Bat Mist Net Survey for the Martin County Solar Project, Martin County, Kentucky

USFWS TAILS#: 2021-B-0327

August 6, 2021

Prepared for:

MARTIN COUNTY SOLAR, LLC

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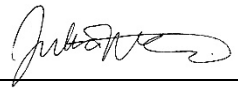
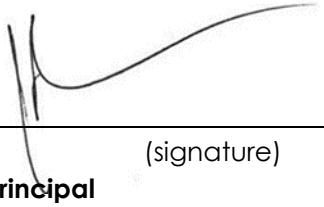
Prepared by 
(signature)
Layna Thrush, Senior Environmental Scientist

Reviewed by 
(signature)
Julia Wilson, Environmental Scientist

Approved by 
(signature)
Joshua Adams, Principal

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Executive Summary

Martin County Solar, LLC is proposing to construct a solar project in Martin County, Kentucky. Due to the presence of potential summer habitat for the Indiana bat (*Myotis sodalis*), a federally endangered species, and the northern-long eared bat (*Myotis septentrionalis*), a federally threatened species, within the forested areas on the proposed project area (the "Project"), Stantec Consulting Services Inc. (Stantec) was retained by Martin County Solar to complete a presence/probable absence bat mist net survey for these two species.

The objective of this survey was to assess the presence, or probable absence, of Indiana and northern long-eared bats during summer within the proposed project area. Survey methods followed the U.S. Fish and Wildlife Service (USFWS) 2020-2021 Range-wide Summer Survey Guidelines dated March 2020, and the USFWS guidance dealing with COVID dated June 12, 2020. Weather restrictions outlined in the above guidance were also followed, and mist netting was conducted in areas with potentially suitable summer habitat for Indiana and northern long-eared bats. Site specific authorization of survey methods were received from the USFWS Kentucky Field Office on May 14, 2021, and email notification was provided to KDFWR.

No Indiana or northern-long eared bats were captured during this 2021 summer mist netting survey. Forty-six big brown bats (*Eptesicus fuscus*), seven eastern red bats (*Lasiurus borealis*), and four eastern small-footed bats (*Myotis leibii*) were captured while conducting 2021 summer mist netting survey activities.

The deciduous hardwood forest within the Project provided potentially suitable summer habitat for both the Indiana and northern long-eared bat, but neither species were documented at mist net locations within potential foraging and traveling habitat. Based on the data collected during mist net surveys completed for the Project following USFWS approved guidelines, and apparent absence of the Indiana bat and northern long-eared bat, a May Affect – Not Likely to Adversely Affect determination is anticipated from the USFWS's Kentucky Field Office for these species.

1.0 INTRODUCTION

Martin County Solar proposes to construct a solar panel array in Martin County, Kentucky. This site was selected because the area has already been impacted by past mining practices. The Project area can be seen on Figure 1 in Appendix A.

Due to the presence of potential summer habitat for the Indiana bat (*Myotis sodalis*), a federally endangered species, and the northern long-eared bat (*Myotis septentrionalis*), a federally threatened species, within forested stands of the proposed Project, Stantec Consulting Services Inc. (Stantec) was retained by Martin County Solar to complete a bat mist net survey for these two species of bats. The objectives of this survey were as follows:

- Determine presence or probable absence of Indiana bats and northern long-eared bats in the Project area;
- Establish baseline data on bat species composition within the Project area; and
- If captured, radio-track Indiana bats to determine their roosting habitat and locations.

1.1 PROJECT LOCATION DESCRIPTION

The Project is located within the Pigeonroost Fork (050702010504) and Upper Wolf Creek (050702010503) drainages within the Tug Fork watershed (HUC 05070201) and is drained by Petercave Fork, Petercave Fork Lake, Wolf Creek, Carcass Branch, and associated unnamed tributaries (KYDOW 2020). The Project itself consists mainly of reclaimed mine land with small areas of intact forested land on the periphery. As such, vegetation is sparse, and the natural hydrology has been significantly altered. Soils within the Project are shallow, approximately 3-8 inches in depth, and underlain by mine spoil (crushed up rock and coal residuals).

1.2 REGULATORY SETTINGS

The federal Endangered Species Act (ESA) [16 U.S.C. 1531 et seq.] became law in 1973. This law provides for the listing, conservation, and recovery of endangered and threatened species of plants and wildlife. Under the ESA, the U. S. Fish and Wildlife Service (USFWS) strives to protect and monitor the numbers and populations of listed species. Many states enacted similar laws.

Section 7(a)(2) of the ESA states that each federal agency shall ensure that any action they authorize, fund, or carry out is not likely to jeopardize the continued existence of a listed species or result in destruction or adverse modification of designated critical habitat. Federal actions include (1) expenditure of federal funds for roads, buildings, or other construction projects, and (2) approval of a permit or license, and the activities resulting from such permit or license. This is true regardless of whether involvement is apparent, such as issuance of a federal permit, or less direct, such as federal oversight of a state-operated program, or federal funding of state highways.

Section 9 of the ESA prohibits the take of listed species. Take is defined by the ESA as "to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect." The definition of harm includes adverse habitat modification. Actions of federal agencies that do not result in jeopardy or adverse modification, but that could result in a take, must be addressed under Section 7 of the ESA.

1.1 PURPOSE OF REPORT

The purpose of this document is to provide a scientifically-defensible report detailing the mist net survey efforts for KDFWR to use in consultation with USFWS. The report includes a description of methods, results and summarized data, and discussion regarding the bat mist netting survey. Maps, field data sheets, and representative photographs are provided as appendices in the report (Appendices A, B, and C respectively). This report will also be used by Stantec for annual coordination of our federal permit activities with USFWS and the Kentucky Department of Fish and Wildlife Resources (KDFWR).

2.0 METHODS

Based on the acreage of proposed tree clearing, nine (9) net nights of mist-netting effort was needed to meet the standards set in the USFWS 2020-2021 Range-wide Indiana Bat Summer Survey Guidance (USFWS 2020). There were two sites (MS-01 and MS-02), with both sites consisting of three separate net sets. MS-01 was surveyed for two nights equaling six net nights of survey effort, and MS-02 was surveyed for one night equaling three net nights of survey effort. Stantec completed a total of nine net nights to meet the USFWS summer survey guidance requirements for non-linear projects located outside of the Appalachian Recovery Unit. Mist net surveys were conducted within the Project from June 7-10, 2021; rain forced the cancellation of surveys at MS-02 on June 9, 2021, so an additional night of survey was completed on June 10. Site specific authorization of survey methods were received from the USFWS Kentucky Field Office on May 14, 2021, and email notification was provided to KDFWR.

Additionally, Center for Disease Control (CDC; 2021) and USFWS (2020b) guidance was followed to ensure all precautions were taken in regard to COVID-19.

