Post-construction Monitoring Study for the Bitter Ridge Wind Farm Jay County, Indiana

Final Report

June 21 – October 15, 2021

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January 28, 2022

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EXECUTIVE SUMMARY

Bitter Ridge Wind Farm, LLC (Bitter Ridge), is operating the Bitter Ridge Wind Farm (Project) in Jay County, Indiana. Bitter Ridge obtained an Incidental Take Permit (ITP; ESPER0014119) for the federally listed endangered Indiana bat and the federally listed threatened northern long-eared bat (hereafter, Covered Species) from the US Fish and Wildlife Service (USFWS) dated June 15, 2021. This report details the post-construction monitoring studies conducted in 2021, consistent with the Project's Habitat Conservation Plan (HCP) and ITP for Covered Species, and the study plan developed for ITP monitoring in 2021.

Post-construction monitoring was completed in accordance with the study plan. The initial draft of the study plan was submitted to the US Fish and Wildlife Service (USFWS) on April 16, 2021. The study plan was revised multiple times to account for changes in survey design and start dates (based on changes in anticipated ITP issuance schedule) and received final approval on August 26, 2021 (Marissa Reed, USFWS, pers. comm.). The study plan was designed to achieve a probability of detection, or *g*, of 0.25. As noted above, the ITP was received on June 15, 2021, and Bitter Ridge started operating under the HCP minimization regime the next day; ITP-level monitoring was mobilized as soon as possible after that and searches began on June 21. The overall goal of this post-construction monitoring study was to generate reliable fatality estimates for the Covered Species and to evaluate compliance with the incidental take authorization granted under the Project's ITP. Specifically, the objectives of the study were to 1) estimate Covered Species take using the Evidence of Absence (EoA) framework as outlined in the HCP, and 2) determine overall bat fatality rates. This report presents the results of the study conducted within the Project from June 21 – October 15, 2021.

Standardized carcass searches were completed for bats at three plot types: cleared plots, uncleared plots, and road and pad plots. During the summer study period (June 21 – July 31), 37 summer risk turbines were searched twice per week. A technician searched gravel road and pad plots at 15 turbines out to a distance of 100 meters (m; 328 feet [ft]) from the turbine. A dog-handler team searched cleared plots at 14 turbines and uncleared plots (i.e., soy plots) at eight turbines. Both cleared and uncleared plots were searched at a 70-m (230-ft) radius. During the fall study period (August 1 – October 15), all 52 turbines were searched twice per week with a technician searching road and pad plots at 38 turbines and dog-handler teams searching cleared plots at 14 turbines. Searcher efficiency and carcass persistence trials were also conducted during each season to correct for detection and scavenger removal bias.

The most commonly found bat species were eastern red bat (40.7%), silver-haired bat (28.0%), big brown bat (15.1%), and hoary bat (13.8%). Carcasses of three additional state-listed endangered species were recorded at Bitter Ridge including little brown bat (n = 1), evening bat (n = 1) and tri-colored bat (n = 1).Species composition recorded at the Project was similar to previous studies at the nearby Headwaters Wind Farm in Randolph County, Indiana. The overall probability of detection (*g*) distribution for 2021 post-construction monitoring surveys had a mean

of 0.33 (95% Confidence Interval [CI]: 0.32–0.35). During the study, 558 bat fatalities were found. The overall bat fatality rate was 15.02 bats per megawatt (90% CI: 11.07–20.91).

Two Indiana bat carcasses were found at the Project, one at Turbine 37 on August 23, 2021, and one at Turbine 11 on October 11, 2021. No northern long-eared bat carcasses were found. Based on the first year of ITP monitoring, cumulative take to-date, M^* at $\alpha = 0.5$ (50^{th} credible bound), is estimated to be 6 Indiana bats and 0 northern long-eared bats. Estimated take for the Covered Species falls below the permitted take level for both species, meaning the Project was in compliance with the ITP. The EoA model estimated the mean annual fatality rate at Bitter Ridge was 7.54 Indiana bats and 1.51 northern long-eared bats. The probability that the annual take rate exceeded the thresholds for either Covered Species did not exceed 95%, indicating that no adaptive management actions are necessary at this time.

STUDY PARTICIPANTS

Kevin Murray	Project Manager, Permitted Bat Biologist
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REPORT REFERENCE

Murray, K. L., L. Voorhees, J. Pickle and G. DiDonato. 2022 Post-construction Monitoring Study for the Bitter Ridge Wind Farm, Jay County, Indiana. Draft Report: June 21 – October 15, 2021. Prepared for Bitter Ridge Wind Farm, LLC, Boulder, Colorado. Prepared by Western EcoSystems Technology, Inc. (WEST). Bloomington, Indiana. January 28, 2022.

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INTRODUCTION

Bitter Ridge Wind Farm, LLC (Bitter Ridge), is operating the Bitter Ridge Wind Farm (Project) in Jay County, Indiana. Bitter Ridge obtained an Incidental Take Permit (ITP; ESPER0014119) for the federally listed endangered Indiana bat (*Myotis sodalis*) and the federally listed threatened northern long-eared bat (*M. septentrionalis*; hereafter Covered Species) from the US Fish and Wildlife Service (USFWS) dated June 15, 2021. The ITP requires the Project to minimize impacts to Covered Species. The ITP requires monitoring to determine if the level of impact exceeds authorized amounts of take, and to determine if adaptive management is necessary to further reduce impacts.

Western EcoSystems Technology, Inc. (WEST) completed a post-construction monitoring study designed to achieve a probability of detection, or *g*, of 0.25. The objectives of this study were to estimate Covered Species take using the Evidence of Absence (EoA) framework as outlined in the Habitat Conservation Plan (HCP), and determine overall bat fatality rates for the study. This report presents the results of the study conducted within the Project from June 21 – October 15, 2021. Bird fatalities were recorded, but were not the focus of this particular ITP study and no analysis of avian fatality rates are included in this report.

STUDY AREA

Bitter Ridge became fully operational in September 2020, and consists of 52, General Electric 2.82-megawatt (MW)-127 turbines with a nameplate capacity of 2.82 MW each. All turbines are within the migratory range of the Covered Species. The HCP identified 37 turbines within 305 meters (m; 1,000 feet [ft]) of summer maternity colony habitat for Indiana bat. Bitter Ridge feathered blades at those turbines from half an hour before sunset to half an hour after sunrise when wind speeds were below 5.0 m/second (m/s; 16.4 ft/second [ft/s]) and temperatures were above 10 degrees Celsius (°C; 50° Fahrenheit). This was done during the summer maternity season (normally May 16 – July 31; in 2021 this started occurring on June 16, after receipt of the ITP) to minimize impacts to summer maternity colonies. The remaining 15 turbines were feathered below the cut-in speed of 3.0 m/s (9.8 ft/s) during the summer. During the fall migration period (August 1 – October 15) all turbines were feathered from half an hour before sunset to half an hour after sunrise when wind speeds were below 5.0 m/s and temperatures were above 10°C.

The Project is located in Jay County, Indiana, on 8,972 hectares (22,170 acres) of private land approximately nine kilometers (six miles) southwest of Portland, Indiana (Figure 1). Prominent geographic features within the Project include the Platt Nibarger Ditch and the Beason Ditch, both of which flow south to join the Mississinewa River, which roughly parallels the southern boundary of the Project. According to the National Land Cover Database (2019), the primary land cover type within the Project is cultivated crops, which covers 82.1% of the Permit Area, followed by deciduous forest, which makes up 8.0%, developed open space, which makes up 4.8%, and hay/pasture, which makes up 3.6% of land cover. The remaining land cover types compose less than 1.7% of total land cover (Table 1).

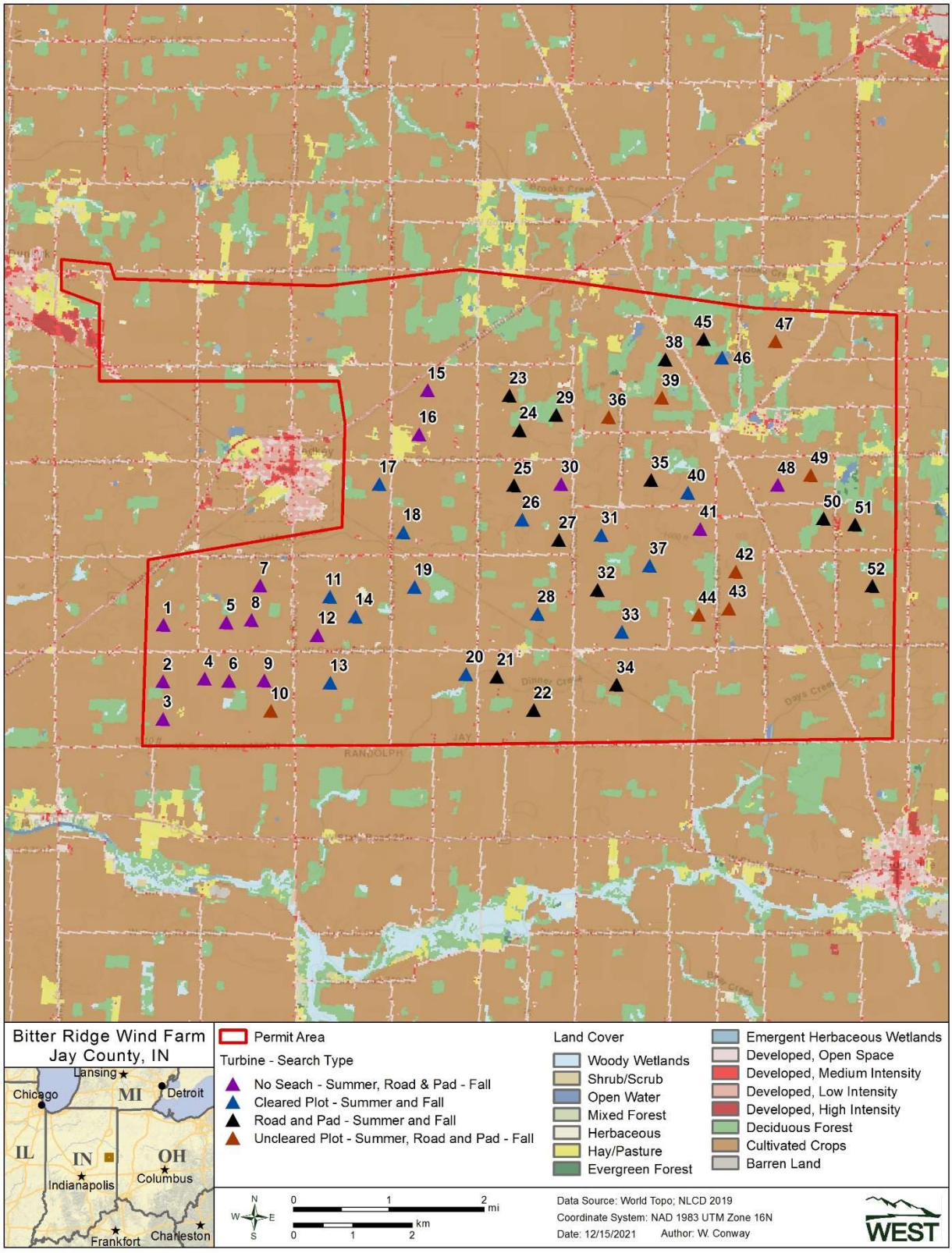

Figure 1. Turbine locations by search type and surrounding land cover at the Bitter Ridge Wind Farm in Jay County, Indiana.

Table 1. National Land Cover Database land cover types and percent (%) composition within the Bitter Ridge Wind Farm Permit Area, Jay County, Indiana.

Habitat	Hectares	Acres	% Composition
Cultivated Crops	7,365.4	18,200.3	82.1
Deciduous Forest	718.5	1,775.4	8.0
Developed, Open Space	435.0	1,074.9	4.8
Hay/Pasture	327.3	808.7	3.6
Herbaceous	52.0	127.5	0.6
Developed, Low Intensity	31.0	76.5	0.3
Open Water	20.0	49.0	0.2
Shrub/Scrub	7.4	18.4	0.1
Woody Wetlands	5.2	12.8	0.1
Emergent Herbaceous Wetlands	5.1	12.7	0.1
Developed, Medium Intensity	4.5	11.2	0.1
Evergreen Forest	1.0	1.6	<0.1
Developed, High Intensity	<1.0	0.5	<0.1
Total	**8,972.0**	**22,169.5**	**100**

Data from the National Land Cover Database (2019).

METHODS

WEST used available data from previous post-construction monitoring studies at the Headwaters Wind Farm to develop a study plan that targeted a *g* of 0.25 to meet the monitoring commitments in the HCP. The initial draft of the study plan was submitted to the USFWS on April 16, 2021. The study plan was revised multiple times to account for changes in survey design and start dates (based on changes in anticipated ITP issuance schedule) and received final approval on August 26, 2021 (M. Reed, USFWS, pers. comm.). As noted above, the ITP was received on June 15, 2021, and Bitter Ridge started operating under the HCP minimization regime the next day; ITP-level monitoring was mobilized as soon as possible after that and searches began on June 21.

Standardized Carcass Searches

Number of Turbines Sampled, Search Frequency, and Plot Size

Technicians and dog-handler teams conducted standardized carcass searches from June 21 – October 15, 2021. Search effort varied by season, and was designed take advantage of available dog-handler teams and to maximize effort when the greatest number of Covered Species were expected to occur (Table 2).

Table 2. Search Effort by Season and Plot Type at Bitter Ridge Wind Farm in Jay County, Indiana.

Season	Plot Type	Search Interval	Number of Turbines	Search Team
Summer (June 21–July 31)	100-m road and pad plot	Twice weekly	15	Humans
	70-m uncleared plot	Twice weekly	8	Dog handlers
	70-m cleared plot	Twice weekly	14	Dog handlers
Fall (August 1–October 15)	100-m road and pad plot	Twice weekly	14	Humans
	70-m cleared plot	Twice weekly	38	Dog handlers

m = meter.

During the summer study period 37 summer risk turbines were searched twice per week. A technician searched gravel road and pad areas (road and pad plots) under 15 turbines to a distance of 100 m (328 ft) from the turbine. A dog-handler team searched eight turbines as uncleared plots (soy plots) with a 70-m (230-ft) radius and 14 turbines as cleared plots with a 70-m radius (Table 2, Figure 1).

All 52 turbines were searched twice per week during the fall (Table 2). A technician searched 38 turbines as road and pad plots to a distance of 100 m from the turbine (Figure 1). Dog-handler teams searched 14 turbines where crops were regularly mowed within a 70-m radius (cleared plots; Table 2, Figure 1).

During the summer and fall study period, vegetation at cleared plots was mowed and maintained by Project staff within 10 to 15 centimeters (four to six inches) in height to enhance detectability of carcasses. Uncleared plots were vegetated with soybeans (*Glycine max*). Seven cleared plots were disked (two in early August, five in mid-September) due to mowing limitations.

Search Methods

All personnel were trained to follow the Bitter Ridge search protocol, including proper handling and reporting of carcasses. Carcass searches began after first light, and ended prior to dusk.

Human Searchers

The technicians walked transects spaced five m (16 ft) apart at a rate of approximately 45–60 m per minute (m/min; 148–197 ft/min) on all gravel road and pad areas within 100 m of the turbine. The technicians scanned the area for fatalities on both sides of the transects out to approximately 2.5 m (8.2 ft) to ensure full visual coverage of each search area.

Dog-handler Teams

Detection dog teams searched cleared and uncleared plots for bat carcasses. Detection dogs were considered candidates for carcass searches if they met temperament, basic obedience, ability to detect bat carcasses requirements. Temperament characteristics that are sought after are high-energy dogs, with a high food or toy drive, and eagerness to please their handler. Prior to conducting searches at Bitter Ridge, handlers trained their detection dogs on the scent of bat carcasses derived from search and rescue programs and drug detection (Kay 2012, Helfers 2017). Dogs were initially trained on cotton scent swabs that had been rubbed on or stored in a

container with bat carcasses and progressed to bat carcasses at increasing distances over a period of three to four weeks. Once the dog achieved a passing grade of 80% or higher in a scent recognition test, consisting of 10 blind trial lineups using bat carcasses, the dog and handler were evaluated in the field to measure their performance. The detection dog coordinator conducted a 2-day field evaluation of each dog-handler team; after teams achieved a searcher efficiency of 75% or greater for 30 bats during evaluation trials, they were approved to conduct standardized carcass searches. Because the objective of the study was to document bat carcasses, dogs were not explicitly trained on native bird carcasses; however, all detection dogs alerted on birds in the field, and handlers rewarded bird finds in the field to encourage future alerts to bird carcasses. Detection dogs used at Bitter Ridge included a Doberman/lab mix, a golden retriever, and an Airedale/terrier mix.

