Post-Construction Bat Monitoring Assessment Report
(April 2023 – October 2023)
ITP Permit Number ESPER0005513

Bluff Point Wind Energy Center
Jay and Randolph Counties, Indiana

Prepared for

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Executive Summary

Bluff Point Wind Energy Center (project) is an operational 119.7-megawatt (MW) wind facility equipped with 57 General Electric 2.1 MW wind turbine generators located in Jay and Randolph counties, Indiana. The project consists of approximately 23,613 acres and is located approximately five miles south of the city of Portland in east-central Indiana. Bluff Point, LLC (BPW) contracted Atwell, LLC (Atwell) to determine the potential impact on bats during the spring, summer, and fall seasons of 2023.

In March 2021, BPW submitted a Habitat Conservation Plan (HCP) to the U.S. Fish and Wildlife Service – Indiana Field Office (USFWS – INFO) in support of an Incidental Take Permit (ITP) for federally listed endangered Indiana bats (*Myotis sodalis*) and federally listed threatened northern long-eared bats (*Myotis septentrionalis;* uplisted to endangered in March 2023). The USFWS – INFO issued an ITP on March 25, 2021, which authorizes the take of 165 Indiana bats and 84 northern long-eared bats over the 30-year permit term and is subject to compliance with, and implementation of the HCP. The Bluff Point Wind Energy Center has been operating under the ITP requirements since April 1, 2021, which includes conducting post-construction mortality monitoring for bats. This report summarizes the third year of baseline monitoring under the HCP.

In total, 3,386 road and pad plot and 1,547 full plot standardized survey searches were completed from April 4, 2023, through October 15, 2023. Fifty-seven turbines were searched during the spring and fall seasons, and 32 turbines within the USFWS designated buffer areas were searched during the summer. Turbines were typically searched weekly in the spring and summer, and daily in the fall. Prior to the start of standardized surveys each season, a "clearance sweep" was performed to remove any carcasses from search plots. Pre-spring clearance sweeps were conducted at 57 turbines between March 29 and April 2, 2023. Pre-summer clearance sweeps were conducted at all 32 summer turbines between May 9 and May 12, 2023 (concurrent with the final week of spring searches). Pre-fall clearance sweeps were conducted on July 31, 2023, at 25 turbines that were not searched during the summer season. All 32 summer turbines were also searched on July 31, 2023, which served as both standardized summer searches and pre-fall clearance sweeps.

During the spring, summer, and fall, a total of 223 bat carcasses representing seven species were found during standardized searches, including: silver-haired bat (*Lasionycteris noctivagans*; 105carcasses), eastern red bat (*Lasiurus borealis*; 66 carcasses), big brown bat (*Eptesicus fuscus*; 26 carcasses), hoary bat (*Lasiurus cinereus*; 21 carcasses), Indiana bat (federally and state-listed endangered; two carcasses), Seminole bat (*Lasiurus seminolus*; two carcasses), and little brown bat (*Myotis lucifugus;* state-listed endangered; one carcass).

In total, 184 searcher efficiency trial carcasses consisting of bat carcasses from previous years were placed throughout the study period. In the spring, searcher efficiency rates were 56.5% and 98.0% at full plots and road and pad plots, respectively. In the summer, searcher efficiency rates were 48.0% and 92.0% at full plots and road and pad plots, respectively. In the fall, searcher efficiency rates were 65.7% and 97.1% at full plots and road and pad plots, respectively.

In total, 130 carcass persistence trials were placed throughout the study, including 50 each in both the spring and fall, and 30 in the summer. The estimated overall median probabilities of persistence by day 1 were 0.84, 0.95, and 0.79 in spring, summer, and fall, respectively. The estimated overall median probabilities of persistence by day 7 were 0.51, 0.71, and 0.49 in spring, summer, and fall, respectively.

The spring, summer, and fall bat fatality estimates were 1.46 bats/turbine (0.70 bats/MW; 83.31 total bats), 1.09 bats/turbine (0.52 bats/MW; 35.03 total bats), and 27.21 bats/turbine (12.96 bats/MW; 1551.13 total bats), respectively.

Two Indiana bats and no northern long-eared bat carcasses were found during standardized surveys. The median take estimate, based on modelling for each species, was 10 Indiana bat fatalities and one northern long-eared bat fatalities in 2023. The estimated detection probability in 2023 for spring, summer, and fall combined was 0.205 (95% confidence interval: 0.174, 0.237; Ba = 126.5796 and Bb= 492.1542) and the mean mortality rate (λ) was 12.30 (95% confidence interval: 2.031, 31.950) for Indiana bats and 2.47 (95% confidence interval: 0.002, 12.440) for northern long-eared bats.

A detection probability of approximately 0.20 is expected during baseline monitoring (years 1 through 3). The overall detection probability following three years of baseline monitoring at the project is 0.199 (95% confidence interval: 0.183, 0.215).

The cumulative median take estimates for Indiana and northern long-eared bats after three years are 16 fatalities and one fatality, respectively, which are below the rates expected under HCP. The three-year baseline mean mortality rates for Indiana and northern long-eared bats (5.879 and 0.840 bats per year, respectively) do not exceed the short-term adaptive management trigger with 99% credibility.

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ACRONYMS AND ABBREVIATIONS

°C	degrees Celsius
AICc	Akaike information criterion (corrected)
AMMs	avoidance and minimization measures
Atwell	Atwell, LLC
BPW	Bluff Point, LLC
DWP	density-weighted proportion
EoA	Evidence of Absence (v2.0)
ESA	Endangered Species Act
ft	foot/feet
GenEst	Generalized Fatality Estimator
HCP	Habitat Conservation Plan
ITP	Incidental Take Permit
m	meter(s)
m/s	meter(s) per second
MW	megawatt
PCMM	post-construction mortality monitoring
project	Bluff Point Wind Energy Center
U.S.C.	U.S. Code
USFWS	U.S. Fish and Wildlife Service
USFWS – INFO	U.S. Fish and Wildlife Service – Indiana Field Office

2023 Summary Table

	Spring Full Plots	Spring Road/Pad Plots	Summer[a] Full Plots	Summer[a] Road/Pad Plots	Fall Full Plots	Fall Road/Pad Plots	Annual	Cumulative
Dates	April 1 through May 15		May 16 through July 31		August 1 through October 15		-	2021 – 2023
Search Interval	7		1		1		-	-
Number of Plots Searched	18	39	10	22	18	39	-	-
Plot Shape	Square	Circle	Square	Circle	Square	Circle	-	-
Plot Dimensions	100 m × 100 m	100 m radius	100 m × 100 m	100 m radius	100 m × 100 m	100 m radius	-	-
Searcher Efficiency (SEEF)	0.565	0.980	0.480	0.920	0.657	0.971	-	-
SEEF Carcass Type	Bats	Bats	Bats	Bats	Bats	Bats	-	-
Median Carcass Persistence (CP)	3.12 days	2.69 days	8.98 days	4.18 days	2.87 days	2.36 days	-	-
CP Carcass Type	Bats	Bats	Bats	Bats	Bats	Bats	-	-
EoA Detection Probability ($\hat{g}$)	-	-	-	-	-	-	0.205	0.199
Average DWP	0.8890	0.0707	0.8890	0.0657	0.8890	0.0707	0.3273[b]	-
Count of Observed Carcasses	11	2	1	1	141	67	223	592
Estimated Number of Fatalities (GenEst)	83.31		35.03		1551.13		-	-
Estimated Indiana Bat Fatalities (EoA)	-		-		-		10	16
Estimated Northern Long-eared Bat Fatalities (EoA)	-		-		-		1	1

[a] Summer estimates are for 32 turbines within 1,000 feet of forested bat habitat (i.e., bat avoidance buffer) only.
[b] The annual DWP is the overall spatial coverage adjusted by the proportion of each plot type and expected seasonal *Myotis* mortality.

1 INTRODUCTION

Bluff Point, LLC (BPW) is a limited liability company and an indirect wholly owned subsidiary of NextEra Energy Resources, LLC. Bluff Point Wind Energy Center (project) is an operational 119.7-megawatt (MW) wind farm equipped with 57 General Electric 2.1 MW wind turbine generators located in Jay and Randolph counties, Indiana (Figure 1).

BPW contracted Atwell, LLC (Atwell) to perform post-construction mortality monitoring (PCMM) surveys and evaluate the potential impact from project operations on bats during the 2023 season. This report documents the results of that work. The survey and statistical methods were developed in coordination with U.S. Fish and Wildlife Service (USFWS) and incorporated relevant guidance and research findings.

This study was conducted under a Habitat Conservation Plan (HCP) that was submitted to the USFWS in support of an application for an Incidental Take Permit (ITP; see Section 1.3) for the federally listed endangered Indiana bat (*Myotis sodalis*) and federally listed threatened northern long-eared bat (*Myotis septentrionalis*). On November 29, 2022, the USFWS announced a final rule to reclassify the northern long-eared bat as endangered. The rule took effect on March 31, 2023.

This report covers the third and final year of baseline PCMM studies for the project since implementation of the HCP.

1.1 STUDY AREA

The project consists of approximately 23,613 acres and is located approximately five miles south of the city of Portland in east-central Indiana (Figure 1). The project spans portions of Madison, Pike, and Jefferson townships within Jay County, and portions of Franklin, Ward, and Jackson townships within Randolph County (Figure 1).

The topography within the project varies, with elevations ranging from approximately 980 and 1,060 feet (ft) above mean sea level. Portions of the project are relatively flat, and many areas are moderately undulating.

Overall, the project is dominated by agricultural land-use consisting mostly of corn *(Zea mays)* and soybeans *(Glycine max)*. According to the 2021 National Land Cover Database, 84.0% of the land is classified as cultivated crops (19,835.50 acres), followed by 7.4% (1,752.2 acres) classified as deciduous forest, 5.3% (1,260.1 acres) classified as developed (open space; low, medium, and high intensities), and 2.2% (515.9 acres) classified as hay/open pasture. Herbaceous areas, open water, woody and emergent herbaceous wetlands, shrub/scrub, barren land, and evergreen and mixed forest, collectively make up approximately 1.1% (248.6 acres) of remaining land uses

(Figure 2) (MRLC 2023). Conservation Reserve Program land is also located within the project area.

1.2 BUFFERED AREAS

In January 2012, the U.S. Fish and Wildlife Service – Indiana Field Office (USFWS – INFO)and BPW established 1,000 ft protective buffers around forested lands that were identified as potential summer habitat for Indiana and northern long-eared bats through desktop research, on-site investigation, and 2011 mist netting and telemetry surveys. These protective buffers (hereafter referred to singularly as a “bat avoidance buffer”) cover 13,524 acres of the 23,613-acre project and include 32 turbines from the total project array (Figure 3). Survey parameters and turbine operations for the spring, summer, and fall seasons of 2023 are addressed in the HCP, which designates specific curtailment strategies (see Section 1.3) for turbines within this buffered area.

1.3 INCIDENTAL TAKE PERMIT

BPW has determined that operation of the project may result in take of the federally listed endangered Indiana and northern long-eared bats. Section 9(a)(1)(B) of the Endangered Species Act (ESA), 16 U.S. Code (U.S.C.) § 1538 (a)(1)(B) states that it is unlawful for any person to “take” an endangered species. In addition, take of any threatened species is prohibited pursuant to 50 Code of Federal Regulations § 17.31, issued by the USFWS under the authority of Sections 4(d) and 9(a)(1)(G) of the ESA, 16 U.S.C., §§ 1533 (d) and 1538(a)(1)(G), respectively. Under the ESA, otherwise lawful activities that may cause or result in the incidental take of federally listed threatened or endangered species is prohibited. Section 10 of the ESA allows for certain limited exceptions to the ESA’s prohibitions for private actions. Section 10(a)(1)(B) of the ESA provides a mechanism for the USFWS to issue an ITP that authorizes the take of a species listed as threatened or endangered, provided that the take is incidental to, and not the purpose of, the operation of the otherwise lawful activity.

In March 2021, BPW submitted to the USFWS – INFO a final HCP in support of that ITP application and in accordance with the requirements set forth under Section 10(a)(1)(B) of the ESA, as amended, and applicable USFWS guidance documents (Atwell 2021).

On March 25, 2021, the USFWS – INFO issued BPW an incidental take permit (Permit Number: ESPER0005513), which authorizes the take of 165 Indiana bats and 84 northern long-eared bats over the 30-year permit term and is subject to compliance with, and implementation of the HCP. BPW seeks to reduce take of Indiana and northern long-eared bats by at least 50% from the authorized 30-year take limit through careful project planning and turbine siting (implemented prior to construction of the project), as well as implementation of operational curtailment strategies (Atwell 2021). These curtailment strategies are described in Section 1.3.1.

BPW has developed four post-construction mortality monitoring protocols to be used for the project: Preliminary Monitoring, Baseline Monitoring, Implementation Monitoring, and Adaptive Management Monitoring. Details of these protocols are described within the HCP (Atwell 2021). The timing of these protocols is implemented as follows:

- BPW performed preliminary monitoring at the project in 2018, 2019, and 2020. These studies were conducted under a technical assistance letter from the USFWS – INFO to allow for operations while BPW prepared the HCP.
- Baseline monitoring is conducted for the first three years of operation under the ITP.
- Implementation monitoring will be conducted from year 4 through year 30.
- Adaptive management monitoring will occur for two years following any deviations from avoidance and minimization measures (AMMs) outlined in the HCP, including if any short or long-term trigger has been met (see Section 3.7.1).

2023 is the third year of PCMM studies for the project since implementation of the HCP. As such, PCMM studies were conducted under the baseline monitoring protocol. Monitoring effort in 2021 resulted in a detection probability below a target of 0.2 (as described in the HCP) (Atwell 2021). Therefore, prior to the start of the 2022 summer monitoring season, and in consultation with USFWS – INFO, BPW decided to increase monitoring effort for the 2022 summer and fall seasons beyond what was outlined in the HCP (Atwell 2021) in order to ensure a detection probability of at least 0.2. Increased monitoring efforts in 2022 resulted in a detection probability of 0.268 (Atwell 2023). BPW decided to reduce the monitoring for the 2023 summer season but maintained the same monitoring efforts for the 2023 fall season. Monitoring methods used for the study summarized in this report are described in Section 2.

To satisfy ITP report requirements, this report summarizes estimates of bat mortality and the results of take compliance monitoring at the project completed for spring, summer, and fall 2023 under the March 25, 2021, ITP.

1.3.1 ITP Minimization Measures

The following minimization measures were proposed within the March 2021 HCP and authorized under the March 25, 2021, ITP as a means of reducing Indiana bat and northern long-eared bat take over the permit term:

- Curtailment of all spring turbine operations by feathering to a cut-in speed of 3.0 meters per second (m/s) based on a 10-minute rolling average from ½ hour before sunset to ½ hour after sunrise during the spring migratory season (April 1 to May 15) when ambient temperature is above 10 degrees Celsius (°C).

- Due to the potential presence of resident Indiana bats and northern long-eared bats within the project boundary during the summer season (May 16 to July 31), 32 turbines within a 1,000 ft bat avoidance buffer were feathered to a cut-in speed of 6.0 m/s based on a 10-minute rolling average from ½ hour before sunset to ½ hour after sunrise from May 16 to July 31 when ambient temperature is above 10°C. Twenty-five turbines located outside of the 1,000 ft bat avoidance buffer were feathered up to 3.0 m/s based on a 10-minute rolling average from ½ hour before sunset to ½ hour after sunrise from May 16 to July 31 when ambient temperature is above 10°C.
- Curtailment of all fall turbine operation by feathering to a cut-in speed of 5.0 m/s based on a 10-minute rolling average from ½ hour before sunset to ½ hour after sunrise during the fall migratory season (August 1 – October 15) when ambient temperature is above 10°C.

The USFWS requested data verifying 2023 operational compliance for turbines 5, 16, 19, 26, 36, 37, 42, 47, 53, and 55 on April 4, May 11, August 24, September 15, and October 7. This data will be provided to USFWS separately.

1.4 STUDY OBJECTIVES

The objectives of the study were to:

- Perform scheduled carcass searches and associated bias trials for spring, summer, and fall seasons (in accordance with the HCP).
- Collect information on bat carcasses found during the search period at the project.
- Evaluate and calculate project-specific bat mortality estimates for each survey season.
- Achieve a target detection probability of 0.2 or greater.
- Estimate take of Indiana and northern long-eared bats (i.e., covered species) to monitor compliance with limits authorized in the ITP.

2 SURVEY METHODS

2.1 STANDARDIZED CARCASS SEARCHES

Standardized carcass searches occurred in the spring (April 4 to May 12, 2023), summer (May 17 to July 31, 2023), and fall (August 1 to October 15, 2023). Turbines were assigned one of two search plot types: road and pad plot or full plot. Each turbine's assigned plot type remained the same throughout the annual monitoring period. Road and pad plots were searched out to 100 meters (m) from the center of the turbine in the spring, summer, and fall. Searchers scanned the entire surface area of the road and pad for carcasses by walking transects, with the initial survey start location at 100 m from the turbine (Figure 4).

Full plot search areas comprised a 100 m by 100 m plot with the wind turbine located at the center of the search area. Full plots were mowed in order to keep vegetation low and increase searcher efficiency. Plots were surveyed by walking 17 linear transects, each approximately 6 m wide, until the entire plot was surveyed (Figure 4).

During the spring migration season, all 57 turbines were typically searched once per week; 18 turbines were searched as full plots and only road and pad searches were conducted at the remaining 39 turbines. During the summer season, the 32 turbines located within the 1,000 ft bat avoidance buffer were typically searched weekly with 10 turbines searched as full plots and 22 turbines searched as road and pad plots. The remaining turbines located outside of the bat avoidance buffer were not searched during the summer. During the fall migration season, all 57 turbines were typically searched daily with 18 turbines searched as full plots and 39 searched as road and pad plots. Some turbines, on occasion, were not searched on a particular day due to turbine maintenance, farming activity, technician availability, or inclement weather conditions (e.g., lightning, impassable roads). The lack of searches at some turbines during the scheduled timeframe was accounted for during statistical analysis.

Prior to the start of standardized surveys each season, a “clearance sweep” was performed to remove any carcasses from search plots. Pre-spring clearance sweeps were conducted at 57 turbines between March 29 and April 2, 2023. Pre-summer clearance sweeps were conducted at all 32 summer turbines between May 9 and May 12, 2023 (concurrent with the final week of spring searches). Pre-fall clearance sweeps were conducted on July 31, 2023, at 25 turbines that were not searched during the summer season. All 32 summer turbines were also searched on July 31, 2023, which served as both standardized summer searches and pre-fall clearance sweeps.

Standardized carcasses were defined as those found within the scheduled search window and search area. Incidental finds were defined as carcasses found outside of the scheduled search window or search area (i.e., off plot). Incidental finds were not included in fatality estimates but are reported in Appendix A-1.

For each bat carcass found, the following data were collected:

- Unique carcass ID
- Survey date and time
- Turbine (i.e., plot) number
- Distance and bearing from the nearest turbine

- UTM coordinates
- Species
- Carcass sex, age, and reproductive condition (when possible)
- Carcass condition (intact, partial, dismembered, fur spot(s), or other)
- Forearm length, when possible
- Ground cover where carcass was found
- Estimated time of death
- Current and previous night's weather conditions

When avian carcasses were encountered during searches, the same data as above were generally collected for the carcass (excluding forearm length); however, avian carcasses were not included in analysis for this study. A list of avian carcasses found during the 2023 fall season is provided as Appendix A-2.

2.2 SEARCHER EFFICIENCY TRIALS

The objective of searcher efficiency trials was to correct for detection bias by adjusting for trial carcasses found compared to total carcasses available to the searcher. Searcher efficiency trials were conducted each season. Trials were conducted blindly so the searcher was not aware of when trials were being conducted. Carcasses used for the trials consisted of bats with confirmed species identifications (eastern red bat, silver-haired bat, big-brown bat) found on site in 2022 or earlier. A total of 184 trial carcasses were placed, including 59 in the spring, 51 in the summer, and 74 in the fall. A total of 88 carcasses were placed at full plot locations (27 in spring, 25 in summer, and 36 in fall), and 96 were placed at road and pad plot locations (32 in spring, 26 in summer, and 38 in fall).

Date, turbine number, distance from the turbine, and direction from the turbine were recorded prior to placement within the plot. Turbines were randomly selected for the searcher efficiency trial and no more than two carcasses were placed at a single turbine. Carcasses were discreetly marked (in a manner so the marking did not influence searcher detection) to indicate that the carcass was part of the study. Any trial carcasses that were missed on the first search following placement were collected and were not available to be found during subsequent searches.

2.3 CARCASS PERSISTENCE TRIALS

Carcass persistence trials were used to determine the length of time a carcass would remain within the search area before being scavenged (e.g., by scavengers, insects) or removed from the search area by another means (e.g., weather event, full plot mowing, agricultural tilling). Carcass persistence trials were conducted twice each season. Carcasses used for the trials consisted of bats with confirmed species identifications (eastern red bat, silver-haired bat, big-brown bat) found on site in 2022 or earlier. A total of 50 bat carcasses (25 per trial) were placed at randomly selected turbines in both the spring and fall. A total of 30 bat carcasses (15 per trial) were placed at randomly selected turbines in the summer. Samples were allocated to each plot type evenly for a total of 65 carcasses placed at each plot type (25 per plot type in the spring and fall; 15 per plot type in the summer).

In the spring and summer, carcasses were typically checked by the searcher on days 1, 2, 3, 4, 7, 10, 14, 21, and 30, as survey conditions allowed. In the fall, carcasses were typically checked by searchers daily for 30 days, as survey conditions allowed. The condition of each carcass was recorded as intact, signs of scavenging, fur spot, or missing during each day of observation. During the spring and summer trials, carcasses were no longer checked after being recorded as missing (unless rediscovered during a scheduled search at a later time). During the fall trials, once a carcass was recorded as "missing," technicians continued daily checks for the carcass for the subsequent seven days. If the carcass was not rediscovered during this seven-day period, the carcass was deemed missing on the originally missed day. If a missing carcass was relocated within or after the seven-day period, technicians would continue checking that carcass daily. This check protocol was implemented to account for carcass checks where the carcass was missed by the observer (e.g., due to condition or location shift) rather than being truly missing. Once the 30-day trial concluded, remaining carcasses were removed.

3 STATISTICAL METHODOLOGY

3.1 GENEST

Analyses were performed separately for each season using a Generalized Fatality Estimator (GenEst) v1.4.9 (Dalthorp et al. 2018; Simonis et al. 2018). This program uses five different data sources and user-populated general inputs to run three separate, but related, analyses. The three analyses (discussed in further detail below) used to determine the mortality rate estimation include searcher efficiency, carcass persistence, and density-weighted proportion (DWP). DWP was calculated separately for each turbine based on the total number of observed carcasses, their distances from the nearest turbine, and area of the plot searched, and was then input into GenEst. These analyses, combined with the carcass observation data and a known search schedule, ultimately provide a median estimate of the number of fatalities at a wind facility while taking into consideration imperfect detection probability. GenEst provides a median estimate rather than a mean because the mortality probability distribution is generally right-skewed, which is not uncommon for mortality data. Because a mean estimate may be strongly influenced by the degree of skewness (Simonis et al. 2018), the median is a more robust measure.

GenEst uses a sophisticated, carcass-specific detection probability to provide fatality estimates. However, for simplicity, the program provides basic detection probability summaries that are based on searcher efficiency, carcass persistence, and average search interval. The estimates are then stratified by the covariates or predictor variables selected for fatality estimation. While these detection probability summaries are not specifically used to provide a fatality rate estimate, an estimate of detection probability may provide useful planning insight (Simonis et al. 2018).

To determine median estimates, the number of parametric bootstrap iterations was set to 10,000 in GenEst and was used to build 90% confidence intervals around parameter estimates (Simonis et al. 2018). As this study focused on providing fatality estimates for bats only, size class was not included as a variable.

3.2 DEFINITION OF VARIABLES

Table 1 provides definitions of variables used for the statistical analyses.