2.1 MIST NETTING GUIDELINES

Environmental factors can be highly variable in field settings, leading to a variety of bat survey techniques. However, the USFWS has standardized certain netting and acoustic practices for endangered bat surveys, which are outlined in the USFWS 2020 Range-Wide Indiana Bat Summer Survey Guidelines (USFWS 2020a). The guidelines, a summary of which follows, were adhered to during this survey. In order to reduce or eliminate exposure to *Pseudogymnoascus destructans*, the fungus that causes White Nose Syndrome in bats (Frick et al. 2016), extra precaution was taken to follow the USFWS White Nose Syndrome (WNS) Disinfectant Protocols (version 10.14.2020; WNS Decontamination Team 2020) during the survey.

USFWS Netting Guidelines

1. **Netting Season**: May 15 to August 15, when Indiana bats occupy summer habitat in Kentucky.

2. **Equipment** (Mist Nets): constructed of the finest, lowest visibility mesh commercially available – monofilament or black nylon – with the mesh size approximately 1½ inch (1¼ –1¾) (38 mm).

3. **Net Placement**: Mist nets extend approximately from water or ground level to overhanging canopy and are bounded by foliage on the sides. Net width and height are adjusted for the fullest coverage of the flight area at each site. A "typical" net set consists of nets "stacked" on top of one another with heights from 5 m (16 ft.) up to 8 m (30 ft.); width may vary up to 18 m (60 ft.).

4. **Minimum Level of Effort Per Net Site**:

   - Non-linear projects – minimum of nine net nights per 123 acres (0.5 square km) of suitable summer habitat outside of Appalachian Recovery Unit; and 42 net nights of effort inside the Appalachian Recovery Unit. No minimum distance apart, but net locations should be distributed throughout suitable habitat.

   - Minimum of three (calendar) nights of netting

   - Linear projects – Outside Appalachian Recovery Unit – minimum of two net nights; Inside Appalachian Recovery Unit – minimum of 10 net nights; (one net night = one net set deployed for one night) typically, one - three net sets are deployed at one site for one - three nights (fourth net added on third night), resulting in two - 10 net net-nights per km of suitable summer habitat.

   - Sample Period: begin at dusk and net for 5 hours

   - Nets are monitored at approximately 10-minute intervals

   - No disturbance near the nets between checks

5. **Weather Conditions**: Net only if the following weather conditions are met:

   - No more than 30 consecutive or cumulative minutes of precipitation

   - Temperature $\geq$ 10°C (50°F)

   - No strong winds (maximum of 4 m/s or 3 on Beaufort scale)

USFWS Netting Guidelines
6. **Moonlight**: Avoid net sets with direct exposure to a moon ½ -full or greater – typically by utilizing forest canopy cover

2.2 MIST NET SITE SELECTION

A qualified Indiana bat mist net surveyor chose suitable net locations within the Project. Net site selection targeted areas throughout the Project area that were suspected to have high amount of bat activity. Net site selection was also influenced by property access. Net placement was based on a variety of characteristics, including canopy cover, presence of potential flight areas, proximity to water, and forest conditions found within the Project area. General habitat types selected included the following characteristics:

- Large trees (>16 inches diameter-at-breast height [dbh]) that can support primary maternity roosts;
- An open canopy, allowing solar exposure for warming of roost sites;
- An open, uncluttered understory used for travel and foraging; and
- Stream area (or other water source) for drinking and prey presence

While riparian areas often provide successful mist net sites, upland areas (e.g., trails or logging roads) also provide suitable sites (Kiser and MacGregor 2005). In upland areas, road ruts or other areas of standing water frequently facilitate capture of a variety of bat species. The actual location and orientation of each mist net was determined in the field.

2.3 HABITAT ASSESSMENT

A habitat description and a sketch of the mist net location was completed on bat mist net datasheets (Appendix B). The emphasis of this description was habitat form: size and relative abundance of large trees and snags that may potentially serve as roost trees, canopy closure, understory clutter/openness, distance to water, stream or pond characteristics (if mist net was placed over them), and flight areas. Habitat form is emphasized because the Indiana bat is known to roost in several different species of trees (USFWS 2007). Tree species composition is included in the assessment because it provides insight to edaphic conditions of each site. In addition, biologists completed a USFWS habitat assessment, the associated datasheet can be found in Appendix B.

Habitat characterization identifies components of the dominant canopy species (DBH >16 inches) and subdominant canopy species (DBH < 16 inches). As defined in the Indiana Bat Habitat

Suitability Index Model (3D/Environmental 1995), dominant trees are the large trees in the canopy (> 16 inches DBH) that have the greatest likelihood of being used by maternity colonies of Indiana bats. Many smaller trees are often also found in the canopy, and in some situations, the canopy can be entirely composed of smaller-diameter trees.

Habitat for the northern long-eared bat is less understood, but apparently far more general than that of the Indiana bat (Schultes and Elliott 2002; Whitaker and Mumford 2009). While some studies have found this species using larger, older forests and roosts (Lacki and Schwierjohann 2001; Henderson and Broders 2008), others have found the species using smaller roosts and forest tracts (Whitaker and Mumford 2009; Schultes and Elliott 2002). Therefore, conditions for capture of the Indiana bat were considered adequate for sampling for northern long-eared bats as well.

The subcanopy, or understory, vegetation layer is well defined in classical ecological literature. It is that portion of the forest structure between the ground vegetation to approximately 0.6 m (2 ft) and the canopy layers, usually beginning at about 7.6 m (25 ft).

Vegetation in the understory may come from:

- Lower branches of overstory trees;
- Young overstory trees; or
- Small trees and shrubs that are confined to the understory

The amount of vegetation in the understory is termed clutter. Many species of bats, including the Indiana bat, tend to avoid areas of high clutter; however, northern long-eared bats are often found in areas of relatively high clutter (Carter and Feldhamer 2005).

2.4 BAT CAPTURE AND PROCESSING

Protocols for bat capture, handling, and equipment decontamination for WNS were followed at each mist net site. Additionally, USFWS COVID-19 guidance was followed during the surveys. The survey was conducted under USFWS permits TE13580D-1 and Kentucky Department of Fish and Wildlife Resources Scientific Wildlife Collecting Permit SC2111249.

2.5 WEATHER

Weather conditions were monitored each night of the survey. Conditions recorded include temperature, wind speed and direction, percent cloud cover, and moon phase (if visible). A standard digital thermometer was used to record temperature, wind speed was estimated by using the Beaufort wind scale, and cloud cover was visually estimated.

3.0 RESULTS

3.1 HABITAT DESCRIPTION

The Project required 9 net nights which were split between two mist net sites as shown in Appendix A. Habitat at the two mist net sites is briefly described below.