Prior to each search, handlers determined the survey start points and the number of transects needed to cover the plot after taking into account wind speed and direction, as well as crop row direction and density (when applicable). Handlers oriented dogs to start searches perpendicular to the wind to maximize scent detection. Both wind speed and crop density can affect scent dispersal across the search area. Transect width varied by plot type to maximize detection and ranged from 5–10 m (16–33 ft) in uncleared plots, and 10–15 m (33–49 ft) in cleared plots. The handler placed a marker by the carcass and rewarded the dog with either a food reward or a short play session when a detection dog correctly alerted to a bird or bat carcass.

Data Collection

For each scheduled search, technicians recorded the date, start and end times, technician name, turbine number, type of search and if any fatalities were found. When a fatality was found, technicians placed a flag near it and continued the search. After searching the entire plot, the technician returned to record information for each fatality on a fatality data sheet, including the date and time, species, sex and age (when possible), technician name, turbine number, measured distance from turbine, azimuth from turbine, location of carcass as Universal Transverse Mercator coordinates, habitat surrounding carcass, condition of carcass (i.e., intact, scavenged, dismembered, feather spot [for birds only], injured), and estimated time of death (e.g., less than one day, two days). Technicians took digital photographs of each fatality, including any visible injuries, and surrounding habitat. The technician also plotted the location of each fatality on a map of the search area. Carcasses found in non-search areas (e.g., outside of a plot boundary) or outside of the scheduled study period, were recorded as incidental discoveries and documented following the same protocol for those found during standard searches, but were not included in analysis.

The condition of each carcass found was recorded using the following categories:

- Intact—a complete carcass, not badly decomposed, and shows no sign of being fed upon by a predator or scavenger.
- Scavenged—an entire carcass that shows signs of being fed upon by a predator or scavenger, or a portion(s) of a carcass in one location (e.g., wings, skeletal remains, portion of a carcass), or a carcass that has been heavily infested by insects.

- Dismembered—an entire carcass found in multiple pieces distributed more than 1.0 m (3.3 ft) apart from one another due to scavenging or other reasons.
- Injured—a bat or bird found alive.

For bird carcasses, the following category was also used:

- Feather spot—10 or more feathers (excluding down), or two or more primary feathers at one location indicating predation or scavenging of a bird carcass.

Bat carcasses were collected under the Projects ITP (ESPER0014119), WEST's Federal Native Endangered and Threatened Species Recovery Permit (TE234121-9), and WEST's Indiana Special Purpose Salvage Permit (2137). Technicians placed all bat carcasses in a re-sealable plastic bag labeled with the unique carcass identification number, turbine number, and date, for storage in a freezer on site. Leather and latex/nitrile gloves were used to handle all bat carcasses to reduce the risk of transmission of rabies or other diseases. Bird carcasses were recorded, but left in place. Injured bats were not taken to rehabilitation facilities or euthanized but were left in place.

Tissue samples were collected from heavily scavenged or decomposed bat carcasses that could not be positively identified and had potential to be a Covered Species were submitted to a USFWS-approved laboratory, either the Northern Arizona University School of Forestry and Center for Microbial Genetics and Genomics, or the Dr. Jane Huffman Wildlife Genetics Institute for identification associated with East Stroudsburg University. Bat carcasses that were heavily scavenged but did not have potential to be a Covered Species (i.e., fur was present on the wing or forearms measured over 41 millimeters) were identified to the closest genus or group possible and were not sent off for further identification.

Carcass Identification and Agency Notification

Identification of bird carcasses were verified by biologists with significant field experience in identification of birds and their feathers. A federally permitted bat biologist (TE234121-9) identified all bat carcasses either via photographs or in person. The USFWS and the Indiana Department of Natural Resources (IDNR) were notified within 24 hours of positive identification any species listed as endangered or threatened under the ESA, or any state-listed threatened or endangered species. A permitted bat biologist (Kevin Murray (TE234121-9) verified the identifications of sensitive bat species carcasses in hand. Bat carcasses were delivered to the USFWS Indiana Ecological Services Field Office in Bloomington, Indiana, in January 2021.

Bias Trials

Searcher Efficiency Trials

The objective of the searcher efficiency trials was to estimate the probability searchers found a bat carcass. Searcher efficiency trials were conducted in the same areas where carcass searches occurred. Personnel conducting carcass surveys did not know when searcher efficiency trials

were being conducted or the location of the trial carcasses. Trial carcasses consisted of eastern red bats (*Lasiurus borealis*), big brown bats (*Eptesicus fuscus*), and silver-haired bats (*Lasionycteris noctivagans*) that had previously been found on site, or were provided by Indiana State University. A minimum of 20 bat carcasses were placed and confirmed available per plot type in the fall. Due to the shortened summer search period, fewer carcasses were placed in the summer. Multiple trials were conducted in each season to measure potential changes in plot conditions on searcher efficiency over time.

Each trial carcass was discreetly marked with a black zip-tie around the upper forelimb for identification as a study carcass after it was found. Carcasses were dropped from waist-height or higher and allowed to land in a random posture. The number and location of trial carcasses found during the subsequent search were recorded, and the number of trial carcasses available for detection during each search was determined immediately after each trial by the person responsible for distributing the carcasses. Searchers had one chance to locate trial carcasses during the first search after carcass placement. The trial administrator walked in a meandering path and dropped trials for detection dogs the night prior to the next search to allow time for the scent to pool and disperse prior to scheduled searches. Following searches, any carcasses that were not detected were checked to confirm availability. Sixty-seven trial carcasses were left in place and used for carcass persistence trials (CPT).

Carcass Persistence Trials

The objective of CPT was to estimate the length of time (in days) a carcass would persist, or be available for detection, in the field. Carcasses could be removed by scavenging or rendered undetectable by typical farming activities. A minimum of 15 trial carcasses were placed in each plot type in the fall to incorporate the effects of varying weather and climatic conditions on carcass persistence. Due to a shortened summer season, fewer carcasses were placed in the summer. Trials were conducted across all plot types to incorporate the effects of varying weather and scavenger densities. No more than three trial carcasses were placed on a plot to avoid potential over-seeding and attracting scavengers.

Technicians monitored the trial carcasses over a 28-day period according to the following schedule, as closely as possible. Carcasses were checked daily for the first four days, then on day 7, 10, 14, 20, and 28. Trial carcasses were monitored until they were completely removed or the trial period ended. Detection dogs were used on the cleared and uncleared plots to determine when carcasses were removed.

Search Area Mapping

Technicians recorded the boundaries of all plots using a Trimble submeter global positioning satellite unit. Unsearchable areas within plot boundaries were also mapped. The plot boundaries were used to verify if carcasses were found inside the search areas, and to inform the distribution of carcasses around turbines to estimate the number of carcasses that fell inside or outside of search areas.

Quality Assurance and Quality Control

Quality assurance and quality control measures were implemented at all stages of the study, including in the field, during data entry and analysis, and report writing. Following field surveys, technicians were responsible for inspecting data forms for completeness, accuracy, and legibility. Potentially erroneous data were identified using a series of database queries. Irregular codes or data suspected as questionable were discussed with the technician and/or project manager. Errors, omissions, or problems identified in later stages of analysis were traced back to the raw data forms, and appropriate changes and measures were implemented. A Microsoft® SQL database was developed to store, organize, and retrieve survey data. All data forms and electronic data files were retained for reference.

Statistical Analysis

The EoA (Dalthorp et al. 2017) modeling framework was used to estimate take of Covered Species. To estimate take, EoA used data collected in the field to estimate the overall probability of detecting a bat fatality, the arrival distribution of bats (described below), and the number of Covered Species detections. Data used in the EoA model included number of Covered Species fatalities, fatality spatial data from all bats found during surveys, and the results of searcher efficacy and CPTs.

Searcher Efficiency Estimation

EoA uses raw searcher efficiency data (e.g., number of found and available trial carcasses) to inform overall probability of detection. However, to determine if searcher efficiency data should be pooled, or separated by strata such as season and/or plot type, we modeled searcher efficiency using logistic regression, while accounting for the detection reduction factor *k* (Dalthorp et al. 2018). Models included plot type and season as potential covariates, and searcher efficiency was modeled separately for humans and dog teams to account for different modes of detection (i.e., humans use sight, dogs use scent). For both sets of models, selection was completed using an information theoretic approach known as AICc, or corrected Akaike Information Criterion (Burnham and Anderson 2002). The best model was selected as the most parsimonious model within two AICc units of the model with the lowest AICc value. Searcher efficiency values were input into the EoA software according to the model selection results.

The change in searcher efficiency between successive searches was defined by a parameter called the detection reduction factor (k) that can range from zero to one. When k is zero, it implies a carcass that was missed on the first search would never be found on subsequent searches. A k of one implies searcher efficiency remained constant no matter how many times a carcass was missed. Huso et al. (2017) estimated a value of k = 0.67 for bats, and this value was used to calculate bat fatality estimates using EoA per the HCP.

Carcass Persistence Rate Estimation

Data collected during CPTs were used to estimate the amount of time, in days, that carcasses remained available to be located by the searcher. The average probability a carcass persisted through the search interval (i.e., the time between scheduled searches) was estimated using an

interval-censored survival regression with four potential distributions: exponential, log-logistic, lognormal, and Weibull distributions (Kalbfleisch and Prentice 2002, Dalthorp et al. 2018). Potential covariates were fit to all parameters of the candidate distributions; the only covariates considered were season and plot type (road and pad, cleared plot, and uncleared plot). The best model was selected as the most parsimonious model within two AICc units of the model with the lowest AICc value. The parameter estimates of the selected model (α [shape] and β [scale], including the 95% Confidence Interval [CI] of β) were used as inputs in the EoA Single Class module.

Area Adjustment

The search area adjustment accounted for unsearched areas beneath turbines, and was calculated as a probability that ranged from zero to one. The area adjustment was estimated as the product of the searched area around each turbine and a carcass-density distribution. A truncated weighted maximum likelihood (TWL) modeling approach (Khokan et al. 2013) was used to estimate the carcass-density distribution using site-specific fatality locations. The TWL approach uses weight based probability of detection and the proportion of area searched in each 1.0-m annulus around the turbine. Distributions considered were normal, gamma, Gompertz, Rayleigh and Weibull (parameterized according to R Development Core Team [2016] and Thomas [2015]). The best model was selected using AICc. The proportion of area searched was calculated in a Geographic Information System as the amount of area searched divided by the total area searched at each 1.0-m annulus around the turbine.

Carcasses Excluded from Area Correction Calculations

Fatalities were excluded from the area correction calculation when the carcass was discovered outside of the spatial and temporal scope of the survey design. For example, carcasses found outside a designated plot were not included in the analysis because the area adjustment accounts for the carcass by adjusting for unsearched areas. Carcasses found prior to the start of surveys (e.g., a carcass found on a plot in the summer that is not searched until the fall) were also excluded because the carcass occurred outside of the study period. Note that carcasses found on a plot incidentally were included in the analysis if that plot had a scheduled search in the future. If a fatality of a Covered Species had been found outside of the spatial or temporal scope of the survey design it would still be excluded from the area correction estimate, but would be included in the EoA fatality estimate following Dalthorp et al. (2020).

Indiana Bat and Northern Long-eared Bat Take and Detection Probability Estimates

Evidence of Absence

EoA was used to estimate the median cumulative take to-date (M^*), and the mean annual take rate (λ) for Indiana bat and northern long-eared bat. Estimates were calculated using the EoA method (Dalthorp et al. 2017), using the Single Class, Multiple Class, and Multiple Years modules of EoA.

The probability of detection (g) was estimated using the bias corrections for searcher efficiency, carcass persistence, and area searched, as well as the assumed seasonality of risk for Indiana bat and northern long-eared bat, which per the HCP was 39% in summer and 61% in fall.

However, monitoring under the ITP did not begin until June 21, 2021, once the ITP was issued. The dates that define the full summer season at the Project are May 18 to July 30, a duration of 72 days. June 21 to July 30 is a duration of 39 days. The summer period during which the Project operated under ITP conditions, and thus posed risk to the covered species, accounted for 39 out 72 days (approximately 54% of the entire summer season). The summer risk percentage (39%) was multiplied by 54% to adjust the arrival proportion in summer: 0.39 × 0.54 = 0.21. This new summer proportion and the original fall arrival proportion were summed, and each proportion was divided by the summed arrival proportion (e.g., for summer, 0.21 / (0.21 + 0.61) = 0.26). The final arrival proportion used were 0.26 for summer and 0.74 for fall.

The EoA Single Class module was used to estimate the distribution of detection probability in each search stratum. This resulted in alpha and beta parameters that defined the Beta distribution of detection probability in each stratum. The area correction for each stratum was included in the Single Class Module as the "Spatial Coverage (a)" input. The EoA Multiple Class module was then used to combine detection probability distributions across strata (cleared plots, uncleared plots, and roads and pads), with weights for each class defined by the within-season sampling fraction. The Multiple Class module was then used to combine beta distribution parameters across seasons, using the arrival proportions as the weight for each season scaled by the proportion of turbines with summer risk (71%). Specifically, the summer arrival proportion (0.26) was multiplied by 0.71, resulting in 0.18. As above, the re-scaled summer arrival proportion and the fall arrival proportion were summed, and then each proportion was divided by the sum to ensure the arrival proportion weights summed to one (e.g., for summer, 0.18 / (0.18 + 74) = 0.20). The final weights used to combine across seasons were 0.20 for summer and 0.80 for fall. The results from the Multiple Years module (Ba and Bb parameters for the detection probability to date) were used to estimate M^*, and mean take rate λ and its 95% CI. The mean annual take rate λ was used to evaluate the short-term adaptive management trigger. If λ does not exceed the expected take rate with 95% confidence then no adaptive management actions are necessary. The cumulative take estimate M^* was used to evaluate the long-term adaptive management trigger. If M^* does not exceed the permitted take limit then the Project is in compliance with the ITP. Appendix C shows detailed inputs needed if using the EoA Graphical User Interface[1].

The EoA Multiple Years module requires the input ρ, which weights the years appropriately. The input value was set to 1 for 2021 because 2021 was the only monitoring conducted to date under ITP operations.

RESULTS

Standardized Carcass Searches

In the summer, 15 turbines were searched twice weekly as road and pads, 14 turbines were twice weekly as cleared plots, and eight turbines were searched twice weekly as uncleared plots. In the

[1] There may be minor differences between screen shots and the results in the main text because EoA is a stochastic estimator, leading to slightly different estimates each time the modules are run.

fall, 38 turbines were searched twice weekly as road and pads, and 14 turbines were searched twice weekly as cleared plots. Between summer and fall monitoring, 1,566 searches were conducted (Table 3). Twenty-two searches (less than 1.4%) were missed due to turbine maintenance, weather constraints, and/or safety hazards. Five hundred fifty-eight bat carcasses and 105 bird carcasses were found during this surveys and incidentally (Appendix A). Appendix A documents the birds that were recorded during this survey; the remainder of the results focuses on the bat-related study.

Table 3. Number of searches per plot type at the Bitter Ridge Wind Farm, Jay County, Indiana, from June 21 – October 15, 2021.

Season	Plot Type	Search Interval	Number of Searches
Summer (June 21 – July 31)	100-m road and pads	Twice weekly	177
	70-m cleared plots	Twice weekly	168
	70-m uncleared plots	Twice weekly	95
Fall (August 1 – October 15)	100-m road and pads	Twice weekly	818
	70-m cleared plots	Twice weekly	308
Overall			**1,566**

M = meter.

