

Appendix L

BAT MIST-NET SURVEY REPORT

Mantle Rock Solar LLC

Livingston County, Kentucky



COPPERHEAD
ENVIRONMENTAL CONSULTING

Summer 2023 Mist-Net Survey for the Mantle Rock Solar Project, Livingston, Kentucky

IPaC Consultation Code: 2023-0072336

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INTRODUCTION

Copperhead Environmental Consulting, Inc. (Copperhead) was requested by Enerfin Renewables, LLC (Enerfin) to conduct a summer listed bat presence/probable absence survey for the proposed Mantle Rock Solar Project (Project) in Livingston County, Kentucky. The survey documented the presence/probable absence (P/A) of the federally endangered Indiana bat (*Myotis sodalis*), and northern long-eared bat (*Myotis septentrionalis*), and the proposed federally endangered tricolored bat (*Perimyotis subflavus*), collectively referred to as listed species. Based on information supplied to Copperhead by Enerfin, the Project is anticipated to impact up to 76.7 acres of forest and blasting will not be required.

METHODS

Level of Effort

Mist-net surveys were implemented in accordance with the 2023 USFWS *Range-Wide Indiana Bat and Northern Long-Eared Bat Survey Guidelines* (USFWS 2023; Guidance). Based on the Guidance for the required number of net nights¹ (nn) for non-linear projects, the requisite mist-net survey level of effort (LOE) for Indiana bats is 6 nn per 123 acres of impacted forested habitat, and the requisite LOE for northern long-eared bats is 10 nn per 123 acres of impacted forested habitat. Since the mist-net survey was to document the presence/probable absence of both Indiana and northern long-eared bats, the higher northern long-eared bat survey LOE was used. Based on the estimated amount of forested habitat within the Project that will be directly impacted (76.7 ac), 10 nn was surveyed to provide regulatory compliance for the Project.

A study plan was submitted to the U.S. Fish & Wildlife Service (USFWS) Kentucky Field Office and Kentucky Department of Fish and Wildlife Resources (KDFWR) on 8 June 2023 and concurrence was received from USFWS and KDFWR on 12 June 2023. USFWS stated the survey would serve as a P/A survey for Indiana and northern long-eared bats. The mist-net survey was conducted under Copperhead Consulting's USFWS Federal Fish and Wildlife Permit #ES94849B-2, and KDFWR Scientific Collecting Permit #SC2311027.

Mist-Net Survey

Prior to the survey, Copperhead biologists conducted field reconnaissance of the Project to select mist-net locations best suitable for bat capture. Mist-nets were set up to maximize coverage of flight paths used by bats along suitable travel corridors, foraging areas, or drinking areas. Placement of mist-nets were based on the extent of canopy cover, presence of an open flyway,

¹ Net night (nn) is defined as one net set deployed for a period of one calendar night.

and forest conditions near the site. The actual location and orientation of each net was determined in the field by biologists permitted to survey federally listed bats.

