce Ridge Wind Project	EDP Renewables	Grafton County, NH	2014	LTA
Lempster Wind Project	Avangrid (Iberdrola Renewables)	Sullivan County, NH	2012-2014	other
Criterion Wind Project	Exelon Generation LLC	Garrett County, MD	2011-2014	MN, LTA
Beethoven Wind Project	Beethoven LLC	McPherson County, SD	2014	other
Howard Wind Project	Everpower Wind Holdings LLC	Steuben County, MD	2012-2013	LTA, FM
Greenfield Wind Project	EDP Renewables North America	Lackawanna County, PA	2012	other
Number 9 Wind Project	EDP Renewables North America	Aroostic County, ME	2013	LTA
Hardscrabble Wind Project	Avangrid (Iberdrola Renewables)	Herkimer County, NY	2013	LTA, FM
Stony Creek Wind Farm	Stony Creek LLC	Somerset County, PA	2012	other
Cape Vincent Wind Project	BP Wind Energy North America	Jefferson County, NY	2012	other
Alder Stream Wind Project	Pattern Energy	Franklin County, ME	2012	LTA
High Sheldon Wind Farm	Invenergy LLC	Wyoming County, NY	2011	LTA, FM
Forward Wind Project	Sun Edison	Somerset County, PA	2010	FM
Lookout Wind Project	Sun Edison	Somerset County, PA	2010	LTA

[1]Mist-netting (M), Presence/Probable Absence Acoustic (P/A); Long-Term Acoustics (LTA), Fatality Monitoring (FM)

Meghan Lout, CWB

Bat Identification, Handling and Banding Experience at The Vermont Bat Center

SPECIES	2015	2016	2017	2018	2019	2022	2023
	# BATS / # BATS BANDED	# BATS / # BATS BANDED	# BATS / # BATS BANDED	# BATS / # BATS BANDED	# BATS / # BATS BANDED	# BATS / # BATS BANDED	# BATS / # BATS BANDED
Eptesicus fuscus	26 / 16	45 / 22	38 / 22	58 / 18	4 / -	- / -	4 / -
Eptesicus fuscus (pups, hand-raised)	17 / 10	14 / 4	12 / 11	4 / 2	- / -	- / -	- / -
Myotis lucifugus	4 / 1	15 / 10	13 / 10	13 / 6	5 / -	12 / -	11 / -
Myotis septentrionalis	1 / 1	5/2	- / -	1 / -	2 / -	3 / -	1 / -
Myotis Leibii	- / -	- / -	- / -	- / -	2 / -	- / -	- / -
Lasiurus cinereus	1 / -	1 / -	2 / 1	- / -	- / -	1 / 0	- / -
Perimyotis subflavus	- / -	- / -	- / -	- / -	- / -	- / -	- / -

Bat Acoustic Monitoring

Meghan is an expert in acoustic monitoring, proper conduct of surveys, data management, and subsequent reporting requirements. She has used Anabat, Song Meter (SM) 2BAT and SM3BAT, and Pettersson D500x Acoustic Detectors. Meghan conducts acoustic analyses using Bat Call Identification, Kaleidoscope Pro, approved versions and SonoBat. Meghan was the technical lead at the following projects:

Active Acoustic Monitoring

- VTrans – various projects, 2020-2023
- Civil Engineering Associates, Vermont National Country Club—VT, 2019
- VTrans, Woodford Roadcut Civil Engineering Associates, Vermont National Country Club—VT, 2019
- CRW Consulting Brattleboro Housing Demolition Project – VT, 2018
- VTrans, Coggman Bridge Replacement Project—VT, 2018
- VTrans, Westminster Bridge Replacement Project—VT, 2018
- VFWD, Weybridge Street Mitigation Surveys—VT, 2018
- VTrans & FRA, Middlebury Bridge and Rail Project—VT, 2017
- VTrans, Encore Renewables, Magee Hill Solar Project—VT, 2017
- VTrans, Bridge No. 6 Rehabilitation Project—VT, 2016
- VTrans, Bridge No. 11 Replacement Project—VT, 2016
- VTrans, Bridge No. 46 Replacement Project—VT, 2016
- VTrans & FRA, Middlebury Bridge and Rail Project—VT, 2016