Table 1. Definitions of Variables Used for Analysis

Variable	Definition
I	Search interval—the number of days between searches
V	Temporal coverage—the proportion of all carcasses expected to arrive during the monitored period.
p	Searcher efficiency—the probability an observer will find a present carcass during the first search after it arrived
k	The proportional change in searcher efficiency with successive searches
r_t	The estimated probability that a carcass arriving at a uniform random time in an interval of *t* days persists until the end of the interval
MedianCP	The median number of days a carcass will persist after day 0
$\hat{M}_i$	The estimated number of carcasses falling within distance band *i*
$\sum\hat{M}_i$	The total number of estimated carcasses
$f\hat{M}_i$	The estimated proportion of carcasses falling within distance band *i*
X	The total number of observed carcasses during searches
X_i	The total number of carcasses observed within distance band *i*, pooled across the entire wind facility
fA_{Avg_i}	The proportion of area surveyed in distance band *i* averaged across all turbines
$fA_{Search_{i,j}}$	The proportion of area surveyed within distance band *i* at turbine j
f_{within}	A correction factor representing the estimated proportion of fatalities occurring within the turbine search radius. This correction factor is applied to the calculated DWP for RP to account for carcasses falling outside of the search radius. For this study, this value was set to 0.99.
a	Spatial coverage — a density-weighted proportion (DWP) of carcasses falling within the searched area.
DWP_j	The calculated, uncorrected DWP for turbine j
$DWPC_j$	The corrected DWP value for turbine j. This is the product of DWP_j * $f_{within.}$
ĝ	The estimated probability of detection
M*	Estimated number of fatalities
λ	Fatality rate
T	Annual fatality rate threshold
Ba and Bb	Parameters that characterize the detection probability

3.3 SEARCHER EFFICIENCY

Searcher efficiency is the probability that a searcher will find a carcass given that the carcass falls within the search area (Simonis et al. 2018). Searcher efficiency was modeled separately for each season with two parameters: *p*, the probability that a present carcass is found during the first search after it arrived, and *k*, the proportional change in searcher efficiency with successive searches. Plot Type (full plot or road and pad plot) was included as a predictor variable. Data from all searcher efficiency trials each season were pooled, and searcher efficiency was modeled with *k* set at 0.75. While searchers in this study had only one opportunity to find trial carcasses, data suggests that *k* tends to remain relatively consistent at 0.75 (Dalthorp 2019 pers. comm.).

GenEst provided corrected Akaike information criterion (AICc) results for two models per season (Table 2). AICc estimates the relative quality of statistical models for a given set of data. Models with lower AICc scores are generally considered to fit the data better while using fewer predictor variables.

Table 2. Models Evaluated for Searcher Efficiency Trials

Model	k value[a]	AICc[b]	ΔAICc[c]
Spring			
p ~ PlotType	k fixed at 0.75	36.77	0.00
p ~ constant	k fixed at 0.75	51.21	14.44
Summer			
p ~ PlotType	k fixed at 0.75	52.81	0.00
p ~ constant	k fixed at 0.75	63.17	10.36
Fall			
p ~ PlotType	k fixed at 0.75	58.26	0.00
p ~ constant	k fixed at 0.75	69.25	10.99

[a] k is the proportional change in searcher efficiency with successive searches. It remains fixed at 0.75 per D. Dalthorp (personal communication).

[b] AICc is the corrected Akaike's Information Criterion.

[c] ΔAICc is the difference in AICc values between a particular model and the top model. When comparing a set of models, lower ΔAICc values are generally considered better models.

The *p* ~ PlotType models were selected for spring, summer, and fall fatality estimation (Table 3). These models were selected as they were the lower AICc model for each season (spring ΔAICc = 14.44, summer ΔAICc = 10.36, and fall ΔAICc = 10.99 where ΔAICc is the difference between the model with the lowest and second lowest AICc value).

Table 3. Searcher Efficiency and Carcass Persistence Models Selected for Fatality Estimation in GenEst

Analysis	Model[a]
Spring	
Searcher Efficiency	p ~ PlotType
Carcass Persistence	lognormal distribution; l~constant, s~constant
Summer	
Searcher Efficiency	p ~ PlotType
Carcass Persistence	exponential distribution; l~PlotType
Fall	
Searcher Efficiency	p ~ PlotType
Carcass Persistence	loglogistic distribution; l~constant, s~constant

[a] For carcass persistence, "l" refers to location and "s" refers to scale in GenEst. Exponential distributions are not modeled with a scale parameter.

3.4 CARCASS PERSISTENCE

Carcass persistence is the probability that a carcass arriving on day 0 will remain on day *t* (e.g., despite scavenging, decomposition, mowing, weather event, etc.) (Simonis et al. 2018). All trial carcass data from each trial were pooled each season for analysis. For 50 trial carcasses in the spring and fall, and 30 trial carcasses in the summer, the last day of detection from day 0 and first day of absence from day 0 were input into GenEst with Plot Type used as predictor variable. Four distributions were modeled: exponential, Weibull, lognormal, and loglogistic. The resulting 14 models per season were compared using AICc (Appendix B), and the most parsimonious model was selected for each season (Table 3). The selected models for the spring and fall were lognormal and loglogistic distributions, respectively, both with constant location and scale formulas (ΔAICc = 0.19 and 0.10 in spring and fall, respectively). The selected model for the summer was the exponential distribution with the location formula a function of Plot Type (ΔAICc = 1.92).

3.5 DENSITY-WEIGHTED PROPORTION

DWP is the expected proportion of carcasses to fall within the searched area of each individual turbine (Simonis et al. 2018). This estimated value takes into consideration the distance of a carcass from the turbine as carcass density around a turbine may differ with increasing distance from the turbine (Hull and Muir 2010).

For road and pad plots, pooled counts of carcasses within 10 m distance bands were used to estimate the proportion of carcasses falling within each band, $f\hat{M}_i$, where i = the distance band (e.g., 0 to 10 m, out to a maximum of 100 m). These proportions were then multiplied by the turbine-specific proportion of searched area in the plot at each distance band, i. Turbine-specific road and pad DWPs were calculated based on bat carcasses observed during the 2023 monitoring season pooled across spring, summer, and fall to provide a larger sample size for calculating DWP. Only non-incidental carcasses found during road and pad searches were used for DWP calculation. DWP was used to calculate a fatality estimate for each season.

Specifically, $f\hat{M}_i = \hat{M}_i / \sum \hat{M}_i$ where $\hat{M}_i = X_i / fA_{Avg_i}$ and $\sum \hat{M}_i$ is the sum of $\hat{M}$ across all distance bands. X_i is the number of pooled carcass observations in each distance band, i, and fA_{Avg_i} is the average proportion of area surveyed in each distance band, i, across all turbines assigned to road and pad plots. DWP at each turbine is then calculated as $DWP_j = \sum (f\hat{M}_i * fA_{Search_{i,j}})$, where j is the specific turbine number and $fA_{Search_{i,j}}$ is the proportion of area surveyed within distance band i at turbine j.

The calculated DWP within the 100 m search radii (DWP_j) were then adjusted to account for carcasses falling beyond the search radius using $DWPc_j = DWP_j * f_{within}$ where f_{within} is the estimated proportion of carcasses occurring within the search radius. For this study, f_{within} is determined from publicly available results from similar studies.

Hull and Muir (2010) reported percentile distances of the fall zone modeled for bats at small, medium, and large turbine sizes based on data from their study sites. For large size turbines (94 m hub height and 112 m rotor diameter, similar to those in operation at the project), modeling suggested that 99% of bat carcasses fell within 66.46 m of the turbine (Hull and Muir 2010). This is less than the 100 m search radius of this study's road and pad plots. Therefore, turbine-specific DWP values for road and pad plots were calculated as $DWP_{c_j} = DWP_j * 0.99$. The average corrected DWP for road and pad plots at the project in 2023 was 0.0707 for spring and fall, and 0.0657 for summer. Average DWP at road and pad plots was based on 39 road and pad plots in the spring and fall and 22 in the summer.

The Fowler Ridge HCP (WEST 2013) estimated the proportion of bat carcasses to fall within its square 80 m × 80 m full plots' dimensions based on a 2011 PCMM study that assessed carcasses within an 80-m radius circular full plot (Good et al. 2012). Fowler Ridge Wind Farm (FRWF) is located approximately 119 miles west of the project, in Benton County Indiana, and is located within a similar physiography and is at a similar elevation as the project. FRWF studies were designed with a robust sample size of large cleared plots that were used to provide mortality estimates that better accounted for carcasses found at greater distances from turbines (Good et al. 2012). Using the full set of carcass data from the 2011 PCMM season at FRWF (Good et al. 2012), DWP values for 100 m × 100 m full plot locations at the project were calculated as 0.889 (i.e., approximately 88.9% of bat carcasses fall within the 100 m × 100 m square plot).

3.6 PROJECT-SPECIFIC FATALITY ESTIMATE

To calculate a fatality estimate using GenEst, searcher efficiency models and carcass persistence models were first selected for each season (see Sections 3.3 and 3.4 above; Table 3). For searcher efficiency, the "Plot Type" model (*p*~PlotType) was selected for all three seasons. For carcass persistence, lognormal and loglogistic distributions, both with constant location and scale formulas (i.e., l~constant, l~constant), were selected for spring and fall, respectively. An exponential distribution with the location formula a function of Plot Type (i.e., l~PlotType) was selected for summer.

Other inputs required to calculate mortality in GenEst included the *Fraction of Facility Surveyed*, turbine-specific *Density-Weighted Proportions* (discussed above), and the *Observation Date* for each carcass found. GenEst combines the carcass *Observation Date* with *Turbine Search Schedule* (uploaded to GenEst as a separate database) to estimate detection probability following arrival (Simonis et al. 2018). All 57 turbines within the project were surveyed for carcasses in the spring and fall. Therefore, *Fraction of Facility Surveyed* was set to 1 for these seasons. In the summer, all 32 turbines within the bat avoidance buffer were surveyed. These turbines were operating with a different cut-in speed than turbines outside of the bat avoidance buffer. Therefore, *Fraction of*

Facility Surveyed was also set to 1 to provide a summer fatality estimate for turbines only within the bat avoidance buffer. *Density-weighted Proportion* and *Turbine Search Schedule* are provided as separate CSV files that are uploaded to GenEst.

3.7 EVIDENCE OF ABSENCE

Evidence of Absence (EoA) software version 2.0 (Dalthorp et al. 2017) multiple class module was used to model estimated take of federally listed endangered Indiana bats and northern long-eared bats during the monitoring period. EoA uses several parameters to estimate a detection probability (g), which is ultimately used to estimate take levels at a user-defined credibility level. Detection probability is a function of search interval, timespan of survey effort, spatial (a) and temporal (v) coverage, searcher efficiency (p), the factor by which searcher efficiency changes between subsequent searches (k),and carcass persistence (r).

Within the multiple class module, total mortality (M) was estimated with a 50% credibility level and $\hat{g}$ parameters were calculated from monitoring data by adding a search class for each plot type and season. A credibility level of 50% was used as this value provides a median estimate. Inputs used for each class (i.e., plot type per season) are provided in Table 4.

Table 4. Search Class Inputs for Multiple Class Analysis in EoA

Variable	Spring Full Plots	Spring Road and Pad Plots	Summer Full Plots	Summer Road and Pad Plots	Fall Full Plots	Fall Road and Pad Plots
Search Schedule						
Start of monitoring	2023-04-04	2023-04-04	2023-05-17	2023-05-17	2023-08-01	2023-08-01
Search interval (days)	7	7	7	7	1	1
Number of searches	6	6	12	12	76	76
Temporal coverage (v)	1	1	1	1	1	1
Searcher Efficiency						
Carcasses available	23	25	25	25	35	35
Carcasses found	13	25	12	23	23	34
Factor by which searcher efficiency changes with each search (k)	0.75	0.75	0.75	0.75	0.75	0.75
Persistence Distribution (from field trials)						
Distribution	Lognormal	Lognormal	Exponential	Exponential	Weibull	Lognormal
Shape (α)	2.4510	4.8200	0.0772	0.166	0.5732	6.8920
Scale (β)	1.1790	0.9122	12.9600	6.024	6.4040	1.0340
95% confidence interval for β	[0.4991, 1.8581]	[-0.0839, 1.9083]	[7.4115, 22.6650]	[3.4403, 10.5492]	[2.9250, 14.0225]	[-0.1298, 2.1975]
r for Ir = 7 (spring and summer) and 1 (fall)	0.535	0.486	0.773	0.591	0.806	0.765
95% confidence interval for r	[0.407, 0.681]	[0.343, 0.652]	[0.647, 0.860]	[0.427, 0.731]	[0.667, 0.926]	[0.624, 0.904]
Fatality Estimation						
Indiana bat carcass count (X)	0	0	0	0	2	0
Northern long-eared bat carcass count (X)	0	0	0	0	0	0
Credibility level	0.5	0.5	0.5	0.5	0.5	0.5

Mortality monitoring began on April 4, 2023, May 17, 2023, and August 1, 2023, for spring, summer, and fall seasons, respectively. Surveys were conducted approximately once per week for six weeks in the spring, once per week for 12 weeks in the and summer, and daily for 76 days in the fall. Temporal coverage was set to 1 for all seasons in order to keep the period of inference restricted to the season in question.

Searcher efficiency and carcass persistence data were based on field trials, and the results were entered into EoA. The factor by which searcher efficiency changes between subsequent searches was set to 0.75 (Dalthorp 2019 pers. comm.) and persistence distributions recommended by EoA as the most appropriate models (Table 4) were selected for each season and plot type. For spring carcass persistence analysis, a lognormal distribution was selected for both full plots and road and pad plots. For summer carcass persistence analysis, an exponential distribution was selected for both full plots and road and pad plots. For fall carcass persistence analysis, Weibull and lognormal distributions were selected for full plots and road and pad plots, respectively. However, while the lognormal distribution was selected for full plots in the fall, it is worth noting that the log-logistic model had a lower ΔAICc than the lognormal model (ΔAICc = 0.12).

Two Indiana bat carcasses and no northern long-eared bat carcasses were found over the course of standardized surveys in spring, summer, and fall seasons (see Section 4.2). The Indiana bat carcasses were discovered at full plots in the fall. Therefore, the analysis was run twice: once with carcass count (X) set to two for full plots in the fall (and zero for all other seasons) to represent observed Indiana bat take, and once with carcass count set to zero for all search classes to represent observed northern long-eared bat take. Searcher efficiency and carcass persistence estimates using EoA for each search class are provided in Section 4.6.

Associated Ba and Bb values, which are parameters that characterize the detection probability, are also provided with the EoA search class output. These Ba and Bb values (see Section 4.6) for each search class were then entered into EoA's multiple class module to provide a single combined take estimate for each covered species during the monitoring period.

Spatial coverage for each plot type and season was manually entered into the "dwp" field of the multiple class module. Spatial coverage was the average DWP (Section 3.5) of turbines searched for each plot type and season (i.e., 0.8890 for full plots, and 0.0707and 0.0657 for road and pad plots in spring/fall and summer, respectively), weighted by the proportion of each plot type for each season (i.e., 0.3158 and 0.3125 for full plots in spring/fall and summer, respectively, and 0.6842 and 0.6875 for road and pad plots in spring/fall and summer, respectively) and the estimated seasonal proportions of *Myotis* mortality, as described in the HCP for Bluff Point (Atwell 2021). Spring, summer, and fall *Myotis* mortality was estimated as 4%, 30%, and 66%, in the spring, summer, and fall, respectively. Therefore, spatial coverage at full plots was 0.0112, 0.0833, and 0.1853 in the spring, summer, and fall, respectively. Spatial coverage at road and pad plots was 0.0019, 0.0135, and 0.0319 in the spring, summer, and fall, respectively. Approximately 67.27% of the expected fall zone for bats was unsearched. Therefore, 0.6727 was entered into the “dwp” field for the “unsearched” class in the multiple class module. Spatial coverage for the summer was based on the 32 searched turbine plots located within the bat habitat avoidance buffer only as it was assumed that no take of covered species occurred outside of these buffered turbines during the summer.

Cumulative take estimates (M*) will be tracked with a 50% credibility level over the life of the ITP using the “Track past mortality” option in EoA’s multiple years module.

3.7.1 Adaptive Management Triggers

The EoA software has incorporated a framework that addresses specific adaptive management “triggers” to help ensure permit compliance and potentially alleviate the project from current AMMs described in Section 6.2 of the HCP (Atwell 2021). Adaptive management triggers built into the software include the short-term trigger, long-term trigger, and reversion trigger (Dalthorp et al. 2017), as described below:

- The short-term trigger acts as a warning tool and fires when the annual fatality rate is greater than a given threshold over the course of one or a few years. BPW will utilize a 3-year window for the short-term trigger against the estimated annual take rate threshold (5.5 Indiana bats and 2.8 northern long-eared bats) with a 99% credibility level (Atwell 2021), as recommended by the software to protect against the trigger firing unnecessarily (Dalthorp et al. 2017). The short-term trigger was applicable to the 2023 monitoring results as it was the third year of monitoring under the HCP and ITP. Results of the short-term trigger analysis are provided in Section 4.6.
- The long-term trigger indicates when total cumulative take has exceeded the authorized threshold (i.e., 165 Indiana bats and 84 northern long-eared bats) with a certain credibility level. As described above, BPW will track estimated cumulative take (M*) using EoA’s multiple years module with a 50% credibility level. This credibility level was determined to most accurately track fatality rates over time while reducing the likelihood of a false trigger (i.e., firing before the cumulative take limit has been exceeded) (Dalthorp et al. 2017).
- The reversion trigger indicates when fatality rates are low enough to allow for a less restrictive operational minimization strategy that will not result in annual fatality rates exceeding the take limit at a given credibility level. BPW expects to reduce the annual take of Indiana bats from 5.5 to 2.09 bats and northern long-eared bats from 2.8 to 1.07 bats. BPW will use the reversion test against the lesser of the expected take threshold (i.e., 2.09 Indiana bats and 1.07 northern long-eared bats) or the average annual take rate as

calculated using EoA after three years of baseline monitoring. BPW will initially run the reversion test with a 99% credibility level and 50% assumed relative mortality rate (ρ) in Year 6, allowing for 3 years of Baseline Monitoring and 3 years of Implementation Monitoring to be completed prior to considering reducing AMMs.

4 RESULTS

4.1 STANDARDIZED CARCASS SEARCHES

Throughout the spring, summer, and fall seasons at the project, 3,386 road and pad plot searches and 1,547 full plot searches were completed during standardized surveys, excluding clearance sweeps at 18 full plots and 39 road and pad plots prior to the spring, and eight full plots and 17 road and pad plots prior to the fall. During the study, 223 bats representing seven species were found across 48 turbine locations during standardized searches (Figures 5a-c). Silver-haired bat (*Lasionycteris noctivagans*) and eastern red bat (*Lasiurus borealis*) were the most commonly found species, followed by big brown (*Eptesicus fuscus*) and hoary bat (*Lasiurus borealis*) (Table 5). Carcass counts of all bat species found during standardized surveys, as well as the proportion of all bats represented by each species, are presented in Table 5.

Table 5. Species Composition of Observed Bat Carcasses

Common Name	Federal Status[a]	State Status[b]	Scientific Name	Count[c]	Percentage of All Bat Carcasses
Silver-haired bat	-	SC	*Lasionycteris noctivagans*	105	47.1%
Eastern red bat	-	SC	*Lasiurus borealis*	66	29.6%
Big brown bat	-	-	*Eptesicus fuscus*	26	11.7%
Hoary bat	-	SC	*Lasiurus cinereus*	21	9.4%
Indiana bat	FE	SE	*Myotis sodalis*	2	0.9%
Seminole bat	-	-	*Lasiurus seminolus*	2	0.9%
Little brown bat	-	SE	*Myotis lucifugus*	1	0.4%
All species	-	-	-	223	100.0%

[a] FE = federally listed endangered. A hyphen indicates no listing status.
[b] SE = state-listed endangered; SC = state species of special concern. A hyphen indicates no listing status.
[c] Incidental finds were excluded from analysis and are not included in this table.

In addition to the 223 bats found during standardized surveys, 22 bats were found incidentally, including bats found during clearance sweeps and outside of standardized search areas or scheduled searches. A list of all bat carcasses found during searches, including incidental finds not summarized in Table 5, is provided in Appendix A-1. Avian carcasses were not included in the analysis; however, a list of avian carcasses found during searches is provided in Appendix A-2.

Of the 223 bats included in the analysis, 13 carcasses (5.8%) were found during the spring season, two carcasses (0.9%) were found during the summer season, and 208 carcasses (93.3%) were found during the fall season (Table 6).

Table 6. Total Bat Carcasses Found by Season during Standardized Searches

Season	Total Bats[a]	Percentage
Spring	13	5.8%
Summer	2	0.9%
Fall	208	93.3%
Total	223	100.0%

[a] Incidental finds were excluded from analysis and are not included in this table.

More bat carcasses were found at full plots compared to road and pad plots (153 carcasses, or 68.6% at full plots; 70 carcasses, or 31.4% at road and pad plots). At full plots, a majority of carcasses were found within 40 m of the turbine (67.3%), with most carcasses found within the 30 to 40 m distance band. At road and pad plots, a majority of carcasses were found within 20 m of the turbine (55.7%), with most carcasses being found within the 0 to 10 m distance band. A breakdown of the distribution of bat carcasses at each plot type is provided in Table 7.

Table 7. Total Counts of Bat Carcasses by Plot Type and Distance from Turbine

Distance Band (m)	Full Plots[a]	Percentage[a, b] (Full Plots)	Roads/Pads Plots	Percentage[b] (Road and Pad Plots)	Total Standardized Carcasses[c]	Percentage[b] (All Plots)
0 to 10	15	9.8%	31	44.3%	46	20.6%
10 to 20	16	10.5%	8	11.4%	24	10.8%
20 to 30	28	18.3%	13	18.6%	41	18.4%
30 to 40	44	28.8%	6	8.6%	50	22.4%
40 to 50	36	23.5%	3	4.3%	39	17.5%
50 to 60	10	6.5%	6	8.6%	16	7.2%
60 to 70	4	2.6%	0	0.0%	4	1.8%
70 to 80	0	0.0%	1	1.4%	1	0.4%
80 to 90	N/A	N/A	1	1.4%	1	0.4%
90 to 100	N/A	N/A	1	1.4%	1	0.4%
Total	153	68.6%	70	31.4%	223	100.0%

[a] N/A indicates not applicable. The maximum distance a carcass could be found within the standardized 100 m × 100 m full plots was approximately 70.7 m (i.e., the corners of the square plots).

[b] Percentage for each distance band is based on the total number of standardized carcasses for each plot type. The total percentage for each plot type is based on all plots combined.

[c] Incidental finds were excluded from analysis and are not included in this table.

4.2 SENSITIVE SPECIES

Two federally and state-listed endangered Indiana bat carcasses were found over the course of standardized spring, summer, and fall surveys (Figure 6). Both carcasses were found at full plots in the fall, including one each at turbines 36 (August 20, 2023) and 10 (September 4, 2023). No northern long-eared bats were discovered during 2023 PCMM surveys. Section 4.6 provides take estimates for Indiana and northern long-eared bats, which are species covered under the HCP (Atwell 2021). No federally listed threatened or endangered species were found incidentally. One state-listed endangered little brown bat (*Myotis lucifugus*) was found over the course of spring, summer, and fall surveys (Figure 6). The little brown bat was found at turbine 19 (full plot) on August 15, 2023. Little brown bat is currently under review for federal listing status (USFWS 2023). No state-listed endangered species were found incidentally.

4.3 SEARCHER EFFICIENCY

As previously described, a total of 184 trial carcasses were placed throughout the study period, including 59 in the spring, 51 in the summer, and 74 in the fall. Eighty-eight carcasses were placed at full plot locations (27 in spring, 25 in summer, and 36 in fall) and 96 were placed at road and pad plot locations (32 in spring, 26 in summer, and 38 in fall). Sixteen carcasses were scavenged prior to the search, including 11 in the spring (four from full plots and seven from road and pad plots), one in the summer (from a road and pad plot), and four in the fall (one from a full plot and three from road and pad plots). These carcasses were subsequently removed from the searcher efficiency calculation. The total number of available carcasses for searchers is presented in Table 8. Searcher efficiency was higher at road and pad plots (98.0%, 92.0%, and 97.1% in spring, summer, and fall, respectively; Table 8) compared to full plots (56.5%, 48.0%, and 65.7% in spring, summer, and fall, respectively; Table 8). Searcher efficiency among seasons was relatively similar overall with 79.2% in the spring, 70.0% in summer, and 81.4% in fall (Table 8).

Table 8. Searcher Efficiency Estimates by Season and Plot Type

Predictor Variable	n[a]	*p*[b]	90% Confidence Interval	
Spring				
Full Plots	23	0.565	0.394	0.722
Road and Pad Plots	25	0.980	0.903	0.996
Overall	48	0.792	0.679	0.872
Summer				
Full Plots	25	0.480	0.323	0.641
Road and Pad Plots	25	0.920	0.774	0.975
Overall	50	0.700	0.584	0.795
Fall				
Full Plots	35	0.657	0.516	0.775
Road and Pad Plots	35	0.971	0.865	0.994
Overall	70	0.814	0.726	0.879

[a] n is the number of carcasses placed for the searcher efficiency trial excluding carcasses scavenged prior to search.
[b] *p* is the calculated searcher efficiency.