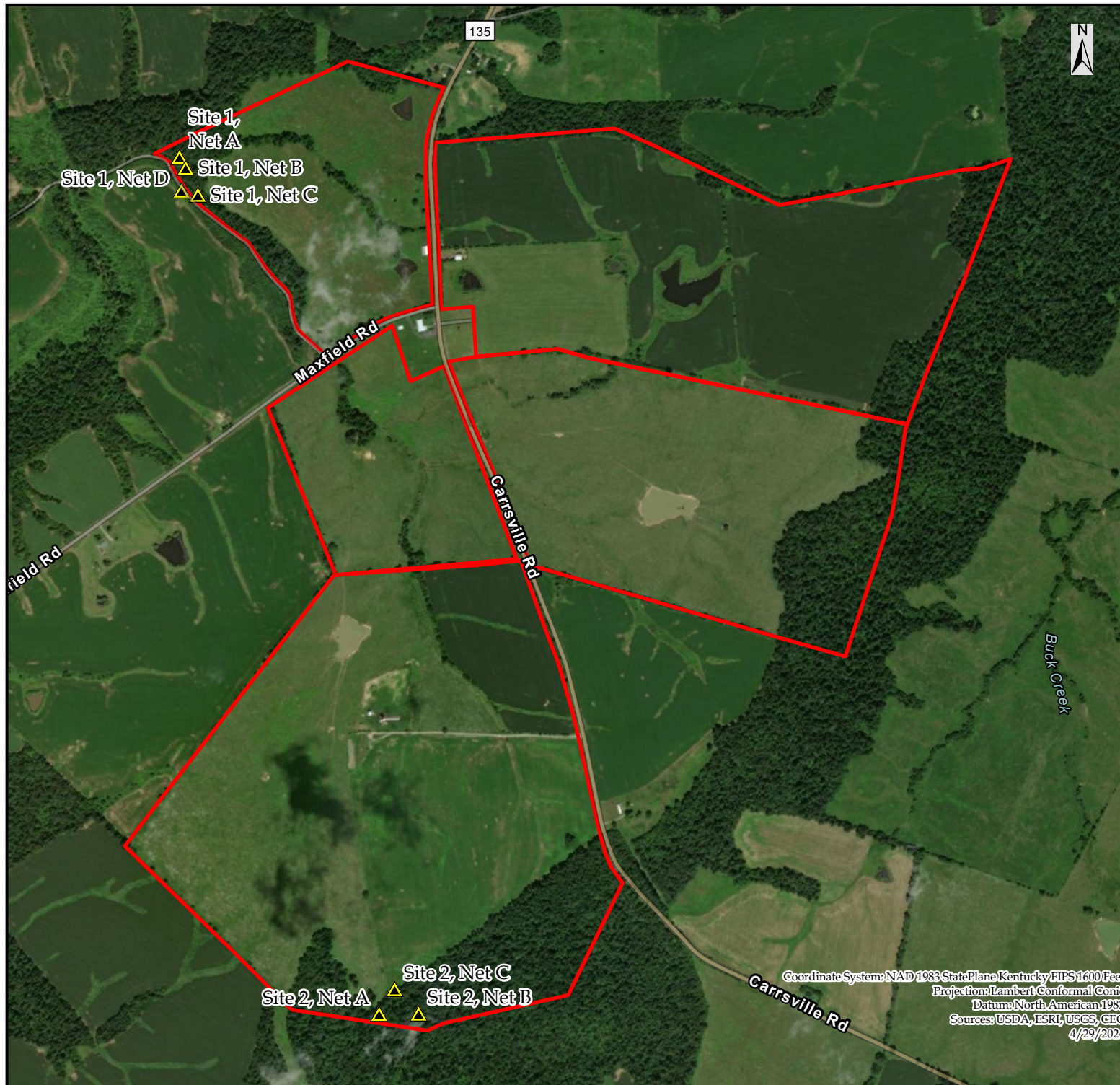
Based on prior coordination with USFWS and the different types of habitat within the project area, the requisite LOE of 10 nn was split between two net sites. One site was surveyed using three mist-nets for two calendar nights and one mist-net for one calendar night, and the second site was surveyed using three mist-nets for one calendar night, totaling 10 nn for the Project (Table 1; Figure 1). Low visibility, high-quality, nylon nets, 6 to 12-meters in length and 2.6 to 5.2-meters high constituted a mist-net set. The length and height of each mist-net was selected based on the width and height of the corridor/feature being surveyed. Mist-net set locations were recorded using a handheld Global Positioning System (GPS) unit, and mapped with ArcGIS (v. 10.6.1 ESRI, Redlands, CA).

Table 1. Mist-net locations for the Mantle Rock Solar Project, Livingston County, Kentucky.

Site No.	Net	Dates Surveyed (2023)	Net Nights Completed	Latitude	Longitude
1	A	12, 13 June	2	37.31946	-88.39784
1	B	12, 13 June	2	37.31925	-88.39768
1	C	12 June	1	37.31872	-88.39736
1	D	12, 13 June	2	37.31880	-88.39777
2	A	14 June	1	37.30259	-88.39228
2	B	14 June	1	37.30262	-88.39130
2	C	14 June	1	37.30308	-88.39191

Mist-nets were set prior to sunset and deployed at dusk. Nets were left open for at least five hours after sunset each night and checked every 10 minutes. Disturbance near the nets was kept to a minimum. Weather data, including temperature, relative wind speed, and cloud cover was recorded on an hourly basis to ensure compliance with mist-netting guidelines (e.g., temperature during survey > 50°F, precipitation that exceeds one half hour, or sustained wind speeds >9 mph).