Passive Acoustic Monitoring

- VTrans (as an employee) – Over 55 Projects, VT, 2020-2022
- VTrans – 20 Projects, VT, 2021
- VTrans – 35 Projects, VT, 2020
- Civil Engineering Associates, Vermont National Country Club—VT, 2019
- VTrans, Woodford Roadcut—VT, 2019
- Dramby Environmental Consulting, Confidential Project—TN, 2019
- Killington/Pico Ski Resort, Squeeze Play Terrain Park—VT, 2019
- U.S. Forest Service, Goshen Emergency Spillway Project—VT, 2019
- VTrans, Woodford Road Cut—VT, 2019
- VHB Bat Training Workshop, Robertson Mill Pond Preserve—NC, 2019
- Project and technical lead for MassDOT projects, 2019
    - Connecticut River and bikeway construction, Chicopee
    - Reconstruction of Route 143, Worthington
    - Bridge replacement, New Marlborough
    - Bridge superstructure replacement, Middlefield

  - Bridge replacement, Sheffield
  - Resurfacing on the Ashuwillticook Rail Trail, Adams/Cheshire/Lanesborough
  - Bridge replacement, Pittsfield
  - Culvert replacements, Dennis
  - Culvert replacements, Saugus
  - Bridge Replacement, Lynn and Saugus
- VTrans, Coggman Bridge Replacement Project—VT, 2018
- VTrans, Westminster Bridge Replacement Project—VT, 2018
- VFWD & VTrans, North Branch Nature Center Bioblitz—VT, 2018
- MassDOT & PanAmerican Railways Patriot Corridor Fall Swarming Surveys—MA, 2018
- Project and technical lead for MassDOT Transportation Projects, 2018
  - Reconstruction of Routes 6 and 28, Wareham
  - Intersection Improvements, Hingham
  - Columbia Greenway Rail Trail Construction, Westfield
  - Glendale Road Reconstruction, Southampton
  - Pedestrian Bridge Rehabilitation, Brookline
  - Road Widening, Lennox
  - Ashuwillticook Rail Trail Extension, Lanesborough/Pittsfield
  - Intersection Improvements, Pembroke
  - Corridor Improvements on Route 123, Norton
  - Road Resurfacing, Marshfield and Hingham
  - Bridge Preservation, Randolph
  - Highway Lighting Upgrade in Interstate 91, Chicopee/West Springfield
- Washington Gas, Offset J Loop Project—VA, 2018
- National Parks Service, Mammoth Cave National Park—KY, 2017
- FRA & VTrans, Middlebury Bridge and Rail Project—VT, 2017
- Encore Renewables, Magee Hill Solar Project—VT 2017
- MassDOT Transportation Projects—MA, 2017
  - Goshen Resurfacing Project
  - Sheffield Bridge Replacement
  - Agawam/West Springfield Bridge Replacement
  - Congamond Road Reconstruction Project
  - Shrewsbury Resurfacing and Widening Project
  - Raynham Bridge Replacement
  - Berkley/Freetown Resurfacing Project
  - Fitchburg/Lunenburg/Leominster Reconstruction Project
- Babson College, Innovation Center Project (presence/probable absence and fall swarming/spring emergence surveys), Wellesley, MA, 2016 and 2017