4.4 CARCASS PERSISTENCE

In all, 130 trial carcasses were placed throughout the study period, including 50 each in the spring and fall, and 30 in the summer. A total of 25 carcasses were placed at each plot type in both spring and fall, whereas 15 carcasses were placed at each plot type in summer. After one day, 70.0%, 80.0%, and 70.0% of carcasses were remaining during the spring, summer, and fall, respectively. By mid-trial (day 14 for spring and summer; day 15 for fall), eight (16.0%), 10 (33.3%), and 11 (22.0%) carcasses were remaining in the spring, summer, and fall, respectively. By the end of the trial (day 30), five (10.0%), zero (0.0%), and eight (16%) carcasses were remaining in the spring, summer, and fall, respectively.

The estimated overall median probabilities of persisting to day 1 after placement were 0.84, 0.95, and 0.79 in spring, summer, and fall, respectively (Table 9; Figures 7a-c). The estimated overall median probabilities of persisting to day 7 were 0.51, 0.71 and 0.49 in spring, summer, and fall, respectively (Table 9; Figures 7a-c). In general, the probability of persisting throughout the entire 30-day trial period was highest in the summer, followed by the fall and spring (0.41, 0.37, and 0.34 by day 28 for spring, summer, and fall respectively; Table 9; Figures 7a-c). In general, carcasses had a greater probability of persisting through the search interval (i.e., day 7 in spring and summer; day 1 in fall) at full plots than road and pad plots (Table 9). Based on the selected models for fatality estimation in GenEst (Table 3), median carcass persistence in the spring and fall was 2.90 and 2.61 days, respectively. Median carcass persistence in the summer was 8.98 days at full plots and 4.18 days at road and pad plots. Estimates provided in Table 9 do not represent the proportion of carcasses remaining at the end of an interval of t days (where t = 1, 3, 7, 14, or 28 days) but rather the probability that a carcass arriving within an interval of t days persists until the end of the interval.

Table 9. Carcass Persistence Estimates by Season and Plot Type

Plot Type	n[a]	Median CP[b]	90% Confidence Interval		Probability of Persistence[c]														
					r_1	90% Confidence Interval		r_3	90% Confidence Interval		r_7	90% Confidence Interval		r_{14}	90% Confidence Interval		r_{28}	90% Confidence Interval	
Spring																			
Full Plots[d]	25	3.12	1.65	5.91	0.85	0.75	0.93	0.69	0.56	0.80	0.53	0.40	0.65	0.39	0.28	0.52	0.27	0.18	0.38
Road and Pad Plots[d]	25	2.69	1.40	5.18	0.83	0.72	0.92	0.66	0.53	0.78	0.50	0.37	0.63	0.37	0.26	0.49	0.25	0.16	0.36
Overall	50	2.90	1.83	4.60	0.84	0.76	0.92	0.67	0.58	0.77	0.51	0.43	0.60	0.38	0.30	0.46	0.26	0.19	0.34
Summer																			
Full Plots[e]	15	8.98	5.85	13.80	0.96	0.94	0.97	0.89	0.84	0.93	0.77	0.68	0.84	0.61	0.49	0.71	0.41	0.29	0.53
Road and Pad Plots[e]	15	4.18	2.72	6.41	0.92	0.88	0.95	0.79	0.70	0.85	0.59	0.47	0.70	0.39	0.27	0.51	0.21	0.14	0.31
Overall	30	6.57	4.85	8.90	0.95	0.93	0.96	0.86	0.81	0.89	0.71	0.63	0.77	0.52	0.43	0.61	0.32	0.25	0.41
Fall																			
Full Plots[f]	25	2.87	1.32	6.23	0.80	0.69	0.89	0.65	0.52	0.77	0.51	0.38	0.64	0.40	0.28	0.52	0.29	0.19	0.41
Road and Pad Plots[f]	25	2.36	1.06	5.23	0.78	0.66	0.87	0.62	0.49	0.74	0.48	0.35	0.61	0.36	0.25	0.49	0.27	0.16	0.39
Overall	50	2.61	1.49	4.57	0.79	0.70	0.87	0.63	0.54	0.73	0.49	0.40	0.59	0.38	0.29	0.47	0.28	0.20	0.37

[a] n is the number of carcasses placed for the carcass persistence trial.

[b] MedianCP is the estimated median number of days a carcass will persist after day 0.

[c] Probability of persistence is the estimated median probability that a carcass arriving at a uniform random time in an interval of t days (i.e., 1, 3, 7, 14, 28 days) persists until the end of the interval.

[d] In the spring, estimates for road and pad plots and full plots were determined using a lognormal distribution with the location formula a function of Plot Type and the scale formula constant; however, this model was not selected for fatality estimation in GenEst.

[e] In the summer, the overall estimate was determined using an exponential distribution with constant location formula; however, this model was not selected for fatality estimation in GenEst.

[f] In the fall, estimates for road and pad plots and full plots were determined using a loglogistic distribution with the location formula a function of Plot Type and the scale formula constant; however, this model was not selected for fatality estimation in GenEst.

4.5 PROJECT-SPECIFIC FATALITY ESTIMATION

In total, 223 bat carcasses (Appendix A-1) were found during standardized searches and input into GenEst to calculate adjusted project-specific fatality estimates for each season. The overall probability of detection ($\hat{g}$) was highest in the fall, followed by the summer then spring (Table 10). The higher detection probability in the fall is primarily driven by more frequent turbine searches compared to the spring and summer.

Probability of detection tended to be higher at road and pad plots compared to full plots (Table 10), which was primarily driven by higher searcher efficiency at road and pad plots. As previously mentioned, the $\hat{g}$-values provided in GenEst (and presented in Table 10) are simplistic estimates based on searcher efficiency estimates, carcass persistence estimates, and the average search interval. However, these estimates do not incorporate spatial coverage of survey plots (i.e., DWP).

Table 10. Detection Probability Estimates by Season and Plot Type

Plot Type	Estimated Detection Probability ($\hat{g}$)[a]	90% Confidence Interval (lower)	90% Confidence Interval (upper)
Spring			
Full Plots	0.363	0.256	0.471
Road and Pad Plots	0.530	0.442	0.626
Overall[b]	0.462	0.373	0.554
Summer			
Full Plots	0.470	0.325	0.613
Road and Pad Plots	0.548	0.414	0.665
Overall[c]	0.551	0.452	0.638
Fall			
Full Plots	0.672	0.569	0.770
Road and Pad Plots	0.774	0.684	0.858
Overall[b]	0.732	0.644	0.822

[a] The $\hat{g}$-values presented in this table are a function of the selected searcher efficiency model, the selected carcass persistence model, and the average search interval. They do not account for spatial coverage (i.e., DWP).

[b] The overall detection probability in spring and fall were determined using constant searcher efficiency and carcass persistence models. While constant carcass persistence models were selected for spring and fall fatality estimation in GenEst, searcher efficiency was modeled as a function of plot type.

[c] The overall detection probability in summer was determined using constant searcher efficiency and carcass persistence models. However, both searcher efficiency and carcass persistence were modeled as functions of plot type for summer fatality estimation in GenEst.

The median fatality estimate was highest in the fall (27.21 bat fatalities/turbine or 12.96 bat fatalities/MW) followed by the spring (1.46 bat fatalities/turbine or 0.70 bat fatalities/MW) then summer (1.09 bat fatalities/turbine or 0.52 bat fatalities/MW) (Table 11).

Table 11. Bat Fatality Estimates by Season

Season	Total Bats[a]	Percentage[b]	Median Fatality Estimate	90% Confidence Interval (lower)	90% Confidence Interval (upper)
Facility-Wide					
Spring	13	5.83%	83.31	34.42	153.65
Summer	2	0.90%	35.03	2.00	104.23
Fall	208	93.27%	1551.13	1251.88	1902.99
Per Turbine[c]					
Spring	13	5.83%	1.46	0.60	2.70
Summer	2	0.90%	1.09	0.06	3.26
Fall	208	93.27%	27.21	21.96	33.39
Per Megawatt[d]					
Spring	13	5.83%	0.70	0.29	1.28
Summer	2	0.90%	0.52	0.03	1.55
Fall	208	93.27%	12.96	10.46	15.90

[a] Incidental finds were excluded from analysis and are not included in this table.
[b] Percentage is the percent of total bats found during each season.
[c] Based on 57 turbines for spring and fall, and 32 turbines for summer
[d] Based on 119.7 MW for spring and fall, and 67.2 MW for summer

4.6 ESTIMATED TAKE OF COVERED SPECIES

Two Indiana bat carcasses, a species covered under the HCP (Atwell 2021), were found over the course of standardized surveys in 2023. No northern long-eared bat carcasses were found at the project in 2023.

Results from the searcher efficiency and carcass removal trials, as well as the site spatial coverage were input into EoA to model estimated Indiana and northern long-eared bat take. Using the multiple class module, EoA estimated searcher efficiency at full plots to be 0.565 (95% confidence interval: 0.365, 0.750), 0.480 (95% confidence interval: 0.295, 0.669), and 0.657 (95% confidence interval: 0.492, 0.797) in the spring, summer, and fall, respectively. Searcher efficiency at road and pad plots was estimated to be 1.000 (95% confidence interval: 0.905, 1.000), 0.920 (95% confidence interval: 0.767, 0.983), and 0.971 (95% confidence interval: 0.874, 0.997) in the spring, summer, and fall, respectively.

For a search interval of seven days in the spring, carcass persistence (*r*) was estimated to be 0.535 (95% confidence interval: 0.407, 0.681) and 0.486 (95% confidence interval: 0.343, 0.652) for full plots and road and pad plots, respectively (Table 4). For a search interval of seven days in the summer, carcass persistence (*r*) was estimated to be 0.773 (95% confidence interval: 0.647, 0.860) at full plots and 0.591 (95% confidence interval: 0.427, 0.731) at road and pad plots (Table 4). For a search interval of one day in the fall, carcass persistence (*r*) was estimated to be 0.806 (95% confidence interval: 0.667, 0.926) at full plots and 0.765 (95% confidence interval: 0.624, 0.904) at road and pad plots (Table 4).

Ba and Bb values, detection probabilities, and spatial coverage values that were input into the multiple classes module for each plot type and season are shown in Table 12, below. The overall spatial coverage for full plots and road and pad plots combined was 0.3273.

The estimated overall detection probability in 2023 was 0.205 (95% confidence interval: 0.174, 0.237; Ba = 126.5796 and Bb= 492.1542; Table 13). With two Indiana bat carcasses found at full plots during standardized surveys in the fall (X = 2), the median fatality estimate for Indiana bats (M*) was 10 fatalities in 2023 and the mean mortality rate (λ) was 12.30 (95% confidence interval: 2.031, 31.950; Table 13). With no northern long-eared bat carcasses found at the project in 2023, the median fatality estimate for northern long-eared bats was one fatality in 2023 and the mean λ was 2.47 (95% confidence interval: 0.002, 12.440; Table 13). EoA outputs are provided in Appendix C.

Table 12. Multiple Class Module Inputs to Estimate Take of HCP-Covered Species using EoA

Season	Plot Type	dwp[a]	Indiana Bat Carcass Count (X)	Northern Long-eared Bat Carcass Count (X)	Ba[b]	Bb[b]	Detection Probability (ĝ)	95% Confidence Interval for ĝ (lower limit)	95% Confidence Interval for ĝ (upper limit)
Spring	Full Plot	0.0112	0	0	14.4153	27.0851	0.347	0.212	0.497
Spring	Road and Pad Plot	0.0019	0	0	18.1099	19.4450	0.482	0.326	0.640
Summer	Full Plot	0.0833	0	0	15.2291	17.1400	0.470	0.304	0.640
Summer	Road and Pad Plot	0.0135	0	0	23.4887	19.4944	0.546	0.397	0.687
Fall	Full Plot	0.1853	2	0	24.1869	10.4989	0.697	0.537	0.836
Fall	Road and Pad Plot	0.0319	0	0	23.6426	7.8487	0.751	0.589	0.883

[a] "dwp" is the average density-weighted proportion for each plot type weighted by the proportion of plots the plot type comprises and the estimated seasonal proportions of *Myotis* mortality as described in the Bluff Point HCP (Atwell 2021).

[b] Ba and Bb values for each plot type were determined from search class inputs in EoA's multiple class module.

Table 13. Overall Detection Probability, Median Fatality Estimate, and Mean Fatality Rate Estimate for HCP-Covered Species

Species	Carcass Count (x)	Overall Detection Probability (ĝ)	95% CI for ĝ (lower limit)[a]	95% CI for ĝ (upper limit)[a]	Ba[b]	Bb[b]	Median Fatality Estimate (M*)	95% CI for M* (lower limit)[a]	95% CI for M* (upper limit)[a]	Mean Fatality Rate Estimate (λ)	95% CI for λ (lower limit)[a]	95% CI for λ (upper limit)[a]
Indiana bat	2	0.205	0.174	0.237	126.5796	492.1542	10	3	28	12.30	2.031	31.950
Northern long-eared bat	0	0.205	0.174	0.237	126.5796	492.1542	1	0	8	2.47	0.002	12.440

[a] CI = Confidence Interval

[b] Ba and Bb values were calculated from EoA's multiple class module and characterize the overall detection probability.

The "Track past mortality" option in EoA's multiple years module was used to track cumulative take with a 50% credibility level at the project over the life of the ITP. The overall detection probability following three years of baseline monitoring is 0.199 (95% confidence interval: 0.183, 0.215). The cumulative median take estimates for Indiana and northern long-eared bats after three years are 16 and one fatalities, respectively (Table 14). Cumulative mean λ estimates are 17.640 and 2.519 for Indiana and northern long-eared bat, respectively (Table 14). As such, the overall annual mean λ after three years of monitoring is 5.879 (95% confidence interval: 1.420, 13.500) Indiana bats and 0.840 (95% confidence interval: 0.001, 4.220) northern long-eared bats (Table 15). The three-year baseline mean mortality rates for Indiana and northern long-eared bats do not exceed the short-term adaptive management trigger with 99% credibility (Table 15; Appendix C).

Table 14. Cumulative Mortality Estimates for Covered Species (2021 – 2023)

Year	Carcass Count (X)	Detection Probability (ĝ)	95% CI for ĝ (lower limit)[a]	95% CI for ĝ (upper limit)[a]	Median Fatality Estimate (M*)	95% CI for M* (lower limit)[a]	95% CI for M* (upper limit)[a]	Mean Fatality Rate Estimate (λ)	95% CI for λ (lower limit)[a]	95% CI for λ (upper limit)[a]
Indiana bat										
2021	0	0.124	0.103	0.147	1	0	14	4.076	0.004	20.570
2022	1	0.196	0.179	0.214	6	1	18	7.675	0.551	23.970
2023	3	0.199	0.183	0.215	16	5	35	17.640	4.246	40.460
Northern long-eared bat										
2021	0	0.124	0.103	0.147	1	0	14	4.076	0.004	20.570
2022	0	0.196	0.179	0.214	1	0	8	2.558	0.003	12.860
2023	0	0.199	0.183	0.215	1	0	8	2.519	0.002	12.670

[a] CI = Confidence Interval

Table 15. Results of an EoA Short-Term Trigger Analysis for HCP-Covered Species

Timeframe	Term (Years)	Species	Baseline Fatality Rate Estimate (λ)[a]	95% CI for λ (lower limit)[b]	95% CI for λ (upper limit)[b]	Annual Rate Threshold (τ)	P(λ > τ)[c]	Result[d]
2021 – 2023	3	Indiana bat	5.879	1.420	13.500	5.500	0.477	Compliance
2021 – 2023	3	Northern long-eared bat	0.840	0.001	4.220	2.800	0.068	Compliance

[a] The baseline fatality rate estimate is the average estimate over the term length.

[b] CI = Confidence Interval

[c] P(λ > τ) is the probability that the baseline fatality rate is greater than the annual rate threshold set per the Bluff Point HCP (Atwell 2021).

[d] Compliance indicates that λ cannot be inferred as greater than τ with 99% credibility.

5 DISCUSSION

Over the course of the study, 223 bat carcasses representing seven species were found during standardized surveys. Using GenEst, the estimated adjusted fatality rates in the spring, summer, and fall were 1.46 bats/turbine (0.70 bats/MW; 83.31 total bats), 1.09 bats/turbine (0.52 bats/MW; 35.03 total bats), and 27.21 bats/turbine (12.96 bats/MW; 1551.13 total bats), respectively. While the spring and fall fatality estimates were for all 57 turbines at the project, the summer fatality estimate was only for 32 turbines within the bat avoidance buffer. This is because all turbines were surveyed and operating at a 3.0 m/s and 5.0 m/s cut-in speed during the spring and fall, respectively, whereas only turbines within the bat avoidance buffer were surveyed and operating at a 6.0 m/s cut-in speed in the summer. Turbines located outside of the bat avoidance buffer were not surveyed in the summer and were operating at the manufacturer's recommended cut-in speed (3.0 m/s).

Spring and summer fatality estimates at the project were lower in 2023 compared to both 2021 (0.93 and 1.06 bats/MW in spring and summer respectively) and 2022 (1.27 and 1.94 bats/MW in spring and summer respectively). The fall estimate in 2023 was higher than the 2022 fall estimate (9.65 bats/MW), but lower than the 2021 fall estimate (18.64 bats/MW). The fall estimate at the project in 2023 was similar to the 2021 fall fatality estimate at the nearby Bitter Ridge Wind Farm (13.21 bats/MW), which is located in Jay County, Indiana, nearly adjacent to the project (Murray et al. 2022). Summer estimates for the project in 2023 were lower than 2021 summer estimates for the Bitter Ridge Wind Farm (1.76 bats/MW). Turbines searched in summer and fall at Bitter Ridge Wind Farm were feathered below a cut-in speed of 5.0 m/s, which was the same as the project in the fall, though lower than the project's summer cut-in speed at searched turbines (Murray et al. 2022).

Silver-haired and eastern red bats made up a majority (76.7%, collectively) of the carcasses found at the project with significant numbers of big brown (11.7%) and hoary bats (9.4%) found, as well (Table 5). This is similar to the species composition found at other wind facilities throughout the Midwest, including the Bitter Ridge Wind Farm. However, specific proportions of each species may differ (Arnett et al. 2008; AWWI 2018; Murray et al. 2022). Based on the timing of peak carcass counts, it is likely that these were fall migrants.

Bat carcass counts were relatively low throughout the spring and summer but higher in the fall, with carcass counts generally peaking in late August to early September (Figure 8). While this pattern may be partially attributed to a lower turbine cut-in speed during the fall monitoring period compared to the summer monitoring period, this temporal influx of carcasses at the project is also similar to trends from other wind facilities throughout the Midwest and United States as a whole. A majority of bat carcasses tend to correspond with the fall migratory period and dispersal from summer breeding grounds compared to the spring and summer seasons

(Johnson 2005; Arnett et al. 2008; AWWI 2018). The timing of peak carcass counts at the project was generally driven by an influx of silver-haired bats (57% of carcasses) in late August and early September, with smaller contributions from eastern red bats (29% of carcasses) and big brown bats (11% of carcasses). Eastern red bat, which was the species with the second-highest carcass count in 2023 overall, peaked two weeks earlier (mid-August) than the cumulative bat count (Figure 9). A secondary peak in bat carcasses occurred in early October, which was almost entirely driven by silver-haired bats (91% of carcasses) and represented the peak silver-haired bat carcass count (Figure 9).

On an individual turbine basis, full plots had more observed bat carcasses at the project than road and pad plots. This was expected since full plots have a greater amount of area searched compared to roads and pads, particularly at distance bands closer to the turbine tower where a greater proportion of carcasses are likely to be found (Hull and Muir 2010).

During the spring, most bat carcasses (62%) were found at turbines in the western portion of the project, though this was based on a small sample size (13 carcasses; Figure 5a). During the summer and fall, bat carcasses were generally distributed throughout the array during and there did not appear to be any areas of significant concentration (Figures 5b-c). Turbines 20 and 15, which are full plots in the central and western portions of the project area, respectively, had the highest carcass counts. A total of 14 and 13 carcasses were found at turbines 20 and 15, respectively (Figure 5c).

The overall detection probability of 0.205 in 2023 exceeded the target detection probability of 0.2 established in the HCP (Atwell 2021). Monitoring efforts in 2021 and 2022 resulted in detection probabilities of 0.124 and 0.268, respectively (Atwell 2022; Atwell 2023). As such, the average baseline detection probability following three full years of monitoring was 0.199.

As previously mentioned, two Indiana bats and no northern long-eared bats were found during PCMM surveys in 2023. Therefore, over the course of 2021 – 2023 baseline monitoring at the project, a total of three Indiana bats and no northern long-eared bats were discovered. The cumulative take after three years of monitoring, based on EoA modelling, is estimated to be 16 Indiana bats and one northern long eared bat. The long-term trigger threshold has not been exceeded for either species. Furthermore, the short-term adaptive management trigger did not indicate that the project is at risk of exceeding its take limit with 99% credibility. Long-term progress toward the total authorized take limit will be tracked over the life of the ITP using EoA's multiple years module.

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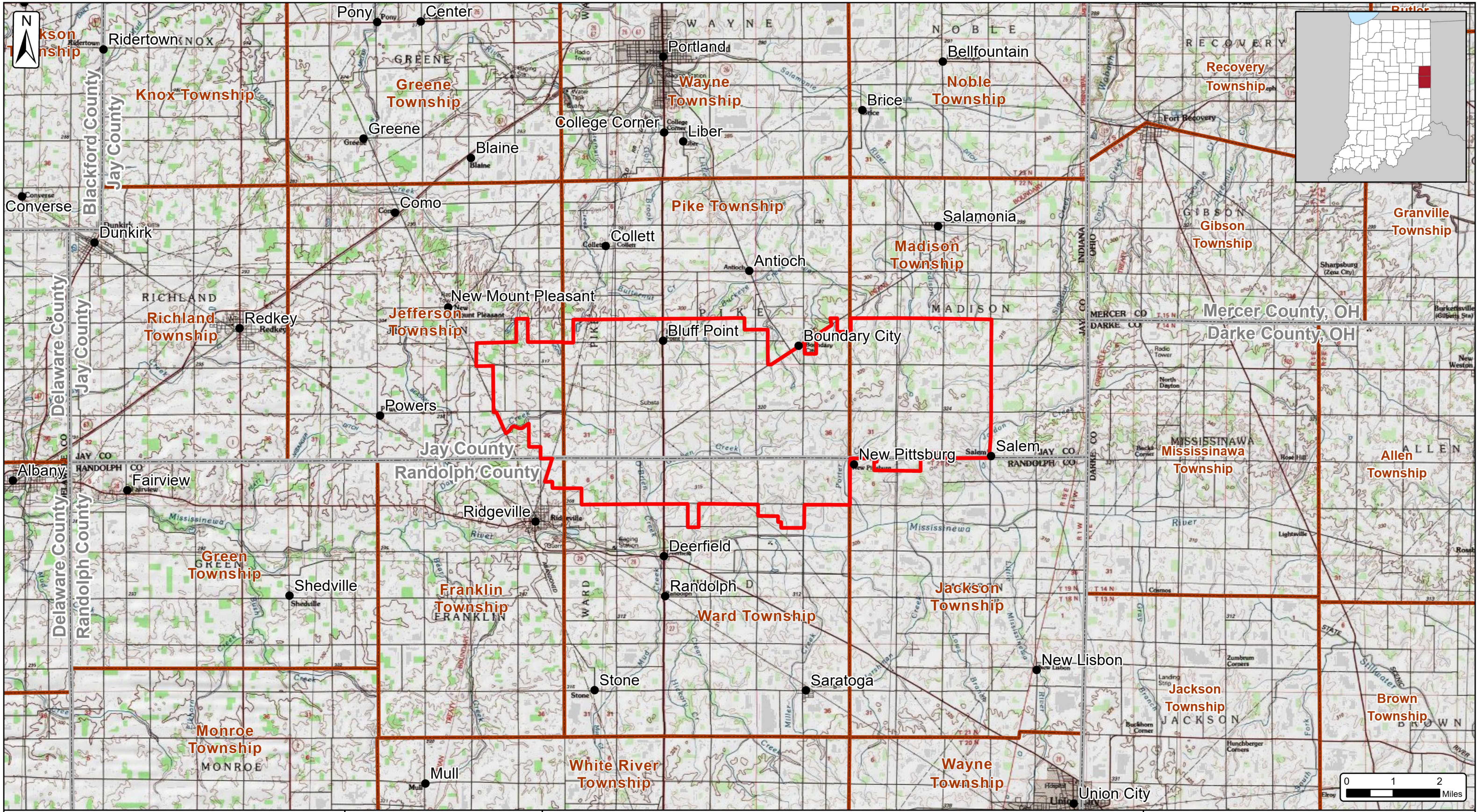
FIGURES



Bluff Point Wind Energy Center

Figure 1
Regional Setting

Jay & Randolph Counties, Indiana
Date: 12/27/2023

Client:

Bluff Point, LLC

Atwell, LLC Project: 20004829

Project Boundary (~23,613 acres)
Township
County Boundaries
Populated Places (USGS)