Bats were live-caught and released unharmed near the point of capture. Data recorded for each individual included time of capture, capture net, capture height, species, sex, age class, reproductive condition, mass, and forearm length. Processing of bats was completed within 30 minutes from the time the bat was removed from the net.



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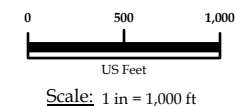
Prepared for:

Enerfin Renewables, LLC

FIGURE 1:
Mist-Net Locations for the
Mantle Rock Solar Project
Livingston County, Kentucky

Legend

- Project Area
- ▲ Mist-net Locations



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White-Nose Syndrome Protocols

To minimize the transmission of White-Nose Syndrome (WNS) between captured bats, all netting and field activities followed the October 2020 *National White-Nose Syndrome Decontamination Protocol* (WNSDMWG 2020). All hard, non-porous netting equipment was sanitized with Isopropyl alcohol wipes (minimum of 70%) prior to arrival and after each survey night; all other equipment was submersed in hot water (131°F) for a minimum of five minutes. Disposable latex gloves were worn over sanitized handling gloves and changed following the handling of each bat. All non-disposable equipment (e.g., PESOLA® scales, rulers, calipers, etc.) that came into contact with a bat was sanitized immediately following the handling of each bat. Bats were evaluated for potential WNS infection through wing scoring following the *Wing-Damage Index Used for Characterizing Wind Condition of Bats Affected by White-nose Syndrome* (Reichard 2008).

Covid-19 and Rabies Protocol

To minimize the potential for transmission of COVID-19, Copperhead conducted all field survey activities in accordance with *Guidance for Fish and Wildlife Service Employees Engaging in Activities with Bats* (USFWS 2020) and our specific federal and state permit guidelines. Copperhead employees were outfitted with COVID-specific personal protective equipment including disposable gloves, disposable, or site-dedicated clothing, and non-vented N95 masks (or another mask that provides a similar level of protection). All unnecessary handling of bats was reduced. Employees who had previously tested positive for COVID-19, or were suspected to have COVID-19, were not allowed to work on the Project until the most current Center for Disease Control criteria for when infected persons can safely be around others were met. Additionally, while in the field, personnel monitored themselves and each other for signs of COVID-19 infection. No employees displayed signs of infection while working on the Project. All Copperhead employees coming in direct contact with bats had up-to-date rabies vaccinations.

RESULTS

Mist-Netting Results

A total of one big brown bat (*Eptesicus fuscus*), 21 eastern red bats (*Lasiurus borealis*), and one evening bat (*Nycticeius humeralis*) were captured (Table 2). No Indiana bats, northern long-eared bats, or tricolored bats were captured. Bat capture, site information, weather and habitat data are provided in Appendix A. Mist-net photographs are provided in Appendix B.

Table 2. Summary of bat captures by species, age, sex, and reproductive condition for the Mantle Rock Solar Project, Livingston County, Kentucky.

Species	Adult Male		Adult Female				Juvenile		U	Total
	N	TD	P	L	PL	N	Male	Female		
<i>Eptesicus fuscus</i>	1	-	-	-	-	-	-	-	-	1
<i>Lasiurus borealis</i>	4	-	1	14	-	-	-	-	2	21
<i>Nycticeius humeralis</i>	1	-	-	-	-	-	-	-	-	1
Total	6	-	1	14	-	-	-	-	2	23

N = non-reproductive; TD = testes descended; L = lactating; P = pregnant; PL = post lactating, U = unknown (escape at net)

Weather Conditions

Weather conditions remained suitable (i.e., no temperatures below 50°F, no strong winds, and/or no precipitation or fog) on 12, 13, and 14 of June.

Habitat

The Project is located north of Hampton, Kentucky and is a mixture of forested habitat and agricultural fields. Land cover at the survey site was considered moderate as the woodlots are small and surrounded by agriculture fields. Forest structure was moderate, containing trees with diverse age classes and diameter varying from 5-inch to over 15-inches. Common tree species within the Project were beech (*Fagus grandifolia*), black walnut (*Juglans nigra*), sugar maple (*Acer saccharum*), bitternut hickory (*Carya cordiformis*), hackberry (*Celtis occidentalis*), slippery elm (*Ulmus rubra*) and red oak (*Quercus rubra*). Water resources were considered poor to moderate, with a couple ephemeral streams throughout the project boundary. Roost habitat was moderate with snags or trees with sloughing bark greater than 5-inch diameter present.