Mist net site 01 (MS-01) contained three net sets surveyed for two calendar nights (June 7-8). Net A was located across Pigeon Roost Fork just north of a bridge that crosses the stream. Net B was located just east of Pigeon Roost Fork under the bridge. Net C was located across Pigeon Roost Fork just south of the bridge. The overstory was dominated by sycamore (*Platanus occidentalis*), boxelder (*Acer negundo*), and tulip poplar (*Liriodendron tulipifera*) that were greater than 16 inches dbh. The dominant subcanopy species (trees with dbh less than 16 inches) include box elder (*Acer negundo*) and smooth sumac (*Rhus glabra*). The dominant shrub species include autumn olive (*Elaeagnus umbellata*), northern spicebush (*Lindera benzoin*), and Japanese knotweed (*Polygonum cuspidatum*). The site had a closed canopy. The potential for roost tree habitat is estimated to be moderate, and an overall habitat rating of good was assigned to this site.

The second mist net site (MS-02) was located near the northern most point of the project area approximately 2 miles from MS-01 and was surveyed for a single calendar night (June 10). Nets A, B and C were located across an upland road corridor that was adjacent to ponds/stream, upslope from Petercave Fork. The overstory was dominated by tulip poplar, northern red oak (*Quercus rubra*), and red maple (*Acer rubrum*) that were greater than 16 inches dbh. The dominant subcanopy tree species (less than 16 inches) were American elm (*Ulmus americana*), black walnut (*Juglans nigra*) and sycamore. The dominant shrub species include autumn olive and American elm. The site had moderate canopy closure. The potential for roost tree habitat is estimated to be moderate, and an overall habitat rating of good was assigned to this site.

A mist net site habitat description and field sketch are included on the datasheets found in Appendix B. Photos of the mist net site can be found in Appendix C.

3.2 BAT CAPTURE

No Indiana or northern long-eared bats were captured during this mist net survey. A total of fifty-seven (57) bats were captured including forty-six (46) big brown bats (*Eptesicus fuscus*), seven eastern red bats (*Lasiurus borealis*), and four eastern small-footed bats (*Myotis leibii*) were captured while conducting 2021 summer mist netting survey activities (Appendix B). Five big brown bats and one eastern red bat escaped from the net prior to having any measurements taken, and one eastern small-footed bat was recaptured. Table 3.1 shows the number of bat species captured and gender data taken during the survey. Field data sheets containing

morphometric data, capture locations, and time of capture for individual bats can be found in Appendix B.

Table 3.1. Bat species captured during mist net surveys for Martin County Solar, Martin County, Kentucky, June 2021.

Site	Adult Male	Adult Female		Total
		Pregnant	Non-reproductive	
Eastern red bat (*Lasiurus borealis*)	6	0	0	7
Eastern small-footed bat *(Myotis leibii*)	3	0	0	4
Big brown bat (*Eptesicus fuscus*)	14	15	12	46
Totals	**23**	**15**	**12**	**57**

3.3 WEATHER AND TEMPERATURE

One adverse weather event occurred on the third night of surveys in the form of rain persisting for over 30 minutes. As a result, surveys were conducted again the following night. Weather during the survey period started in the low seventies and started dropping after sunset and throughout the night into the high sixties. Cloud cover ranged from 20 percent to 95 percent during the first two nights of the survey period and ranged from 10 percent to 100 percent. There was very little wind during the entire survey period. Table 3.2 contains onsite weather data collected during survey period.

Table 3.2. Weather Recordings for Martin County Solar 2021 Mist Net Survey, Martin County, Kentucky

Site	Date	Temp.°F			Wind Speed[1]			Cloud Cover %		
		2100h	2300h	0200h	2100h	2300h	0200h	2100h	2300h	0200h
MS-01	7-June-21	74.0	69.4	67.3	0	0	0	70	80	50
MS-01	8-June-21	70.1	67.8	68.1	0	0	0	95	70	50
MS-02	9-June-21	74.5	71.6	-	0	0	-	80	100	-
MS-02	10-June-21	74.9	70.8	68.0	0	0	0	90	100	10

[1] Based on the Beaufort wind speed indicators
Data incomplete for 9-June-21 due to rain out

4.0 DISCUSSION

No federally listed bat species were captured during this 2021 summer mist net survey in Martin County, Kentucky. Forty-six (46) big brown bats (*Eptesicus fuscus*), seven eastern red bats (*Lasiurus*

borealis), and four eastern small-footed bats (*Myotis leibii*) were captured during survey efforts for this project.

Mist netting was conducted during June 7 – 10, 2021, a period during the summer Indiana bat maternity season (i.e., May, June, July, and August). Adverse weather conditions that would affect bat activity and capture efficacy were observed on the third night of netting, so that site was resurveyed the following night (USFWS 2020a; Table 1). Mist netting was conducted in areas with suitable Indiana bat habitat, which also is suitable for the northern long-eared bat. The deciduous hardwood forests within the project area provided suitable habitat for Indiana and northern long-eared bats, but neither species were captured at mist net locations within bat commuting and foraging habitat. Based on the data from mist net surveys at the proposed Ashwood Solar project, and the apparent absence of the Indiana and northern long-eared bat, a May Affect – Not likely to Adversely Affect determination is anticipated from the USFWS's Kentucky Field Office.