Source: USGS 30-by-60 Minute Topographic Quadrangles

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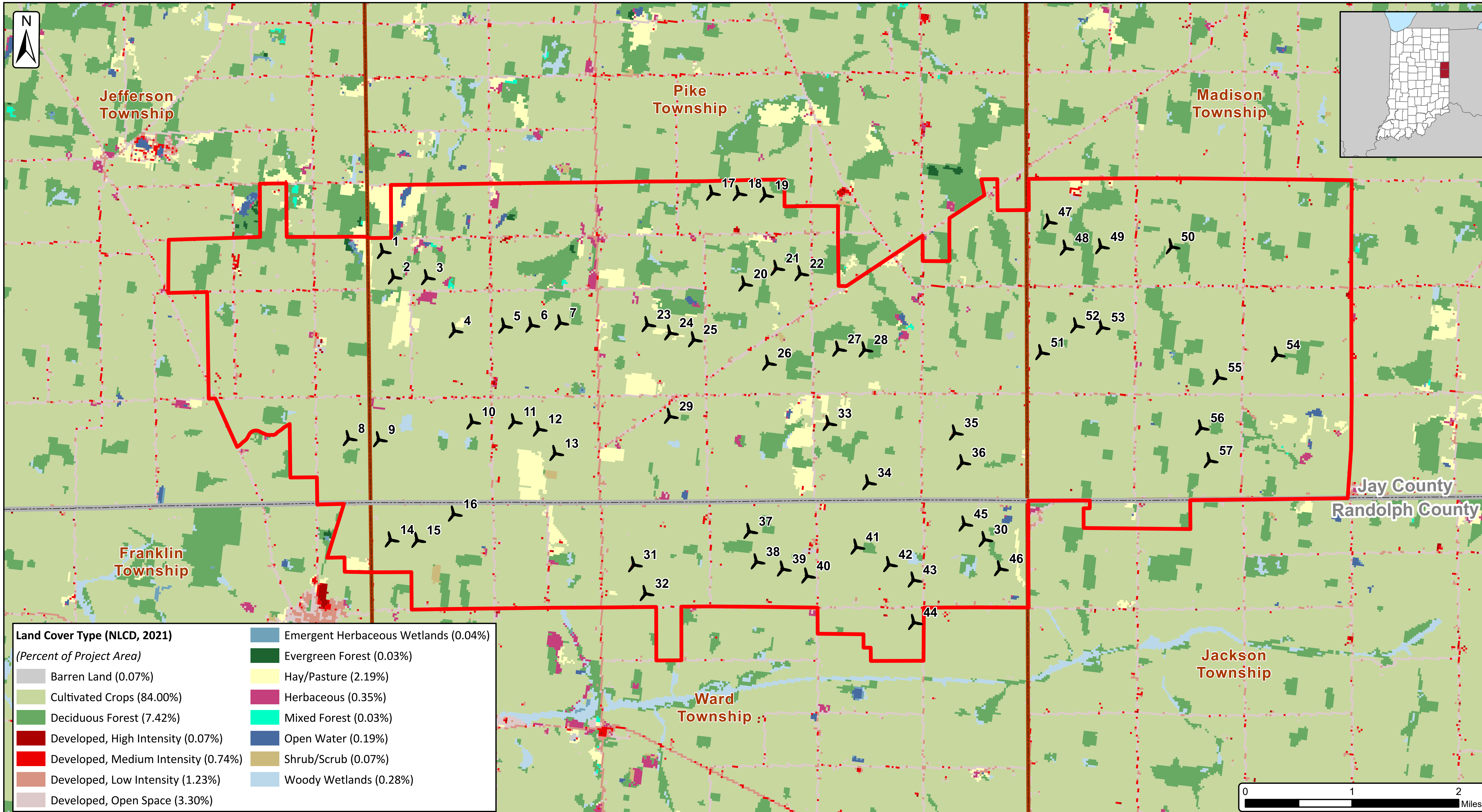

Bluff Point Wind Energy Center

Figure 2

2021 National Land Cover Database

Jay & Randolph Counties, Indiana

Date: 12/27/2023

Client:

Bluff Point, LLC

Atwell, LLC Project: 20004829

As-Built Turbine Locations (10/24/2017)

Project Boundary (~23,612 acres)

Township

County Boundaries

Source: USGS National Land Cover Database (2021)

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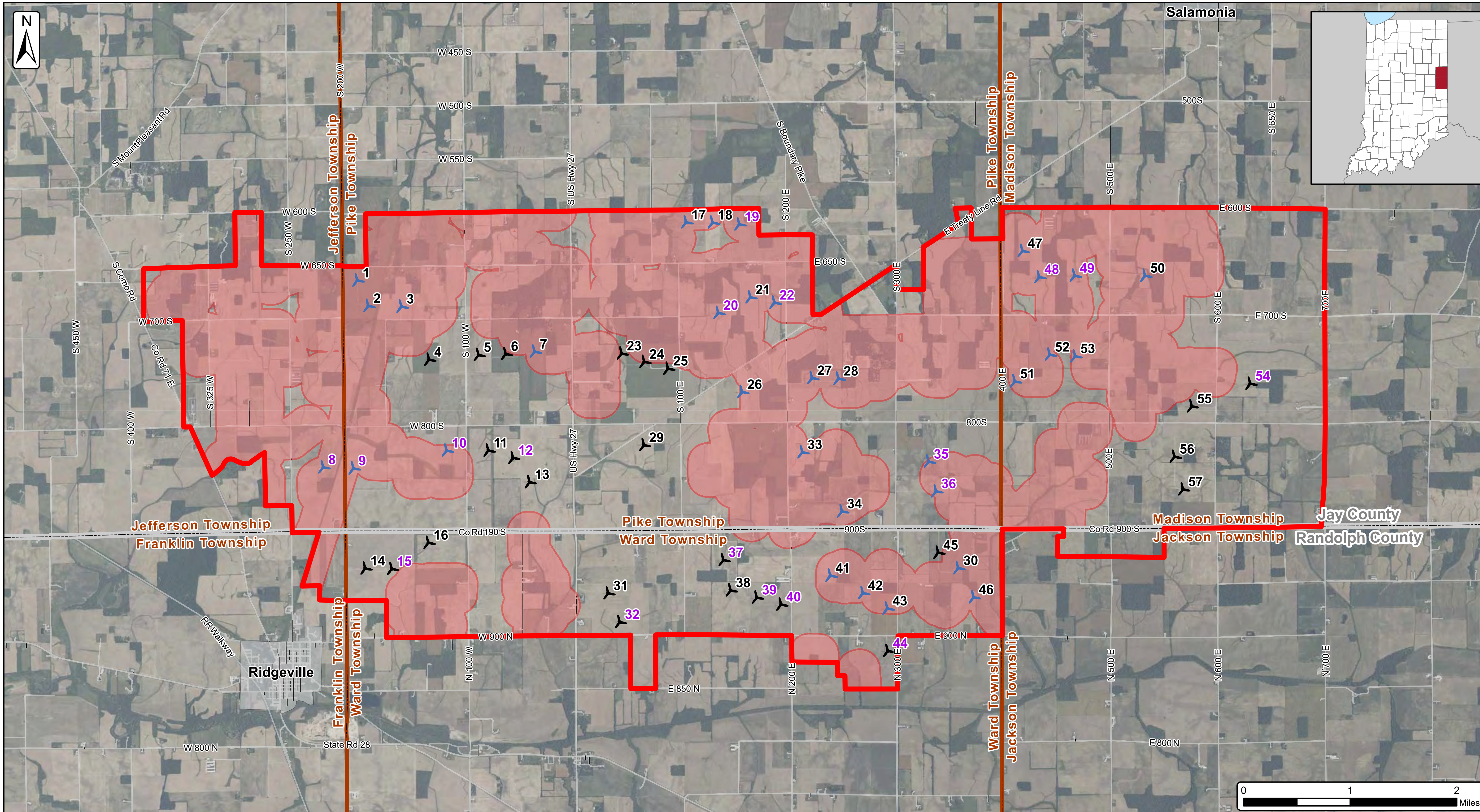
The information contained on this map is proprietary and confidential. The use or disclosure of this information by you to third parties is prohibited by law and may give rise to civil or criminal liability.



Bluff Point Wind Energy Center

Figure 3

As-Built Turbines and Bat Carcass Search Locations

Jay & Randolph Counties, Indiana

Date: 12/27/2023

Client:

Bluff Point, LLC

Atwell, LLC Project: 20004829

As-Built Turbine Locations (10/24/2017)*

- 25 Turbines Outside USFWS Bat Avoidance Area
- 32 Turbines Within USFWS Bat Avoidance Buffer
- USFWS Bat Avoidance Buffer
- Project Boundary (~23,613 acres)
- City/Village
- Township Boundary
- County Boundary

* Turbines with purple text label represent 100 x 100 meter full plot survey areas.

Source: USDA National Agriculture Imagery Program (2022)

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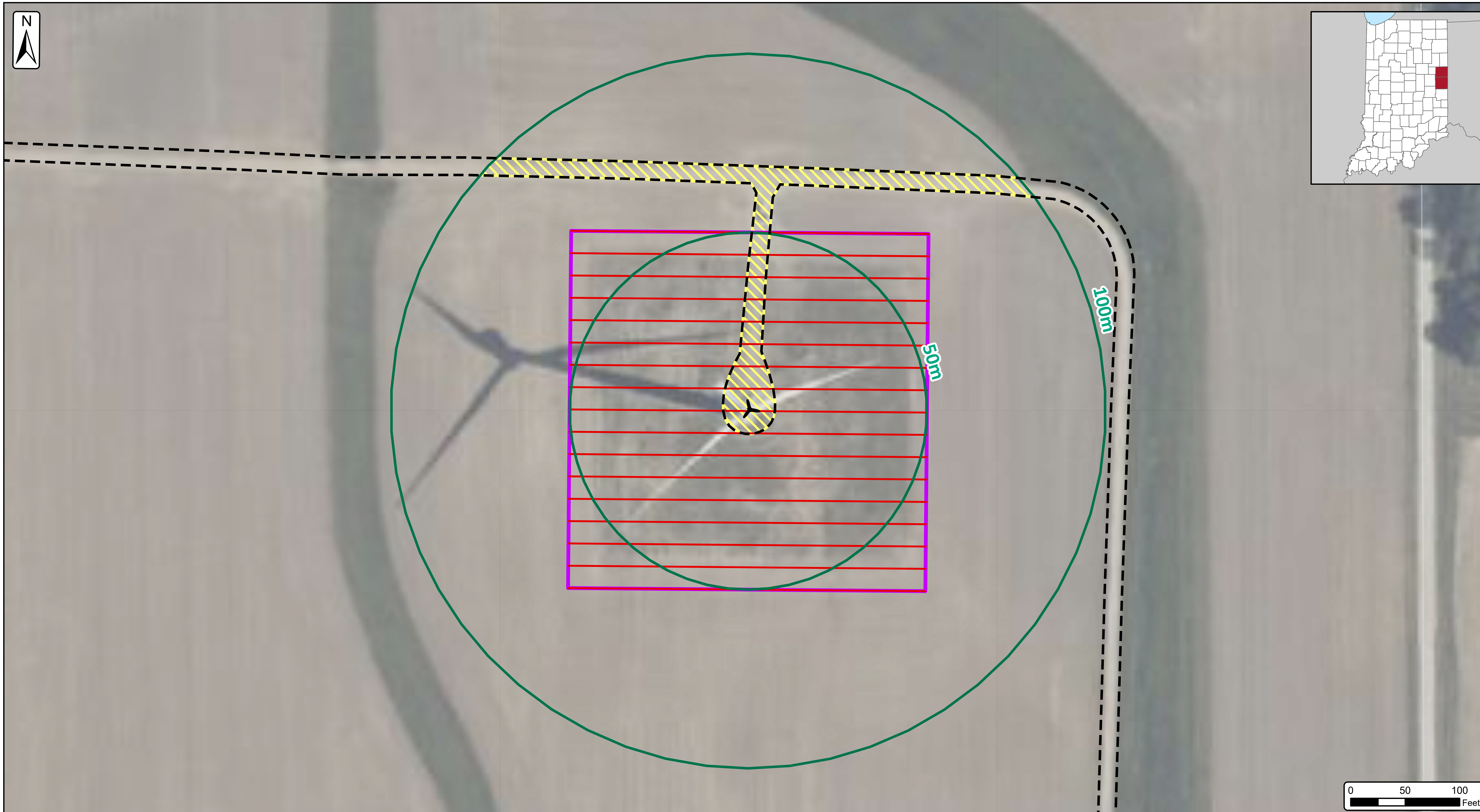

Bluff Point Wind Energy Center
Figure 4
Example Schematic of Two Search Plot Types
Jay & Randolph Counties, Indiana
Date: 12/27/2023

Client:

Bluff Point, LLC

Atwell, LLC Project: 20004829

As-Built Turbine Location (10/24/2017)
Distance from Turbine
100 x 100 Meter Full Plot
100 m x 100 m Full Plot Transect
As-Built Access Road (10/24/2017)
Road and Pad Search Area

Source: USDA National Agriculture Imagery Program (2022)

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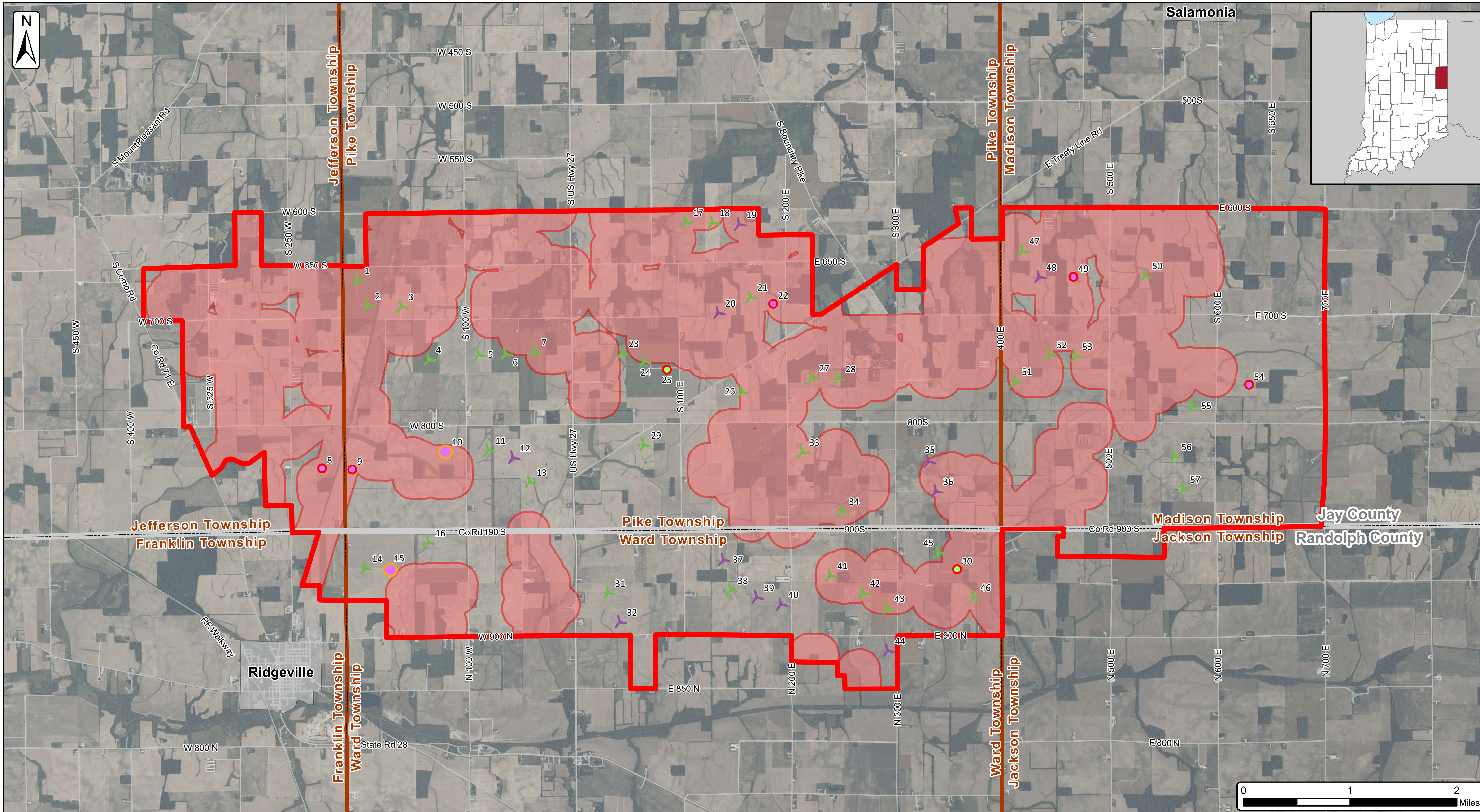

Bluff Point Wind Energy Center

Figure 5a

Weighted Standardized Bat Carcass Discoveries (Spring)

Jay & Randolph Counties, Indiana

Date: 12/27/2023

Client:

Bluff Point, LLC

Atwell, LLC Project: 20004829

- Road and Pad Plot with Standardized Bat Fatalities
- Cleared Full Plot with Standardized Bat Fatalities
- Road and Pad Plot with Zero Standardized Bat Fatalities
- Cleared Full Plot with Zero Standardized Bat Fatalities
- USFWS Bat Avoidance Buffer
- Project Boundary (~23,613 acres)
- Town/Village
- Township Boundary
- County Boundary

Weighted Standardized Fatalities

- 1
- 3

Source: USDA National Agriculture Imagery Program (2022)

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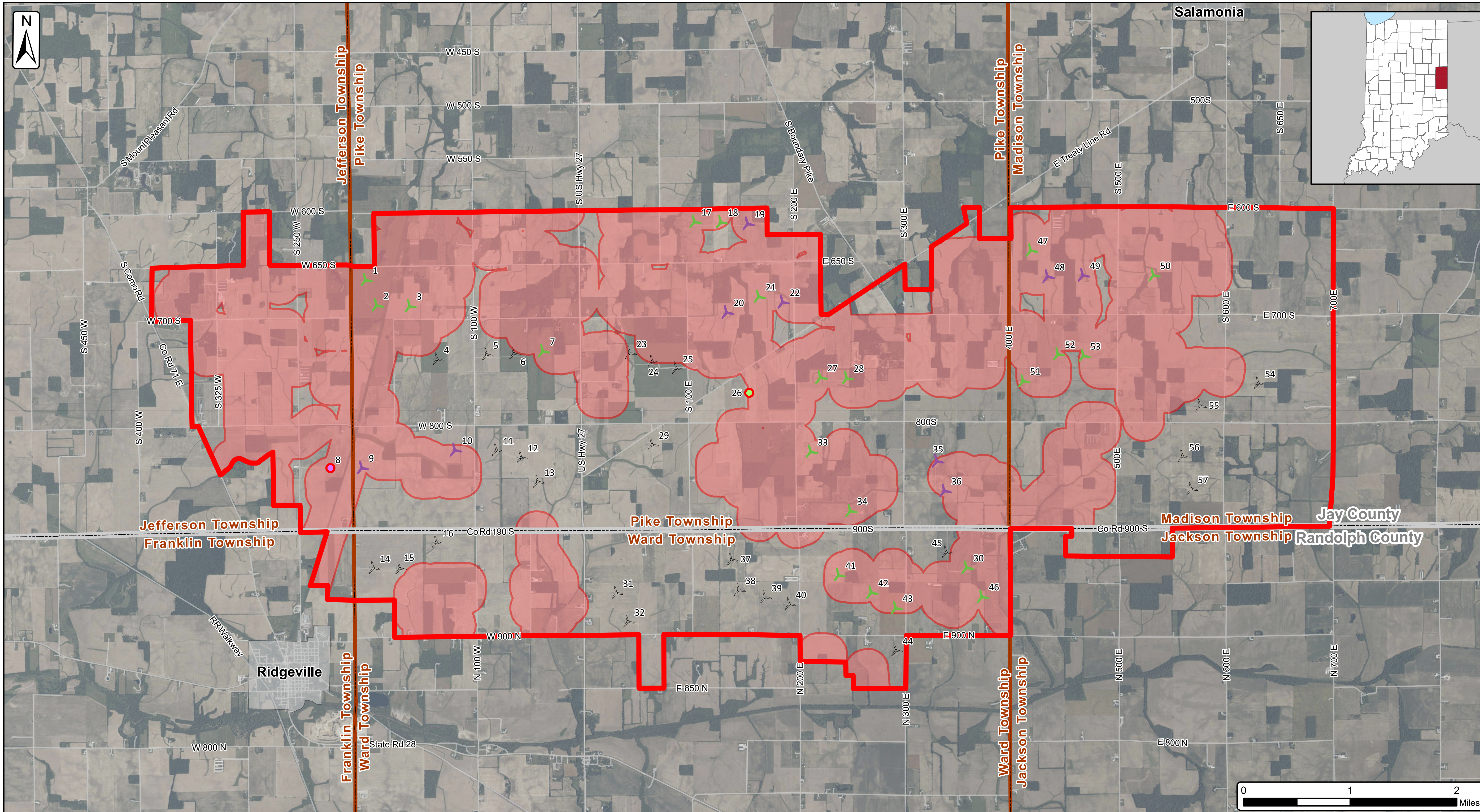

Bluff Point Wind Energy Center

Figure 5b

Weighted Standardized Bat Carcass Discoveries (Summer)

Jay & Randolph Counties, Indiana

Date: 12/27/2023

Client:

Bluff Point, LLC

Atwell, LLC Project: 20004829

- Road and Pad Plot with Standardized Bat Fatalities
- Cleared Full Plot with Standardized Bat Fatalities
- Road and Pad Plot with Zero Standardized Bat Fatalities
- Cleared Full Plot with Zero Standardized Bat Fatalities
- Unsearched Turbine
- USFWS Bat Avoidance Buffer
- Project Boundary (~23,613 acres)
- Town/Village
- Township Boundary
- County Boundary

Weighted Standardized Fatalities

- 1

Source: USDA National Agriculture Imagery Program (2022)

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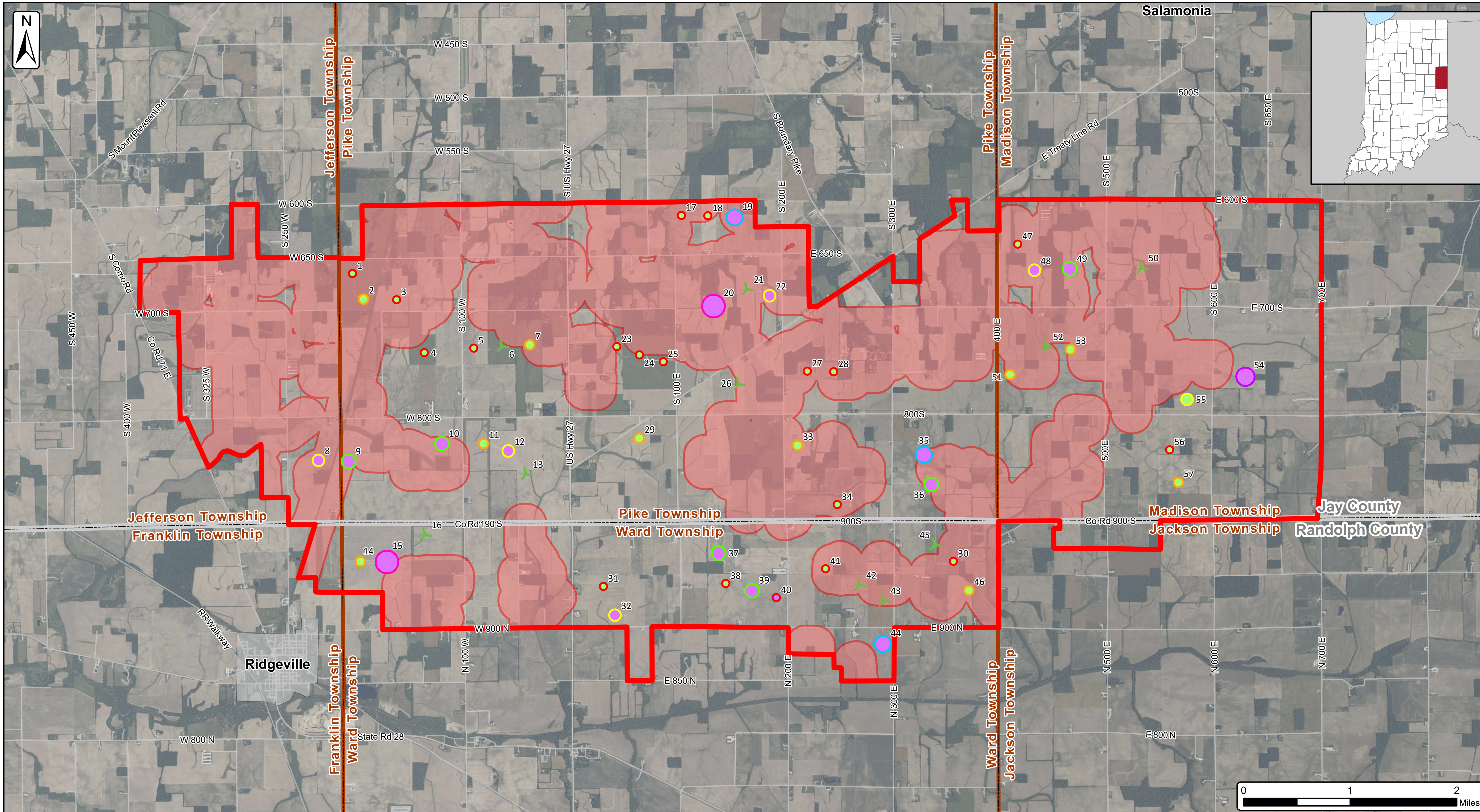