CONCLUSIONS

The mist-net survey meets the suggested LOE of 10 nm to determine the P/A of federally listed bats (USFWS 2023). No federally listed species were captured indicating that Indiana bats, northern long-eared bats, and tricolored bats are not likely present within the Project area during the maternity season.

LITERATURE CITED

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APPENDIX A

Bat Mist-Net Survey Data

Nightly Mist-Net Site Information

Site No.	Date (2023)	Habitat Type	County	State	Permitee	Latitude	Longitude	Total Nightly Net Sets	Time Nets Up	Time Nets Down	Moon %	Moonrise	Moonset	Sunrise	Sunset	Dominant Vegetation	Roost Habitat	Water Resources	Forest Structure	Land Cover	Survey Comments/ Notes
1	6/12	Creek/ Riparian	Livingston	KY	K. Eshler	37.31879	-88.3976	4	20:14	01:14	31	02:06	14:52	05:32	20:14	Acer saccharum, Carya cordiformis, Fagus grandifolia, Juglans nigra, Ulmus rubra	Moderate	Moderate	Moderate	Moderate	-
1	6/13	Creek/ Riparian	Livingston	KY	K. Eshler	37.30304	-88.30304	3	20:14	01:14	21	02:32	05:05	05:32	20:14	Acer saccharum, Carya cordiformis, Fagus grandifolia, Juglans nigra, Ulmus rubra	Moderate	Moderate	Moderate	Moderate	-
2	6/14	Upland Forest	Livingston	KY	K. Eshler	37.31879	-88.3976	3	20:15	01:15	New-20	02:59	17:05	05:32	20:15	Acer saccharum, Juglans nigra, Celtis occidentalis, Quercus rubra	Moderate	Poor	Moderate	Moderate	-

Bat Captures

Site No.	Bat No.	Species*	Date (2023)	Time Caught	Net	Age	Sex	Reproductive Status	Mass (g)	RFA (mm)	Net Height (m)	Wing Damage Index
1	1	LABO	12 June	20:45	D	A	F	L	13.5	44	2	0
1	2	LABO	12 June	20:55	D	U	U	U	U	U	4	U
1	3	LABO	12 June	20:55	D	A	F	L	13.0	43	2	0
1	4	LABO	12 June	21:05	D	A	F	L	12.0	41	3.5	0
1	5	LABO	12 June	21:20	D	A	M	NR	11.5	40	1.5	0
1	6	LABO	12 June	23:00	D	A	M	NR	12.0	40	4	0
1	7	LABO	12 June	00:15	D	U	U	U	-	-	-	U
1	1	LABO	13 June	21:10	D	A	F	L	14.0	41	2	0
1	2	LABO	13 June	21:29	D	A	F	L	13.5	42	2	0
1	3	LABO	13 June	21:29	D	A	F	L	12.5	40	3	0
1	4	LABO	13 June	22:00	D	A	F	L	14.0	41	4	0
1	5	LABO	13 June	22:12	D	A	F	L	13.75	40	2.5	0
1	6	LABO	13 June	23:03	D	A	M	NR	12	40	2.5	0
1	7	LABO	13 June	23:03	D	A	F	L	12	40	3	0
1	8	LABO	13 June	23:46	D	A	F	P	16	40	3.5	0
1	9	LABO	13 June	23:46	D	A	M	NR	11.5	39	4	0
1	10	LABO	13 June	00:07	D	A	F	L	-	-	3	0
1	11	LABO	13 June	00:54	D	A	F	L	12	40	2	0
1	12	LABO	13 June	01:14	D	A	F	L	12	40	4	0
2	1	LABO	14 June	21:25	C	A	F	L	12.5	40	3	0
2	2	NYHU	14 June	22:45	B	A	M	NR	9.75	35	3	0
2	3	LABO	14 June	00:10	C	A	F	L	13.75	40	4	0
2	4	EPFU	14 June	00:41	C	A	M	NR	17.5	46	3.5	0