Species Composition

Two Indiana bat carcasses were found during post-construction monitoring surveys, one at Turbine 37 on August 23, 2021, and one at Turbine 11 on October 11, 2021 (Figure 2). One unidentified *Myotis* carcass was found on July 30, 2021, which could not be identified to species after two attempts to extract and identify DNA from a tissue sample. This bat was identified as a *Myotis* using its teeth (two small upper premolars immediately behind the canine). However, the carcass was very desiccated and DNA analysis failed. The Indiana bats were identified by a permitted bat biologist (TE234121-9) and reported to USFWS and IDNR on August 25 and October 20, 2021. The estimated time of death of both Indiana bats was two to three days prior to discovery, and the unknown *Myotis* carcass estimated time of death was eight to 14 days prior. Scavenging and decomposition of the carcasses prior to finding them prevented assignment of sex and age. DNA analysis identified the Indiana bat carcass found on August 23 as a female and the Indiana bat carcass found on October 11 as a male. Both Indiana bat carcasses and the unknown *Myotis* carcass were transferred to Marissa Reed at the USFWS Indiana Ecological Services Field Office. No northern long-eared bat carcasses were found during the study. Three state-listed endangered bats were also found including an evening bat (*Nycticeius humeralis*) found at turbine 40 on June 26, a tri-colored bat (*Perimyotis subflavus*) found at turbine 45 on August 17, and a little brown bat (*M. lucifugus*) found at turbine 37 on September 10, 2021 (Figure 2).

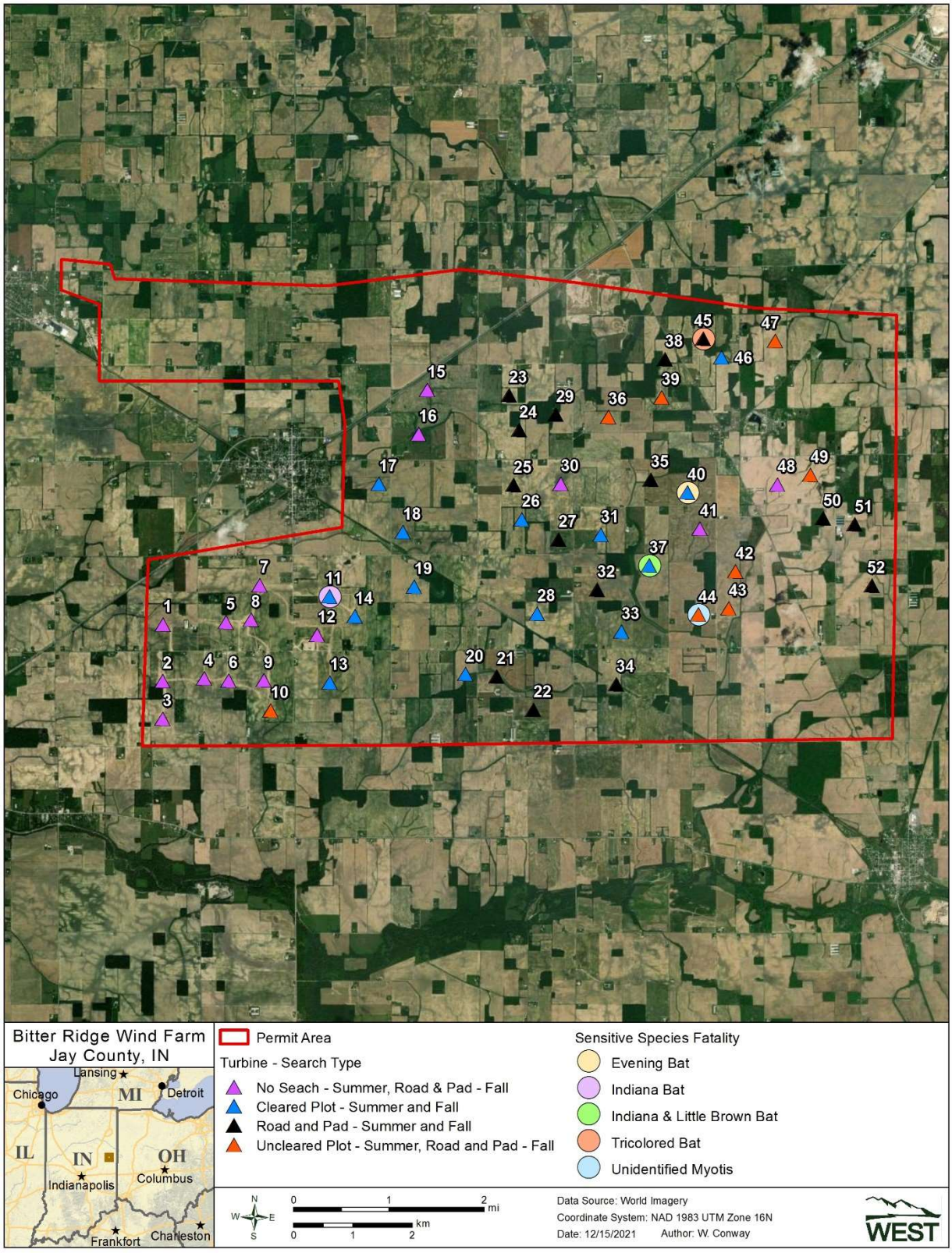

Figure 2. Location of state- and federally listed carcasses in relation to turbines at the Bitter Ridge Wind Farm from June 21 – October 15, 2021

Seventy-four bats were found in the summer, and 484 bats were found in the fall (Appendix A). The most commonly found bat species were eastern red bat (227 carcasses; 40.7%) and silver-haired bat (156; 28%), followed by big brown bat (84; 15.1%) and hoary bat (*Lasiurus cinereus*; 77; 13.8%). The remaining species and unidentified categories composed less than 3.0% of the total bats found. (Table 4, Appendix A). Over the course of the monitoring period, five carcasses were found that could not be identified to species but were determined not to be *Myotis* species based on carcass characteristics (e.g., dentition, forearm length, fur; unidentified non-*Myotis*; 0.9%). Twelve, heavily scavenged bats (e.g., wing membrane only, bones, or partial carcasses) were sent off for identification via DNA analysis including one evening bat, one hoary bat, two big brown bats, and four silver-haired bats. Four carcasses could not be identified from DNA analysis. The majority of bat carcasses were recorded on plots searched by dog handler teams (Table 5).

Table 4. Number and percent (%) of bat carcasses found at the Bitter Ridge Wind Farm, Jay County, Indiana, from June 21 – October 15, 2021.

	Included in Area Correction		Outside Search Area*		Outside Study Period*		Total	
Species	**Total**	**%**	**Total**	**%**	**Total**	**%**	**Total**	**%**
eastern red bat	215	41.8	5	26.3	7	28	227	40.7
silver-haired bat	141	27.4	6	31.6	9	36	156	28.0
big brown bat	76	15.6	2	10.5	6	24	84	15.1
hoary bat	71	13.7	4	21.1	2	8	77	13.8
unidentified non-*Myotis*	4	0.8	0	0	1	4	5	0.9
Indiana bat	2	0.4	0	0	0	0	2	0.4
unidentified bat	2	0.4	0	0	0	0	2	0.4
little brown bat	1	0.2	0	0	0	0	1	0.2
Seminole bat	1	0.2	0	0	0	0	1	0.2
unidentified *Myotis*	1	0.2	0	0	0	0	1	0.2
evening bat	0	0	1	5.3	0	0	1	0.2
tri-colored bat	0	0	1	5.3	0	0	1	0.2
Total	**514**	**100**	**19**	**100**	**25**	**100**	**558**	**100**

* Carcasses not included in analysis.

Sums may not equal total values shown due to rounding.

Carcasses for Area Correction Analysis

Forty-four of the 558 bats found during summer and fall monitoring season were excluded from modeling the area correction for EoA; 19 bat carcasses were excluded from analysis because they were found off plot. Another 25 bats were excluded because their estimated time of death was prior to the start of surveys.

Table 5. Species composition by plot type for bat carcasses[1] found at the Bitter Ridge Wind Farm, Jay County, Indiana, from June 21 – October 15, 2021.

	Summer						Fall			
	100-m Road and Pads		70-m Cleared Plots		70-m Uncleared Plots		100-m Road and Pads		70-m Cleared Plots	
Species	# of Carcasses	%	# of Carcasses	%	# of Carcasses	%	# of Carcasses	%	# of Carcasses	%
big brown bat	2	50	3	13.6	3	10.7	22	20.4	46	13.1
eastern red bat	2	50	11	50	12	42.9	38	35.2	152	43.2
hoary bat	0	0	4	18.2	7	25	12	11.1	48	13.6
Indiana bat	0	0	0	0	0	0	0	0	2	0.6
little brown bat	0	0	0	0	0	0	0	0	1	0.3
silver-haired bat	0	0	3	13.6	2	7.1	34	31.5	102	29
unidentified non-*Myotis*	0	0	1	4.6	2	7.1	0	0	1	0.3
Seminole bat	0	0	0	0	0	0	1	0.9	0	0
unidentified bat	0	0	0	0	1	3.6	1	0.9	0	0
unidentified *Myotis*	0	0	0	0	1	3.6	0	0	0	0
Total	**4**	**100**	**22**	**100**	**28**	**100**	**108**	**100**	**352**	**100**

1. This table only includes bat carcasses included in the area correction calculation.

Sums may not equal total values shown due to rounding.

m = meter.

Bias Trials

Searcher Efficiency Trials

One hundred two bats were placed for searcher efficiency trials on 16 separate dates (June 23 and 24, July 9, 10, 19, 22, 23, and 30, August 9, 10, 12, 13, and 14, September 30, and October 1 and 7, 2021), and 97 were available for search teams to find across all plot types. Searcher efficiency rates ranged from 76.2% on 70-m cleared and uncleared plots searched by dog teams to 91.2% on human searched road and pads (Table 6). The best-fit model for searcher efficiency on 70-m dog-aided plots did not support the inclusion of season or plot type as a covariate, meaning there was not a substantial difference between searcher efficiency rates in the summer and fall (Table 7). The best-fit model for searcher efficiency on non-aided, 100-m road and pads did not support the inclusion of season as a covariate (Table 8). Thus, for EoA, the total number of available and found searcher efficiency trials were summed across aided and non-aided plot types, which maintained the stratification of 70-m plots and 100-m road and pad plots. The EoA inputs for the 70-m plots were 63 available carcasses and 48 found carcasses for all seasons. The EoA inputs for road and pad plots were 34 available carcasses and 31 found carcasses for all seasons (Table 6).

Table 6. Searcher efficiency results by plot type at the Bitter Ridge Wind Farm, Jay County, Indiana, from June 21 – October 15, 2021.

Season	Plot Type	Number Placed	Number Available	Number Found	% Found
Summer	70-m cleared plots	18	18	16	88.9
	70-m uncleared plots	26	23	17	73.9
	100-m road and pads	15	14	13	92.9
Fall	Cleared	23	22	15	68.2
	Roads and Pads	20	20	18	90.0
Overall 70-m aided plots (cleared and uncleared)		**67**	**63**	**48**	**76.2**
Overall 100-m unaided road and pads		**35**	**34**	**31**	**91.2**
Overall		**102**	**97**	**79**	**81.4**

m = meter.

Table 7. Searcher efficiency models for 70-meter aided plots at the Bitter Ridge Wind Farm, Jay County, Indiana, from June 21 – October 15, 2021.

Covariates	k Value	AICc	Delta AICc
No covariates	0.67	71.22	0*
Season	0.67	72.19	0.97

* Selected model.

AICc = corrected Akaike Information Criterion.

n = 63.

Table 8. Searcher efficiency models for 100-meter non-aided road and pads at the Bitter Ridge Wind Farm, Jay County, Indiana, from June 21 – October 15, 2021.

Covariates	k Value	AICc	Delta AICc
No covariates	0.67	22.42	0*
Season	0.67	24.6	2.18

* Selected model.

AICc = corrected Akaike Information Criterion.

n = 34.

Carcass Persistence Trials

Sixty-seven carcasses were placed to estimate carcass persistence. The best-fit model for carcass persistence rates was based on season and plot search type with a Weibull distribution, and suggests bat carcass persistence rates varied by season and plot type (Table 9). The estimated median carcass persistence times ranged from 7.2 days on 100-m road and pads in the summer to 26.2 days on 70-m cleared plots in the fall (Table 10). The average probability a carcass persisted through a 3.5-day search interval ranged from 0.82 (90% CI: 0.72–0.90) on 100-m road and pads in the fall to 0.91 (90% CI: 0.85–0.95) on 70-m cleared and uncleared plots in the summer (Table 11, Figures 3 and 4).

Table 9. Carcass persistence models with covariates and distributions for bats at Bitter Ridge Wind Farm, Jay County, Indiana, from June 21 – October 15, 2021.

Location Covariates	Scale Covariates	Distribution	AICc	Delta AICc
Season + PlotSearchType	Season	Weibull	262.22	0*
PlotSearchType	Season + PlotSearchType	Weibull	264.56	2.34
Season + PlotSearchType	Season + PlotSearchType	Weibull	264.98	2.76
Season + PlotSearchType	No Covariates	Weibull	266.72	4.50
PlotSearchType	Season + PlotSearchType	loglogistic	266.74	4.52
PlotSearchType	No Covariates	Weibull	267.56	5.34
PlotSearchType	Season + PlotSearchType	lognormal	268.78	6.56
Season + PlotSearchType	Season	loglogistic	269.03	6.81
Season + PlotSearchType	Season + PlotSearchType	loglogistic	269.30	7.08
Season + PlotSearchType	–	exponential	269.62	7.40
PlotSearchType	No Covariates	loglogistic	269.72	7.50
PlotSearchType	–	exponential	269.78	7.56
PlotSearchType	No Covariates	lognormal	270.37	8.15
Season + PlotSearchType	Season	lognormal	270.38	8.16
Season + PlotSearchType	PlotSearchType	Weibull	271.23	9.01
Season + PlotSearchType	Season + PlotSearchType	lognormal	271.31	9.09
Season + PlotSearchType	No Covariates	loglogistic	271.80	9.58
PlotSearchType	PlotSearchType	Weibull	272.11	9.89
Season + PlotSearchType	No Covariates	lognormal	272.45	10.23
PlotSearchType	PlotSearchType	loglogistic	273.62	11.40
PlotSearchType	PlotSearchType	lognormal	274.07	11.85
Season + PlotSearchType	PlotSearchType	loglogistic	276.09	13.87
Season + PlotSearchType	PlotSearchType	lognormal	276.51	14.29
No Covariates	Season	Weibull	276.58	14.36
No Covariates	Season	lognormal	276.79	14.57
No Covariates	Season	loglogistic	277.31	15.09
Season	Season	Weibull	277.85	15.63
Season	Season	lognormal	279.01	16.79

Table 9. Carcass persistence models with covariates and distributions for bats at Bitter Ridge Wind Farm, Jay County, Indiana, from June 21 – October 15, 2021.

Location Covariates	Scale Covariates	Distribution	AICc	Delta AICc
No Covariates	Season + PlotSearchType	loglogistic	279.50	17.28
No Covariates	Season + PlotSearchType	lognormal	279.51	17.29
Season	Season	loglogistic	279.55	17.33
No Covariates	Season + PlotSearchType	Weibull	280.42	18.20
Season	Season + PlotSearchType	Weibull	280.79	18.57
Season	Season + PlotSearchType	loglogistic	281.44	19.22
Season	Season + PlotSearchType	lognormal	281.91	19.69
No Covariates	–	exponential	282.85	20.63
No Covariates	No Covariates	lognormal	283.44	21.22
Season	–	exponential	284.01	21.79
No Covariates	No Covariates	Weibull	284.20	21.98
No Covariates	No Covariates	loglogistic	284.25	22.03
Season	No Covariates	Weibull	285.37	23.15
Season	No Covariates	lognormal	285.52	23.30
Season	No Covariates	loglogistic	286.22	24.00
No Covariates	PlotSearchType	Weibull	286.76	24.54
No Covariates	PlotSearchType	lognormal	287.46	25.24
No Covariates	PlotSearchType	loglogistic	288.31	26.09

* Selected model.

AICc = corrected Akaike Information Criterion.

Table 10. Carcass persistence top model with covariates, distributions, and model parameters for the Bitter Ridge Wind Farm, Jay County, Indiana, from June 21 – October 15, 2021.