5.0 REFERENCES

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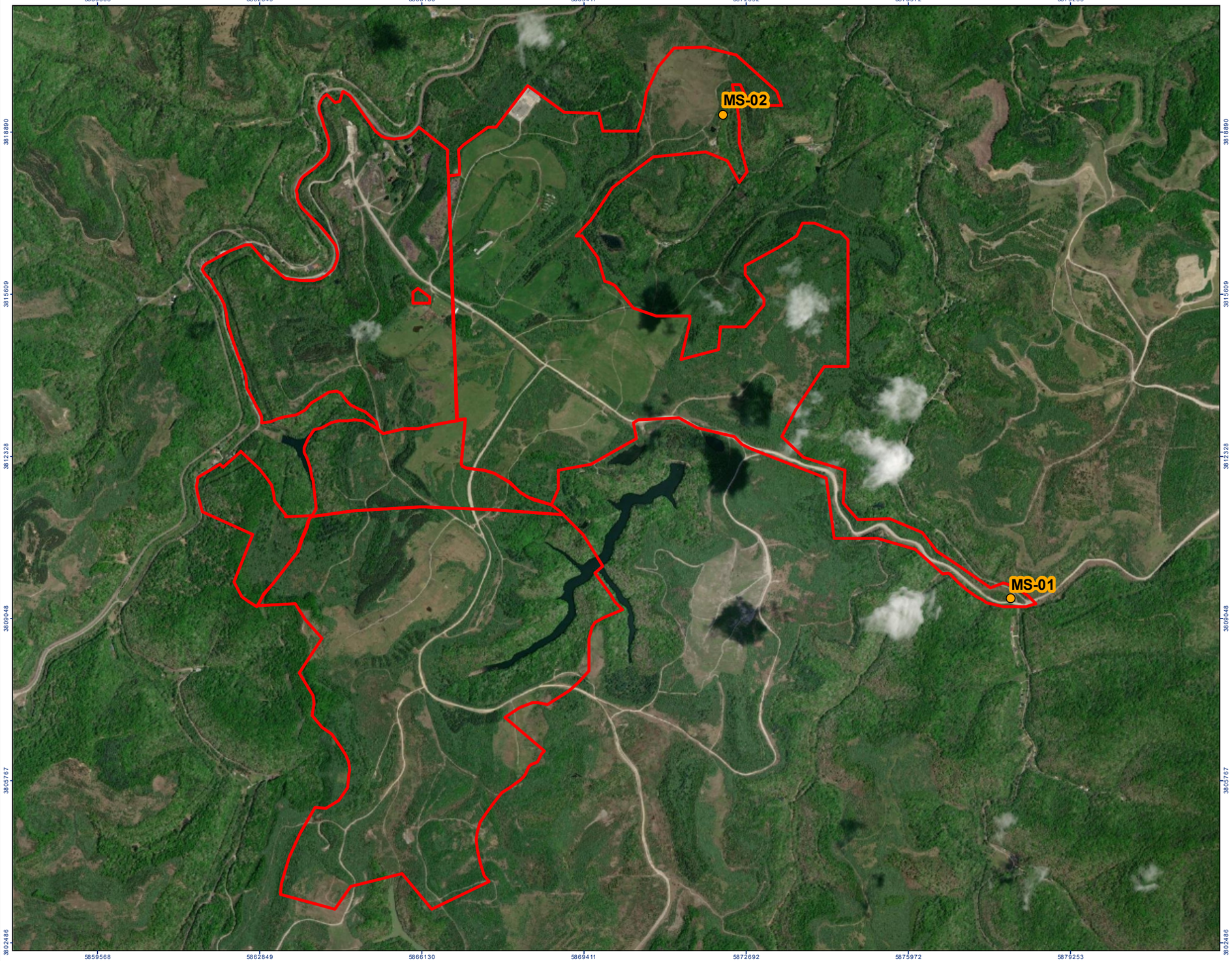
Appendix A PROJECT AREA MAP



Stantec

Legend

- Project Site
- Mist Net Site

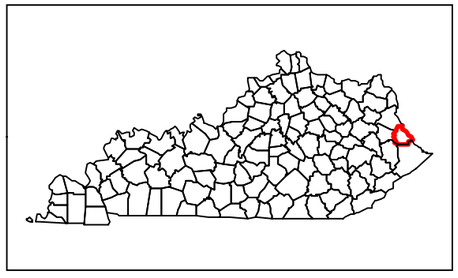
N

0 2,000 4,000 Feet

(At original document size of 11x17)
1:24,000

Notes

1. Coordinate System: NAD 1983 StatePlane Kentucky FIPS 1600 Feet
2. Data Sources: Imagery Date (5/8/2018)
3. Background: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community



Project Location

Wolf Creek Road (CR-1439)
Inez (Threeforks), Martin County, Kentucky

Prepared by SPK on 2021-06-16
TR by JW on 2021-06-17
IR Review by JA on 2020-06-17

Client/Project

Martin County Solar Project, LLC
Martin County Solar Project I & II
Mist Net Sites

172658261 REVA

Figure No.

1

Title

Mist Net Site Locations

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Appendix B BAT MIST NET DATA SHEETS

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Bat Capture Data Sheet

Project Name/No.: Martin Co. Solar **Date:** 6/7/21 **Biologist(s):** Julia Wilson, Shane Kelley

Site Name/No.: MS-01 **State/County:** KY/Martin **GPS (D:D:S):** 37.738256, -82.440020

Map Kilometer No.: _____ **Nets Opened:** 20:50 **Nets Closed:** 1:50 **Moon Phase:** Waning Crescent

Site Location: Under bridge along Pigeon roost Fork

Time	Temp	Wind	Cloud Cover
21:00	74.0	0	70
22:00	71.0	0	70
23:00	69.4	0	80%
00:00	68.1	0	20%
01:00	66.8	6	40
02:00	67.3	0	50

Beaufort Wind Scale	
Scale	Wind Speed Indicators
0	Smoke rises vertically (<1 mph)
1	Wind direction shown by smoke drift (1-3 mph)
2	Wind felt on face; leaves rustle (4-7 mph)
3	Leaves, small twigs in constant motion (8-12 mph)
4	Dust rises, small branches move (13-18 mph)
5	Small trees in leaf begin to sway (19-24 mph)

Net	Length	Height	Road	Stream	Pond	Cave/ Portal	Other
A	6	9		X			Bridge
B	18	9					Under bridge
C	9	6		X			

No.	Species	Time	Age	Sex	Repro.*	RFA (mm)	Wt (g)	Guano (Y/N)	Net/Location	WNS Wing Score
1	EPFU	21:00	A	F	B L	46.0	20.5	N	B/4	0
2	EPFU	21:00	A	F	L	47.4	19.0	N	B/5	0
3	EPFU	21:00	A	M	NR	45.9	16.5	N	B/7	0
4	EPFU		A	F	P	48.9	22.5	N	B/3	0
5	EPFU		A	F	L	48.8	19.5	N	B/3	0
6	EPFU		A	M	NR	49.3	17.75	N	B/4	0
7	EPFU		Escaped From Bag					N	B/2	0
8	EPFU		A	F	L	47.65	17.5	N	B/1.5	0
9	EPFU		A	F	P	49.7	26.25	N	B/5	0
10	EPFU		A	F	P	48.1	28.5	N	B/4	0
11	MYLE	21:15	A	M	NR	31.4	5.0	N	B/3.5	0
12	EPFU	21:00	Escaped	From	Net				B/6	
13	EPFU	21:30	Escaped	From	Net				B/3M	

If found, please return to
Stantec Consulting Services Inc
10509 Timberwood Circle, Suite 100
Louisville, Kentucky 40223-5301