*LABO = *Lasiurus borealis*; NYHU = *Nycticeius humeralis*; EPFU = *Eptesicus fuscus*

Mist-Net Site Information

Date	Site No.	Net ID	Net Set Habitat	Net Height (m)	Net Length (m)	Latitude	Longitude
12 June 2023	1	A	Creek	5.2	6	37.31946	-88.39784
12 June 2023	1	B	Creek	2.6	9	37.31925	-88.39768
12 June 2023	1	C	Corridor	5.2	9	37.31872	-88.39736
12 June 2023	1	D	Creek	5.2	6	37.31880	-88.39777
13 June 2023	1	A	Creek	5.2	6	37.31946	-88.39784
13 June 2023	1	B	Creek	2.6	9	37.31925	-88.39768
13 June 2023	1	D	Corridor	5.2	6	37.31880	-88.39777
14 June 2023	2	A	Forest Gap	5.2	9	37.30259	-88.39228
14 June 2023	2	B	Forest Gap	5.2	9	37.30262	-88.39130
14 June 2023	2	C	Forest Edge	5.2	12	37.30308	-88.39191

Weather Conditions

Date	Site No.	Time	Temperature (°F)	Sky	Wind	Condition	Comments/Notes
6/12/2023	1	20:15	70	0	0	-	-
6/12/2023	1	21:15	60	1	0	-	-
6/12/2023	1	22:15	56	0	0	-	-
6/12/2023	1	23:15	55	0	0	-	-
6/12/2023	1	00:15	54	0	0	-	-
6/12/2023	1	01:15	53	0	0	-	-
6/13/2023	1	20:14	73	0	0	-	-
6/13/2023	1	21:14	67	1	0	-	-
6/13/2023	1	22:14	65	0	0	-	-
6/13/2023	1	23:14	63	0	0	-	-
6/13/2023	1	00:14	62	0	0	-	-
6/13/2023	1	01:14	61	0	0	-	-
6/14/2023	2	20:15	76	2	1	-	-
6/14/2023	2	21:15	74	2	1	-	-
6/14/2023	2	22:15	74	1	0	-	-
6/14/2023	2	23:15	73	0	0	-	-
6/14/2023	2	00:15	70	0	0	-	-
6/14/2023	2	01:15	70	0	1	-	-

Weather Conditions Key		
Sky Code		
	0	Clear
	1	Few Clouds
	2	Partly Cloudy
	3	Cloudy or Overcast
	4	Fog or Smoke
	5	Drizzle or light rain
	6	Heavy Rain - thunderstorm
Beaufort Wind Scale		
	0	Calm: <1 mph
	1	Light air: 1-3 mph
	2	Light breeze: 4-6 mph
	3	Gentle breeze: 7-10 mph
	4	Moderate breeze: 11-16 mph

APPENDIX B

Mist-Net Photographs

Photo Number:

1.

6/12/2023

Description:

Site 1, Net A



Photo Number:

2.

6/12/2023

Description:

Site 1, Net B.