Bluff Point Wind Energy Center

Figure 5c

Weighted Standardized Bat Carcass Discoveries (Fall)

Jay & Randolph Counties, Indiana

Date: 12/27/2023

Client:

Bluff Point, LLC

Atwell, LLC Project: 20004829

- Road and Pad Plot with Standardized Bat Fatalities
- Cleared Full Plot with Standardized Bat Fatalities
- Road and Pad Plot with Zero Standardized Bat Fatalities
- Cleared Full Plot with Zero Standardized Bat Fatalities
- USFWS Bat Avoidance Buffer
- Project Boundary (~23,613 acres)
- Town/Village
- Township Boundary
- County Boundary

Weighted Standardized Fatalities

- 1 - 2
- 3 - 4
- 5 - 6
- 7 - 8
- 9 - 10
- 11 - 12
- 13 - 14

Source: USDA National Agriculture Imagery Program (2022)

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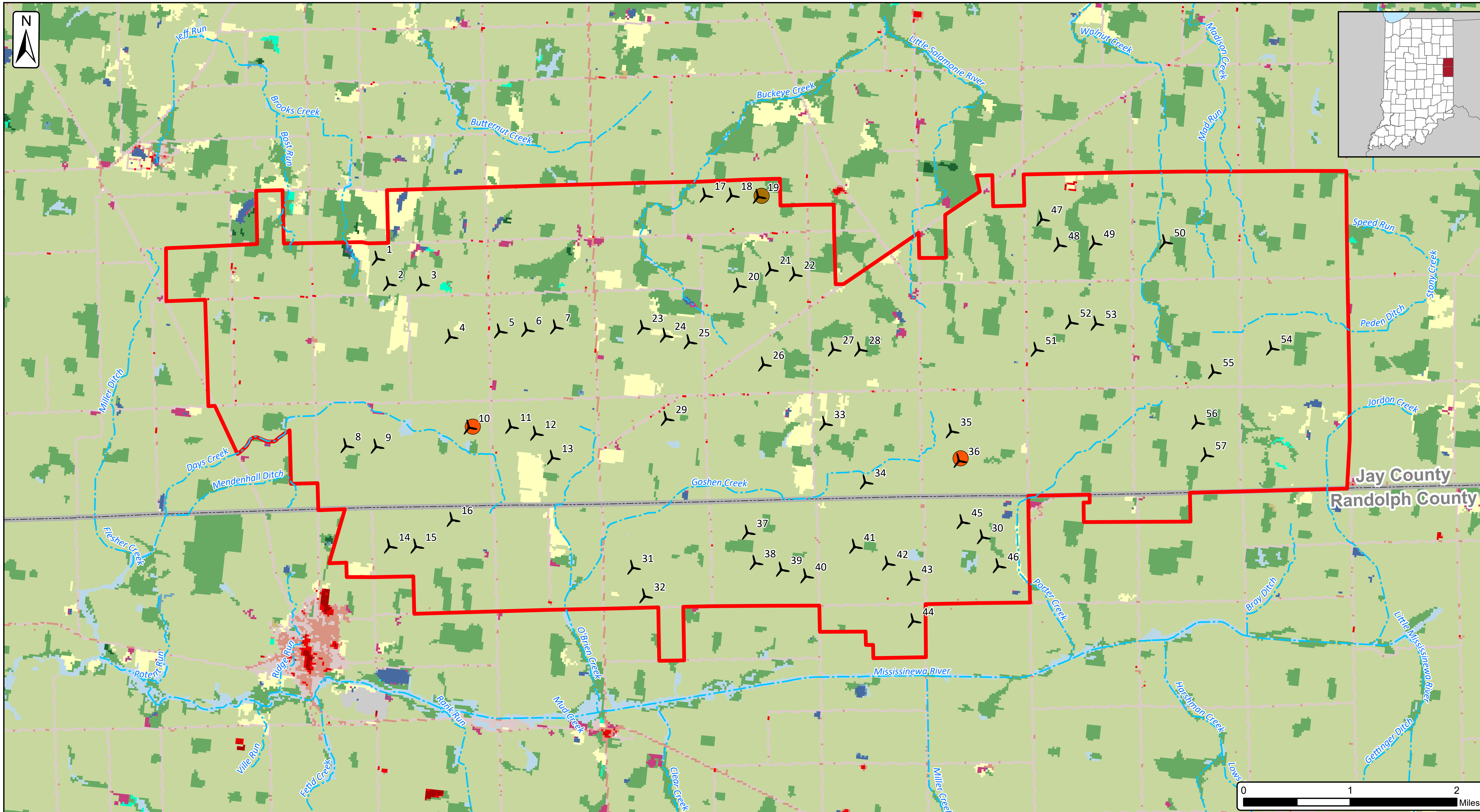

Bluff Point Wind Energy Center

Figure 6

Locations of Sensitive Bat Species

Jay & Randolph Counties, Indiana

Date: 12/27/2023

Client:

Bluff Point, LLC

Atwell, LLC Project: 20004829

Indiana bat (federally and state-listed endangered)

Little brown bat (state-listed endangered*)

As-Built Turbine Locations (10/24/2017)

Watercourse (NHD)

*As of the preparation of this report, little brown bat is under review for federal listing status.

Source: USGS National Land Cover Database (2016)

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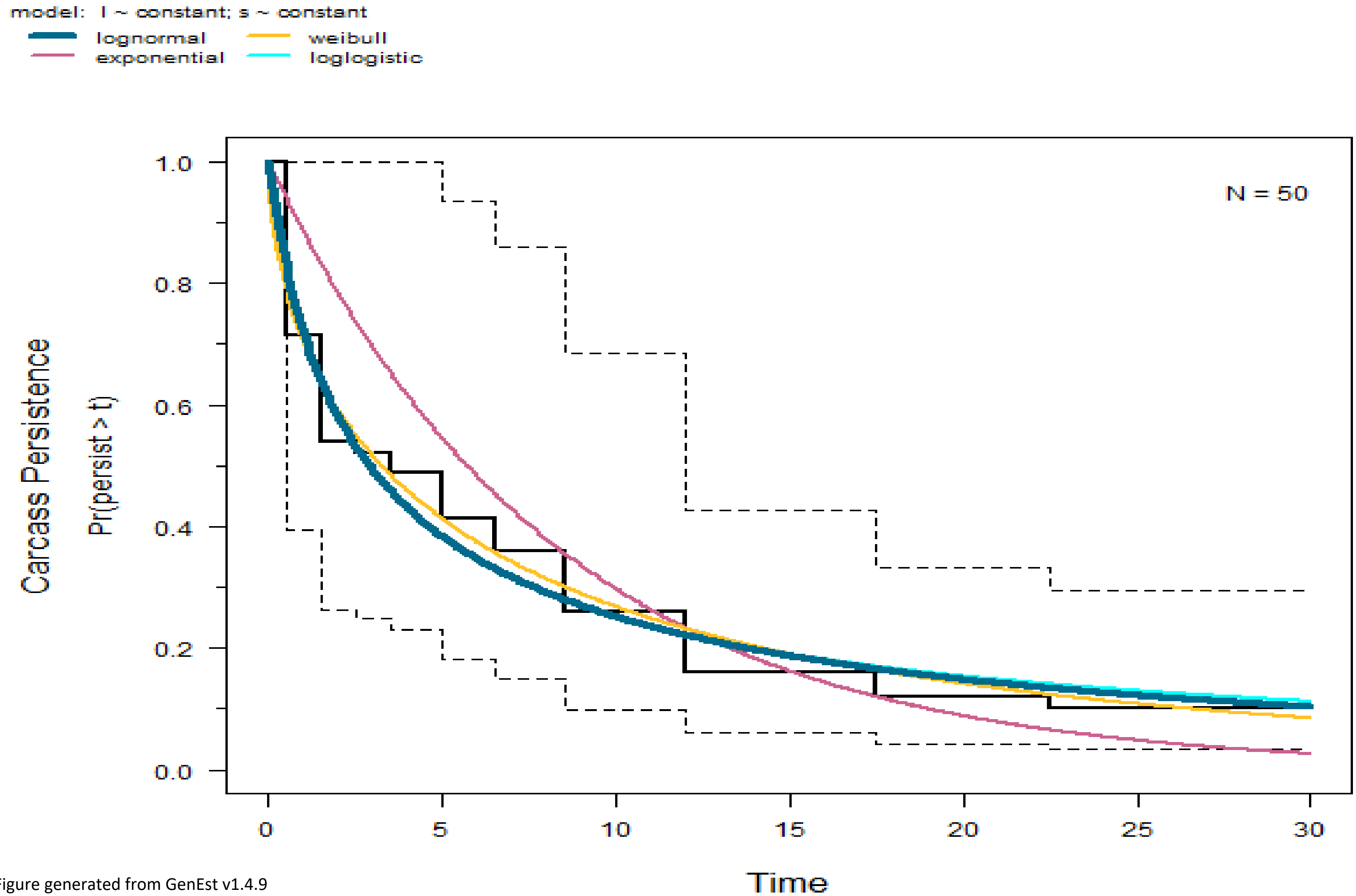


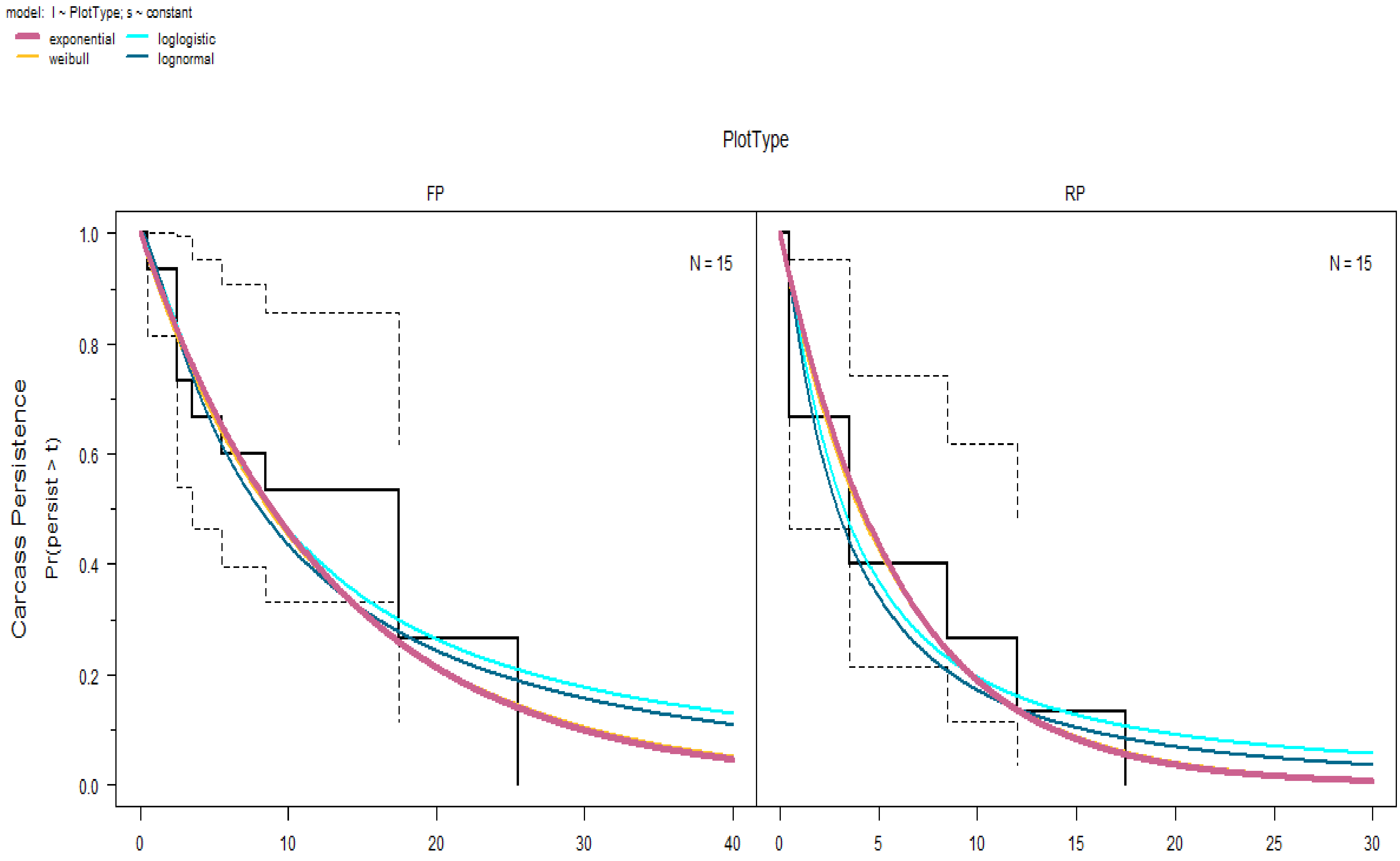
Figure generated from GenEst v1.4.9

ATWELL

2023 PCMM Assessment Report
Bluff Point Wind Energy Center
January 2024

Spring Carcass Persistence Rates

Figure 7a



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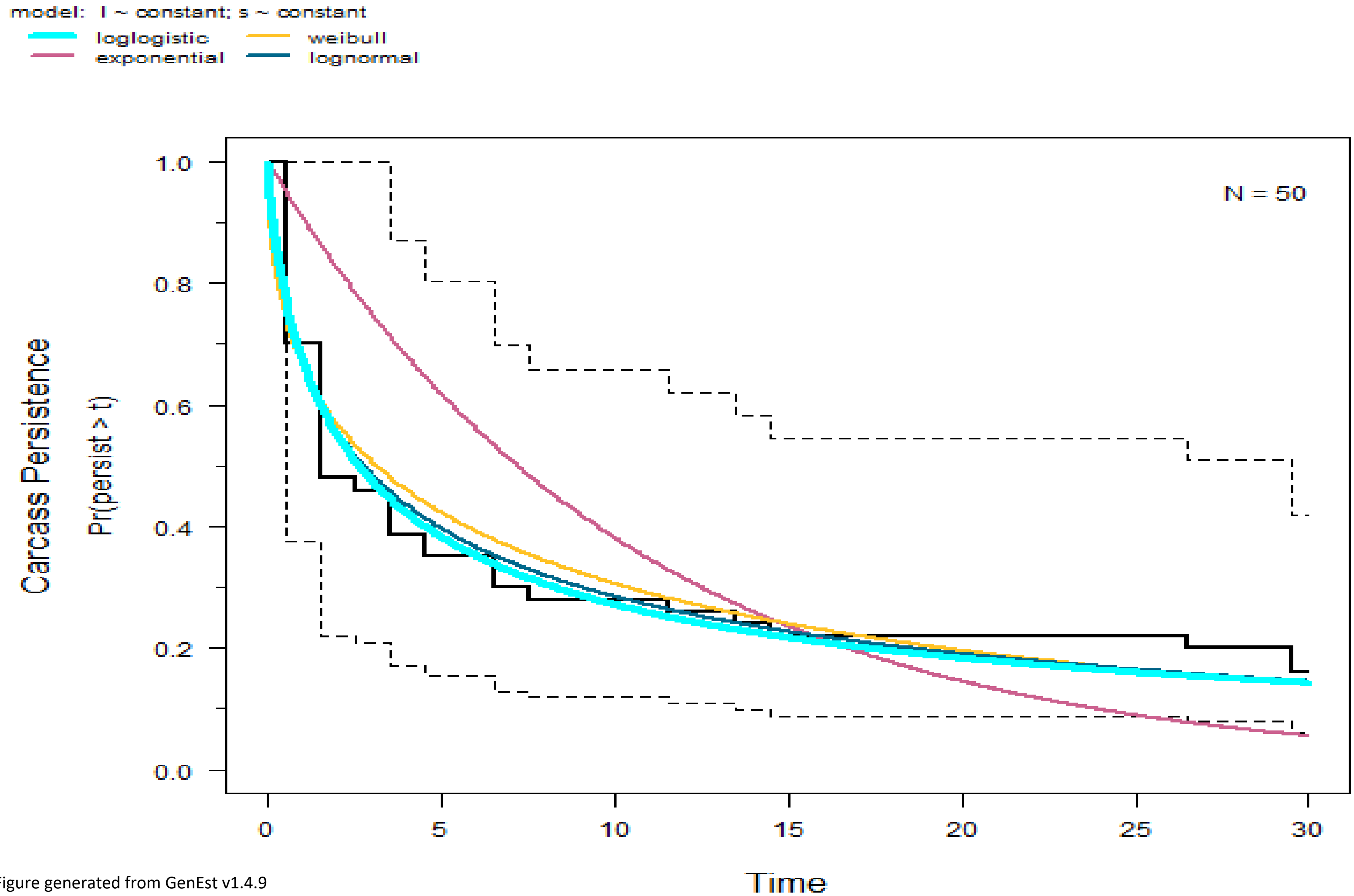
2023 PCMM Assessment Report
Bluff Point Wind Energy Center
January 2024

Summer Carcass Persistence Rates

Figure 7b



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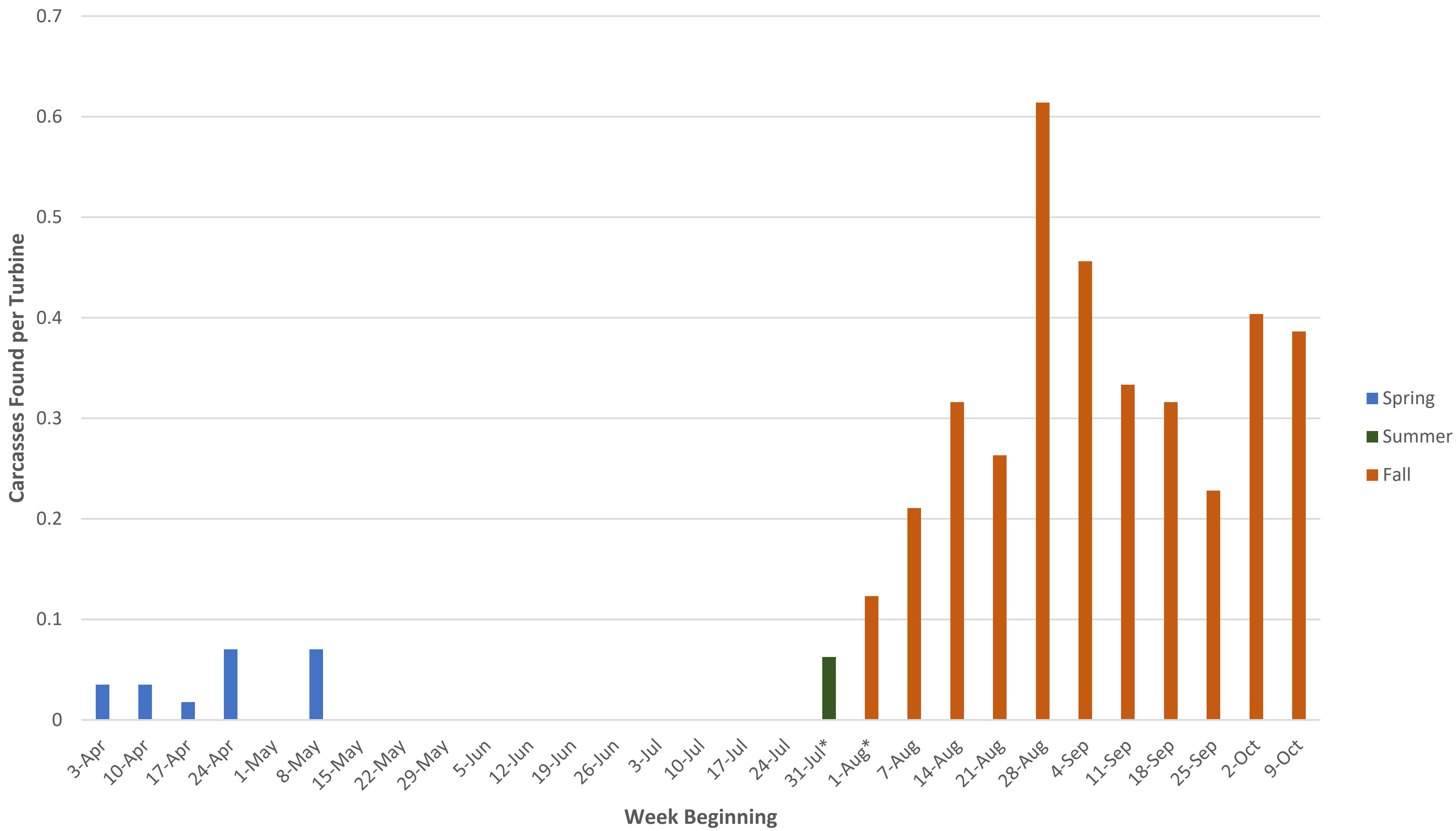
Fall Carcass Persistence Rates

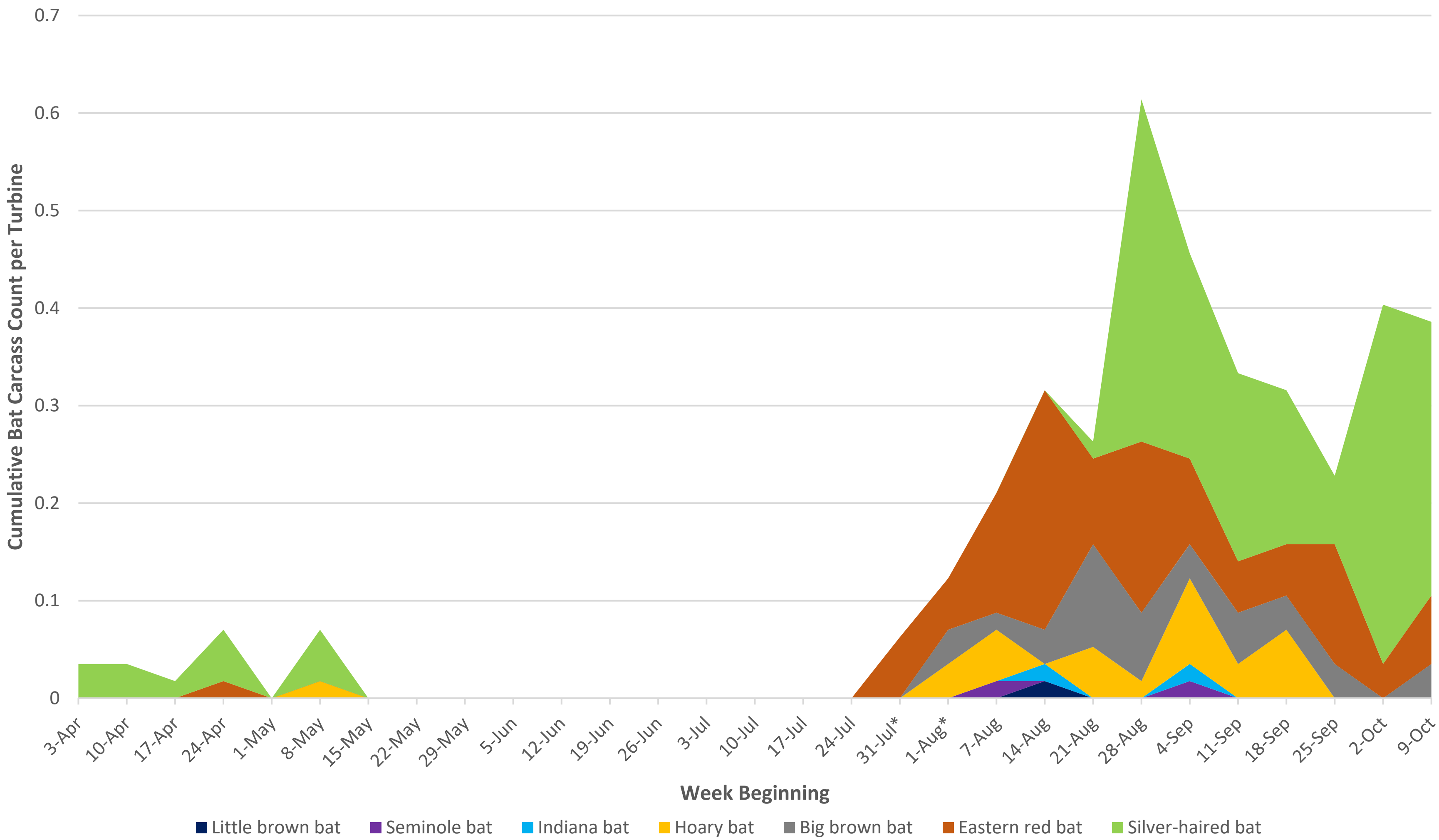
Figure 7c



1-Apr to 15-May = spring season (3.0 m/s cut-in; 57 turbines searched weekly)
16-May to 31-Jul = summer season (6.0 m/s cut-in; 32 turbines searched weekly)
1-Aug to 15-Oct = fall season (5.0 m/s cut-in; 57 turbines searched daily)
*The "Week Beginning" 31-Jul is a single day (i.e., the last day of the summer season) where all 32 summer turbines were searched. As such, the "Week Beginning" 1-Aug was only 6 days long.