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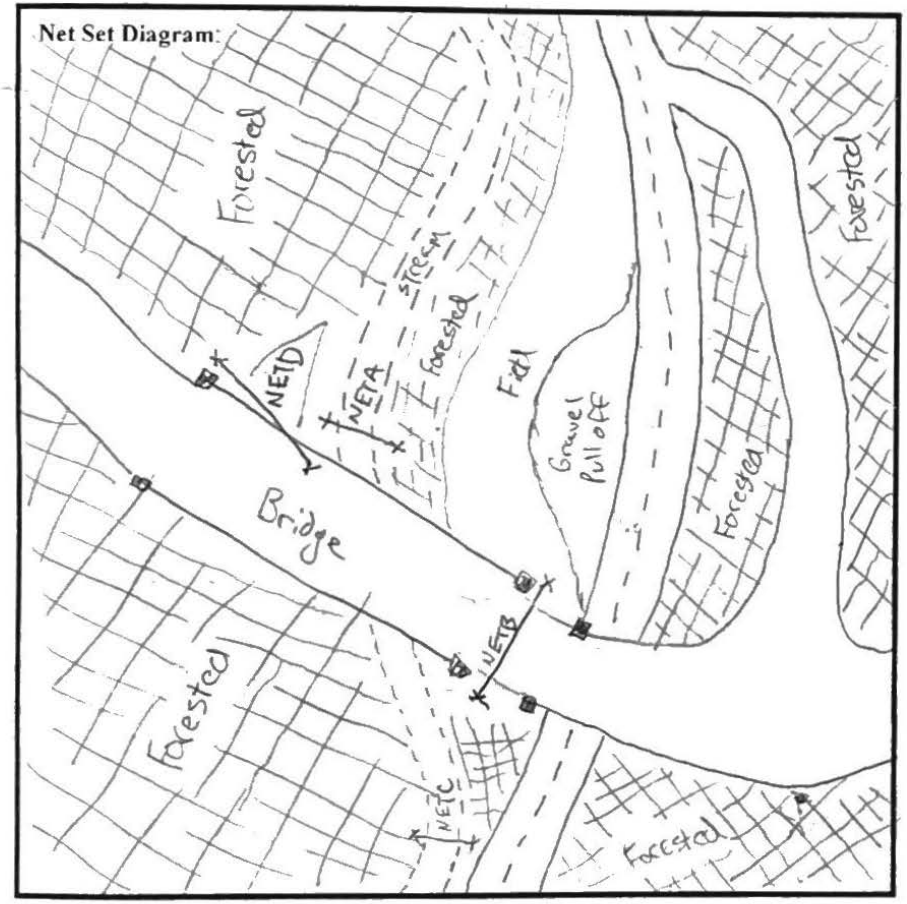
Bat Capture Data Sheet

NET SITE HABITAT DESCRIPTION

Net Set Diagram:



Project Name/No.: Martin County Solar / 172656261

Date: 6/7/2021 Site Name: MS-01

Estimated Distance to Water Source: 0 Ft

Other Wildlife Observations BWWA, ACEL, WHIP, WOTH, ~~REVI~~ WEVI, INBU, AMCR, CAWR, BAWA, YBCU, ESOW, ~~SCT~~

STREAM CHARACTERISTICS

Bank Height: 0.75m Channel Width: 6m

Stream Width: 5.5 m Riparian Width: (rt bank) 3M (lt bank) 30 m

Avg. Water Depth: .75m % Canopy Cover 70%

% Substrate type: Bedrock ___, Boulder X, Cobble X, Gravel X, Sand X, Fines ___.

VEGETATION

Estimated Canopy Closure: (closed) moderate open

Dominant Canopy Species Avg. DBH range 30in

1. Platanus occidentalis 2. Acer negundo 3. Liriodendron Tulipifera

Roost Tree Potential consists of: Large Trees Snags Both

Roost Tree Potential for Area: High Moderate Low

Dominant Subcanopy Species Rhus

1. ~~Acer~~ negundo 2. ~~Rosa~~ glabra 3. ___

Dominant Shrub Species

1. ~~Rosa~~ Elaeagnus umbellata 2. Lindera benzoin 3. Polygonum cuspidatum

Comments: ___

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Bat Capture Data Sheet

Project Name/No.: Martin Co **Site Name/No.:** MS-01/172658261 **Date:** 6/7/21

No.	Species	Time	Age	Sex	Repro.*	RFA (mm)	Wt (g)	Guano (Y/N)	Net/Location	Band and/or Specimen # (e.g., Hair, Wing Punch)
14	EPFU	21:30	A	F/R	NR	48.1	22.5	N	B/3M	0
15	EPFU	22:00	A	F	P	49.5	25.0	N	B/4M	0
16	LABO	22:00	A	M	NR	39.25	11.5	N	B/6.5M	0
17	EPFU	22:00	A	F	P	49.2	22.5	N	B/4.5M	0
18	EPFU	22:00	A	F	P	46.4	27.5	N	B/5M	0
19	EPFU	22:00	A	M	DESC.	49.4	19.5	N	A/4M	0
20	LABO	22:10	Escaped From Net					→	B/7.5	
21	EPFU	22:25	A	F	P	49.5	25.5	N	B/5	0
22	EPFU	22:25	A	M	NR	48.0	18.0	N	B/3.5	0
23	EPFU	22:25	A	F	L	48.2	22.0	N	B/3.0	0
24	EPFU	22:40	A	F	L	48.7	23.5	N	B/7.5	0
25	EPFU	22:40	A	F	L	49.2	21.5	N	B/8.0	0
26	EPFU	22:40	Escaped From net					N	B/8.5	0
27	EPFU	23:00	A	F	P	48.6	22.5	N	B/6	0
28	EPFU	23:10	A	F	L	46.1	22.0	N	B/7	0
29	EPFU	23:30	A	F	P	49.2	28.0	N	B/7	0
30	EPFU	23:30	A	F	P	50.7	26.0	N	B/6	0
31	EPFU	23:30	A	F	NR	45.7	17.5	N	B/4	0
32	EPFU	23:30	Escaped from net					N	B/7	0
33	EPFU	00:00	A	F	P	48.8	31.5	N	B/8.5	0
34	EPFU	0:15	A	F	L	47.6	21.8	N	B/4.0	0
35	EPFU	0:40	A	F	P	45.9	23.5	N	B/7.5	0
36	EPFU	1:10	A	M	NR	48.0	18.5	N	B/6.0	0
37	EPFU	1:10	A	M	NR	49.1	19.75	N	B/7.0	0
38	EPFU	01:30	A	F	P	48.9	30.5	N	B/7.0	0
39	EPFU	01:30	A	M	NR	47.6	22.5	N	B/8.0	0
40	EPFU	01:30	A	M	DESC.	49.4	22.5	N	B/7.5	0

Bat bag

Huge engorged tick

*Reproduction: P – Pregnant; L – Lactating; PL – Post Lactating; ↑ - Testes Ascended; ↓ - Testes Descended

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Bat Capture Data Sheet

Project Name/No.: Martin County Solar **Site Name/No.:** MS-01 **Date:** 6/7/21

No.	Species	Time	Age	Sex	Repro.*	RFA (mm)	Wt (g)	Guano (Y/N)	Net/Location	Band and/or Specimen # (e.g., Hair, Wing Punch)
41	EPFU	01:30	A	M	NR	45.9	20.5	N	B/3.0	
42	EPFU	01:40	A	M	NR	46.3	20.25	N	B/6.00	