Season	Plot Search Type	Distribution	Estimated Median Removal Times (days)	Parameter 1	Parameter 2
Fall	70-m cleared plots	Weibull*	26.20	shape=0.9718	scale=38.2063
	100-m road and pads	Weibull*	9.26	shape=0.9718	scale=13.5042
Summer	70-m cleared plots	Weibull*	20.37	shape=1.8975	scale=24.7049
	70-m uncleared plots	Weibull*	19.86	shape=1.8975	scale=24.0949
	100-m road and pads	Weibull*	7.20	shape=1.8975	scale=8.7320

* Parameterization follows the base R parameterization for this distribution.

n=67.

Table 11. Probability a carcass would persist through the 3.5-day search interval for the Bitter Ridge Wind Farm, Jay County, Indiana, from June 21 – October 15, 2021.

Season	Plot Search Type	Average probability of persistence through search interval*	90% Confidence Interval
Summer	70-m cleared plots	0.91	0.85–0.95
	100-m road and pads	0.87	0.77–0.94
	70-m uncleared plots	0.91	0.85–0.95
Fall	70-m cleared plots	0.86	0.79–0.92
	100-m road and pads	0.82	0.72–0.90

* 3.5 day search interval.

m = meter.

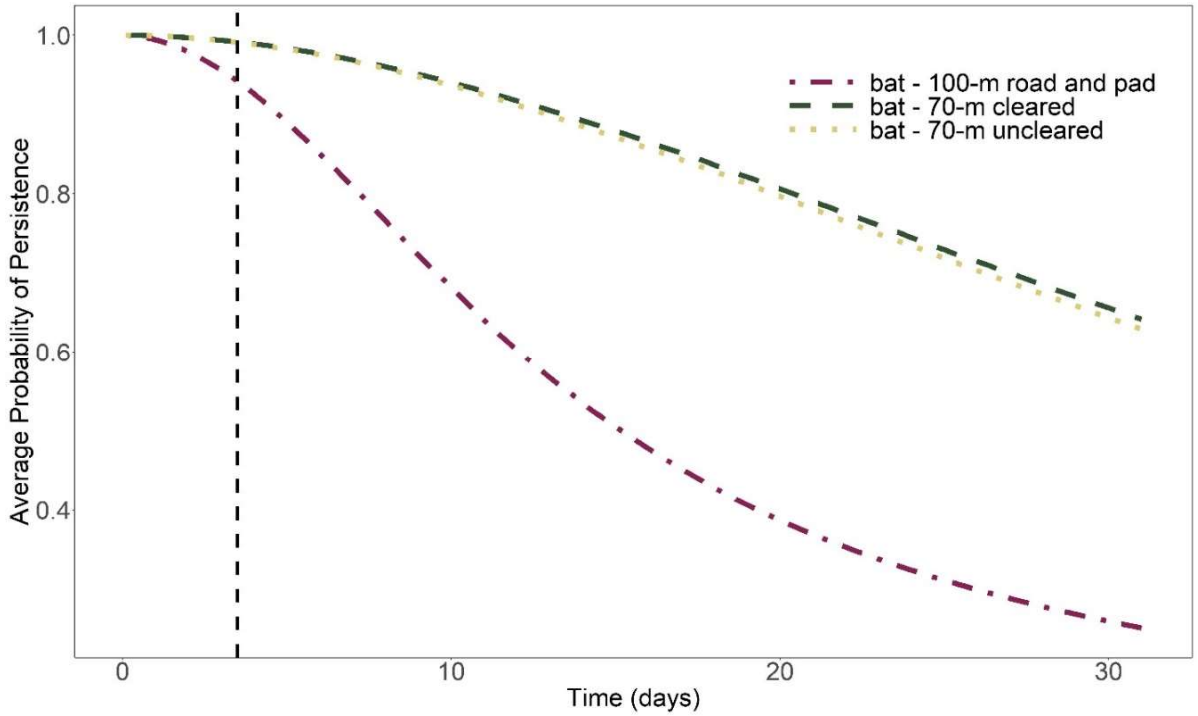

Figure 3. The average probability of persistence during the summer, in days, at Bitter Ridge Wind Farm, Jay County, Indiana, from June 21 – October 15, 2021.

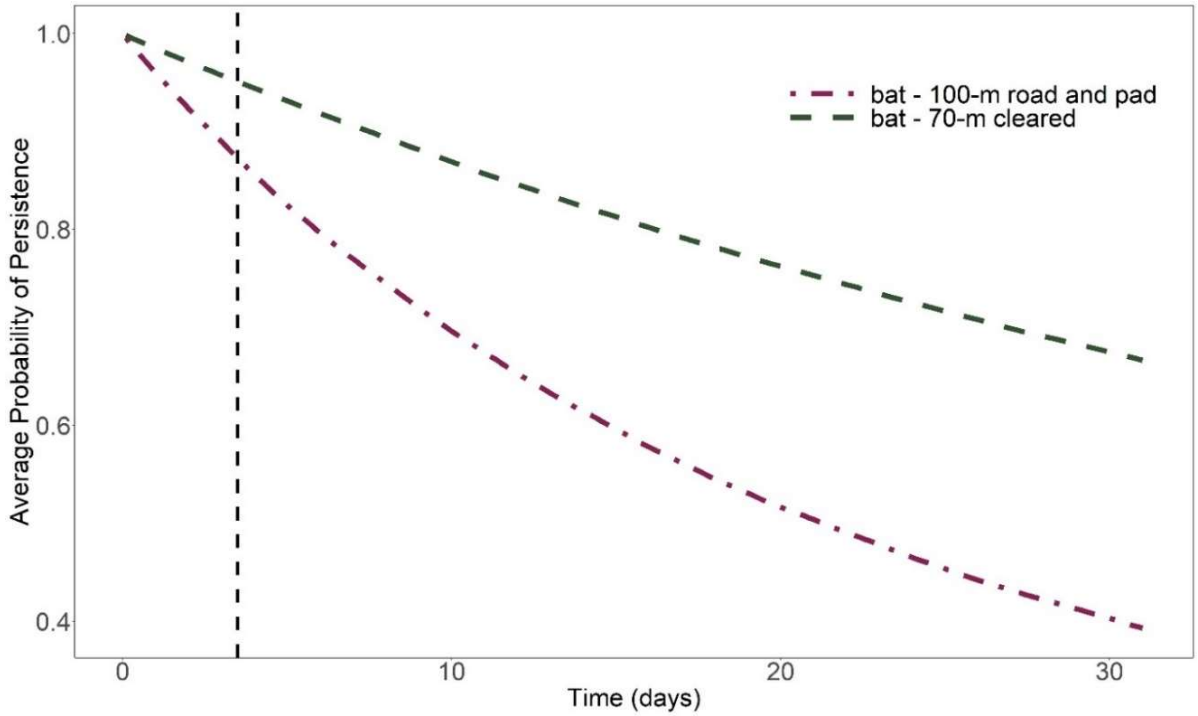

Figure 4. The average probability of persistence during the fall, in days, at Bitter Ridge Wind Farm, Jay County, Indiana, from June 21 – October 15, 2021.

Statistical Analysis

Area Correction

The best-fit model for the distribution of bats with respect to distance from turbine base was a Gompertz distribution (Appendix B). The TWL area correction for bats was estimated to be 0.96 for 70-m cleared plots, 0.98 for 70-m uncleared plots, and 0.08 and 0.09 for 100-m road and pads in the summer and fall, respectively (Appendix B, Figure 5).

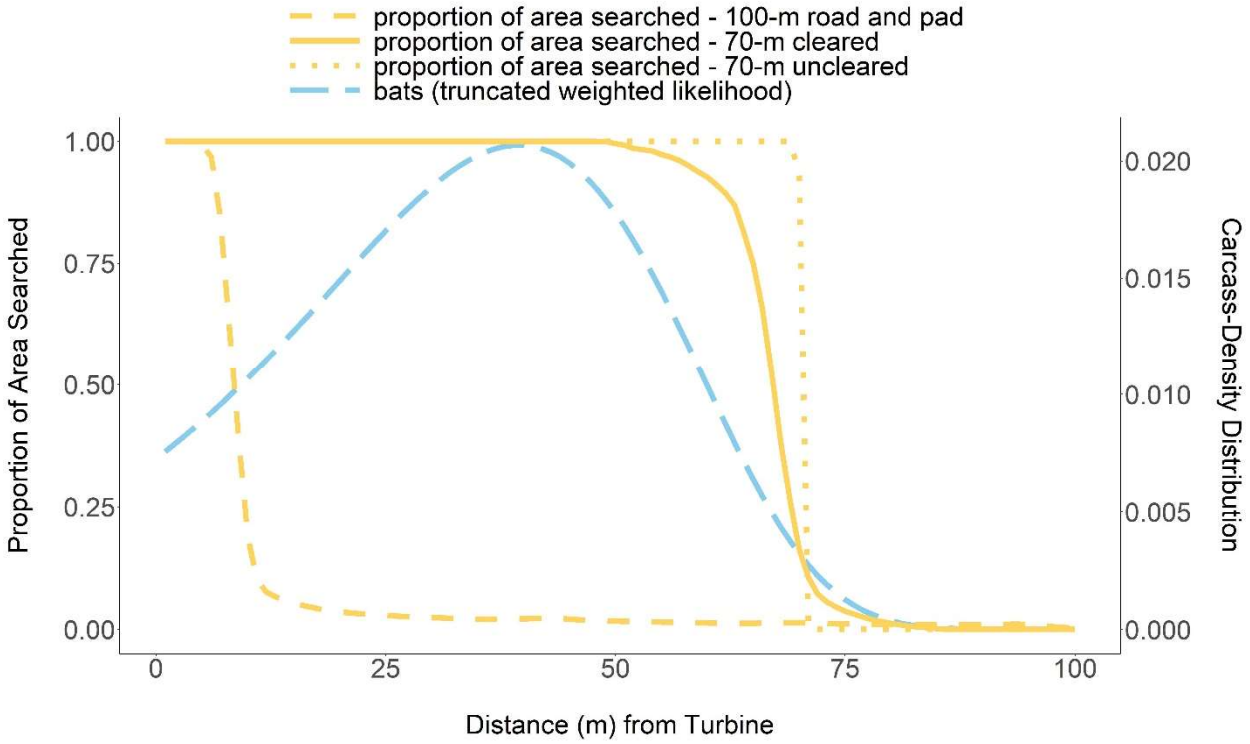

Figure 5. Density of bat carcasses per area searched at all roads and pads, cleared plots, and uncleared plots at the Bitter Ridge Wind Farm, Jay County, Indiana, from June 21 – October 15, 2021.

Adjusted Overall Bat Fatality Estimates

Bat fatality estimates were calculated for the year, per the ITP. Fatality estimates were highest in the fall, and the overall estimate for the study was 15.02 bats per MW (90% CI: 11.07–20.91; Table 12).

Table 12. Overall bat fatality rates per turbine and megawatt using GenEst for studies conducted at the Bitter Ridge Wind Farm, Jay County, Indiana, from June 21 – October 15, 2021.

Season	Bat Fatality Estimate per Turbine	90% Confidence Limits	Bat Fatality Estimate per Megawatt	90% Confidence Limits
Summer	4.93	2.86–8.93	1.76	1.02–3.19
Fall	36.98	27.26–50.89	13.21	9.73–18.17
Overall	**42.06**	**31.00–58.55**	**15.02**	**11.07–20.91**

Indiana Bat and Northern Long-eared Bat Take Estimates

Evidence of Absence Framework

Two Indiana bats and zero northern long-eared bat carcasses were found during the study. The overall probability of detection distribution achieved for the 2021 monitoring period had a mean of 0.33 (95% CI: 0.32–0.35; Table 13). The estimated *g* of 0.33 and 95% CI exceed the target probability of detection value (0.25), indicating the realized *g* for the 2021 monitoring period is statistically greater than the target *g*. Inputs required to run the EoA Single Class module and stratum-specific *g* distribution values and inputs required for the Multiple Class module are described in Appendix C.

Table 13. Annual and overall probabilities of detection (*g*), Ba, Bb, and ρ for the Bitter Ridge Wind Farm, Jay County, Indiana, from June 21 – October 15, 2021.

Year	Ba[1]	Bb[1]	ρ[2]	g	95% Confidence Intervals
2021	1559.98	3145.32	1	0.33	0.32–0.35

1. Ba and Bb are the parameters for the beta distribution used to characterize the probability of detection. The *g* value is the mean of that distribution.
2. ρ is the weight in the weighted average that is used to combine the probability of detection distributions across years.

Table 14. Cumulative take estimate to date using Evidence of Absence for studies conducted at Bitter Ridge Wind Farm, Jay County, Indiana, from June 21 – October 15, 2021.

Species	Cumulative take (M*)	Mean Annual Take Rate (λ)
Indiana bat	6 (50th credible bound)	7.54 (95% CI = 1.25 – 19.37)
northern long-eared bat	0 (50th credible bound)	1.51 (95% CI = <0.01 – 7.58)

The expected average annual take rate reported in the HCP is 1.95 Indiana bats per year and 1.27 northern long-eared bats per year; the total permitted take for each species is 69 Indiana bats and 45 northern long-eared bat over the 35-year permit term. Based on the first year of ITP monitoring, take to-date, *M** at α = 0.5 (50th credible bound), is estimated to be 6 Indiana bats and 0 northern long-eared bats (Table 14). These values fall below the permitted take level for both species, meaning the Project is in compliance with the ITP. The mean annual take rate (λ) was estimated to be 7.54 (95% CI = 1.25–19.37) Indiana bats per year and 1.51 (95% CI = <0.01–7.58) northern long-eared bats per year (Table 14). Based on these data, the probability that estimated annual take exceeded expected annual take did not exceed 95% for either species and no adaptive management actions are necessary at this time.

DISCUSSION

The most commonly found bat species were eastern red bat (40.7%), silver-haired bat (28.0%), big brown bat (15.1%), and hoary bat (13.8%). Species composition recorded at the Project was similar to previous studies at Headwaters Wind Farm, a nearby wind farm in Randolph County,

Indiana (Rodriguez et al. 2020, 2021). During the study, a total of 558 bat fatalities were found. The overall bat fatality rate was 15.02 bats per MW (90% CI: 11.07–20.91).

The overall probability of detection (*g*) distribution for 2021 PCM surveys had a mean of 0.33 (95% CI: 0.32–0.35). Thus, overall *g* for 2021 exceeded the target *g* of 0.25 for the monitoring period, indicating that the detection probability was higher than expected for PCM surveys in 2021. No site-specific data was available from Bitter Ridge to estimate values for carcass persistence or area correction in 2021. Instead, we used publically available data from 2019 and 2020 post-construction monitoring at the Headwaters Wind Farm (Rodriguez et al. 2020, 2021). The area correction data from Bitter Ridge indicated that nearly all bat fatalities (0.96) occurred within 70 meters of turbines whereas area correction values at Headwaters were lower (0.80 [2019] and 0.74 [2020]). In addition, carcass persistence trials indicated persistence times in 2021 were relatively long (longer than what was documented in the 2019 and 2020 Headwaters studies), confirming that the search interval of 3.5 days was sufficient to detect the majority of bat carcasses. These factors were responsible for the overall probability of detection exceeding the target *g* in 2021.

Two Indiana bat carcasses were found at the Project, one at Turbine 37 on August 23, 2021, and one at Turbine 11 on October 11, 2021. No northern long-eared bat carcasses were found. Based on the first year of ITP monitoring, take to-date, M^* at $\alpha = 0.5$ (50^{th} credible bound), is estimated to be 6 Indiana bats and 0 northern long-eared bats. Estimated take for the Covered Species falls below the permitted take level for both species, meaning the Project is in compliance with the ITP. The EoA model estimated the mean annual fatality rate at Bitter Ridge was 7.54 Indiana bats and 1.51 northern long-eared bats. The probability that the annual take rate exceeded the thresholds for either Covered Species did not exceed 95%, indicating that no adaptive management actions are necessary at this time. Carcasses of three additional state-listed endangered species were recorded at Bitter Ridge including little brown bat (n = 1), evening bat (n = 1) and tri-colored bat (n = 1).

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Appendix A. Carcasses Found during the 2021 Post-construction Monitoring Surveys at the Bitter Ridge Wind Farm

Appendix A. Carcasses found at the Bitter Ridge Wind Farm, Jay County, Indiana, from June 21 – October 15, 2021.