Total Bat Carcass Discoveries by Week at Bluff Point Wind Energy Center

Figure 8



1-Apr to 15-May = spring season (3.0 m/s cut-in; 57 turbines searched weekly)
16-May to 31-Jul = summer season (6.0 m/s cut-in; 32 turbines searched weekly)
1-Aug to 15-Oct = fall season (5.0 m/s cut-in; 57 turbines searched daily)
*The "Week Beginning" 31-Jul is a single day (i.e., the last day of the summer season) where all 32 summer turbines were searched. As such, the "Week Beginning" 1-Aug was only 6 days long.

APPENDICES

APPENDIX A-1

LIST OF BAT CARCASSES LOCATED DURING POST-CONSTRUCTION MONITORING SURVEYS AT BLUFF POINT WIND ENERGY CENTER

List of Bat Carcasses Located during Post-construction Monitoring Surveys at Bluff Point Wind Energy Center

Common Name	Scientific Name	Carcass ID	Turbine No.	Plot Type[a]	Date	Distance from Turbine (m)	Bearing from Turbine (degrees)	Coordinates (UTM)	Condition[b]	Forearm Length (mm)	Age[c]	Sex[d]	Incidental Find?
Silver-haired bat	*Lasionycteris noctivagans*	20230406_SHBA_10_1	10	FP	04/06/23	39	119	16T 669984 4465163	I	42.2	A	F	No
Silver-haired bat	*Lasionycteris noctivagans*	20230406_SHBA_10_2	10	FP	04/06/23	42	283	16T 669909 4465189	I	41.9	A	F	No
Silver-haired bat	*Lasionycteris noctivagans*	20230414_SHBA_49_1	49	FP	04/14/23	38	284	16T 679333 4468058	I	40.7	A	F	No
Silver-haired bat	*Lasionycteris noctivagans*	20230414_SHBA_54_1	54	FP	04/14/23	54	233	16T 682019 4466449	I	42.8	A	U	No
Silver-haired bat	*Lasionycteris noctivagans*	20230419_SHBA_22_1	22	FP	04/19/23	43	236	16T 674811 4467510	I	41.7	A	F	No
Eastern red bat	*Lasiurus borealis*	20230425_ERBA_08_1	8	FP	04/25/23	42	114	16T 668130 4464869	I	37.4	A	F	No
Silver-haired bat	*Lasionycteris noctivagans*	20230425_SHBA_15_1	15	FP	04/25/23	25	39	16T 669178 4463395	I	42.5	A	F	No
Silver-haired bat	*Lasionycteris noctivagans*	20230425_SHBA_15_2	15	FP	04/25/23	46	262	16T 669117 4463367	I	41.1	A	F	No
Silver-haired bat	*Lasionycteris noctivagans*	20230427_SHBA_30_1	30	RP	04/27/23	3	291	16T 677715 4463591	I	39.9	A	F	No
Silver-haired bat	*Lasionycteris noctivagans*	20230511_SHBA_25_1	25	RP	05/11/23	42	51	16T 673295 4466527	P	NA	A	U	No
Silver-haired bat	*Lasionycteris noctivagans*	20230512_SHBA_09_1	9	FP	05/12/23	14	156	16T 668554 4464867	I	41.9	A	U	No
Hoary bat	*Lasiurus cinereus*	20230512_HOBA_10_1	10	FP	05/12/23	39	45	16T 669977 4465209	I	58.4	A	U	No
Silver-haired bat	*Lasionycteris noctivagans*	20230512_SHBA_15_1	15	FP	05/12/23	50	333	16T 669139 4463419	I	38.2	A	F	No
Eastern red bat	*Lasiurus borealis*	20230731_ERBA_08_1	8	FP	07/31/23	10	15	16T 668094 4464895	I	37.6	U	U	No
Eastern red bat	*Lasiurus borealis*	20230731_ERBA_26_1	26	RP	07/31/23	28	5	16T 674392 4466201	I	36.7	A	M	No
Big brown bat	*Eptesicus fuscus*	20230801_BBBA_11_1	11	RP	08/01/23	3	154	16T 670580 4465195	A	NA	J	F	No
Big brown bat	*Eptesicus fuscus*	20230801_BBBA_37_1	37	FP	08/01/23	48	127	16T 674207 4463600	I	44.0	J	M	No
Eastern red bat	*Lasiurus borealis*	20230801_ERBA_37_1	37	FP	08/01/23	41	118	16T 674205 4463609	I	35.7	A	M	No

Common Name	Scientific Name	Carcass ID	Turbine No.	Plot Type[a]	Date	Distance from Turbine (m)	Bearing from Turbine (degrees)	Coordinates (UTM)	Condition[b]	Forearm Length (mm)	Age[c]	Sex[d]	Incidental Find?
Hoary bat	*Lasiurus cinereus*	20230802_HOBA_53_1	53	RP	08/02/23	10	5	16T 679409 4466843	I	52.0	A	F	No
Hoary bat	*Lasiurus cinereus*	20230805_HOBA_17_1	17	RP	08/05/23	30	168	16T 673491 4468688	I	48.1	J	U	No
Eastern red bat	*Lasiurus borealis*	20230806_ERBA_12_1	12	FP	08/06/23	8	114	16T 670962 4465093	I	37.0	J	F	No
Eastern red bat	*Lasiurus borealis*	20230806_ERBA_14_1	14	RP	08/06/23	24	47	16T 668779 4463389	I	43.3	U	F	No
Hoary bat	*Lasiurus cinereus*	20230807_HOBA_15_1	15	FP	08/07/23	25	246	16T 669140 4463364	I	53.2	U	U	No
Eastern red bat	*Lasiurus borealis*	20230809_ERBA_09_1	9	FP	08/09/23	22	271	16T 668526 4464879	I	39.2	U	U	No
Eastern red bat	*Lasiurus borealis*	20230809_ERBA_19_1	19	FP	08/09/23	44	343	16T 674274 4468748	I	37.6	U	F	No
Eastern red bat	*Lasiurus borealis*	20230809_ERBA_37_1	37	FP	08/09/23	25	3	16T 674169 4463652	I	38.9	U	F	No
Hoary bat	*Lasiurus cinereus*	20230809_HOBA_44_1	44	FP	08/09/23	26	148	16T 676698 4462292	I	58.4	U	F	No
Eastern red bat	*Lasiurus borealis*	20230810_ERBA_32_1	32	FP	08/10/23	32	246	16T 672596 4462639	P	40.4	J	F	No
Eastern red bat	*Lasiurus borealis*	20230811_ERBA_09_1	9	FP	08/11/23	33	6	16T 668551 4464912	I	37.6	U	F	No
Eastern red bat	*Lasiurus borealis*	20230811_ERBA_33_1	33	RP	08/11/23	4	139	16T 675325 4465282	I	39.8	U	M	No
Hoary bat	*Lasiurus cinereus*	20230812_HOBA_19_1	19	FP	08/12/23	43	103	16T 674330 4468697	I	50.9	U	U	No
Eastern red bat	*Lasiurus borealis*	20230813_ERBA_20_1	20	FP	08/13/23	10	284	16T 673993 4467361	I	41.6	J	F	No
Seminole bat	*Lasiurus seminolus*	20230813_SEBA_22_1	22	FP	08/13/23	40	353	16T 674840 4467575	I	41.3	A	U	No
Big brown bat	*Eptesicus fuscus*	20230813_BBBA_27_1	27	RP	08/13/23	31	219	16T 675423 4466385	I	45.8	A	M	No
Big brown bat	*Eptesicus fuscus*	20230814_BBBA_10_1	10	FP	08/14/23	14	264	16T 669936 4465179	I	47.7	U	F	No
Eastern red bat	*Lasiurus borealis*	20230814_ERBA_12_1	12	FP	08/14/23	30	308	16T 670931 4465114	I	37.4	U	M	No
Eastern red bat	*Lasiurus borealis*	20230815_ERBA_09_1	9	FP	08/15/23	30	218	16T 668530 4464855	I	40.8	U	M	No
Eastern red bat	*Lasiurus borealis*	20230815_ERBA_15_1	15	FP	08/15/23	21	337	16T 669154 4463394	I	42.9	U	U	No

Common Name	Scientific Name	Carcass ID	Turbine No.	Plot Type[a]	Date	Distance from Turbine (m)	Bearing from Turbine (degrees)	Coordinates (UTM)	Condition[b]	Forearm Length (mm)	Age[c]	Sex[d]	Incidental Find?
Little brown bat	*Myotis lucifugus*	20230815_LBBA_19_1	19	FP	08/15/23	31	80	16T 674318 4468712	I	36.4	U	M	No
Eastern red bat	*Lasiurus borealis*	20230815_ERBA_20_1	20	FP	08/15/23	21	91	16T 674023 4467359	I	39.8	U	U	No
Eastern red bat	*Lasiurus borealis*	20230816_ERBA_11_1	11	RP	08/16/23	28	25	16T 670590 4465223	I	37.4	U	M	No
Eastern red bat	*Lasiurus borealis*	20230816_ERBA_28_1	28	RP	08/16/23	6	145	16T 675844 4466405	I	39.7	J	M	No
Eastern red bat	*Lasiurus borealis*	20230817_ERBA_15_1	15	FP	08/17/23	49	164	16T 669177 4463328	I	37.5	A	F	No
Eastern red bat	*Lasiurus borealis*	20230817_ERBA_44_1	44	FP	08/17/23	29	221	16T 676665 4462291	I	38.4	U	F	No
Eastern red bat	*Lasiurus borealis*	20230817_ERBA_48_1	48	FP	08/17/23	33	94	16T 678869 4468015	I	34.4	U	F	No
Big brown bat	*Eptesicus fuscus*	20230817_BBBA_54_1	54	FP	08/17/23	34	146	16T 682081 4466455	I	46.1	J	F	No
Eastern red bat	*Lasiurus borealis*	20230819_ERBA_08_1	8	FP	08/19/23	50	142	16T 668123 4464847	I	40.8	J	M	No
Eastern red bat	*Lasiurus borealis*	20230819_ERBA_24_1	24	RP	08/19/23	28	218	16T 672884 4466572	I	39.6	U	U	No
Eastern red bat	*Lasiurus borealis*	20230820_ERBA_07_1	7	RP	08/20/23	5	245	16T 671238 4466705	I	40.9	U	M	No
Eastern red bat	*Lasiurus borealis*	20230820_ERBA_36_1	36	FP	08/20/23	11	23	16T 677360 4464752	I	37.4	U	M	No
Indiana bat	*Myotis sodalis*	20230820_INBA_36_1	36	FP	08/20/23	29	7	16T 677359 4464771	I	38.8	U	F	No
Eastern red bat	*Lasiurus borealis*	20230820_ERBA_57_1	57	RP	08/20/23	7	359	16T 681085 4464868	I	37.6	U	M	No
Eastern red bat	*Lasiurus borealis*	20230821_ERBA_09_1	9	FP	08/21/23	21	100	16T 668569 4464876	I	37.2	U	F	No
Eastern red bat	*Lasiurus borealis*	20230821_ERBA_31_1	31	RP	08/21/23	2	123	16T 672442 4463083	I	40.7	U	F	No
Big brown bat	*Eptesicus fuscus*	20230822_BBBA_51_1	51	RP	08/22/23	10	272	16T 678496 4466431	I	45.0	U	M	No
Eastern red bat	*Lasiurus borealis*	20230823_ERBA_14_1	14	RP	08/23/23	7	30	16T 668765 4463378	I	33.0	J	M	No
Silver-haired bat	*Lasionycteris noctivagans*	20230823_SHBA_15_1	15	FP	08/23/23	36	15	16T 669171 4463410	I	41.5	J	M	No
Eastern red bat	*Lasiurus borealis*	20230823_ERBA_33_1	33	RP	08/23/23	23	282	16T 675300 4465289	I	36.0	A	F	No

Common Name	Scientific Name	Carcass ID	Turbine No.	Plot Type[a]	Date	Distance from Turbine (m)	Bearing from Turbine (degrees)	Coordinates (UTM)	Condition[b]	Forearm Length (mm)	Age[c]	Sex[d]	Incidental Find?
Big brown bat	*Eptesicus fuscus*	20230824_BBBA_18_1	18	RP	08/24/23	7	241	16T 673878 4468718	I	46.2	J	M	No
Big brown bat	*Eptesicus fuscus*	20230825_BBBA_02_1	2	RP	08/25/23	4	174	16T 668714 4467335	I	41.9	J	M	No
Hoary bat	*Lasiurus cinereus*	20230825_HOBA_20_1	20	FP	08/25/23	40	336	16T 673985 4467395	I	53.6	U	U	No
Hoary bat	*Lasiurus cinereus*	20230825_HOBA_23_1	23	RP	08/25/23	5	272	16T 672552 4466712	I	56.0	U	F	No
Big brown bat	*Eptesicus fuscus*	20230825_BBBA_48_1	48	FP	08/25/23	63	48	16T 678882 4468060	I	44.7	J	M	No
Eastern red bat	*Lasiurus borealis*	20230825_ERBA_55_1	55	RP	08/25/23	5	68	16T 681193 4466121	I	32.2	A	M	No
Big brown bat	*Eptesicus fuscus*	20230826_BBBA_12_1	12	FP	08/26/23	48	250	16T 670910 4465079	I	45.0	J	F	No
Big brown bat	*Eptesicus fuscus*	20230827_BBBA_07_1	7	RP	08/27/23	58	265	16T 671185 4466701	I	49.0	U	F	No
Hoary bat	*Lasiurus cinereus*	20230827_HOBA_32_1	32	FP	08/27/23	36	33	16T 672644 4462683	I	55.5	U	U	No
Eastern red bat	*Lasiurus borealis*	20230828_ERBA_14_1	14	RP	08/28/23	57	288	16T 668707 4463389	I	41.2	U	F	No
Big brown bat	*Eptesicus fuscus*	20230828_BBBA_49_1	49	FP	08/28/23	4	112	16T 679374 4468048	I	47.9	U	F	No
Eastern red bat	*Lasiurus borealis*	20230829_ERBA_03_1	3	RP	08/29/23	53	179	16T 669216 4467288	I	40.0	U	F	No
Eastern red bat	*Lasiurus borealis*	20230829_ERBA_44_1	44	FP	08/29/23	24	352	16T 676680 4462337	D	41.2	U	U	No
Silver-haired bat	*Lasionycteris noctivagans*	20230830_SHBA_05_1	5	RP	08/30/23	35	132	16T 670423 4466615	I	40.0	U	F	No
Silver-haired bat	*Lasionycteris noctivagans*	20230830_SHBA_15_1	15	FP	08/30/23	44	180	16T 669164 4463331	I	39.0	U	M	No
Silver-haired bat	*Lasionycteris noctivagans*	20230830_SHBA_20_1	20	FP	08/30/23	7	309	16T 673997 4467363	I	43.0	U	M	No
Silver-haired bat	*Lasionycteris noctivagans*	20230830_SHBA_31_1	31	RP	08/30/23	27	85	16T 672467 4463087	I	41.0	U	F	No
Big brown bat	*Eptesicus fuscus*	20230830_BBBA_37_1	37	FP	08/30/23	37	169	16T 674176 4463591	I	42.0	U	M	No
Silver-haired bat	*Lasionycteris noctivagans*	20230830_SHBA_46_1	46	RP	08/30/23	10	247	16T 677952 4463151	I	42.5	U	U	No
Eastern red bat	*Lasiurus borealis*	20230831_ERBA_08_1	8	FP	08/31/23	17	270	16T 668075 4464885	I	40.2	U	F	No

Common Name	Scientific Name	Carcass ID	Turbine No.	Plot Type[a]	Date	Distance from Turbine (m)	Bearing from Turbine (degrees)	Coordinates (UTM)	Condition[b]	Forearm Length (mm)	Age[c]	Sex[d]	Incidental Find?
Silver-haired bat	*Lasionycteris noctivagans*	20230831_SHBA_08_1	8	FP	08/31/23	34	284	16T 668058 4464893	I	42.2	J	M	No
Silver-haired bat	*Lasionycteris noctivagans*	20230831_SHBA_22_1	22	FP	08/31/23	18	118	16T 674862 4467527	I	40.5	A	M	No
Silver-haired bat	*Lasionycteris noctivagans*	20230831_SHBA_55_1	55	RP	08/31/23	21	56	16T 681205 4466131	I	41.0	U	M	No
Silver-haired bat	*Lasionycteris noctivagans*	20230901_SHBA_09_1	9	FP	09/01/23	38	257	16T 668511 4464870	I	37.6	U	M	No
Eastern red bat	*Lasiurus borealis*	20230901_ERBA_12_1	12	FP	09/01/23	45	173	16T 670961 4465052	I	39.0	U	M	No
Silver-haired bat	*Lasionycteris noctivagans*	20230901_SHBA_20_1	20	FP	09/01/23	5	314	16T 673999 4467362	I	43.2	J	F	No
Silver-haired bat	*Lasionycteris noctivagans*	20230901_SHBA_20_2	20	FP	09/01/23	23	73	16T 674024 4467366	I	40.1	U	U	No
Hoary bat	*Lasiurus cinereus*	20230901_HOBA_36_1	36	FP	09/01/23	40	87	16T 677396 4464745	I	55.0	U	U	No
Eastern red bat	*Lasiurus borealis*	20230901_ERBA_46_1	46	RP	09/01/23	20	274	16T 677941 4463156	I	37.0	U	M	No
Silver-haired bat	*Lasionycteris noctivagans*	20230901_SHBA_51_1	51	RP	09/01/23	9	231	16T 678499 4466425	I	41.0	J	M	No
Eastern red bat	*Lasiurus borealis*	20230902_ERBA_32_1	32	FP	09/02/23	7	125	16T 672631 4462649	I	41.7	U	M	No
Silver-haired bat	*Lasionycteris noctivagans*	20230902_SHBA_41_1	41	RP	09/02/23	79	7	16T 675797 4463508	I	40.0	U	F	No
Silver-haired bat	*Lasionycteris noctivagans*	20230902_SHBA_51_1	51	RP	09/02/23	15	261	16T 678491 4466428	I	41.4	U	F	No
Eastern red bat	*Lasiurus borealis*	20230903_ERBA_04_1	4	RP	09/03/23	3	157	16T 669652 4466547	I	39.4	U	M	No
Silver-haired bat	*Lasionycteris noctivagans*	20230903_SHBA_08_1	8	FP	09/03/23	46	333	16T 668070 4464926	I	37.8	U	M	No
Eastern red bat	*Lasiurus borealis*	20230903_ERBA_11_1	11	RP	09/03/23	21	13	16T 670583 4465218	I	38.1	U	M	No
Silver-haired bat	*Lasionycteris noctivagans*	20230903_SHBA_11_1	11	RP	09/03/23	33	327	16T 670560 4465225	I	40.8	U	M	No
Silver-haired bat	*Lasionycteris noctivagans*	20230903_SHBA_22_1	22	FP	09/03/23	11	276	16T 674835 4467536	I	39.5	U	U	No
Big brown bat	*Eptesicus fuscus*	20230903_BBBA_28_1	28	RP	09/03/23	7	291	16T 675834 4466412	I	45.7	U	M	No
Big brown bat	*Eptesicus fuscus*	20230903_BBBA_35_1	35	FP	09/03/23	51	71	16T 677281 4465205	I	46.0	U	M	No

Common Name	Scientific Name	Carcass ID	Turbine No.	Plot Type[a]	Date	Distance from Turbine (m)	Bearing from Turbine (degrees)	Coordinates (UTM)	Condition[b]	Forearm Length (mm)	Age[c]	Sex[d]	Incidental Find?
Eastern red bat	*Lasiurus borealis*	20230903_ERBA_36_1	36	FP	09/03/23	33	127	16T 677383 4464723	P	41.4	U	F	No
Silver-haired bat	*Lasionycteris noctivagans*	20230903_SHBA_39_1	39	FP	09/03/23	24	8	16T 674689 4463097	I	40.7	U	M	No
Silver-haired bat	*Lasionycteris noctivagans*	20230903_SHBA_39_2	39	FP	09/03/23	27	97	16T 674713 4463070	I	41.0	U	F	No
Silver-haired bat	*Lasionycteris noctivagans*	20230903_SHBA_39_3	39	FP	09/03/23	40	94	16T 674726 4463071	I	41.2	U	F	No
Big brown bat	*Eptesicus fuscus*	20230904_BBBA_10_1	10	FP	09/04/23	37	97	16T 669987 4465177	I	44.5	U	F	No
Hoary bat	*Lasiurus cinereus*	20230904_HOBA_10_1	10	FP	09/04/23	37	69	16T 669984 4465195	I	57.0	U	F	No
Indiana bat	*Myotis sodalis*	20230904_INBA_10_1	10	FP	09/04/23	35	85	16T 669985 4465185	I	36.5	U	M	No
Silver-haired bat	*Lasionycteris noctivagans*	20230904_SHBA_10_1	10	FP	09/04/23	34	50	16T 669975 4465203	I	38.5	U	M	No
Silver-haired bat	*Lasionycteris noctivagans*	20230904_SHBA_15_1	15	FP	09/04/23	38	97	16T 669200 4463371	I	38.3	U	M	No
Silver-haired bat	*Lasionycteris noctivagans*	20230904_SHBA_15_2	15	FP	09/04/23	35	88	16T 669198 4463377	I	40.1	U	M	No
Silver-haired bat	*Lasionycteris noctivagans*	20230904_SHBA_38_1	38	RP	09/04/23	42	312	16T 674257 4463199	D	40.5	U	U	No
Hoary bat	*Lasiurus cinereus*	20230904_HOBA_46_1	46	RP	09/04/23	49	327	16T 677933 4463195	I	57.2	U	F	No
Silver-haired bat	*Lasionycteris noctivagans*	20230904_SHBA_49_1	49	FP	09/04/23	61	48	16T 679415 4468091	I	41.9	U	F	No
Silver-haired bat	*Lasionycteris noctivagans*	20230904_SHBA_56_1	56	RP	09/04/23	32	45	16T 680965 4465374	I	38.0	U	F	No
Silver-haired bat	*Lasionycteris noctivagans*	20230905_SHBA_25_1	25	RP	09/05/23	4	270	16T 673259 4466500	I	41.0	J	F	No
Silver-haired bat	*Lasionycteris noctivagans*	20230906_SHBA_09_1	9	FP	09/06/23	47	112	16T 668592 4464863	D	41.5	U	U	No
Silver-haired bat	*Lasionycteris noctivagans*	20230906_SHBA_35_1	35	FP	09/06/23	24	285	16T 677210 4465193	I	43.8	J	M	No
Hoary bat	*Lasiurus cinereus*	20230906_HOBA_49_1	49	FP	09/06/23	50	71	16T 679417 4468067	I	52.4	A	F	No
Eastern red bat	*Lasiurus borealis*	20230907_ERBA_08_1	8	FP	09/07/23	34	162	16T 668103 4464853	I	37.9	U	F	No
Eastern red bat	*Lasiurus borealis*	20230907_ERBA_22_1	22	FP	09/07/23	33	204	16T 674833 4467505	I	41.7	U	F	No