*Reproduction: P – Pregnant; L – Lactating; PL – Post Lactating; ↑ - Testes Ascended; ↓ - Testes Descended

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Bat Capture Data Sheet

Project Name/No.: Martin County Solar/172658261 **Date:** 6/8/2021 **Biologist(s):** Julia Wilson, Shane Kelley

Site Name/No.: MS-01 **State/County:** KY/Martin **GPS (D:D:S):** 37.738256, -82.440020

Map Kilometer No.: _____ **Nets Opened:** 20:50 **Nets Closed:** 1:50 **Moon Phase:** Waning Crescent

Site Location: MS-01 - Under bridge over Pigeonroost Fork

Time	Temp	Wind	Cloud Cover
21:00	70.1	0	95%
22:00	68.7	0	60%
23:00	67.8	0	70%
00:00	68.8	0	80%
0100	68.4	0	80%
0200	68.1	0	50%

Beaufort Wind Scale	
Scale	**Wind Speed Indicators**
0	Smoke rises vertically (<1 mph)
1	Wind direction shown by smoke drift (1-3 mph)
2	Wind felt on face, leaves rustle (4-7 mph)
3	Leaves, small twigs in constant motion (8-12 mph)
4	Dust rises; small branches move (13-18 mph)
5	Small trees in leaf begin to sway (19-24 mph)

Net	Length	Height	Road	Stream	Pond	Cave/ Portal	Other
A	6m	9m		x			
B	18m	9m					Under Bridge
D	9m	6m					Bridge corridor

No.	Species	Time	Age	Sex	Repro.*	RFA (mm)	Wt (g)	Guano (Y/N)	Net/Location	WNS Wing Score
1	MYLE	21:20	A	M	NR	31.4	5.5	N	B/3m	0
2	MYLE	21:40	Recapture						D/5m	0
3	EPFU	21:55	A	F	L	49.4	23.0	N	B/7m	0
4	EPFU	22:10	A	F	L	49.0	25.5	N	B/7.5m	0
5	EPFU	22:35	A	F	P	49.5	27.8	N	B/6	0
6	LABO	23:15	A	M	Escaped	Nt			A/3m	
7	EPFU	23:15	A	M	NR	48.3	21.3	N	B/6.5m	0
8	MYLE	0:00	A	M	NR	31.5	7.0	N	B/7m	0
9	EPFU	0:30	A	F	P	49.4	28.0	N	B/8m	0
10	EPFU	01:10	A	M	DESC	49.2	20.0	N	B/8m	0
11	EPFU	01:40	A	M	NR	49.1	18.0	N	B/7m	0
12	EPFU	01:55	A	M	DESC	47.9	18.0	N	B/8m	0

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Bat Capture Data Sheet

Project Name/No.: Martin County Solar / 172658261

Date: 6/8/2021 Site Name: MS-01

Estimated Distance to Water Source: 0

Other Wildlife Observations YBCU, BAWA, PIWO, NOCA, WOTH, CAWA, CACH, BLJA, REVI, OVEN, WEVI, TUTI, EATO, LOWA, MODO, NOPA, BWWA, COYE, SCTA

NET SITE HABITAT DESCRIPTION

Net Set Diagram:

See Previous Data Sheet

STREAM CHARACTERISTICS

Bank Height:_____ Channel Width:_____

Stream Width:_____ Riparian Width: (rt bank)_____(lt bank)_____

Avg. Water Depth:_____ % Canopy Cover_____

% Substrate type: Bedrock____, Boulder_____, Cobble_____, Gravel_____, Sand _____, Fines_____.

VEGETATION

Estimated Canopy Closure: closed moderate open

Dominant Canopy Species Avg. DBH range_____

1._____ 2._____ 3._____

Roost Tree Potential consists of: Large Trees Snags Both

Roost Tree Potential for Area: High Moderate Low

Dominant Subcanopy Species

1._____ 2._____ 3._____

Dominant Shrub Species

1._____ 2._____ 3._____

Comments: 15 EPFU, approximately, were observed emerging from opposite side of bridge

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Bat Capture Data Sheet

Project Name/No.: Martin Co. **Date:** 6/9/21 **Biologist(s):** Julia Wilson, Shane Kelley

Site Name/No.: MS-02 **State/County:** KY/Martin **GPS (D:D:S):** 37.765531, -82.459568

Map Kilometer No.: _____ **Nets Opened:** 20:50 **Nets Closed:** 01:00 **Moon Phase:** Waning Crescent

Site Location: Upland road corridor adjacent to ponds/stream, upslope from Peterave Fork

Time	Temp	Wind	Cloud Cover
21:00	74.5	0	80
22:00	72.3	0	100
23:00	71.6	0	100
00:00	70.1	1	100
01:00	70.0	1	100
	Rain out		

Beaufort Wind Scale	
Scale	Wind Speed Indicators
0	Smoke rises vertically (<1 mph)
1	Wind direction shown by smoke drift (1-3 mph)
2	Wind felt on face, leaves rustle (4-7 mph)
3	Leaves, small twigs in constant motion (8-12 mph)
4	Dust rises; small branches move (13-18 mph)
5	Small trees in leaf begin to sway (19-24 mph)

Net	Length	Height	Road	Stream	Pond	Cave/ Portal	Other
A	9m	9m	X		~		
B	6m	6m	X				
C	9m	9m	X				

No.	Species	Time	Age	Sex	Repro.*	RFA (mm)	Wt (g)	Guano (Y/N)	Net/Location	WNS Wing Score
–	American robin	20:50							C/2.5m	
–	Louisiana waterthrush	21:00							A/3m	
–	Swainson's warbler	21:00							B/2m	
	Rain Out – No bats									