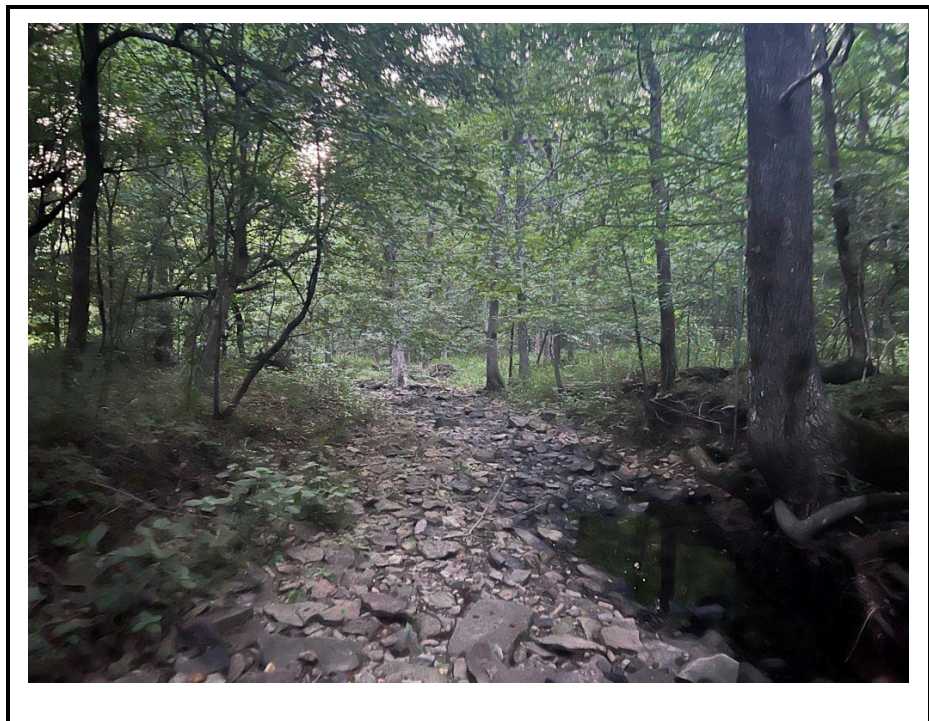


Photo Number:

3.
6/12/2023

Description:

Site 1, Net C.



Photo Number:

4.
6/12/2023

Description:

Site 1, Net D.



Photo Number:

5.
6/14/2023

Description:

Site 2, Net A.

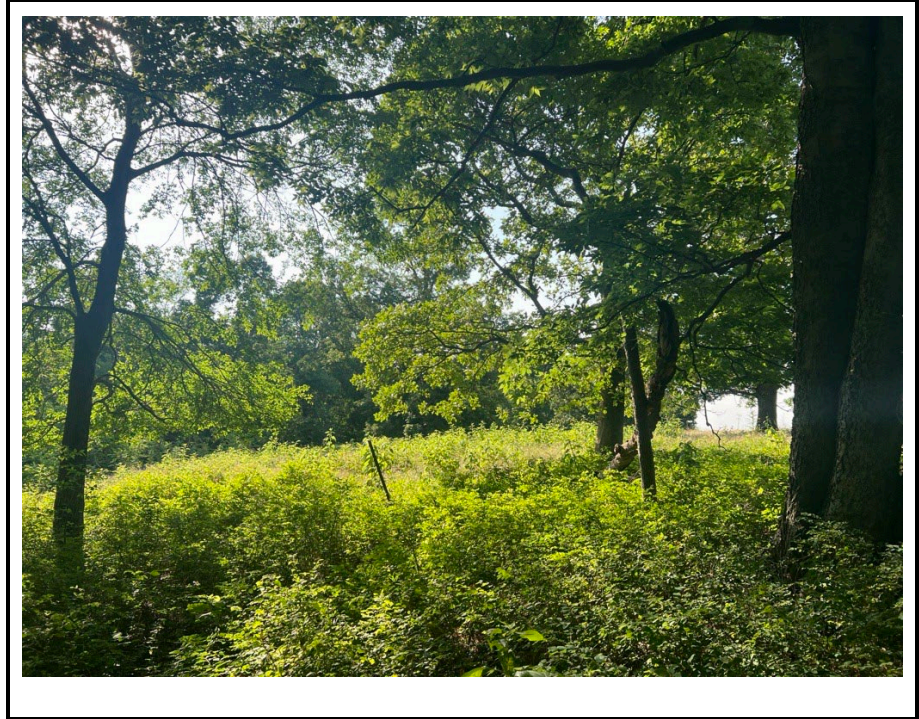


Photo Number:

6.
6/14/2023

Description:

Site 2, Net B.