Found Date	Common Name	Distance from Turbine (m)	Search Location	Search Type	Search Area Type	Physical Condition	Dog Aided Search
Bat Carcasses							
06/21/2021	eastern red bat	68	13	carcass search	70-m cleared	scavenged	yes*
06/21/2021	eastern red bat	50	47	carcass search	70-m uncleared	scavenged	yes*
06/21/2021	silver-haired bat	62	13	carcass search	70-m cleared	scavenged	yes*
06/21/2021	silver-haired bat	57	19	carcass search	70-m cleared	scavenged	yes*
06/21/2021	silver-haired bat	25	20	carcass search	70-m cleared	scavenged	yes*
06/21/2021	silver-haired bat	31	20	carcass search	70-m cleared	scavenged	yes*
06/21/2021	silver-haired bat	48	24	carcass search**	100-m road and pad	scavenged	yes*
06/21/2021	unidentified non-myotis	37	19	carcass search	70-m cleared	dismembered	yes*
06/22/2021	eastern red bat	21	44	carcass search	70-m uncleared	scavenged	yes*
06/22/2021	eastern red bat	12	44	carcass search	70-m uncleared	dismembered	yes*
06/22/2021	hoary bat	3	50	carcass search	100-m road and pad	dismembered	no
06/22/2021	silver-haired bat	5	2	incidental	100-m road and pad	scavenged	no
06/22/2021	silver-haired bat	26	37	carcass search	70-m cleared	scavenged	yes*
06/22/2021	silver-haired bat	4	44	carcass search	70-m uncleared	scavenged	yes*
06/22/2021	silver-haired bat	8	52	carcass search	100-m road and pad	scavenged	no
06/23/2021	eastern red bat	6	28	carcass search	70-m cleared	intact	yes*
06/23/2021	eastern red bat	48	40	carcass search	70-m cleared	scavenged	yes*
06/23/2021	silver-haired bat	32	28	carcass search	70-m cleared	scavenged	yes*
06/24/2021	eastern red bat	70	47	carcass search	70-m uncleared	scavenged	yes*
06/25/2021	silver-haired bat	50	49	carcass search	70-m uncleared	scavenged	yes*
06/26/2021	big brown bat	5	52	carcass search	100-m road and pad	intact	no
06/26/2021	eastern red bat	88	20	incidental**	70-m cleared	intact	no
06/26/2021	eastern red bat	3	44	carcass search	70-m uncleared	dismembered	yes*
06/26/2021	evening bat	79	40	carcass search**	70-m cleared	dismembered	yes*
06/26/2021	silver-haired bat	33	26	carcass search	70-m cleared	scavenged	yes*
06/26/2021	silver-haired bat	9	29	incidental**	100-m road and pad	intact	no
06/26/2021	silver-haired bat	78	44	carcass search**	70-m uncleared	scavenged	yes*
06/28/2021	eastern red bat	21	10	carcass search	70-m uncleared	scavenged	yes*
06/28/2021	eastern red bat	19	13	carcass search	70-m cleared	scavenged	yes*

Appendix A. Carcasses found at the Bitter Ridge Wind Farm, Jay County, Indiana, from June 21 – October 15, 2021.

Found Date	Common Name	Distance from Turbine (m)	Search Location	Search Type	Search Area Type	Physical Condition	Dog Aided Search
06/28/2021	eastern red bat	23	20	carcass search	70-m cleared	scavenged	yes*
06/28/2021	unidentified non-myotis	46	17	carcass search	70-m cleared	dismembered	yes*
06/29/2021	hoary bat	10	44	carcass search	70-m uncleared	scavenged	yes*
06/29/2021	hoary bat	31	49	carcass search	70-m uncleared	scavenged	yes*
06/29/2021	silver-haired bat	42	26	carcass search	70-m cleared	scavenged	yes*
07/02/2021	big brown bat	41	44	carcass search	70-m uncleared	scavenged	yes*
07/02/2021	eastern red bat	21	33	carcass search	70-m cleared	scavenged	yes*
07/02/2021	silver-haired bat	49	49	carcass search	70-m uncleared	scavenged	yes*
07/03/2021	eastern red bat	32	28	carcass search	70-m cleared	scavenged	yes*
07/05/2021	eastern red bat	22	17	carcass search	70-m cleared	dismembered	yes*
07/05/2021	eastern red bat	15	36	carcass search	70-m uncleared	intact	yes*
07/05/2021	eastern red bat	30	47	carcass search	70-m uncleared	scavenged	yes*
07/06/2021	big brown bat	1	43	carcass search	70-m uncleared	scavenged	yes*
07/06/2021	eastern red bat	25	31	carcass search	70-m cleared	scavenged	yes*
07/06/2021	eastern red bat	53	49	carcass search	70-m uncleared	intact	yes*
07/06/2021	hoary bat	48	49	carcass search	70-m uncleared	intact	yes*
07/06/2021	unidentified bat	10	44	carcass search	70-m uncleared	dismembered	yes*
07/06/2021	unidentified non-myotis	19	44	carcass search	70-m uncleared	dismembered	yes*
07/09/2021	hoary bat	11	19	carcass search	70-m cleared	scavenged	yes*
07/10/2021	eastern red bat	48	44	carcass search	70-m uncleared	scavenged	yes*
07/10/2021	hoary bat	17	43	carcass search	70-m uncleared	scavenged	yes*
07/12/2021	big brown bat	66	18	incidental	70-m cleared	scavenged	yes*
07/12/2021	big brown bat	44	47	carcass search	70-m uncleared	scavenged	yes*
07/13/2021	eastern red bat	5	52	carcass search	100-m road and pad	intact	no
07/15/2021	hoary bat	16	17	carcass search	70-m cleared	scavenged	yes*
07/16/2021	eastern red bat	33	10	carcass search	70-m uncleared	scavenged	yes*
07/17/2021	big brown bat	13	40	carcass search	70-m cleared	scavenged	yes*
07/17/2021	eastern red bat	14	43	carcass search	70-m uncleared	scavenged	yes*
07/17/2021	hoary bat	9	40	carcass search	70-m cleared	scavenged	yes*
07/19/2021	eastern red bat	5	29	carcass search	100-m road and pad	intact	no

Appendix A. Carcasses found at the Bitter Ridge Wind Farm, Jay County, Indiana, from June 21 – October 15, 2021.

Found Date	Common Name	Distance from Turbine (m)	Search Location	Search Type	Search Area Type	Physical Condition	Dog Aided Search
07/20/2021	hoary bat	64	33	carcass search	70-m cleared	scavenged	yes*
07/22/2021	hoary bat	5	36	incidental	70-m uncleared	scavenged	yes*
07/23/2021	eastern red bat	10	10	carcass search	70-m uncleared	intact	yes*
07/23/2021	hoary bat	13	10	carcass search	70-m uncleared	scavenged	yes*
07/24/2021	eastern red bat	18	44	carcass search	70-m uncleared	scavenged	yes*
07/26/2021	eastern red bat	54	13	carcass search	70-m cleared	scavenged	yes*
07/26/2021	eastern red bat	62	14	carcass search	70-m cleared	scavenged	yes*
07/26/2021	eastern red bat	20	19	carcass search	70-m cleared	scavenged	yes*
07/26/2021	hoary bat	38	47	incidental	70-m uncleared	scavenged	yes*
07/26/2021	silver-haired bat	35	20	carcass search	70-m cleared	scavenged	yes*
07/27/2021	eastern red bat	20	47	carcass search	70-m uncleared	scavenged	yes*
07/29/2021	unidentified non-myotis	65	36	carcass search	70-m uncleared	dismembered	yes*
07/30/2021	big brown bat	8	35	carcass search	100-m road and pad	intact	no
07/30/2021	big brown bat	15	37	carcass search	70-m cleared	intact	yes*
07/30/2021	unidentified myotis	42	44	carcass search	70-m uncleared	scavenged	yes*
08/02/2021	big brown bat	5	1	carcass search	100-m road and pad	intact	no
08/02/2021	big brown bat	5	15	carcass search	100-m road and pad	scavenged	no
08/02/2021	big brown bat	0	2	carcass search	100-m road and pad	dismembered	no
08/02/2021	big brown bat	11	2	carcass search	100-m road and pad	dismembered	no
08/02/2021	big brown bat	7	2	carcass search	100-m road and pad	scavenged	no
08/02/2021	big brown bat	8	6	carcass search	100-m road and pad	dismembered	no
08/02/2021	big brown bat	3	9	carcass search	100-m road and pad	scavenged	no
08/02/2021	eastern red bat	8	13	carcass search	70-m cleared	scavenged	yes*
08/02/2021	eastern red bat	12	14	carcass search	70-m cleared	scavenged	yes*
08/02/2021	eastern red bat	6	15	carcass search	100-m road and pad	scavenged	no
08/02/2021	eastern red bat	8	2	carcass search	100-m road and pad	scavenged	no
08/02/2021	hoary bat	40	15	carcass search	100-m road and pad	dismembered	no
08/02/2021	hoary bat	38	18	carcass search	70-m cleared	intact	yes*
08/03/2021	big brown bat	1	30	carcass search	100-m road and pad	intact	no
08/03/2021	big brown bat	27	31	carcass search	70-m cleared	dismembered	yes*

Appendix A. Carcasses found at the Bitter Ridge Wind Farm, Jay County, Indiana, from June 21 – October 15, 2021.

Found Date	Common Name	Distance from Turbine (m)	Search Location	Search Type	Search Area Type	Physical Condition	Dog Aided Search
08/03/2021	eastern red bat	7	30	carcass search	100-m road and pad	intact	no
08/03/2021	hoary bat	24	40	carcass search	70-m cleared	scavenged	yes*
08/05/2021	big brown bat	3	3	carcass search	100-m road and pad	scavenged	no
08/05/2021	eastern red bat	31	1	carcass search	100-m road and pad	scavenged	no
08/05/2021	hoary bat	0	4	carcass search	100-m road and pad	intact	no
08/05/2021	unidentified bat	5	6	incidental	100-m road and pad	dismembered	no
08/09/2021	big brown bat	45	11	carcass search	70-m cleared	scavenged	yes*
08/09/2021	big brown bat	1	15	carcass search	100-m road and pad	intact	no
08/09/2021	big brown bat	9	29	carcass search	100-m road and pad	dismembered	no
08/09/2021	eastern red bat	9	11	carcass search	70-m cleared	intact	yes*
08/09/2021	eastern red bat	64	13	carcass search	70-m cleared	intact	yes*
08/09/2021	eastern red bat	40	13	carcass search	70-m cleared	scavenged	yes*
08/09/2021	eastern red bat	18	17	carcass search	70-m cleared	intact	yes*
08/09/2021	eastern red bat	5	17	carcass search	70-m cleared	intact	yes*
08/09/2021	eastern red bat	20	19	carcass search	70-m cleared	dismembered	yes*
08/09/2021	eastern red bat	5	2	carcass search	100-m road and pad	intact	no
08/09/2021	eastern red bat	56	23	carcass search**	100-m road and pad	scavenged	no
08/09/2021	eastern red bat	0	23	carcass search	100-m road and pad	intact	no
08/09/2021	eastern red bat	6	29	carcass search	100-m road and pad	scavenged	no
08/09/2021	hoary bat	59	18	carcass search	70-m cleared	scavenged	yes*
08/09/2021	hoary bat	21	19	carcass search	70-m cleared	intact	yes*
08/10/2021	big brown bat	25	26	carcass search	70-m cleared	scavenged	yes*
08/10/2021	big brown bat	27	31	carcass search	70-m cleared	scavenged	yes*
08/10/2021	big brown bat	15	33	carcass search	70-m cleared	intact	yes*
08/10/2021	big brown bat	26	40	carcass search	70-m cleared	scavenged	yes*
08/10/2021	big brown bat	52	40	carcass search	70-m cleared	scavenged	yes*
08/10/2021	big brown bat	50	46	carcass search	70-m cleared	intact	yes*
08/10/2021	eastern red bat	40	26	carcass search	70-m cleared	scavenged	yes*
08/10/2021	eastern red bat	25	26	carcass search	70-m cleared	scavenged	yes*
08/10/2021	eastern red bat	49	30	carcass search	100-m road and pad	intact	no

Appendix A. Carcasses found at the Bitter Ridge Wind Farm, Jay County, Indiana, from June 21 – October 15, 2021.

Found Date	Common Name	Distance from Turbine (m)	Search Location	Search Type	Search Area Type	Physical Condition	Dog Aided Search
08/10/2021	eastern red bat	11	37	carcass search	70-m cleared	intact	yes*
08/10/2021	eastern red bat	39	39	carcass search	100-m road and pad	scavenged	no
08/10/2021	eastern red bat	12	40	carcass search	70-m cleared	scavenged	yes*
08/11/2021	big brown bat	42	19	carcass search	70-m cleared	intact	yes*
08/11/2021	eastern red bat	24	11	carcass search	70-m cleared	intact	yes*
08/11/2021	eastern red bat	49	11	carcass search	70-m cleared	scavenged	yes*
08/11/2021	eastern red bat	33	17	carcass search	70-m cleared	intact	yes*
08/11/2021	eastern red bat	20	17	carcass search	70-m cleared	scavenged	yes*
08/11/2021	eastern red bat	8	19	carcass search	70-m cleared	intact	yes*
08/11/2021	eastern red bat	25	19	carcass search	70-m cleared	intact	yes*
08/11/2021	eastern red bat	30	20	carcass search	70-m cleared	scavenged	yes*
08/11/2021	hoary bat	52	17	carcass search	70-m cleared	scavenged	yes*
08/12/2021	big brown bat	35	37	carcass search	70-m cleared	intact	yes*
08/12/2021	eastern red bat	7	2	carcass search	100-m road and pad	intact	no
08/12/2021	eastern red bat	5	23	carcass search	100-m road and pad	dismembered	no
08/12/2021	eastern red bat	32	26	carcass search	70-m cleared	scavenged	yes*
08/12/2021	eastern red bat	9	26	carcass search	70-m cleared	intact	yes*
08/12/2021	eastern red bat	23	40	carcass search	70-m cleared	scavenged	yes*
08/12/2021	hoary bat	6	16	carcass search	100-m road and pad	intact	no
08/12/2021	hoary bat	5	24	carcass search	100-m road and pad	intact	no
08/12/2021	hoary bat	38	26	carcass search	70-m cleared	scavenged	yes*
08/12/2021	hoary bat	25	33	carcass search	70-m cleared	scavenged	yes*
08/12/2021	hoary bat	12	6	carcass search	100-m road and pad	scavenged	no
08/13/2021	eastern red bat	8	36	carcass search	100-m road and pad	scavenged	no
08/13/2021	eastern red bat	43	44	carcass search	100-m road and pad	scavenged	no
08/13/2021	eastern red bat	15	50	carcass search	100-m road and pad	scavenged	no
08/16/2021	big brown bat	33	19	carcass search	70-m cleared	scavenged	yes*
08/16/2021	big brown bat	1	20	carcass search	70-m cleared	intact	yes*
08/16/2021	big brown bat	22	20	carcass search	70-m cleared	scavenged	yes*
08/16/2021	big brown bat	6	22	carcass search	100-m road and pad	intact	no

Appendix A. Carcasses found at the Bitter Ridge Wind Farm, Jay County, Indiana, from June 21 – October 15, 2021.