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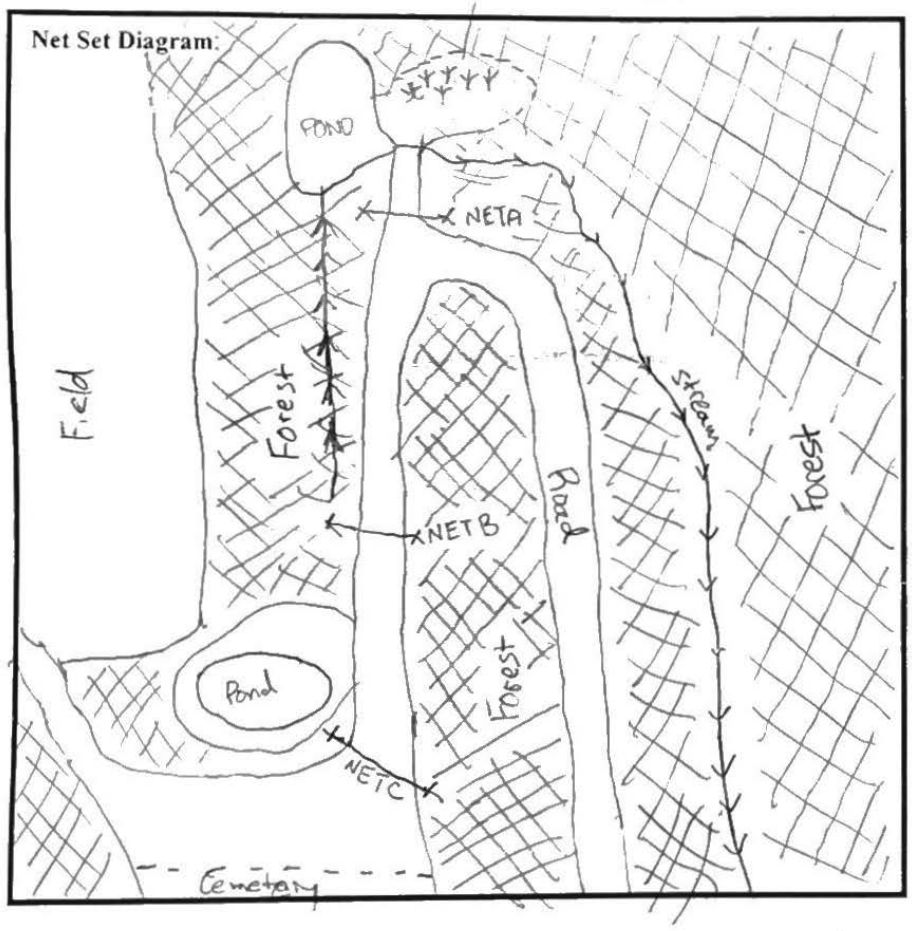
Bat Capture Data Sheet

NET SITE HABITAT DESCRIPTION

Net Set Diagram:



Project Name/No.: Martinco

Date: 6/9/21 Site Name: MS-02

Estimated Distance to Water Source: 20m

Other Wildlife Observations CEDA, CAWR, SCTA, NAMO, NOBO, MODO, OVEN, HOWA, YBCU, WEVI, INBU, EAWP, DOWO, AMCR, WOTH, PRWA, AMRO, WHIP, NOCA, REVI, KILL, RWBL, LOWA, ACFL, COYT, SWWA, ESOW, Green frog, northern watersnake, American toad, spring peepers, coyotes

STREAM CHARACTERISTICS

Bank Height:_____ Channel Width:_____

Stream Width:_____ Riparian Width: (rt bank)_____ (lt bank)_____

Avg. Water Depth:_____ % Canopy Cover_____

% Substrate type: Bedrock___, Boulder_____, Cobble_____, Gravel_____, Sand _____, Fines_____.

VEGETATION

Estimated Canopy Closure: closed (moderate) open

Dominant Canopy Species Avg. DBH range 20-30 in

1. Liriodendron tulipifera 2. Quercus alba 3. Acer rubrum

Roost Tree Potential consists of: Large Trees Snags Both

Roost Tree Potential for Area: High (Moderate) Low

Dominant Subcanopy Species

1. Ulmus americana 2. Juglans nigra 3. Picicnus accidentalis

Dominant Shrub Species

1. Or Eleagnus umbellata 2._____ 3. Ulmus americana

Comments: Road corridor adjacent to two wetlands/ponds

Prior to netting, it rained the entirety of the day

Rained for 15 minutes of survey, brief fog

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Bat Capture Data Sheet

Project Name/No.: Martin Co. **Date:** 6/10/21 **Biologist(s):** Julia Wilson, Shane Kelley

Site Name/No.: MS-02 **State/County:** KY/Martin **GPS (D:D:S):** 37.765531, -82.459568

Map Kilometer No.: _____ **Nets Opened:** 20:52 **Nets Closed:** 01:52 **Moon Phase:** New moon

Site Location: See previous datasheet

Time	Temp	Wind	Cloud Cover
21:00	74.9	0	90
22:00	71.4	0	100
23:00	70.8	0	100
0:00	69.9	0	75
1:00	69.3	0	50
02:00	68.0	0	10

Beaufort Wind Scale	
Scale	Wind Speed Indicators
0	Smoke rises vertically (<1 mph)
1	Wind direction shown by smoke drift (1-3 mph)
2	Wind felt on face; leaves rustle (4-7 mph)
3	Leaves, small twigs in constant motion (8-12 mph)
4	Dust rises, small branches move (13-18 mph)
5	Small trees [illegible] begin to sway (19-24 mph)

Net	Length	Height	Road	Stream	Pond	Cave/ Portal	Other
A	9	9 m	X				
B	6	6 m	X				
C	9	9 m	X				

No.	Species	Time	Age	Sex	Repro.*	RFA (mm)	Wt (g)	Guano (Y/N)	Net/Location	WNS Wing Score
1	LABO	21:40	A	M	NR	40.1	11.5	N	B/2.5m	0
2	LABO	22:50	A	M	NR	40.1	14.0	N	B/0.2 m	0
3	LABO	23:05	A	M	NR	39.5	15.0	N	B/4m	0
4	LABO	00:25	A	M	NR	40.1	—	N	A/1.5m	0

Lg. hole in wing same individual as (1)

Recap

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Bat Capture Data Sheet

NET SITE HABITAT DESCRIPTION

Net Set Diagram:

See previous datasheet

Project Name/No.: NORTH CO

Date: 6/10/21 Site Name: MS-02

Estimated Distance to Water Source: ~~Over~~ 20m

Other Wildlife Observations COYE, EATO, WEVI, BLJA, MODO, LOWA, NOBO, HOWA, WHIP, ESAW, WITH, OVEN, BARO, YBCU

wood frog, killifish, green frog, spring peepers

~~BOGA~~ LACP observed flying @ dusk

STREAM CHARACTERISTICS

Bank Height:_____ Channel Width:_____

Stream Width:_____ Riparian Width: (rt bank)_____(lt bank)_____

Avg. Water Depth:_____ % Canopy Cover_____

% Substrate type: Bedrock____, Boulder_____, Cobble_____, Gravel_____,

Sand ____, Fines_____.