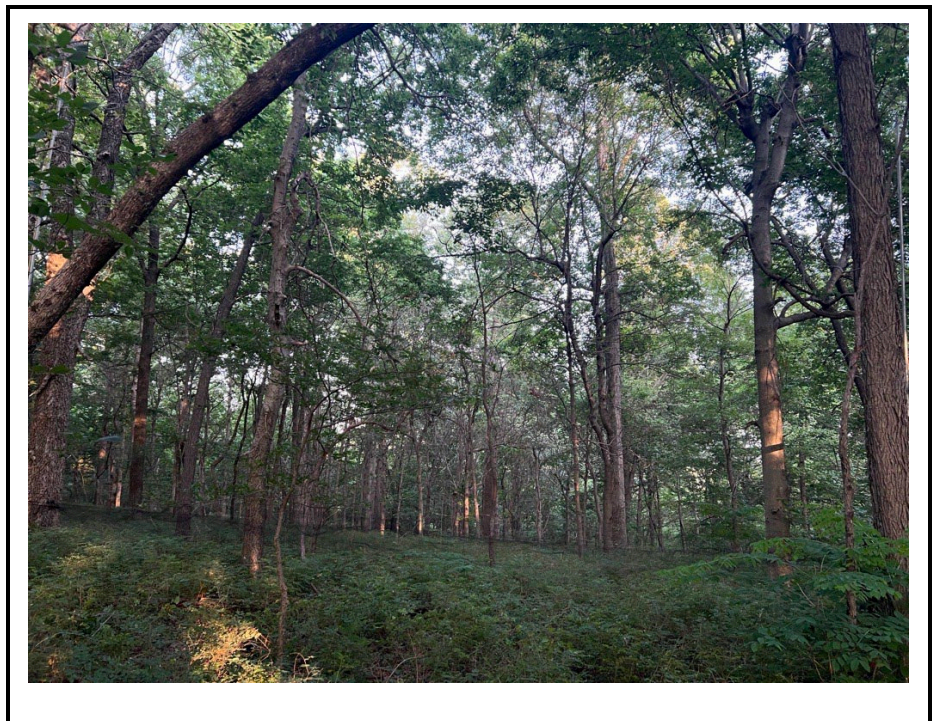


Photo Number:

7.
6/14/2023

Description:

Site 2, Net C.

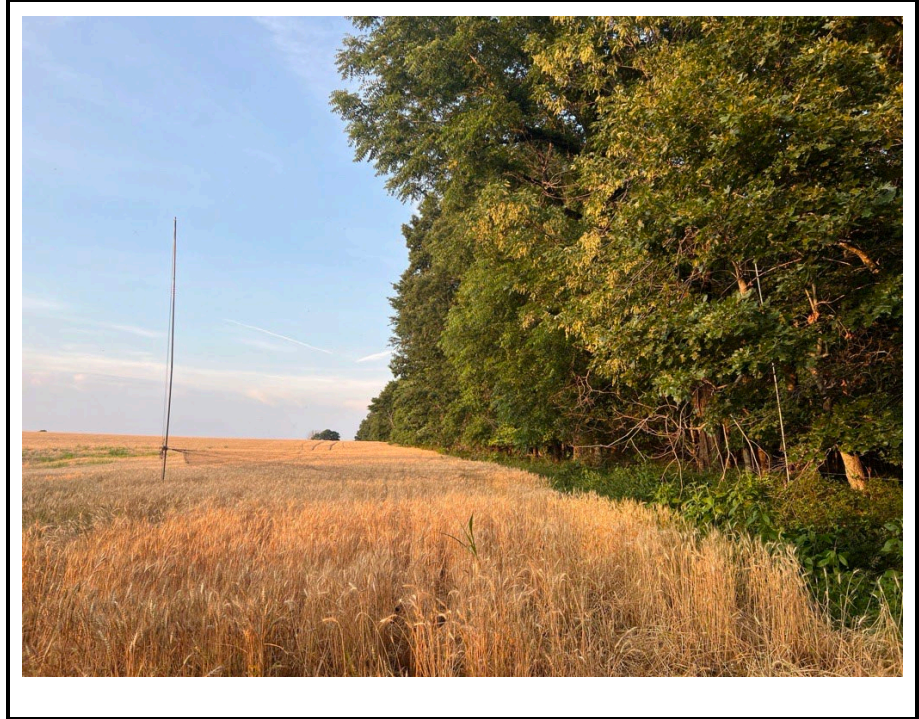


Photo Number:

8.
6/12/2023

Description:

Site 1, LABO representative
photo



Photo Number:

9.
6/14/2023

Description:

Site 2, LABO representative
photo



Photo Number:

10.
6/14/2023

Description:

Site 2, EPFU representative
photo



Photo Number:

11.
6/14/2023

Description:

Site 2, NYHU representative
photo