- Cold River Camp Inventory, Appalachian Mountain Club, NH,2016
- Bridge No. 11 Replacement Project, VTrans, Montpelier, VT, 2016
- Bridge No. 46 Replacement Project VTrans, Saint Johnsbury, VT, 2016
- Middlebury Bridge and Rail Project, FRA & VTrans, Middlebury, VT, 2016
- Avangrid (Iberdrola Renewables), Stiles Brook Wind Project—VT, 2015
- EDP Renewables North America, Jericho Rise Wind Project—NY, 2015
- EDP Renewables North America, Kimberly Run Wind Project—PA, 2015
- EDP Renewables North America, Mason Dixon Wind Project—PA, 2015
- EDP Renewables North America, Highland North Wind Project—PA, 2015
- Avangrid (Iberdrola Renewables), Groton Wind Plant—NH, 2012-2015
- Apex Clean Energy, Pinewood Wind Project—VA, 2012-2015
- Apex Clean Energy, Rocky Forge Wind Project—VA, 2012-2015
- EDP Renewables North America, Arkwright Summit Wind Project—NY, 2015
- EDP Renewables North America, Marble River Wind Project—NY, 2015
- EDP Renewables North America, Maple Ridge I and II Wind Projects—NY, 2014-2015
- Exelon Generation, Fair Winds Wind Project—MD, 2014
- EDP Renewables North America, Spruce Ridge Wind Project—NH, 2014
- Exelon Generation, Criterion Wind Project—MD, 2011-2014
- EDP Renewables North America, Number Nine Wind Project—ME, 2013
- Avangrid (Iberdrola Renewables), Hardscrabble Wind Project—NY, 2013
- VT Electric Company—VT, 2012
- Pattern Energy, Alder Stream Wind Project—ME, 2012
- Everpower Wind Holdings, Howard Wind Project—NY, 2012
- Invenergy, High Sheldon Wind Farm—NY, 2011
- Invenergy, Beech Ridge Wind Project—WV, 2011
- Sun Edison, Look out Wind Project—PA, 2010

Expert Testimony

Surfside Crossing Partners, LLC – Massachusetts, 2019
Meghan reviewed documents prepared by the Massachusetts Natural Heritage and Endangered Species Program, and reports and interpretation of acoustic data of Project opponents to provide rebuttal exert and live testimony related to whether the State's No Take Determination for the northern long-eared bat was made in accordance with the Massachusetts Endangered Species Act.

Hibernacula Survey Experience

Barton Hill Mine – Moriah, NY 2022

Mount Snow, Ltd. – Vermont 2019-2024

Other Professional Experience

2020-Present: Vermont Agency of Transportation: Biologist/Bat Specialist

- Review transportation projects for impacts to natural resources
- Primary Job Responsibilities: write Resource Identification Memorandums and NEPA Clearances; Conduct surveys for RT&E species; wetland delineations and permitting; Army Corps of Engineers permitting

2016-2020: Vanasse Hangen Brustlin (VHB): Wildlife Biologist/Bat Specialist

- Conduct/Supervise wildlife surveys for RT&E Species, primarily bats
- NEPA and ESA reporting
- Developing Scopes of Work and Study Plans for RT&E species

2011-2016: Western EcoSystems Technology, Inc.: Wildlife Biologist/Project Manager (Vermont)

- Conduct/supervise wildlife surveys for RT&E species
- Train field technicians
- NEPA and ESA reporting for wildlife studies at wind energy facilities
- Developing Scopes of Work and Study Plans for RT&E species

2011 Springfield College—Adjunct Professor of Ecology (fall semester; Springfield, MA) Adjunct Professor of Ecology: Biology 260 (Ecology), 261 (Ecology lab)

2011 University of Massachusetts: Wood Thrush Field Biologist (Amherst, MA)

- Assisted with nest searches, mounting transmitters on and tracking fledglings for research investigating population decline

2010-2011 Stantec Consulting—Avian and Bat Migration Technician (Topsham, ME)

- Supervised pre and post-construction surveys at proposed and operational wind energy facilities in Pennsylvania.
- Assisted with bat acoustic data analysis and writing technical reports.

2006-2009 Purdue University—Graduate Student Research (West Lafayette, IN and Costa Rica)

- Investigated song differentiation of nightingale thrushes at range boundaries to test hypotheses addressing forces underlying species distributions, and whether such traits could affect range shifts and subsequent extinction rates predicted by climate change models.
- Recorded and analyzed avian vocalizations; territory mapping.