VEGETATION

Estimated Canopy Closure: closed moderate open

Dominant Canopy Species Avg. DBH range_____

1._____ 2._____ 3._____

Roost Tree Potential consists of: Large Trees Snags Both

Roost Tree Potential for Area: High Moderate Low

Dominant Subcanopy Species

1._____ 2._____ 3._____

Dominant Shrub Species

1._____ 2._____ 3._____

Comments:_____

Appendix C PHOTOGRAPHS

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Photographic Log

Client:	**Martin County Solar, LLC**	**Project:**	**Martin County Solar**
Site Name:	**Mist Net Site Locations**	**Site Location:**	**Martin County, Kentucky**

Photograph ID: 1

Photo Location:
MS-01 Net A

Longitude/Latitude :
37.738256, -82.440020

Survey Date:
6/7/2021

Comments:
Net A facing south.

Photograph ID: 2

Photo Location:
MS-01 Net B

Longitude/Latitude :
37.738256, -82.440020

Survey Date:
6/7/2021

Comments:
Net B facing east.

Client:	**Martin County Solar, LLC**	**Project:**	**Martin County Solar**
Site Name:	**Mist Net Site Locations**	**Site Location:**	**Martin County, Kentucky**

Photograph ID: 3

Photo Location:
MS-01 Net C

Longitude/Latitude :
37.738256, -82.440020

Survey Date:
6/7/2021

Comments:
Net C facing south.

Photograph ID: 4

Photo Location:
MS-01 Net D

Longitude/Latitude :
37.738256, -82.440020

Survey Date:
6/8/2021

Comments:
Net C facing south.

Client:	**Martin County Solar, LLC**	**Project:**	**Martin County Solar**
Site Name:	**Mist Net Site Locations**	**Site Location:**	**Martin County, Kentucky**

Photograph ID: 5

Photo Location:
MS-02 Net A

Longitude/Latitude :
37.765531, -82.459568

Survey Date:
6/9/2021

Comments:
Net A facing north.

Photograph ID: 6

Photo Location:
MS-02 Net B

Longitude/Latitude :
37.765531, -82.459568

Survey Date:
6/9/2021

Comments:
Net B facing north.

Client:	**Martin County Solar, LLC**	**Project:**	**Martin County Solar**
Site Name:	**Mist Net Site Locations**	**Site Location:**	**Martin County, Kentucky**

Photograph ID: 7

Photo Location:
MS-02 Net C

Longitude/Latitude :
37.765531, -82.459568

Survey Date:
6/9/2021

Comments:
Net C facing north.

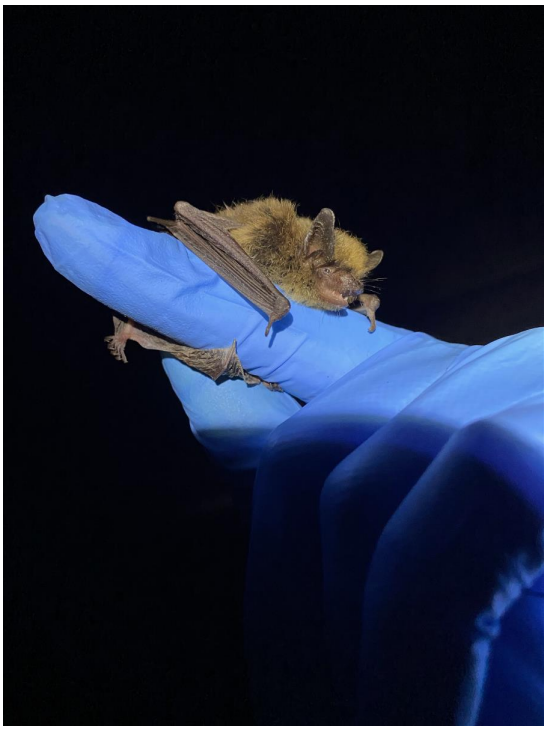
Photograph ID: 8

Photo Location:
MS-01

Longitude/Latitude :
37.738256, -82.440020

Survey Date:
6/7/2021

Comments:
Myotis leibii captured from Site MS-01



Client:	**Martin County Solar, LLC**	**Project:**	**Martin County Solar**
Site Name:	**Mist Net Site Locations**	**Site Location:**	**Martin County, Kentucky**

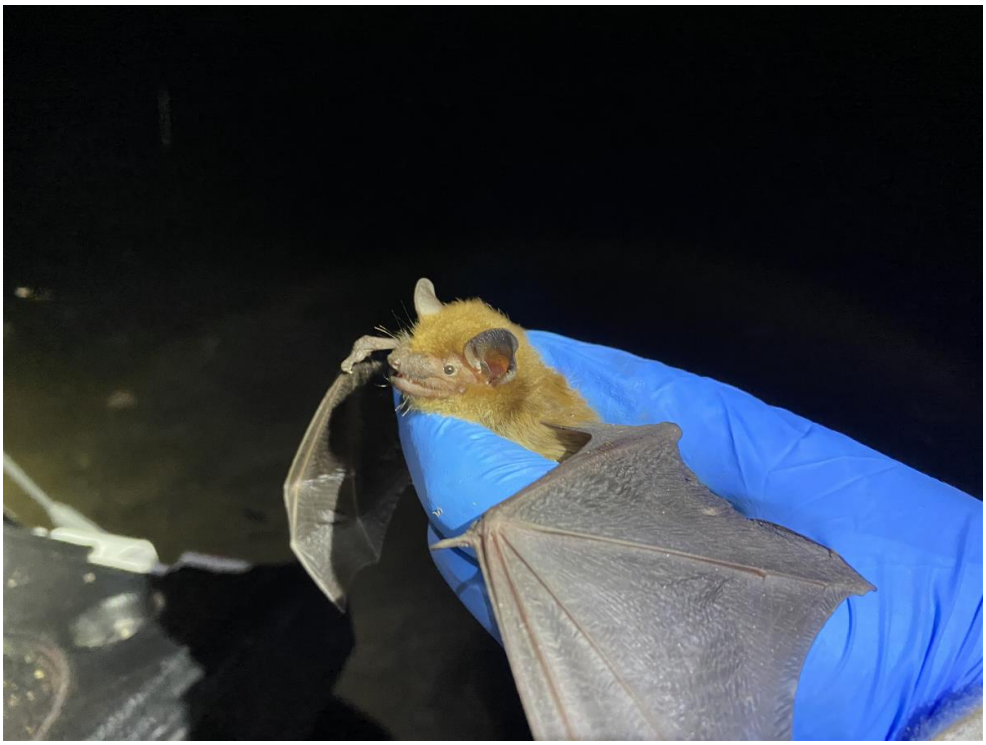
Photograph ID: 9

Photo Location:
MS-01

Longitude/Latitude :
37.738256, -82.440020

Survey Date:
6/7/2021

Comments:
Eptesicus fuscus captured from Site MS-01



Photograph ID: 10

Photo Location:
MS-02

Longitude/Latitude :
37.765531, -82.459568

Survey Date:
6/23/2021

Comments:
Lasiurus borealis captured from Site MS-02