Found Date	Common Name	Distance from Turbine (m)	Search Location	Search Type	Search Area Type	Physical Condition	Dog Aided Search
08/16/2021	eastern red bat	43	11	carcass search	70-m cleared	scavenged	yes*
08/16/2021	eastern red bat	46	13	carcass search	70-m cleared	scavenged	yes*
08/16/2021	eastern red bat	47	13	carcass search	70-m cleared	scavenged	yes*
08/16/2021	eastern red bat	61	17	carcass search	70-m cleared	intact	yes*
08/16/2021	eastern red bat	64	18	carcass search	70-m cleared	intact	yes*
08/16/2021	eastern red bat	40	19	carcass search	70-m cleared	scavenged	yes*
08/16/2021	eastern red bat	53	19	carcass search	70-m cleared	scavenged	yes*
08/16/2021	eastern red bat	61	20	carcass search	70-m cleared	scavenged	yes*
08/16/2021	eastern red bat	11	22	carcass search**	100-m road and pad	intact	no
08/16/2021	eastern red bat	7	4	carcass search	100-m road and pad	scavenged	no
08/16/2021	hoary bat	28	14	carcass search	70-m cleared	intact	yes*
08/16/2021	hoary bat	46	17	carcass search	70-m cleared	dismembered	yes*
08/16/2021	hoary bat	24	19	carcass search	70-m cleared	intact	yes*
08/17/2021	big brown bat	59	27	carcass search	100-m road and pad	scavenged	no
08/17/2021	big brown bat	43	28	carcass search	70-m cleared	scavenged	yes*
08/17/2021	eastern red bat	33	26	carcass search	70-m cleared	scavenged	yes*
08/17/2021	eastern red bat	52	28	carcass search	70-m cleared	scavenged	yes*
08/17/2021	eastern red bat	8	28	carcass search	70-m cleared	scavenged	yes*
08/17/2021	eastern red bat	23	28	carcass search	70-m cleared	scavenged	yes*
08/17/2021	eastern red bat	23	28	carcass search	70-m cleared	scavenged	yes*
08/17/2021	eastern red bat	33	31	carcass search	70-m cleared	scavenged	yes*
08/17/2021	eastern red bat	37	33	carcass search	70-m cleared	scavenged	yes*
08/17/2021	eastern red bat	45	40	carcass search	70-m cleared	scavenged	yes*
08/17/2021	eastern red bat	42	40	carcass search	70-m cleared	scavenged	yes*
08/17/2021	eastern red bat	26	46	carcass search	70-m cleared	scavenged	yes*
08/17/2021	hoary bat	56	37	carcass search	70-m cleared	scavenged	yes*
08/17/2021	hoary bat	42	37	carcass search	70-m cleared	scavenged	yes*
08/17/2021	hoary bat	30	46	carcass search	70-m cleared	scavenged	yes*
08/17/2021	hoary bat	20	46	carcass search	70-m cleared	scavenged	yes*
08/17/2021	hoary bat	28	52	incidental**	100-m road and pad	scavenged	no

Appendix A. Carcasses found at the Bitter Ridge Wind Farm, Jay County, Indiana, from June 21 – October 15, 2021.

Found Date	Common Name	Distance from Turbine (m)	Search Location	Search Type	Search Area Type	Physical Condition	Dog Aided Search
08/17/2021	tri-colored bat	9	45	carcass search**	100-m road and pad	dismembered	no
08/19/2021	big brown bat	31	17	carcass search	70-m cleared	scavenged	yes*
08/19/2021	big brown bat	34	19	carcass search	70-m cleared	scavenged	yes*
08/19/2021	eastern red bat	25	17	carcass search	70-m cleared	scavenged	yes*
08/19/2021	eastern red bat	10	19	carcass search	70-m cleared	scavenged	yes*
08/19/2021	eastern red bat	22	19	carcass search	70-m cleared	scavenged	yes*
08/19/2021	eastern red bat	31	19	carcass search	70-m cleared	scavenged	yes*
08/19/2021	hoary bat	35	20	carcass search	70-m cleared	scavenged	yes*
08/19/2021	silver-haired bat	18	17	carcass search	70-m cleared	scavenged	yes*
08/20/2021	eastern red bat	20	26	carcass search	70-m cleared	scavenged	yes*
08/20/2021	eastern red bat	16	26	carcass search	70-m cleared	scavenged	yes*
08/20/2021	eastern red bat	15	28	carcass search	70-m cleared	scavenged	yes*
08/20/2021	eastern red bat	61	40	carcass search	70-m cleared	scavenged	yes*
08/20/2021	hoary bat	40	40	carcass search	70-m cleared	scavenged	yes*
08/23/2021	big brown bat	14	13	carcass search	70-m cleared	scavenged	yes*
08/23/2021	big brown bat	11	15	carcass search**	100-m road and pad	intact	no
08/23/2021	eastern red bat	5	14	carcass search	70-m cleared	scavenged	yes*
08/23/2021	eastern red bat	39	18	carcass search	70-m cleared	scavenged	yes*
08/23/2021	eastern red bat	30	18	carcass search	70-m cleared	scavenged	yes*
08/23/2021	hoary bat	50	18	carcass search	70-m cleared	scavenged	yes*
08/23/2021	hoary bat	24	29	carcass search	100-m road and pad	intact	no
08/23/2021	Indiana bat	33	37	incidental	70-m cleared	scavenged	yes*
08/24/2021	big brown bat	36	31	carcass search	70-m cleared	scavenged	yes*
08/24/2021	big brown bat	26	37	carcass search	70-m cleared	scavenged	yes*
08/24/2021	eastern red bat	20	28	incidental	70-m cleared	scavenged	yes*
08/24/2021	eastern red bat	51	33	carcass search	70-m cleared	scavenged	yes*
08/24/2021	eastern red bat	50	37	carcass search	70-m cleared	scavenged	yes*
08/24/2021	eastern red bat	27	37	carcass search	70-m cleared	scavenged	yes*
08/24/2021	eastern red bat	31	40	carcass search	70-m cleared	scavenged	yes*
08/24/2021	hoary bat	34	46	carcass search	70-m cleared	intact	yes*

Appendix A. Carcasses found at the Bitter Ridge Wind Farm, Jay County, Indiana, from June 21 – October 15, 2021.

Found Date	Common Name	Distance from Turbine (m)	Search Location	Search Type	Search Area Type	Physical Condition	Dog Aided Search
08/24/2021	unidentified non-myotis	46	26	carcass search	70-m cleared	dismembered	yes*
08/25/2021	big brown bat	2	10	carcass search	100-m road and pad	intact	no
08/25/2021	big brown bat	7	32	carcass search	100-m road and pad	scavenged	no
08/25/2021	big brown bat	14	5	carcass search	100-m road and pad	scavenged	no
08/25/2021	big brown bat	27	8	carcass search	100-m road and pad	scavenged	no
08/25/2021	eastern red bat	6	32	carcass search	100-m road and pad	intact	no
08/25/2021	eastern red bat	9	8	carcass search	100-m road and pad	scavenged	no
08/25/2021	eastern red bat	5	8	carcass search	100-m road and pad	intact	no
08/26/2021	big brown bat	3	17	carcass search	70-m cleared	intact	yes*
08/26/2021	big brown bat	20	18	carcass search	70-m cleared	scavenged	yes*
08/26/2021	big brown bat	8	18	carcass search	70-m cleared	scavenged	yes*
08/26/2021	eastern red bat	22	14	carcass search	70-m cleared	scavenged	yes*
08/26/2021	eastern red bat	43	17	carcass search	70-m cleared	scavenged	yes*
08/26/2021	eastern red bat	40	17	carcass search	70-m cleared	scavenged	yes*
08/26/2021	eastern red bat	12	17	carcass search	70-m cleared	scavenged	yes*
08/26/2021	eastern red bat	37	17	carcass search	70-m cleared	scavenged	yes*
08/26/2021	eastern red bat	10	18	carcass search	70-m cleared	intact	yes*
08/26/2021	eastern red bat	39	18	carcass search	70-m cleared	scavenged	yes*
08/26/2021	eastern red bat	50	20	carcass search	70-m cleared	scavenged	yes*
08/26/2021	eastern red bat	5	24	carcass search	100-m road and pad	intact	no
08/26/2021	eastern red bat	31	50	incidental**	100-m road and pad	scavenged	no
08/26/2021	eastern red bat	8	50	carcass search	100-m road and pad	intact	no
08/26/2021	eastern red bat	9	8	carcass search**	100-m road and pad	intact	no
08/26/2021	eastern red bat	8	8	carcass search	100-m road and pad	intact	no
08/26/2021	hoary bat	42	18	carcass search	70-m cleared	intact	yes*
08/26/2021	hoary bat	60	19	carcass search	70-m cleared	scavenged	yes*
08/27/2021	big brown bat	1	31	carcass search	70-m cleared	scavenged	yes*
08/27/2021	big brown bat	30	40	carcass search	70-m cleared	scavenged	yes*
08/27/2021	big brown bat	11	41	incidental**	n/a	scavenged	no
08/27/2021	eastern red bat	13	26	carcass search	70-m cleared	scavenged	yes*

Appendix A. Carcasses found at the Bitter Ridge Wind Farm, Jay County, Indiana, from June 21 – October 15, 2021.

Found Date	Common Name	Distance from Turbine (m)	Search Location	Search Type	Search Area Type	Physical Condition	Dog Aided Search
08/27/2021	eastern red bat	14	31	carcass search	70-m cleared	scavenged	yes*
08/27/2021	eastern red bat	24	31	carcass search	70-m cleared	scavenged	yes*
08/27/2021	eastern red bat	10	31	carcass search	70-m cleared	scavenged	yes*
08/27/2021	eastern red bat	25	33	carcass search	70-m cleared	scavenged	yes*
08/27/2021	eastern red bat	26	33	carcass search	70-m cleared	scavenged	yes*
08/27/2021	eastern red bat	60	37	carcass search	70-m cleared	scavenged	yes*
08/27/2021	eastern red bat	37	37	carcass search	70-m cleared	scavenged	yes*
08/27/2021	eastern red bat	19	37	carcass search	70-m cleared	scavenged	yes*
08/27/2021	eastern red bat	10	40	carcass search	70-m cleared	scavenged	yes*
08/27/2021	eastern red bat	46	40	carcass search	70-m cleared	scavenged	yes*
08/27/2021	eastern red bat	31	46	carcass search	70-m cleared	scavenged	yes*
08/27/2021	hoary bat	12	28	carcass search	70-m cleared	scavenged	yes*
08/27/2021	hoary bat	12	28	carcass search	70-m cleared	scavenged	yes*
08/27/2021	hoary bat	22	31	carcass search	70-m cleared	scavenged	yes*
08/30/2021	big brown bat	22	1	carcass search	100-m road and pad	scavenged	no
08/30/2021	big brown bat	41	19	carcass search	70-m cleared	scavenged	yes*
08/30/2021	big brown bat	38	20	carcass search	70-m cleared	scavenged	yes*
08/30/2021	eastern red bat	1	12	carcass search	100-m road and pad	scavenged	no
08/30/2021	eastern red bat	53	13	carcass search	70-m cleared	scavenged	yes*
08/30/2021	eastern red bat	8	13	carcass search	70-m cleared	scavenged	yes*
08/30/2021	eastern red bat	12	13	carcass search	70-m cleared	scavenged	yes*
08/30/2021	eastern red bat	39	14	carcass search	70-m cleared	scavenged	yes*
08/30/2021	eastern red bat	9	14	carcass search	70-m cleared	scavenged	yes*
08/30/2021	eastern red bat	41	17	carcass search	70-m cleared	scavenged	yes*
08/30/2021	eastern red bat	20	17	carcass search	70-m cleared	scavenged	yes*
08/30/2021	eastern red bat	5	17	carcass search	70-m cleared	scavenged	yes*
08/30/2021	eastern red bat	16	19	carcass search	70-m cleared	scavenged	yes*
08/30/2021	eastern red bat	20	19	carcass search	70-m cleared	scavenged	yes*
08/30/2021	eastern red bat	3	19	carcass search	70-m cleared	scavenged	yes*
08/30/2021	eastern red bat	2	29	carcass search	100-m road and pad	dismembered	no

Appendix A. Carcasses found at the Bitter Ridge Wind Farm, Jay County, Indiana, from June 21 – October 15, 2021.

Found Date	Common Name	Distance from Turbine (m)	Search Location	Search Type	Search Area Type	Physical Condition	Dog Aided Search
08/30/2021	hoary bat	5	10	carcass search	100-m road and pad	scavenged	no
08/30/2021	hoary bat	50	17	carcass search	70-m cleared	scavenged	yes*
08/31/2021	big brown bat	4	30	carcass search	100-m road and pad	scavenged	no
08/31/2021	big brown bat	16	33	carcass search	70-m cleared	scavenged	yes*
08/31/2021	big brown bat	17	40	carcass search	70-m cleared	scavenged	yes*
08/31/2021	eastern red bat	48	26	carcass search	70-m cleared	scavenged	yes*
08/31/2021	eastern red bat	31	26	carcass search	70-m cleared	scavenged	yes*
08/31/2021	eastern red bat	18	28	carcass search	70-m cleared	scavenged	yes*
08/31/2021	eastern red bat	28	32	carcass search	100-m road and pad	scavenged	no
08/31/2021	eastern red bat	46	33	carcass search	70-m cleared	scavenged	yes*
08/31/2021	eastern red bat	22	33	carcass search	70-m cleared	scavenged	yes*
08/31/2021	eastern red bat	7	38	carcass search	100-m road and pad	intact	no
08/31/2021	eastern red bat	35	40	carcass search	70-m cleared	scavenged	yes*
08/31/2021	eastern red bat	5	44	carcass search	100-m road and pad	scavenged	no
08/31/2021	eastern red bat	6	48	carcass search	100-m road and pad	intact	no
08/31/2021	hoary bat	24	26	carcass search	70-m cleared	scavenged	yes*
08/31/2021	hoary bat	40	28	carcass search	70-m cleared	scavenged	yes*
09/02/2021	big brown bat	6	16	carcass search	100-m road and pad	scavenged	no
09/02/2021	big brown bat	38	17	carcass search	70-m cleared	scavenged	yes*
09/02/2021	big brown bat	10	19	carcass search	70-m cleared	intact	yes*
09/02/2021	big brown bat	30	19	carcass search	70-m cleared	scavenged	yes*
09/02/2021	big brown bat	5	2	carcass search	100-m road and pad	intact	no
09/02/2021	big brown bat	0	5	carcass search	100-m road and pad	scavenged	no
09/02/2021	big brown bat	0	9	carcass search	100-m road and pad	intact	no
09/02/2021	eastern red bat	21	17	incidental	70-m cleared	scavenged	yes*
09/02/2021	eastern red bat	56	19	carcass search	70-m cleared	scavenged	yes*
09/02/2021	eastern red bat	4	3	carcass search	100-m road and pad	scavenged	no
09/02/2021	hoary bat	14	13	carcass search	70-m cleared	intact	yes*
09/02/2021	hoary bat	12	23	carcass search**	100-m road and pad	intact	no
09/02/2021	silver-haired bat	18	17	carcass search	70-m cleared	intact	yes*

Appendix A. Carcasses found at the Bitter Ridge Wind Farm, Jay County, Indiana, from June 21 – October 15, 2021.