Common Name	Scientific Name	Carcass ID	Turbine No.	Plot Type[a]	Date	Distance from Turbine (m)	Bearing from Turbine (degrees)	Coordinates (UTM)	Condition[b]	Forearm Length (mm)	Age[c]	Sex[d]	Incidental Find?
Silver-haired bat	*Lasionycteris noctivagans*	20230907_SHBA_48_1	48	FP	09/07/23	5	318	16T 678833 4468020	I	40.0	U	M	No
Big brown bat	*Eptesicus fuscus*	20230908_BBBA_29_1	29	RP	09/08/23	9	26	16T 672931 4465344	I	43.9	J	F	No
Eastern red bat	*Lasiurus borealis*	20230908_ERBA_32_1	32	FP	09/08/23	46	65	16T 672666 4462673	P	41.0	U	F	No
Eastern red bat	*Lasiurus borealis*	20230908_ERBA_35_1	35	FP	09/08/23	60	324	16T 677196 4465235	I	38.0	U	F	No
Hoary bat	*Lasiurus cinereus*	20230908_HOBA_39_1	39	FP	09/08/23	36	49	16T 674713 4463097	I	43.0	U	F	No
Silver-haired bat	*Lasionycteris noctivagans*	20230908_SHBA_39_1	39	FP	09/08/23	19	112	16T 674704 4463066	I	40.0	J	F	No
Seminole bat	*Lasiurus seminolus*	20230909_SEBA_10_1	10	FP	09/09/23	4	18	16T 669951 4465185	A	NA	U	M	No
Silver-haired bat	*Lasionycteris noctivagans*	20230909_SHBA_17_1	17	RP	09/09/23	4	341	16T 673483 4468721	I	42.7	J	M	No
Eastern red bat	*Lasiurus borealis*	20230909_ERBA_37_1	37	FP	09/09/23	63	224	16T 674126 4463581	I	38.5	A	M	No
Hoary bat	*Lasiurus cinereus*	20230909_HOBA_57_1	57	RP	09/09/23	17	313	16T 681073 4464872	I	57.0	J	F	No
Silver-haired bat	*Lasionycteris noctivagans*	20230911_SHBA_07_1	7	RP	09/11/23	38	261	16T 671205 4466700	I	43.1	U	F	No
Silver-haired bat	*Lasionycteris noctivagans*	20230911_SHBA_35_1	35	FP	09/11/23	24	306	16T 677213 4465201	I	40.1	U	M	No
Big brown bat	*Eptesicus fuscus*	20230912_BBBA_20_1	20	FP	09/12/23	14	255	16T 673989 4467355	I	48.0	U	F	No
Silver-haired bat	*Lasionycteris noctivagans*	20230912_SHBA_38_1	38	RP	09/12/23	7	309	16T 674283 4463176	I	41.3	U	F	No
Big brown bat	*Eptesicus fuscus*	20230913_BBBA_15_1	15	FP	09/13/23	39	79	16T 669201 4463383	I	40.0	U	U	No
Big brown bat	*Eptesicus fuscus*	20230913_BBBA_22_1	22	FP	09/13/23	32	104	16T 674877 4467528	I	45.7	J	F	No
Eastern red bat	*Lasiurus borealis*	20230913_ERBA_39_1	39	FP	09/13/23	10	284	16T 674676 4463075	I	39.6	U	F	No
Hoary bat	*Lasiurus cinereus*	20230913_HOBA_48_1	48	FP	09/13/23	37	221	16T 678813 4467988	I	53.0	U	M	No
Silver-haired bat	*Lasionycteris noctivagans*	20230914_SHBA_22_1	22	FP	09/14/23	43	169	16T 674855 4467493	I	40.3	U	F	No
Hoary bat	*Lasiurus cinereus*	20230914_HOBA_29_1	29	RP	09/14/23	12	48	16T 672936 4465344	I	51.0	U	M	No

Common Name	Scientific Name	Carcass ID	Turbine No.	Plot Type[a]	Date	Distance from Turbine (m)	Bearing from Turbine (degrees)	Coordinates (UTM)	Condition[b]	Forearm Length (mm)	Age[c]	Sex[d]	Incidental Find?
Silver-haired bat	*Lasionycteris noctivagans*	20230915_SHBA_15_1	15	FP	09/15/23	15	355	16T 669161 4463390	I	40.2	U	M	No
Silver-haired bat	*Lasionycteris noctivagans*	20230915_SHBA_35_1	35	FP	09/15/23	24	223	16T 677217 4465169	I	40.0	J	M	No
Eastern red bat	*Lasiurus borealis*	20230915_ERBA_51_1	51	RP	09/15/23	4	227	16T 678503 4466428	I	41.3	U	F	No
Silver-haired bat	*Lasionycteris noctivagans*	20230915_SHBA_54_1	54	FP	09/15/23	9	24	16T 682065 4466491	D	43.0	U	U	No
Silver-haired bat	*Lasionycteris noctivagans*	20230915_SHBA_57_1	57	RP	09/15/23	13	290	16T 681073 4464865	I	40.0	U	U	No
Silver-haired bat	*Lasionycteris noctivagans*	20230916_SHBA_30_1	30	RP	09/16/23	91	247	16T 677635 4463552	I	40.5	U	M	No
Silver-haired bat	*Lasionycteris noctivagans*	20230916_SHBA_35_1	35	FP	09/16/23	37	197	16T 677223 4465152	I	41.0	U	M	No
Eastern red bat	*Lasiurus borealis*	20230917_ERBA_15_1	15	FP	09/17/23	20	292	16T 669144 4463382	I	36.2	U	U	No
Silver-haired bat	*Lasionycteris noctivagans*	20230917_SHBA_36_1	36	FP	09/17/23	12	219	16T 677349 4464733	P	40.1	U	M	No
Silver-haired bat	*Lasionycteris noctivagans*	20230918_SHBA_34_1	34	RP	09/18/23	23	89	16T 675965 4464406	I	43.7	U	M	No
Big brown bat	*Eptesicus fuscus*	20230919_BBBA_20_1	20	FP	09/19/23	27	238	16T 673980 4467344	P	46.0	U	U	No
Hoary bat	*Lasiurus cinereus*	20230920_HOBA_33_1	33	RP	09/20/23	58	272	16T 675264 4465286	I	52.0	U	F	No
Silver-haired bat	*Lasionycteris noctivagans*	20230920_SHBA_44_1	44	FP	09/20/23	61	306	16T 676634 4462348	I	40.5	U	F	No
Silver-haired bat	*Lasionycteris noctivagans*	20230921_SHBA_02_1	2	RP	09/21/23	3	352	16T 668713 4467342	I	40.8	U	M	No
Eastern red bat	*Lasiurus borealis*	20230921_ERBA_09_1	9	FP	09/21/23	39	239	16T 668515 4464858	I	40.2	U	F	No
Eastern red bat	*Lasiurus borealis*	20230921_ERBA_10_1	10	FP	09/21/23	47	241	16T 669909 4465157	I	39.0	U	M	No
Hoary bat	*Lasiurus cinereus*	20230921_HOBA_10_1	10	FP	09/21/23	39	33	16T 669970 4465214	I	54.9	U	F	No
Silver-haired bat	*Lasionycteris noctivagans*	20230921_SHBA_32_1	32	FP	09/21/23	56	324	16T 672591 4462697	I	40.5	U	U	No
Silver-haired bat	*Lasionycteris noctivagans*	20230922_SHBA_19_1	19	FP	09/22/23	18	222	16T 674276 4468692	I	41.3	U	M	No
Hoary bat	*Lasiurus cinereus*	20230922_HOBA_35_1	35	FP	09/22/23	35	302	16T 677203 4465205	I	55.0	U	F	No

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Silver-haired bat	*Lasionycteris noctivagans*	20230922_SHBA_39_1	39	FP	09/22/23	37	242	16T 674654 4463055	I	38.0	U	U	No
Silver-haired bat	*Lasionycteris noctivagans*	20230922_SHBA_44_1	44	FP	09/22/23	51	312	16T 676645 4462347	I	42.9	U	F	No
Silver-haired bat	*Lasionycteris noctivagans*	20230922_SHBA_53_1	53	RP	09/22/23	59	294	16T 679354 4466856	I	41.3	U	M	No
Hoary bat	*Lasiurus cinereus*	20230923_HOBA_04_1	4	RP	09/23/23	3	333	16T 669649 4466553	D	50.7	U	F	No
Silver-haired bat	*Lasionycteris noctivagans*	20230923_SHBA_36_1	36	FP	09/23/23	54	208	16T 677332 4464694	I	41.0	U	F	No
Eastern red bat	*Lasiurus borealis*	20230924_ERBA_20_1	20	FP	09/24/23	18	272	16T 673984 4467359	I	38.2	U	M	No
Big brown bat	*Eptesicus fuscus*	20230924_BBBA_32_1	32	FP	09/24/23	7	310	16T 672620 4462657	A	45.4	U	U	No
Eastern red bat	*Lasiurus borealis*	20230925_ERBA_12_1	12	FP	09/25/23	50	278	16T 670905 4465102	I	39.0	U	F	No
Eastern red bat	*Lasiurus borealis*	20230925_ERBA_19_1	19	FP	09/25/23	58	240	16T 674238 4468676	I	39.9	U	M	No
Eastern red bat	*Lasiurus borealis*	20230925_ERBA_33_1	33	RP	09/25/23	53	276	16T 675270 4465289	A	NA	U	F	No
Silver-haired bat	*Lasionycteris noctivagans*	20230925_SHBA_44_1	44	FP	09/25/23	15	217	16T 676675 4462301	P	39.5	U	M	No
Eastern red bat	*Lasiurus borealis*	20230925_ERBA_46_1	46	RP	09/25/23	31	301	16T 677934 4463170	P	NA	U	U	No
Big brown bat	*Eptesicus fuscus*	20230925_BBBA_53_1	53	RP	09/25/23	1	34	16T 679409 4466834	D	48.0	U	U	No
Eastern red bat	*Lasiurus borealis*	20230926_ERBA_19_1	19	FP	09/26/23	46	174	16T 674294 4468660	I	37.0	U	M	No
Silver-haired bat	*Lasionycteris noctivagans*	20230928_SHBA_44_1	44	FP	09/28/23	49	272	16T 676635 4462314	I	43.2	U	M	No
Silver-haired bat	*Lasionycteris noctivagans*	20230928_SHBA_54_1	54	FP	09/28/23	44	263	16T 682018 4466476	I	39.0	U	U	No
Big brown bat	*Eptesicus fuscus*	20230929_BBBA_01_1	1	RP	09/29/23	29	128	16T 668562 4467703	I	47.0	U	U	No
Eastern red bat	*Lasiurus borealis*	20230929_ERBA_44_1	44	FP	09/29/23	22	44	16T 676699 4462330	I	40.7	U	M	No
Silver-haired bat	*Lasionycteris noctivagans*	20230929_SHBA_44_1	44	FP	09/29/23	42	237	16T 676649 4462290	P	43.0	U	U	No
Eastern red bat	*Lasiurus borealis*	20230929_ERBA_49_1	49	FP	09/29/23	21	152	16T 679381 4468031	I	39.9	U	U	No

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Silver-haired bat	*Lasionycteris noctivagans*	20231002_SHBA_02_1	2	RP	10/02/23	10	327	16T 668708 4467347	I	39.0	U	M	No
Silver-haired bat	*Lasionycteris noctivagans*	20231002_SHBA_15_1	15	FP	10/02/23	6	301	16T 669157 4463378	I	41.2	A	M	No
Silver-haired bat	*Lasionycteris noctivagans*	20231004_SHBA_37_1	37	FP	10/04/23	6	237	16T 674163 4463624	P	39.0	U	M	No
Silver-haired bat	*Lasionycteris noctivagans*	20231005_SHBA_15_1	15	FP	10/05/23	45	250	16T 669121 4463359	I	41.2	U	M	No
Silver-haired bat	*Lasionycteris noctivagans*	20231005_SHBA_48_1	48	FP	10/05/23	44	252	16T 678795 4468002	I	39.0	U	M	No
Silver-haired bat	*Lasionycteris noctivagans*	20231005_SHBA_48_2	48	FP	10/05/23	42	276	16T 678795 4468020	I	37.0	U	F	No
Eastern red bat	*Lasiurus borealis*	20231006_ERBA_27_1	27	RP	10/06/23	85	106	16T 675525 4466388	I	40.2	U	M	No
Silver-haired bat	*Lasionycteris noctivagans*	20231006_SHBA_29_1	29	RP	10/06/23	16	40	16T 672937 4465348	I	42.2	U	F	No
Eastern red bat	*Lasiurus borealis*	20231006_ERBA_56_1	56	RP	10/06/23	29	132	16T 680965 4465332	I	41.8	U	F	No
Silver-haired bat	*Lasionycteris noctivagans*	20231007_SHBA_08_1	8	FP	10/07/23	29	14	16T 668098 4464914	I	NA	U	U	No
Silver-haired bat	*Lasionycteris noctivagans*	20231007_SHBA_47_1	47	RP	10/07/23	8	183	16T 678574 4468397	I	42.6	U	F	No
Silver-haired bat	*Lasionycteris noctivagans*	20231008_SHBA_19_1	19	FP	10/08/23	43	39	16T 674314 4468740	I	42.5	U	F	No
Silver-haired bat	*Lasionycteris noctivagans*	20231008_SHBA_19_2	19	FP	10/08/23	19	127	16T 674303 4468695	D	41.0	U	U	No
Silver-haired bat	*Lasionycteris noctivagans*	20231008_SHBA_20_1	20	FP	10/08/23	22	150	16T 674014 4467340	I	40.4	U	M	No
Silver-haired bat	*Lasionycteris noctivagans*	20231008_SHBA_20_2	20	FP	10/08/23	17	127	16T 674016 4467349	I	41.2	U	M	No
Silver-haired bat	*Lasionycteris noctivagans*	20231008_SHBA_34_1	34	RP	10/08/23	16	88	16T 675958 4464406	D	NA	U	U	No
Silver-haired bat	*Lasionycteris noctivagans*	20231008_SHBA_36_1	36	FP	10/08/23	32	172	16T 677361 4464711	I	40.8	U	F	No
Silver-haired bat	*Lasionycteris noctivagans*	20231008_SHBA_54_1	54	FP	10/08/23	30	141	16T 682081 4466459	I	40.0	U	M	No
Silver-haired bat	*Lasionycteris noctivagans*	20231008_SHBA_54_2	54	FP	10/08/23	38	125	16T 682093 4466461	I	41.0	A	F	No
Silver-haired bat	*Lasionycteris noctivagans*	20231008_SHBA_54_3	54	FP	10/08/23	41	123	16T 682096 4466461	I	41.0	U	F	No

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Silver-haired bat	*Lasionycteris noctivagans*	20231008_SHBA_54_4	54	FP	10/08/23	22	68	16T 682082 4466491	I	39.0	U	M	No
Silver-haired bat	*Lasionycteris noctivagans*	20231008_SHBA_54_5	54	FP	10/08/23	39	59	16T 682094 4466503	I	40.0	U	U	No
Silver-haired bat	*Lasionycteris noctivagans*	20231008_SHBA_55_2	55	RP	10/08/23	30	63	16T 681214 4466133	I	42.5	U	F	No
Silver-haired bat	*Lasionycteris noctivagans*	20231009_SHBA_07_1	7	RP	10/09/23	3	185	16T 671242 4466704	I	41.8	A	M	No
Eastern red bat	*Lasiurus borealis*	20231009_ERBA_20_1	20	FP	10/09/23	40	131	16T 674033 4467333	I	39.0	U	M	No
Silver-haired bat	*Lasionycteris noctivagans*	20231009_SHBA_20_1	20	FP	10/09/23	40	129	16T 674034 4467334	I	41.0	U	F	No
Silver-haired bat	*Lasionycteris noctivagans*	20231009_SHBA_40_1	40	FP	10/09/23	7	18	16T 675058 4462983	I	43.5	U	U	No
Silver-haired bat	*Lasionycteris noctivagans*	20231009_SHBA_49_1	49	FP	10/09/23	47	162	16T 679386 4468005	I	40.5	U	M	No
Silver-haired bat	*Lasionycteris noctivagans*	20231009_SHBA_49_2	49	FP	10/09/23	54	123	16T 679417 4468021	I	42.0	U	M	No
Silver-haired bat	*Lasionycteris noctivagans*	20231009_SHBA_49_3	49	FP	10/09/23	38	219	16T 679347 4468019	I	39.7	U	U	No
Silver-haired bat	*Lasionycteris noctivagans*	20231009_SHBA_54_1	54	FP	10/09/23	49	121	16T 682104 4466458	I	42.0	U	F	No
Silver-haired bat	*Lasionycteris noctivagans*	20231009_SHBA_55_1	55	RP	10/09/23	18	53	16T 681202 4466130	I	39.5	A	M	No
Silver-haired bat	*Lasionycteris noctivagans*	20231010_SHBA_20_1	20	FP	10/10/23	53	29	16T 674027 4467406	I	40.0	U	M	No
Big brown bat	*Eptesicus fuscus*	20231010_BBBA_55_1	55	RP	10/10/23	2	153	16T 681189 4466117	A	NA	U	F	No
Eastern red bat	*Lasiurus borealis*	20231011_ERBA_39_1	39	FP	10/11/23	29	97	16T 674715 4463070	I	40.9	U	M	No
Silver-haired bat	*Lasionycteris noctivagans*	20231012_SHBA_54_1	54	FP	10/12/23	36	64	16T 682093 4466499	I	40.0	A	M	No
Eastern red bat	*Lasiurus borealis*	20231013_ERBA_15_1	15	FP	10/13/23	29	205	16T 669151 4463348	I	36.1	U	M	No
Silver-haired bat	*Lasionycteris noctivagans*	20231013_SHBA_19_1	19	FP	10/13/23	45	103	16T 674332 4468697	I	42.5	U	F	No
Big brown bat	*Eptesicus fuscus*	20231013_BBBA_35_1	35	FP	10/13/23	42	188	16T 677228 4465146	I	47.0	A	M	No
Eastern red bat	*Lasiurus borealis*	20231013_ERBA_35_1	35	FP	10/13/23	53	299	16T 677186 4465212	I	37.0	A	M	No

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Silver-haired bat	*Lasionycteris noctivagans*	20231013_SHBA_35_1	35	FP	10/13/23	47	246	16T 677191 4465167	I	40.5	A	F	No
Silver-haired bat	*Lasionycteris noctivagans*	20231013_SHBA_37_1	37	FP	10/13/23	31	48	16T 674191 4463649	P	NA	U	U	No
Silver-haired bat	*Lasionycteris noctivagans*	20231013_SHBA_44_1	44	FP	10/13/23	50	315	16T 676648 4462348	P	42.1	U	M	No
Silver-haired bat	*Lasionycteris noctivagans*	20231013_SHBA_57_1	57	RP	10/13/23	2	249	16T 681083 4464860	I	41.0	U	U	No
Silver-haired bat	*Lasionycteris noctivagans*	20231015_SHBA_54_1	54	FP	10/15/23	38	212	16T 682042 4466450	I	40.5	U	F	No
Silver-haired bat	*Lasionycteris noctivagans*	20230512_SHBA_04_1	4	RP	05/12/23	10	272	16T 669641 4466550	I	41.0	A	F	Yes
Silver-haired bat	*Lasionycteris noctivagans*	20230512_SHBA_14_1	14	RP	05/12/23	75	285	16T 668689 4463390	I	42.2	A	F	Yes
Hoary bat	*Lasiurus cinereus*	20230719_HOBA_44_1	44	FP	07/19/23	30	354	16T 676680 4462343	I	43.2	A	U	Yes
Eastern red bat	*Lasiurus borealis*	20230727_ERBA_12_1	12	FP	07/27/23	56	66	16T 671005 4465120	I	38.8	A	F	Yes
Hoary bat	*Lasiurus cinereus*	20230731_HOBA_14_1	14	RP	07/31/23	NA	NA	NA	I	NA	U	F	Yes
Hoary bat	*Lasiurus cinereus*	20230731_HOBA_16_1	16	RP	07/31/23	8	311	16T 669699 4463788	P	NA	U	U	Yes
Eastern red bat	*Lasiurus borealis*	20230731_ERBA_24_1	24	RP	07/31/23	6	319	16T 672897 4466599	P	39.6	U	F	Yes
Eastern red bat	*Lasiurus borealis*	20230731_ERBA_25_1	25	RP	07/31/23	25	359	16T 673262 4466525	I	38.1	J	U	Yes
Big brown bat	*Eptesicus fuscus*	20230731_BBBA_29_1	29	RP	07/31/23	9	35	16T 672932 4465343	I	43.8	U	M	Yes
Hoary bat	*Lasiurus cinereus*	20230731_HOBA_29_1	29	RP	07/31/23	6	174	16T 672928 4465330	I	53.5	J	U	Yes
Eastern red bat	*Lasiurus borealis*	20230731_ERBA_37_1	37	FP	07/31/23	35	313	16T 674142 4463651	I	40.0	J	F	Yes
Eastern red bat	*Lasiurus borealis*	20230731_ERBA_40_1	40	FP	07/31/23	41	131	16T 675088 4462950	I	40.2	U	F	Yes
Hoary bat	*Lasiurus cinereus*	20230816_HOBA_11_1	11	RP	08/16/23	12	185	16T 670578 4465185	P	49.1	U	U	Yes
Big brown bat	*Eptesicus fuscus*	20230817_BBBA_17_1	17	RP	08/17/23	37	163	16T 673496 4468682	I	44.4	J	F	Yes
Eastern red bat	*Lasiurus borealis*	20230820_ERBA_13_1	13	RP	08/20/23	57	356	16T 671208 4464791	A	NA	J	M	Yes

Common Name	Scientific Name	Carcass ID	Turbine No.	Plot Type[a]	Date	Distance from Turbine (m)	Bearing from Turbine (degrees)	Coordinates (UTM)	Condition[b]	Forearm Length (mm)	Age[c]	Sex[d]	Incidental Find?
Big brown bat	*Eptesicus fuscus*	20230829_BBBA_24_1	24	RP	08/29/23	28	195	16T 672894 4466567	I	40.0	J	U	Yes
Eastern red bat	*Lasiurus borealis*	20230915_ERBA_53_1	53	RP	09/15/23	46	312	16T 679373 4466863	I	39.4	U	M	Yes
Eastern red bat	*Lasiurus borealis*	20231007_ERBA_49_1	49	FP	10/07/23	70	134	16T 679422 4468002	I	39.9	U	M	Yes
Silver-haired bat	*Lasionycteris noctivagans*	20231008_SHBA_55_1	55	RP	10/08/23	113	84	16T 681300 4466133	I	40.0	U	M	Yes
Silver-haired bat	*Lasionycteris noctivagans*	20231009_SHBA_09_1	9	FP	10/09/23	67	138	16T 668594 4464830	I	40.0	U	F	Yes
Silver-haired bat	*Lasionycteris noctivagans*	20231009_SHBA_52_1	52	RP	10/09/23	8	203	16T 679020 4466840	I	39.6	U	M	Yes
Silver-haired bat	*Lasionycteris noctivagans*	20231014_SHBA_09_1	9	FP	10/14/23	62	216	16T 668513 4464828	I	39.0	U	U	Yes

[a] Plot Type: FP = cleared full plot; RP = road and pad plot

[b] Condition: I = Intact; P = Partial; D = Dismembered; A = Alive

[c] Age: A = Adult; J = Juvenile; U = Unknown

[d] Sex: M = Male; F = Female; U = Unknown

NA (Not Applicable) indicates data not recorded.