2005 University of Kentucky—Bat Research Technician (Lexington, KY and northern ID)

- Supervised a research project investigating the roosting and foraging ecology of

bats in response to various forest management practices

- Mist-netted, processed and mounted transmitters on, and tracked bats to roosts using radio telemetry equipment

2005 USGS/Northern Prairie Wildlife Research Center—Sandhill Crane Research Technician (Jamestown, ND and North Platte River in NE)

- Assisted with rocket-netting, processing, mounting transmitters on, and tracking foraging and roosting sandhill crane using null-peak telemetry to understand use of the North Platte River by cranes

2004 Utah State University—Ferruginous Hawk Research Assistant (Logan and Uintah Basin, UT)

- Conducted aerial and ground-based hawk and eagle surveys for research assessing the impact of oil and gas well developments on ferruginous hawk
- Banded, mounted transmitters on nestlings and tracked until dispersal

2003-2004 The Peregrine Fund—California Condor Field Biologist (Northern, AZ)

- Assisted with reintroduction/monitoring of the California condor
- Tracked, handled, chelated sick birds and monitored behavior

2000-2001 U.S. Fish and Wildlife Service—Ornithology Intern (North Chatham, MA and The Eastern MA National Wildlife Refuge Complex)

- Monitored shorebirds, conducted staging counts and censuses
- Conducted passerine, marsh-bird, waterfowl and horseshoe crab surveys
- Assisted with gull population and nocturnal predator control

Presentations

- Acoustic Monitoring Results and Mitigation for Bat Species at Transportation Projects Throughout Vermont, Northeast Bat Working Group Conference Manchester, NH 2022
- Northern long-eared Bats and Little brown Bats at the Middlebury Bridge and Rail Project, Vermont, Northeast Bat Working Group Conference, Manchester, NH 2022
- Acoustic Monitoring Results and Mitigation for the Northern Long-eared bat (*Myotis Septentrionalis*) at Transportation Projects throughout Vermont, Northeast Bat Working Group Conference, virtual, 2021
- National Bat Week Presentations for VTrans – 2020 and 2021
- Avoidance, Minimization and Mitigation of Vermont Bats, Vermont Institute of Natural Sciences Bat Panel, 2021
- Acoustic Monitoring of the Northern Long-eared Bat Throughout Vermont, Northeast Bat Working Group Conference, 2021
- Presence of the Northern Long-eared Bat in Urban Vermont,Northeast Bat Working Group Conference – Saratoga Springs, NY, 2020

- Presence of the Northern long-eared Bat at Historic Hibernaculum—State College, PA, 2019
- Identifying Suitable Habitat for Rare, Threatened and Endangered Bats—Vermont Electric Company, South Burlington, VT, 2018
- Unexpected Use of Anthropogenic Structures and Urban Areas by the Northern Long-eared Bat—Northeast Bat Working Group and Small Mammals Colloquium Conference, Roanoke, VA, 2018
- Land Use Review Guidance for Bats—Vermont Fish and Wildlife's Land Use Review Training for Northern Long-eared Bats in VT, Castleton, VT, 2017
- Unexpected Co-habitation of Bridge Roosts by Myotis Bats—Northeast Bat Working Group Conference, Amherst, MA, 2017
- Bats, Regulations and Vermont Projects—Vermont Society of Engineers, Waterbury, VT, 2017
- Bats of New Hampshire—Appalachian Mountain Club, North Chatham, NH, 2016
- Bats and Bridges—Northeast Transportation and Wildlife Conference, Lake Placid, NY, 2016
- Using Acoustic Monitoring to Determine Impacts of Wind Energy to Migratory Songbirds, Cornell University – Ithaca, NY, 2015
- Species Interactions at Range Boundaries Along a Tropical Elevational Gradient, Purdue University – West Lafayette Indiana, 2010