Found Date	Common Name	Distance from Turbine (m)	Search Location	Search Type	Search Area Type	Physical Condition	Dog Aided Search
09/02/2021	silver-haired bat	40	17	carcass search	70-m cleared	intact	yes*
09/02/2021	silver-haired bat	8	17	carcass search	70-m cleared	intact	yes*
09/02/2021	silver-haired bat	33	18	carcass search	70-m cleared	scavenged	yes*
09/02/2021	silver-haired bat	1	29	carcass search	100-m road and pad	intact	no
09/03/2021	big brown bat	1	37	carcass search	70-m cleared	intact	yes*
09/03/2021	big brown bat	6	45	carcass search	100-m road and pad	scavenged	no
09/03/2021	eastern red bat	40	33	carcass search	70-m cleared	scavenged	yes*
09/03/2021	eastern red bat	42	33	carcass search	70-m cleared	scavenged	yes*
09/03/2021	eastern red bat	55	35	carcass search	100-m road and pad	scavenged	no
09/03/2021	eastern red bat	34	37	carcass search	70-m cleared	intact	yes*
09/03/2021	eastern red bat	15	46	carcass search	70-m cleared	scavenged	yes*
09/03/2021	hoary bat	20	31	carcass search	70-m cleared	scavenged	yes*
09/03/2021	hoary bat	22	45	carcass search**	100-m road and pad	scavenged	no
09/03/2021	hoary bat	18	46	carcass search	70-m cleared	scavenged	yes*
09/03/2021	silver-haired bat	15	28	carcass search	70-m cleared	scavenged	yes*
09/03/2021	silver-haired bat	46	31	carcass search	70-m cleared	intact	yes*
09/03/2021	silver-haired bat	5	33	carcass search	70-m cleared	scavenged	yes*
09/03/2021	silver-haired bat	62	37	carcass search	70-m cleared	scavenged	yes*
09/03/2021	silver-haired bat	15	38	carcass search**	100-m road and pad	intact	no
09/03/2021	silver-haired bat	4	38	carcass search	100-m road and pad	intact	no
09/03/2021	silver-haired bat	32	40	carcass search	70-m cleared	scavenged	yes*
09/03/2021	silver-haired bat	44	40	carcass search	70-m cleared	scavenged	yes*
09/03/2021	silver-haired bat	65	46	carcass search	70-m cleared	scavenged	yes*
09/03/2021	silver-haired bat	55	46	carcass search	70-m cleared	scavenged	yes*
09/06/2021	big brown bat	8	14	carcass search	70-m cleared	scavenged	yes*
09/06/2021	big brown bat	20	18	carcass search	70-m cleared	intact	yes*
09/06/2021	eastern red bat	30	11	carcass search	70-m cleared	scavenged	yes*
09/06/2021	eastern red bat	28	11	carcass search	70-m cleared	scavenged	yes*
09/06/2021	eastern red bat	11	14	carcass search	70-m cleared	scavenged	yes*
09/06/2021	eastern red bat	40	17	carcass search	70-m cleared	intact	yes*

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Found Date	Common Name	Distance from Turbine (m)	Search Location	Search Type	Search Area Type	Physical Condition	Dog Aided Search
09/06/2021	eastern red bat	8	20	carcass search	70-m cleared	scavenged	yes*
09/06/2021	hoary bat	54	11	carcass search	70-m cleared	scavenged	yes*
09/06/2021	hoary bat	54	14	carcass search	70-m cleared	scavenged	yes*
09/06/2021	hoary bat	62	17	carcass search	70-m cleared	dismembered	yes*
09/06/2021	hoary bat	39	20	carcass search	70-m cleared	intact	yes*
09/06/2021	silver-haired bat	15	1	carcass search	100-m road and pad	scavenged	no
09/06/2021	silver-haired bat	6	10	carcass search	100-m road and pad	intact	no
09/06/2021	silver-haired bat	40	13	carcass search	70-m cleared	scavenged	yes*
09/06/2021	silver-haired bat	24	17	carcass search	70-m cleared	intact	yes*
09/06/2021	silver-haired bat	7	19	carcass search	70-m cleared	intact	yes*
09/06/2021	silver-haired bat	14	20	carcass search	70-m cleared	intact	yes*
09/06/2021	silver-haired bat	11	20	carcass search	70-m cleared	intact	yes*
09/06/2021	silver-haired bat	25	9	carcass search	100-m road and pad	intact	no
09/07/2021	big brown bat	20	33	carcass search	70-m cleared	scavenged	yes*
09/07/2021	big brown bat	40	37	carcass search	70-m cleared	scavenged	yes*
09/07/2021	big brown bat	6	43	carcass search	100-m road and pad	scavenged	no
09/07/2021	eastern red bat	29	26	carcass search	70-m cleared	dismembered	yes*
09/07/2021	eastern red bat	45	28	carcass search	70-m cleared	scavenged	yes*
09/07/2021	eastern red bat	48	28	carcass search	70-m cleared	intact	yes*
09/07/2021	eastern red bat	59	33	carcass search	70-m cleared	intact	yes*
09/07/2021	eastern red bat	43	33	carcass search	70-m cleared	scavenged	yes*
09/07/2021	eastern red bat	44	33	carcass search	70-m cleared	scavenged	yes*
09/07/2021	eastern red bat	10	37	carcass search	70-m cleared	scavenged	yes*
09/07/2021	eastern red bat	32	46	carcass search	70-m cleared	scavenged	yes*
09/07/2021	hoary bat	38	46	carcass search	70-m cleared	scavenged	yes*
09/07/2021	silver-haired bat	11	32	carcass search	100-m road and pad	scavenged	no
09/07/2021	silver-haired bat	38	33	carcass search	70-m cleared	scavenged	yes*
09/07/2021	silver-haired bat	28	33	carcass search	70-m cleared	scavenged	yes*
09/07/2021	silver-haired bat	5	36	carcass search	100-m road and pad	scavenged	no
09/07/2021	silver-haired bat	35	37	carcass search	70-m cleared	scavenged	yes*

Appendix A. Carcasses found at the Bitter Ridge Wind Farm, Jay County, Indiana, from June 21 – October 15, 2021.

Found Date	Common Name	Distance from Turbine (m)	Search Location	Search Type	Search Area Type	Physical Condition	Dog Aided Search
09/07/2021	silver-haired bat	41	46	carcass search	70-m cleared	dismembered	yes*
09/09/2021	big brown bat	10	11	carcass search	70-m cleared	intact	yes*
09/09/2021	big brown bat	34	11	carcass search	70-m cleared	scavenged	yes*
09/09/2021	eastern red bat	43	11	carcass search	70-m cleared	scavenged	yes*
09/09/2021	eastern red bat	38	14	carcass search	70-m cleared	intact	yes*
09/09/2021	eastern red bat	52	14	carcass search	70-m cleared	intact	yes*
09/09/2021	eastern red bat	33	18	carcass search	70-m cleared	scavenged	yes*
09/09/2021	eastern red bat	45	18	carcass search	70-m cleared	scavenged	yes*
09/09/2021	eastern red bat	1	23	carcass search	100-m road and pad	scavenged	no
09/09/2021	eastern red bat	6	6	carcass search	100-m road and pad	scavenged	no
09/09/2021	eastern red bat	7	8	carcass search	100-m road and pad	scavenged	no
09/09/2021	hoary bat	24	17	carcass search	70-m cleared	scavenged	yes*
09/09/2021	silver-haired bat	7	1	carcass search	100-m road and pad	intact	no
09/09/2021	silver-haired bat	46	11	carcass search	70-m cleared	scavenged	yes*
09/09/2021	silver-haired bat	12	17	carcass search	70-m cleared	scavenged	yes*
09/09/2021	silver-haired bat	48	20	carcass search	70-m cleared	scavenged	yes*
09/10/2021	big brown bat	48	28	carcass search	70-m cleared	scavenged	yes*
09/10/2021	big brown bat	43	37	carcass search	70-m cleared	scavenged	yes*
09/10/2021	big brown bat	6	38	incidental	100-m road and pad	scavenged	no
09/10/2021	big brown bat	16	46	incidental	70-m cleared	scavenged	yes*
09/10/2021	eastern red bat	0	27	carcass search	100-m road and pad	injured	no
09/10/2021	eastern red bat	22	33	carcass search	70-m cleared	scavenged	yes*
09/10/2021	eastern red bat	3	36	carcass search	100-m road and pad	intact	no
09/10/2021	eastern red bat	52	47	carcass search	100-m road and pad	scavenged	no
09/10/2021	little brown bat	46	37	carcass search	70-m cleared	intact	yes*
09/10/2021	Seminole bat	2	50	carcass search	100-m road and pad	intact	no
09/10/2021	silver-haired bat	46	33	carcass search	70-m cleared	scavenged	yes*
09/10/2021	silver-haired bat	7	37	carcass search	70-m cleared	scavenged	yes*
09/10/2021	silver-haired bat	2	40	carcass search	70-m cleared	scavenged	yes*
09/10/2021	silver-haired bat	9	40	carcass search	70-m cleared	scavenged	yes*

Appendix A. Carcasses found at the Bitter Ridge Wind Farm, Jay County, Indiana, from June 21 – October 15, 2021.

Found Date	Common Name	Distance from Turbine (m)	Search Location	Search Type	Search Area Type	Physical Condition	Dog Aided Search
09/10/2021	silver-haired bat	5	46	carcass search	70-m cleared	intact	yes*
09/10/2021	silver-haired bat	8	52	carcass search**	100-m road and pad	scavenged	no
09/13/2021	eastern red bat	49	13	carcass search	70-m cleared	intact	yes*
09/13/2021	eastern red bat	37	13	carcass search	70-m cleared	intact	yes*
09/13/2021	eastern red bat	42	17	carcass search	70-m cleared	scavenged	yes*
09/13/2021	eastern red bat	55	17	carcass search	70-m cleared	scavenged	yes*
09/13/2021	eastern red bat	30	18	carcass search	70-m cleared	scavenged	yes*
09/13/2021	eastern red bat	2	18	carcass search	70-m cleared	injured	yes*
09/13/2021	eastern red bat	43	19	carcass search	70-m cleared	intact	yes*
09/13/2021	eastern red bat	50	23	carcass search	100-m road and pad	intact	no
09/13/2021	eastern red bat	15	7	carcass search	100-m road and pad	intact	no
09/13/2021	hoary bat	35	11	carcass search	70-m cleared	intact	yes*
09/13/2021	hoary bat	5	14	carcass search	70-m cleared	intact	yes*
09/13/2021	hoary bat	25	15	carcass search	100-m road and pad	dismembered	no
09/13/2021	hoary bat	5	19	carcass search	70-m cleared	scavenged	yes*
09/13/2021	hoary bat	45	20	carcass search	70-m cleared	scavenged	yes*
09/13/2021	silver-haired bat	58	11	carcass search	70-m cleared	scavenged	yes*
09/13/2021	silver-haired bat	30	14	carcass search	70-m cleared	intact	yes*
09/13/2021	silver-haired bat	15	20	carcass search	70-m cleared	intact	yes*
09/13/2021	silver-haired bat	22	25	carcass search	100-m road and pad	scavenged	no
09/14/2021	big brown bat	5	32	carcass search	100-m road and pad	dismembered	no
09/14/2021	big brown bat	48	40	carcass search	70-m cleared	intact	yes*
09/14/2021	eastern red bat	0	27	carcass search	100-m road and pad	scavenged	no
09/14/2021	eastern red bat	48	31	carcass search	70-m cleared	scavenged	yes*
09/14/2021	eastern red bat	30	33	carcass search	70-m cleared	scavenged	yes*
09/14/2021	eastern red bat	13	33	carcass search	70-m cleared	scavenged	yes*
09/14/2021	hoary bat	27	31	carcass search	70-m cleared	intact	yes*
09/14/2021	hoary bat	0	45	carcass search	100-m road and pad	dismembered	no
09/14/2021	silver-haired bat	22	26	carcass search	70-m cleared	scavenged	yes*
09/14/2021	silver-haired bat	46	26	carcass search	70-m cleared	dismembered	yes*

Appendix A. Carcasses found at the Bitter Ridge Wind Farm, Jay County, Indiana, from June 21 – October 15, 2021.

Found Date	Common Name	Distance from Turbine (m)	Search Location	Search Type	Search Area Type	Physical Condition	Dog Aided Search
09/14/2021	silver-haired bat	12	26	carcass search	70-m cleared	intact	yes*
09/14/2021	silver-haired bat	28	37	carcass search	70-m cleared	scavenged	yes*
09/14/2021	silver-haired bat	13	40	carcass search	70-m cleared	scavenged	yes*
09/14/2021	silver-haired bat	6	45	carcass search	100-m road and pad	scavenged	no
09/16/2021	big brown bat	7	24	carcass search	100-m road and pad	intact	no
09/16/2021	eastern red bat	29	11	carcass search	70-m cleared	scavenged	yes*
09/16/2021	eastern red bat	60	19	carcass search	70-m cleared	scavenged	yes*
09/16/2021	eastern red bat	7	6	carcass search	100-m road and pad	scavenged	no
09/16/2021	hoary bat	15	19	carcass search	70-m cleared	dismembered	yes*
09/16/2021	silver-haired bat	2	11	carcass search	70-m cleared	scavenged	yes*
09/16/2021	silver-haired bat	38	19	carcass search	70-m cleared	scavenged	yes*
09/17/2021	big brown bat	32	28	carcass search	70-m cleared	intact	yes*
09/17/2021	eastern red bat	28	46	carcass search	70-m cleared	scavenged	yes*
09/17/2021	hoary bat	61	28	carcass search	70-m cleared	intact	yes*
09/17/2021	hoary bat	40	37	carcass search	70-m cleared	scavenged	yes*
09/17/2021	hoary bat	28	37	carcass search	70-m cleared	scavenged	yes*
09/17/2021	hoary bat	35	46	carcass search	70-m cleared	scavenged	yes*
09/17/2021	silver-haired bat	29	28	carcass search	70-m cleared	intact	yes*
09/17/2021	silver-haired bat	3	32	carcass search	100-m road and pad	scavenged	no
09/17/2021	silver-haired bat	25	37	carcass search	70-m cleared	scavenged	yes*
09/17/2021	silver-haired bat	19	37	carcass search	70-m cleared	intact	yes*
09/17/2021	silver-haired bat	9	42	carcass search	100-m road and pad	intact	no
09/17/2021	silver-haired bat	69	43	carcass search	100-m road and pad	dismembered	no
09/17/2021	silver-haired bat	25	43	carcass search	100-m road and pad	intact	no
09/20/2021	eastern red bat	57	13	carcass search	70-m cleared	scavenged	yes*
09/20/2021	eastern red bat	55	14	carcass search	70-m cleared	intact	yes*
09/20/2021	eastern red bat	2	17	carcass search	70-m cleared	scavenged	yes*
09/20/2021	hoary bat	55	14	carcass search	70-m cleared	scavenged	yes*
09/20/2021	hoary bat	9	3	carcass search	100-m road and pad	intact	no
09/20/2021	silver-haired bat	10	11	carcass search	70-m cleared	scavenged	yes*

Appendix A. Carcasses found at the Bitter Ridge Wind Farm, Jay County, Indiana, from June 21 – October 15, 2021.

Found Date	Common Name	Distance from Turbine (m)	Search Location	Search Type	Search Area Type	Physical Condition	Dog Aided Search
09/20/2021	silver-haired bat	43	11	carcass search	70-m cleared	intact	yes*
09/20/2021	silver-haired bat	11	11	carcass search	70-m cleared	intact	yes*
09/20/2021	silver-haired bat	19	11	carcass search	70-m cleared	scavenged	yes*
09/20/2021	silver-haired bat	30	11	carcass search	70-m cleared	intact	yes*
09/20/2021	silver-haired bat	12	22	carcass search	100-m road and pad	intact	no
09/20/2021	silver-haired bat	7	4	carcass search	100-m road and pad	intact	no
09/21/2021	eastern red bat	19	26	carcass search	70-m cleared	scavenged	yes*
09/21/2021	eastern red bat	6	49	carcass search	100-m road and pad	scavenged	no
09/21/2021	hoary bat	15	26	carcass search	70-m cleared	scavenged	yes*
09/21/2021	hoary bat	6	41	carcass search	100-m road and pad	intact	no
09/21/2021	hoary bat	36	52	carcass search	100-m road and pad	intact	no
09/21/2021	hoary bat	10	52	carcass search**	100-m road and pad	intact	no
09/21/2021	silver-haired bat	13	28	carcass search	70-m cleared	intact	yes*
09/21/2021	silver-haired bat	14	31	carcass search	70-m cleared	scavenged	yes*
09/21/2021	silver-haired bat	1	35	carcass search	100-m road and pad	scavenged	no
09/21/2021	silver-haired bat	55	40	carcass search	70-m cleared	intact	yes*
09/21/2021	silver-haired bat	37	46	carcass search	70-m cleared	scavenged	yes*
09/21/2021	silver-haired bat	38	46	carcass search	70-m cleared	scavenged	yes*
09/21/2021	silver-haired bat	25	46	carcass search	70-m cleared	intact	yes*
09/23/2021	eastern red bat	16	17	carcass search	70-m cleared	intact	yes*
09/23/2021	eastern red bat	58	19	carcass search	70-m cleared	intact	yes*
09/23/2021	silver-haired bat	68	13	carcass search	70-m cleared	intact	yes*
09/23/2021	silver-haired bat	40	5	carcass search	100-m road and pad	scavenged	no
09/24/2021	eastern red bat	11	28	carcass search	70-m cleared	intact	yes*
09/24/2021	hoary bat	37	46	carcass search	70-m cleared	scavenged	yes*
09/24/2021	silver-haired bat	42	26	carcass search	70-m cleared	scavenged	yes*
09/24/2021	silver-haired bat	43	28	carcass search	70-m cleared	dismembered	yes*
09/24/2021	silver-haired bat	7	45	carcass search	100-m road and pad	intact	no
09/24/2021	silver-haired bat	30	46	carcass search	70-m cleared	scavenged	yes*
09/27/2021	big brown bat	42	13	carcass search	70-m cleared	intact	yes*

Appendix A. Carcasses found at the Bitter Ridge Wind Farm, Jay County, Indiana, from June 21 – October 15, 2021.