APPENDIX A-2

LIST OF AVIAN CARCASSES LOCATED DURING POST-CONSTRUCTION MONITORING SURVEYS AT BLUFF POINT WIND ENERGY CENTER

List of Avian Carcasses Located during Post-construction Monitoring Surveys at Bluff Point Wind Energy Center

Common Name	Scientific Name	Carcass ID	Turbine No.	Plot Type[a]	Date	Distance from Turbine (m)	Bearing from Turbine (degrees)	Coordinates (UTM)	Incidental Find?[b]
Horned Lark	*Eremophila alpestris*	20230404_HOLA_12_1	12	FP	4/4/23	45	270	16T 670910 4465095	No
Northern Flicker	*Colaptes auratus*	20230408_NOFL_35_1	35	FP	4/8/23	27	53	16T 677254 4465204	No
European Starling	*Sturnus vulgaris*	20230419_EUST_18_1	18	RP	4/19/23	3	220	16T 673882 4468719	No
Horned Lark	*Eremophila alpestris*	20230425_HOLA_08_1	8	FP	4/25/23	5	119	16T 668096 4464883	No
Northern Bobwhite	*Colinus virginianus*	20230512_NOBO_01_1	1	RP	5/12/23	4	147	16T 668541 4467717	No
Killdeer	*Charadrius vociferus*	20230512_KILL_08_1	8	FP	5/12/23	21	34	16T 668103 4464903	No
Indigo Bunting	*Passerina cyanea*	20230517_INBU_19_1	19	FP	5/17/23	13	263	16T 674275 4468704	No
Indigo Bunting	*Passerina cyanea*	20230518_INBU_10_1	10	FP	5/18/23	7	11	16T 669951 4465188	No
Brown-headed Cowbird	*Molothrus ater*	20230519_BHCO_36_1	36	FP	5/19/23	11	315	16T 677348 4464750	No
Northern Bobwhite	*Colinus virginianus*	20230711_NOBO_02_1	2	RP	7/11/23	2	39	16T 668715 4467341	No
Killdeer	*Charadrius vociferus*	20230711_KILL_10_1	10	FP	7/11/23	25	169	16T 669955 4465156	No
Killdeer	*Charadrius vociferus*	20230717_KILL_26_1	26	RP	7/17/23	4	331	16T 674388 4466176	No
Mourning Dove	*Zenaida macroura*	20230801_MODO_04_1	4	RP	8/1/23	4	204	16T 669649 4466546	No
Northern Bobwhite	*Colinus virginianus*	20230801_NOBO_25_1	25	RP	8/1/23	5	281	16T 673258 4466501	No
Northern Bobwhite	*Colinus virginianus*	20230801_NOBO_25_2	25	RP	8/1/23	4	284	16T 673259 4466501	No
Killdeer	*Charadrius vociferus*	20230804_KILL_08_1	8	FP	8/4/23	39	23	16T 668106 4464921	No
Northern Bobwhite	*Colinus virginianus*	20230804_NOBO_25_1	25	RP	8/4/23	6	239	16T 673258 4466497	No
Killdeer	*Charadrius vociferus*	20230805_KILL_09_1	9	FP	8/5/23	30	284	16T 668519 4464886	No
Killdeer	*Charadrius vociferus*	20230807_KILL_22_1	22	FP	8/7/23	30	19	16T 674855 4467564	No

Common Name	Scientific Name	Carcass ID	Turbine No.	Plot Type[a]	Date	Distance from Turbine (m)	Bearing from Turbine (degrees)	Coordinates (UTM)	Incidental Find?[b]
Red-tailed Hawk	*Buteo jamaicensis*	20230808_RTHA_02_1	2	RP	8/8/23	6	50	16T 668718 4467343	No
Horned Lark	*Eremophila alpestris*	20230809_HOLA_54_1	54	FP	8/9/23	10	5	16T 682062 4466492	No
Unknown Small bird	*Aves sp. (small)*	20230810_XXSB_40_1	40	FP	8/10/23	36	167	16T 675065 4462942	No
Horned Lark	*Eremophila alpestris*	20230811_HOLA_39_1	39	FP	8/11/23	32	261	16T 674655 4463067	No
Horned Lark	*Eremophila alpestris*	20230813_HOLA_10_1	10	FP	8/13/23	44	136	16T 669981 4465150	No
Unknown Bird Sp.	*Aves sp.*	20230814_XXBI_25_1	25	RP	8/14/23	2	94	16T 673265 4466500	No
Horned Lark	*Eremophila alpestris*	20230821_HOLA_10_1	10	FP	8/21/23	32	336	16T 669936 4465210	No
Horned Lark	*Eremophila alpestris*	20230821_HOLA_10_2	10	FP	8/21/23	31	329	16T 669933 4465207	No
Unknown Passerine	*Passeriformes sp.*	20230822_XXPA_06_1	6	RP	8/22/23	94	256	16T 670716 4466638	No
Turkey Vulture	*Cathartes aura*	20230825_TUVU_30_1	30	RP	8/25/23	3	182	16T 677718 4463587	No
Horned Lark	*Eremophila alpestris*	20230825_HOLA_54_1	54	FP	8/25/23	50	34	16T 682088 4466524	No
Killdeer	*Charadrius vociferus*	20230829_KILL_22_1	22	FP	8/29/23	17	148	16T 674855 4467521	No
Killdeer	*Charadrius vociferus*	20230830_KILL_15_1	15	FP	8/30/23	18	221	16T 669151 4463361	No
Red-tailed Hawk	*Buteo jamaicensis*	20230831_RTHA_06_1	6	RP	8/31/23	21	177	16T 670808 4466642	No
Horned Lark	*Eremophila alpestris*	20230904_HOLA_32_1	32	FP	9/4/23	3	108	16T 672628 4462652	No
Horned Lark	*Eremophila alpestris*	20230905_HOLA_22_1	22	FP	9/5/23	64	318	16T 674802 4467582	No
Killdeer	*Charadrius vociferus*	20230905_KILL_22_1	22	FP	9/5/23	14	79	16T 674859 4467538	No
Horned Lark	*Eremophila alpestris*	20230906_HOLA_09_1	9	FP	9/6/23	22	310	16T 668531 4464893	No
Unknown Shorebird	*Charadriiformes sp.*	20230910_XXSH_42_1	42	RP	9/10/23	64	225	16T 676243 4463132	No
Turkey Vulture	*Cathartes aura*	20230911_TUVU_48_1	48	FP	9/11/23	32	180	16T 678837 4467984	No

Common Name	Scientific Name	Carcass ID	Turbine No.	Plot Type[a]	Date	Distance from Turbine (m)	Bearing from Turbine (degrees)	Coordinates (UTM)	Incidental Find?[b]
Horned Lark	*Eremophila alpestris*	20230913_HOLA_12_1	12	FP	9/13/23	35	293	16T 670922 4465109	No
Horned Lark	*Eremophila alpestris*	20230913_HOLA_48_1	48	FP	9/13/23	34	269	16T 678803 4468015	No
Horned Lark	*Eremophila alpestris*	20230914_HOLA_10_1	10	FP	9/14/23	18	339	16T 669943 4465197	No
Horned Lark	*Eremophila alpestris*	20230915_HOLA_48_1	48	FP	9/15/23	35	312	16T 678810 4468039	No
Red-eyed Vireo	*Vireo olivaceus*	20230918_REVI_54_1	54	FP	9/18/23	8	247	16T 682054 4466479	No
Horned Lark	*Eremophila alpestris*	20230919_HOLA_17_1	17	RP	9/19/23	52	124	16T 673528 4468689	No
Blackburnian Warbler	*Setophaga fusca*	20230919_BLBW_22_1	22	FP	9/19/23	57	212	16T 674817 4467486	No
Horned Lark	*Eremophila alpestris*	20230919_HOLA_39_1	39	FP	9/19/23	26	75	16T 674711 4463080	No
Horned Lark	*Eremophila alpestris*	20230920_HOLA_10_1	10	FP	9/20/23	25	212	16T 669937 4465159	No
Turkey Vulture	*Cathartes aura*	20230924_TUVU_35_1	35	FP	9/24/23	34	288	16T 677200 4465197	No
Horned Lark	*Eremophila alpestris*	20230925_HOLA_10_1	10	FP	9/25/23	34	249	16T 669918 4465168	No
Northern Parula	*Setophaga americana*	20230925_NOPA_20_1	20	FP	9/25/23	50	294	16T 673956 4467378	No
Magnolia Warbler	*Setophaga magnolia*	20230929_MAWA_48_1	48	FP	9/29/23	10	300	16T 678828 4468021	No
Killdeer	*Charadrius vociferus*	20231003_KILL_35_1	35	FP	10/3/23	58	126	16T 677281 4465154	No
Chimney Swift	*Chaetura pelagica*	20231005_CHSW_54_1	54	FP	10/5/23	41	348	16T 682052 4466522	No
Turkey Vulture	*Cathartes aura*	20231007_TUVU_48_1	48	FP	10/7/23	16	183	16T 678836 4468000	No
Horned Lark	*Eremophila alpestris*	20231012_HOLA_54_1	54	FP	10/12/23	38	216	16T 682040 4466451	No
Turkey Vulture	*Cathartes aura*	20231013_TUVU_09_1	9	FP	10/13/23	44	252	16T 668507 4464865	No
Unknown Sparrow	*Passerellidae sp. (sparrow sp.)*	20231013_XXSP_37_1	37	FP	10/13/23	52	36	16T 674198 4463670	No
Golden-crowned Kinglet	*Regulus satrapa*	20231013_GCKI_42_1	42	RP	10/13/23	61	229	16T 676242 4463137	No

Common Name	Scientific Name	Carcass ID	Turbine No.	Plot Type[a]	Date	Distance from Turbine (m)	Bearing from Turbine (degrees)	Coordinates (UTM)	Incidental Find?[b]
Golden-crowned Kinglet	*Regulus satrapa*	20231013_GCKI_47_1	47	RP	10/13/23	41	209	16T 678555 4468368	No
Chimney Swift	*Chaetura pelagica*	20231013_CHSW_56_1	56	RP	10/13/23	39	146	16T 680966 4465319	No
Killdeer	*Charadrius vociferus*	20231014_KILL_08_1	8	FP	10/14/23	21	100	16T 668112 4464882	No
Golden-crowned Kinglet	*Regulus satrapa*	20231015_GCKI_35_1	35	FP	10/15/23	44	280	16T 677190 4465194	No
Killdeer	*Charadrius vociferus*	20230329_KILL_10_1	10	FP	3/29/23	28	81	16T 669977 4465186	Yes
Turkey Vulture	*Cathartes aura*	20230511_TUVU_21_1	21	RP	5/11/23	45	216	16T 674456 4467571	Yes
Turkey Vulture	*Cathartes aura*	20230519_TUVU_50_1	50	RP	5/19/23	11	75	16T 680446 4468078	Yes
Red-tailed Hawk	*Buteo jamaicensis*	20230522_RTHA_50_1	50	RP	5/22/23	25	134	16T 680453 4468058	Yes
Unknown Bird Sp.	*Aves sp.*	20230727_XXBI_12_1	12	FP	7/27/23	12	92	16T 670967 4465096	Yes
Horned Lark	*Eremophila alpestris*	20230808_HOLA_11_1	11	RP	8/8/23	73	91	16T 670652 4465198	Yes
Killdeer	*Charadrius vociferus*	20230926_KILL_22_1	22	FP	9/26/23	53	194	16T 674834 4467483	Yes
Killdeer	*Charadrius vociferus*	20231009_KILL_04_1	4	RP	10/9/23	33	70	16T 669681 4466562	Yes

[a] Plot Type: FP = cleared full plot; RP = road and pad plot

[b] For avian species, non-incidental finds are those that were located within the search plot during standardized surveys. However, avian species were not included in fatality estimate analysis.

APPENDIX B

MODELS EVALUATED TO DETERMINE THE BEST DISTRIBUTION AND EXPLANATORY VARIABLES FOR ESTIMATING CARCASS PERSISTENCE TIME

Models Evaluated to Determine the Best Distribution and Explanatory Variables for Estimating Carcass Persistence Time

Distribution	Location Formula	Scale Formula	AICc	ΔAICc
Spring				
lognormal	l ~ constant	s ~ constant	213.86	0.00
weibull	l ~ constant	s ~ constant	214.05	0.19
loglogistic	l ~ constant	s ~ constant	214.21	0.35
lognormal	l ~ constant	s ~ PlotType	214.88	1.02
weibull	l ~ constant	s ~ PlotType	215.00	1.14
loglogistic	l ~ constant	s ~ PlotType	215.31	1.45
lognormal	l ~ PlotType	s ~ constant	216.05	2.19
weibull	l ~ PlotType	s ~ constant	216.27	2.41
loglogistic	l ~ PlotType	s ~ constant	216.37	2.51
lognormal	l ~ PlotType	s ~ PlotType	217.03	3.17
weibull	l ~ PlotType	s ~ PlotType	217.36	3.50
loglogistic	l ~ PlotType	s ~ PlotType	217.48	3.62
exponential	l ~ constant	-	231.50	17.64
exponential	l ~ PlotType	-	233.38	19.52
Summer				
exponential	l ~ PlotType	-	140.33	0.00
exponential	l ~ constant	-	142.25	1.92
weibull	l ~ PlotType	s ~ constant	142.74	2.41
weibull	l ~ PlotType	s ~ PlotType	143.90	3.57
weibull	l ~ constant	s ~ constant	143.99	3.66
weibull	l ~ constant	s ~ PlotType	145.79	5.46
lognormal	l ~ PlotType	s ~ constant	148.73	8.40
loglogistic	l ~ PlotType	s ~ constant	149.96	9.63
lognormal	l ~ PlotType	s ~ PlotType	150.45	10.12
lognormal	l ~ constant	s ~ constant	150.46	10.13
loglogistic	l ~ constant	s ~ constant	151.20	10.87
loglogistic	l ~ PlotType	s ~ PlotType	151.69	11.36
lognormal	l ~ constant	s ~ PlotType	152.20	11.87
loglogistic	l ~ constant	s ~ PlotType	153.00	12.67
Fall				
loglogistic	l ~ constant	s ~ constant	235.42	0.00
lognormal	l ~ constant	s ~ constant	235.52	0.10
lognormal	l ~ constant	s ~ PlotType	236.70	1.28
loglogistic	l ~ constant	s ~ PlotType	236.89	1.47
loglogistic	l ~ PlotType	s ~ constant	237.60	2.18
lognormal	l ~ PlotType	s ~ constant	237.78	2.36

Distribution	Location Formula	Scale Formula	AICc	ΔAICc
weibull	l ~ constant	s ~ constant	238.85	3.43
lognormal	l ~ PlotType	s ~ PlotType	239.07	3.65
loglogistic	l ~ PlotType	s ~ PlotType	239.15	3.73
weibull	l ~ constant	s ~ PlotType	239.28	3.86
weibull	l ~ PlotType	s ~ constant	240.76	5.34
weibull	l ~ PlotType	s ~ PlotType	241.51	6.09
exponential	l ~ constant	-	276.15	40.73
exponential	l ~ PlotType	-	277.13	41.71

APPENDIX C

EOA OUTPUTS FOR TAKE ESTIMATES OF COVERED SPECIES

Summary statistics for multiple class estimate [Indiana bat]

==

Input: Detection probability, by search class

Search coverage = 0.3273

Class	DWP	X	Ba	Bb	ghat	95% CI
unsearched	0.673	0	---	---	0	[0, 0]
Spring_FP	0.0112	0	14.42	27.09	0.347	[0.212, 0.497]
Spring_RP	0.0019	0	18.11	19.45	0.482	[0.326, 0.640]
Summer_FP	0.0833	0	15.23	17.14	0.470	[0.304, 0.640]
Summer_RP	0.0135	0	23.49	19.49	0.546	[0.398, 0.691]
Fall_FP	0.185	2	24.19	10.5	0.697	[0.537, 0.836]
Fall_RP	0.0319	0	23.64	7.849	0.751	[0.589, 0.883]

==

Results for full site

Detection probability

Estimated g = 0.205, 95% CI = [0.174, 0.237]

Fitted beta distribution parameters for estimated g: Ba = 126.5796, Bb = 492.1542

Mortality

M* = 10 for credibility 1 - alpha = 0.5, i.e., P(M <= 10) >= 50%

Estimated annual fatality rate: lambda = 12.3, 95% CI = [2.03, 31.95]

Test of assumed relative weights (rho)

Class	Assumed	Fitted (95% CI)
unsearched	0.673	NA
Spring_FP	0.011	[0.000, 0.185]
Spring_RP	0.002	[0.000, 0.160]
Summer_FP	0.083	[0.000, 0.172]
Summer_RP	0.013	[0.000, 0.141]
Fall_FP	0.185	[0.027, 0.265]
Fall_RP	0.032	[0.000, 0.123]

p = 0.87291 for likelihood ratio test of H0: assumed rho = true rho

Mortality rates (lambda) by class

Class	Median	IQR	95% CI
unsearched	---	---	---
Spring_FP	0.68	[0.15, 2.00]	[0.00, 7.97]
Spring_RP	0.48	[0.11, 1.42]	[0.00, 5.54]
Summer_FP	0.50	[0.11, 1.46]	[0.00, 5.76]
Summer_RP	0.42	[0.09, 1.24]	[0.00, 4.79]
Fall_FP	3.15	[1.93, 4.84]	[0.60, 9.58]
Fall_RP	0.31	[0.07, 0.89]	[0.00, 3.42]

Posterior distribution of M

m	p(M = m)	p(M > m)
0	0.0000	1.0000
1	0.0000	1.0000
2	0.0184	0.9816
3	0.0370	0.9446
4	0.0517	0.8929

5	0.0618	0.8311
6	0.0677	0.7635
7	0.0700	0.6934
8	0.0697	0.6238
9	0.0673	0.5564
10	0.0637	0.4928
11	0.0591	0.4336
12	0.0542	0.3795
13	0.0490	0.3304
14	0.0440	0.2864
15	0.0391	0.2473
16	0.0345	0.2128
17	0.0303	0.1825
18	0.0264	0.1561
19	0.0230	0.1331
20	0.0199	0.1132
21	0.0171	0.0961
22	0.0147	0.0814
23	0.0126	0.0688
24	0.0108	0.0580
25	0.0092	0.0488
26	0.0078	0.0410
27	0.0066	0.0344
28	0.0056	0.0288
29	0.0047	0.0240
30	0.0040	0.0200
31	0.0034	0.0166
32	0.0028	0.0138
33	0.0024	0.0114
34	0.0020	0.0094
35	0.0017	0.0077
36	0.0014	0.0062
37	0.0012	0.0051
38	0.0010	0.0041
39	0.0008	0.0032
40	0.0007	0.0025
41	0.0006	0.0019
42	0.0005	0.0015
43	0.0004	0.0011
44	0.0003	0.0007
45	0.0003	0.0004
46	0.0002	0.0002
47	0.0002	0.0000

Summary statistics for multiple class estimate [northern long-eared bat]

==

Input: Detection probability, by search class

Search coverage = 0.3273

Class	DWP	X	Ba	Bb	ghat	95% CI
unsearched	0.673	0	---	---	0	[0, 0]
Spring_FP	0.0112	0	14.42	27.09	0.347	[0.212, 0.497]
Spring_RP	0.0019	0	18.11	19.45	0.482	[0.326, 0.640]
Summer_FP	0.0833	0	15.23	17.14	0.470	[0.304, 0.640]
Summer_RP	0.0135	0	23.49	19.49	0.546	[0.398, 0.691]
Fall_FP	0.185	0	24.19	10.5	0.697	[0.537, 0.836]
Fall_RP	0.0319	0	23.64	7.849	0.751	[0.589, 0.883]

==

Results for full site

Detection probability

Estimated g = 0.205, 95% CI = [0.174, 0.237]

Fitted beta distribution parameters for estimated g: Ba = 126.5796, Bb = 492.1542

Mortality

M* = 1 for credibility 1 - alpha = 0.5, i.e., P(M <= 1) >= 50%

Estimated annual fatality rate: lambda = 2.47, 95% CI = [0.00243, 12.44]

Test of assumed relative weights (rho)

Class	Assumed	Fitted (95% CI)
unsearched	0.673	NA
Spring_FP	0.011	[0.001, 0.255]
Spring_RP	0.002	[0.000, 0.229]
Summer_FP	0.083	[0.000, 0.233]
Summer_RP	0.013	[0.000, 0.215]
Fall_FP	0.185	[0.000, 0.192]
Fall_RP	0.032	[0.000, 0.175]

p = 1 for likelihood ratio test of H0: assumed rho = true rho

Mortality rates (lambda) by class

Class	Median	IQR	95% CI
unsearched	---	---	---
Spring_FP	0.68	[0.15, 2.00]	[0.00, 7.97]
Spring_RP	0.48	[0.11, 1.42]	[0.00, 5.54]
Summer_FP	0.50	[0.11, 1.46]	[0.00, 5.76]
Summer_RP	0.42	[0.09, 1.24]	[0.00, 4.79]
Fall_FP	0.33	[0.07, 0.96]	[0.00, 3.70]
Fall_RP	0.31	[0.07, 0.89]	[0.00, 3.42]

Posterior distribution of M

m	p(M = m)	p(M > m)
0	0.4920	0.5080
1	0.1621	0.3459
2	0.0990	0.2469
3	0.0664	0.1805
4	0.0466	0.1339

5	0.0336	0.1003
6	0.0246	0.0757
7	0.0183	0.0574
8	0.0137	0.0437
9	0.0103	0.0334
10	0.0078	0.0256
11	0.0060	0.0196
12	0.0046	0.0150
13	0.0035	0.0115
14	0.0027	0.0087
15	0.0021	0.0066
16	0.0016	0.0050
17	0.0013	0.0037
18	0.0010	0.0027
19	0.0008	0.0020
20	0.0006	0.0014
21	0.0005	0.0009
22	0.0004	0.0005
23	0.0003	0.0002
24	0.0002	0.0000

Summary statistics for mortality estimates through 3 years [Indiana bat]

Results

M* = 16 for 1 - Î± = 0.5, i.e., P(M <= 16) >= 50%
Estimated overall detection probability: g = 0.199, 95% CI = [0.183, 0.215]
Ba = 485.1, Bb = 1953.8
Estimated baseline fatality rate (for rho = 1): lambda = 5.879, 95% CI = [1.42, 13.5]

Cumulative Mortality Estimates

				mean			
Year	X	g	M*	median	95% CI	lambda	95% CI
2021	0	0.124	1	1	[0, 14]	4.076	[0.003964, 20.57]
2022	1	0.196	6	6	[1, 18]	7.674	[0.5507, 23.97]
2023	3	0.199	16	16	[5, 35]	17.64	[4.246, 40.46]

Annual Mortality Estimates

				mean			
Year	X	g	M*	median	95% CI	lambda	95% CI
2021	0	0.124	1	1	[0, 14]	4.0760	[0.0040, 20.5700]
2022	1	0.268	4	4	[1, 13]	5.6200	[0.4030, 17.5700]
2023	2	0.205	10	10	[3, 28]	12.3300	[2.0310, 31.9500]

Test of assumed relative weights (rho) and potential bias

	Fitted rho
Assumed rho	95% CI
1	[0.002, 1.913]
1	[0.072, 2.143]
1	[0.460, 2.796]

p = 0.35796 for likelihood ratio test of H0: assumed rho = true rho
Quick test of relative bias: 1.067

===
Input

Year (or period)	rho	X	Ba	Bb	ghat	95% CI
2021	1.000	0	104.5	737.1	0.124	[0.103, 0.147]
2022	1.000	1	267.7	731.5	0.268	[0.241, 0.296]
2023	1.000	2	126.6	492.2	0.205	[0.174, 0.237]

Summary statistics for mortality estimates through 3 years [northern long-eared bat]

Results

M* = 1 for 1 - Î± = 0.5, i.e., P(M <= 1) >= 50%
Estimated overall detection probability: g = 0.199, 95% CI = [0.183, 0.215]
Ba = 485.1, Bb = 1953.8
Estimated baseline fatality rate (for rho = 1): lambda = 0.8398, 95% CI = [0.000817, 4.22]

Cumulative Mortality Estimates

				mean			
Year	X	g	M*	median	95% CI	lambda	95% CI
2021	0	0.124	1	1	[0, 14]	4.076	[0.003964, 20.57]
2022	0	0.196	1	1	[0, 8]	2.558	[0.002528, 12.86]
2023	0	0.199	1	1	[0, 8]	2.519	[0.002452, 12.67]

Annual Mortality Estimates

				mean			
Year	X	g	M*	median	95% CI	lambda	95% CI
2021	0	0.124	1	1	[0, 14]	4.0760	[0.0040, 20.5700]
2022	0	0.268	0	0	[0, 6]	1.8730	[0.0018, 9.4260]
2023	0	0.205	1	1	[0, 8]	2.4670	[0.0024, 12.4300]

Test of assumed relative weights (rho) and potential bias

	Fitted rho
Assumed rho	95% CI
1	[0.012, 2.897]
1	[0.003, 2.687]
1	[0.006, 2.832]

p = 1 for likelihood ratio test of H0: assumed rho = true rho
Quick test of relative bias: 0.904

==

Input

Year (or period)	rho	X	Ba	Bb	ghat	95% CI
2021	1.000	0	104.5	737.1	0.124	[0.103, 0.147]
2022	1.000	0	267.7	731.5	0.268	[0.241, 0.296]
2023	1.000	0	126.6	492.2	0.205	[0.174, 0.237]

Short-term trigger: Test of average fatality rate (lambda) over 3 years [Indiana bat]
Years: 2021 - 2023
==

Results
Estimated overall detection probability: g = 0.199, 95% CI = [0.183, 0.215]
Ba = 485.1, Bb = 1953.8

Estimated annual fatality rate over the past 3 years: lambda = 5.879, 95% CI = [1.42, 13.5]
P(lambda > 5.5) = 0.4767
Compliance: Cannot infer lambda > 5.5 with 99% credibility

Input
Threshold for short-term rate (tau) = 5.5 per year

Period	rel_wt	X	Ba	Bb	ghat	95% CI
2021	1.000	0	104.5	737.1	0.124	[0.103, 0.147]
2022	1.000	1	267.7	731.5	0.268	[0.241, 0.296]
2023	1.000	2	126.6	492.2	0.205	[0.174, 0.237]

Short-term trigger: Test of average fatality rate (lambda) over 3 years [northern long-eared bat]
Years: 2021 - 2023

===

Results
Estimated overall detection probability: g = 0.199, 95% CI = [0.183, 0.215]
Ba = 485.1, Bb = 1953.8

Estimated annual fatality rate over the past 3 years: lambda = 0.8398, 95% CI = [0.000817, 4.22]
P(lambda > 2.8) = 0.0679
Compliance: Cannot infer lambda > 2.8 with 99% credibility

Input
Threshold for short-term rate (tau) = 2.8 per year

Period	rel_wt	X	Ba	Bb	ghat	95% CI
2021	1.000	0	104.5	737.1	0.124	[0.103, 0.147]
2022	1.000	0	267.7	731.5	0.268	[0.241, 0.296]
2023	1.000	0	126.6	492.2	0.205	[0.174, 0.237]