Found Date	Common Name	Distance from Turbine (m)	Search Location	Search Type	Search Area Type	Physical Condition	Dog Aided Search
09/27/2021	eastern red bat	12	19	carcass search	70-m cleared	scavenged	yes*
09/27/2021	silver-haired bat	25	11	carcass search	70-m cleared	scavenged	yes*
09/27/2021	silver-haired bat	41	13	carcass search	70-m cleared	intact	yes*
09/27/2021	silver-haired bat	30	13	carcass search	70-m cleared	scavenged	yes*
09/27/2021	silver-haired bat	21	13	carcass search	70-m cleared	intact	yes*
09/27/2021	silver-haired bat	53	14	carcass search	70-m cleared	scavenged	yes*
09/27/2021	silver-haired bat	37	14	carcass search	70-m cleared	intact	yes*
09/27/2021	silver-haired bat	47	18	carcass search	70-m cleared	intact	yes*
09/28/2021	silver-haired bat	56	40	carcass search	70-m cleared	scavenged	yes*
09/28/2021	silver-haired bat	6	42	carcass search	100-m road and pad	intact	no
09/30/2021	eastern red bat	30	11	carcass search	70-m cleared	intact	yes*
09/30/2021	eastern red bat	48	19	carcass search	70-m cleared	scavenged	yes*
09/30/2021	eastern red bat	44	19	carcass search	70-m cleared	intact	yes*
09/30/2021	silver-haired bat	7	15	carcass search	100-m road and pad	intact	no
09/30/2021	silver-haired bat	6	29	carcass search	100-m road and pad	dismembered	no
09/30/2021	silver-haired bat	9	29	carcass search	100-m road and pad	intact	no
09/30/2021	silver-haired bat	7	29	carcass search	100-m road and pad	dismembered	no
09/30/2021	silver-haired bat	0	5	carcass search	100-m road and pad	intact	no
10/01/2021	big brown bat	21	28	carcass search	70-m cleared	scavenged	yes*
10/01/2021	big brown bat	32	46	carcass search	70-m cleared	dismembered	yes*
10/01/2021	eastern red bat	45	31	carcass search	70-m cleared	scavenged	yes*
10/01/2021	eastern red bat	28	46	carcass search	70-m cleared	intact	yes*
10/01/2021	eastern red bat	11	46	carcass search	70-m cleared	intact	yes*
10/01/2021	silver-haired bat	52	26	carcass search	70-m cleared	scavenged	yes*
10/01/2021	silver-haired bat	51	26	carcass search	70-m cleared	scavenged	yes*
10/01/2021	silver-haired bat	40	31	carcass search	70-m cleared	scavenged	yes*
10/01/2021	silver-haired bat	4	33	carcass search	70-m cleared	scavenged	yes*
10/01/2021	silver-haired bat	12	43	carcass search	100-m road and pad	intact	no
10/01/2021	silver-haired bat	38	46	carcass search	70-m cleared	intact	yes*
10/04/2021	eastern red bat	64	14	carcass search	70-m cleared	scavenged	yes*

Appendix A. Carcasses found at the Bitter Ridge Wind Farm, Jay County, Indiana, from June 21 – October 15, 2021.

Found Date	Common Name	Distance from Turbine (m)	Search Location	Search Type	Search Area Type	Physical Condition	Dog Aided Search
10/04/2021	silver-haired bat	45	1	carcass search	100-m road and pad	intact	no
10/04/2021	silver-haired bat	25	11	carcass search	70-m cleared	intact	yes*
10/04/2021	silver-haired bat	30	13	carcass search	70-m cleared	intact	yes*
10/04/2021	silver-haired bat	59	13	carcass search	70-m cleared	scavenged	yes*
10/04/2021	silver-haired bat	10	14	carcass search	70-m cleared	intact	yes*
10/04/2021	silver-haired bat	41	14	carcass search	70-m cleared	intact	yes*
10/04/2021	silver-haired bat	17	14	carcass search	70-m cleared	intact	yes*
10/04/2021	silver-haired bat	1	23	carcass search	100-m road and pad	intact	no
10/04/2021	silver-haired bat	32	29	carcass search	100-m road and pad	intact	no
10/05/2021	eastern red bat	25	37	carcass search	70-m cleared	scavenged	yes*
10/05/2021	silver-haired bat	7	27	carcass search	100-m road and pad	scavenged	no
10/05/2021	silver-haired bat	2	30	carcass search	100-m road and pad	scavenged	no
10/05/2021	silver-haired bat	4	33	carcass search	70-m cleared	intact	yes*
10/05/2021	silver-haired bat	34	37	carcass search	70-m cleared	scavenged	yes*
10/05/2021	silver-haired bat	3	40	carcass search	70-m cleared	intact	yes*
10/07/2021	silver-haired bat	15	13	carcass search	70-m cleared	intact	yes*
10/07/2021	silver-haired bat	10	13	carcass search	70-m cleared	injured	yes*
10/07/2021	silver-haired bat	48	17	carcass search	70-m cleared	intact	yes*
10/08/2021	eastern red bat	32	31	carcass search	70-m cleared	scavenged	yes*
10/08/2021	silver-haired bat	23	18	carcass search	70-m cleared	scavenged	yes*
10/08/2021	silver-haired bat	14	28	carcass search	70-m cleared	scavenged	yes*
10/08/2021	silver-haired bat	8	31	carcass search	70-m cleared	scavenged	yes*
10/08/2021	silver-haired bat	33	31	carcass search	70-m cleared	scavenged	yes*
10/08/2021	silver-haired bat	12	35	carcass search	100-m road and pad	intact	no
10/08/2021	silver-haired bat	40	40	carcass search	70-m cleared	scavenged	yes*
10/08/2021	silver-haired bat	12	46	carcass search	70-m cleared	intact	yes*
10/08/2021	silver-haired bat	4	49	carcass search	100-m road and pad	injured	no
10/08/2021	silver-haired bat	8	50	carcass search	100-m road and pad	intact	no
10/11/2021	Indiana bat	50	11	carcass search	70-m cleared	scavenged	yes*
10/11/2021	silver-haired bat	28	11	carcass search	70-m cleared	intact	yes*

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Found Date	Common Name	Distance from Turbine (m)	Search Location	Search Type	Search Area Type	Physical Condition	Dog Aided Search
10/11/2021	silver-haired bat	33	13	carcass search	70-m cleared	scavenged	yes*
10/11/2021	silver-haired bat	24	14	carcass search	70-m cleared	dismembered	yes*
10/11/2021	silver-haired bat	38	18	carcass search	70-m cleared	scavenged	yes*
10/11/2021	silver-haired bat	47	18	carcass search	70-m cleared	scavenged	yes*
10/11/2021	silver-haired bat	54	19	carcass search	70-m cleared	intact	yes*
10/11/2021	silver-haired bat	35	20	carcass search	70-m cleared	intact	yes*
10/11/2021	silver-haired bat	24	20	carcass search	70-m cleared	scavenged	yes*
10/11/2021	silver-haired bat	33	20	carcass search	70-m cleared	intact	yes*
10/12/2021	eastern red bat	18	28	carcass search	70-m cleared	scavenged	yes*
10/12/2021	eastern red bat	9	50	carcass search	100-m road and pad	intact	no
10/12/2021	silver-haired bat	43	28	carcass search	70-m cleared	intact	yes*
10/12/2021	silver-haired bat	49	28	carcass search	70-m cleared	intact	yes*
10/12/2021	silver-haired bat	47	39	carcass search**	100-m road and pad	scavenged	no
10/12/2021	silver-haired bat	8	46	carcass search	70-m cleared	intact	yes*
10/14/2021	eastern red bat	20	11	carcass search	70-m cleared	intact	yes*
10/14/2021	eastern red bat	21	20	carcass search	70-m cleared	intact	yes*
10/14/2021	hoary bat	15	5	carcass search	100-m road and pad	intact	no
10/14/2021	silver-haired bat	42	11	carcass search	70-m cleared	scavenged	yes*
10/15/2021	eastern red bat	44	26	carcass search	70-m cleared	scavenged	yes*
Birds							
6/21/2021	northern flicker	18	36	carcass search	70-m uncleared plot	scavenged	yes
6/21/2021	red-tailed hawk	29	10	carcass search	70-m uncleared plot	scavenged	yes
6/21/2021	unidentified passerine	32	39	incidental	70-m uncleared plot	scavenged	yes
6/22/2021	unidentified passerine	79	49	carcass search**	70-m uncleared plot	scavenged	yes
6/22/2021	unidentified small bird	30	49	carcass search	70-m uncleared plot	dismembered	yes
6/23/2021	horned lark	28	28	carcass search	70-m cleared plot	scavenged	yes
6/23/2021	turkey vulture	42	42	carcass search	70-m uncleared plot	scavenged	yes
6/24/2021	horned lark	38	47	carcass search	70-m uncleared plot	scavenged	yes
6/24/2021	killdeer	61	18	carcass search	70-m cleared plot	feather spot	yes
6/28/2021	horned lark	40	47	carcass search	70-m uncleared plot	scavenged	yes

Appendix A. Carcasses found at the Bitter Ridge Wind Farm, Jay County, Indiana, from June 21 – October 15, 2021.

Found Date	Common Name	Distance from Turbine (m)	Search Location	Search Type	Search Area Type	Physical Condition	Dog Aided Search
7/1/2021	chimney swift	60	18	carcass search	70-m cleared plot	scavenged	yes
7/2/2021	horned lark	24	14	carcass search	70-m cleared plot	scavenged	yes
7/6/2021	red-tailed hawk	320	26	incidental**	70-m cleared plot	dismembered	no
7/6/2021	tree swallow	25	34	carcass search	100-m road and pad	dismembered	no
7/9/2021	killdeer	45	19	carcass search	70-m cleared plot	intact	yes
7/9/2021	red-bellied woodpecker	22	47	incidental	70-m uncleared plot	dismembered	yes
7/12/2021	killdeer	33	11	carcass search	70-m cleared plot	scavenged	yes
7/13/2021	cedar waxwing	55	42	carcass search	70-m uncleared plot	scavenged	yes
7/13/2021	killdeer	9	33	carcass search	70-m cleared plot	scavenged	yes
7/13/2021	turkey vulture	49	46	carcass search	70-m cleared plot	dismembered	yes
7/16/2021	horned lark	55	13	carcass search	70-m cleared plot	scavenged	yes
7/16/2021	killdeer	30	11	carcass search	70-m cleared plot	scavenged	yes
7/16/2021	mourning dove	5	32	carcass search	100-m road and pad	intact	no
7/16/2021	tree swallow	50	11	carcass search	70-m cleared plot	scavenged	yes
7/16/2021	unidentified small bird	6	27	carcass search	100-m road and pad	scavenged	no
7/19/2021	red-tailed hawk	22	49	incidental	70-m uncleared plot	intact	no
7/23/2021	unidentified sparrow	25	39	carcass search	70-m uncleared plot	scavenged	yes
7/26/2021	turkey vulture	27	20	carcass search	70-m cleared plot	dismembered	yes
7/27/2021	killdeer	60	14	incidental	n/a	feather spot	yes
7/27/2021	unidentified passerine	8	27	carcass search	100-m road and pad	scavenged	no
7/27/2021	unidentified small bird	57	11	incidental	n/a	feather spot	yes
7/27/2021	unidentified swallow	35	14	incidental	n/a	intact	yes
7/28/2021	killdeer	65	46	carcass search	70-m cleared plot	feather spot	yes
7/29/2021	horned lark	38	19	carcass search	70-m cleared plot	feather spot	yes
7/29/2021	unidentified vireo	67	39	carcass search	70-m uncleared plot	feather spot	yes
7/30/2021	unidentified passerine	32	43	carcass search	70-m uncleared plot	scavenged	yes
8/2/2021	red-tailed hawk	35	20	carcass search	70-m cleared plot	scavenged	yes
8/5/2021	horned lark	57	8	carcass search	100-m road and pad	scavenged	no
8/9/2021	horned lark	7	16	carcass search	100-m road and pad	dismembered	no
8/10/2021	barn swallow	60	46	carcass search	70-m cleared plot	scavenged	yes

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Found Date	Common Name	Distance from Turbine (m)	Search Location	Search Type	Search Area Type	Physical Condition	Dog Aided Search
8/11/2021	killdeer	58	13	carcass search	70-m cleared plot	feather spot	yes
8/16/2021	European starling	4	6	carcass search	100-m road and pad	dismembered	no
8/16/2021	pine warbler	5	19	carcass search	70-m cleared plot	dismembered	yes
8/17/2021	horned lark	38	28	carcass search	70-m cleared plot	scavenged	yes
8/17/2021	horned lark	9	31	carcass search	70-m cleared plot	scavenged	yes
8/17/2021	killdeer	53	37	carcass search	70-m cleared plot	scavenged	yes
8/19/2021	horned lark	3	11	carcass search	70-m cleared plot	scavenged	yes
8/19/2021	horned lark	32	17	carcass search	70-m cleared plot	feather spot	yes
8/23/2021	horned lark	37	11	carcass search	70-m cleared plot	feather spot	yes
8/23/2021	horned lark	77	18	carcass search**	70-m cleared plot	scavenged	yes
8/24/2021	horned lark	17	31	carcass search	70-m cleared plot	feather spot	yes
8/26/2021	chimney swift	46	17	carcass search	70-m cleared plot	scavenged	yes
8/26/2021	horned lark	54	13	carcass search	70-m cleared plot	feather spot	yes
8/26/2021	horned lark	37	18	carcass search	70-m cleared plot	intact	yes
8/30/2021	horned lark	7	18	carcass search	70-m cleared plot	scavenged	yes
8/31/2021	horned lark	26	40	carcass search	70-m cleared plot	scavenged	yes
9/2/2021	horned lark	47	11	carcass search	70-m cleared plot	scavenged	yes
9/2/2021	horned lark	51	17	carcass search	70-m cleared plot	feather spot	yes
9/2/2021	horned lark	1	18	carcass search	70-m cleared plot	scavenged	yes
9/2/2021	unidentified oriole	18	18	carcass search	70-m cleared plot	scavenged	yes
9/6/2021	horned lark	45	11	carcass search	70-m cleared plot	scavenged	yes
9/6/2021	horned lark	43	18	carcass search	70-m cleared plot	feather spot	yes
9/6/2021	horned lark	25	19	carcass search	70-m cleared plot	scavenged	yes
9/6/2021	magnolia warbler	50	7	carcass search	100-m road and pad	dismembered	no
9/6/2021	red-eyed vireo	77	17	carcass search**	70-m cleared plot	scavenged	yes
9/6/2021	red-eyed vireo	5	17	carcass search	70-m cleared plot	intact	yes
9/7/2021	horned lark	28	26	carcass search	70-m cleared plot	scavenged	yes
9/7/2021	horned lark	37	37	carcass search	70-m cleared plot	scavenged	yes
9/7/2021	horned lark	23	40	carcass search	70-m cleared plot	scavenged	yes
9/7/2021	unidentified passerine	25	46	carcass search	70-m cleared plot	scavenged	yes

Appendix A. Carcasses found at the Bitter Ridge Wind Farm, Jay County, Indiana, from June 21 – October 15, 2021.

Found Date	Common Name	Distance from Turbine (m)	Search Location	Search Type	Search Area Type	Physical Condition	Dog Aided Search
9/10/2021	horned lark	19	40	carcass search	70-m cleared plot	scavenged	yes
9/10/2021	horned lark	39	40	carcass search	70-m cleared plot	scavenged	yes
9/10/2021	red-eyed vireo	20	37	carcass search	70-m cleared plot	intact	yes
9/10/2021	ruby-throated hummingbird	17	28	carcass search	70-m cleared plot	intact	yes
9/13/2021	black-throated green warbler	36	17	carcass search	70-m cleared plot	intact	yes
9/14/2021	mourning warbler	39	26	carcass search	70-m cleared plot	scavenged	yes
9/16/2021	horned lark	19	20	carcass search	70-m cleared plot	scavenged	yes
9/16/2021	horned lark	32	20	carcass search	70-m cleared plot	intact	yes
9/16/2021	northern parula	22	44	incidental	100-m road and pad	dismembered	no
9/17/2021	American redstart	64	37	carcass search	70-m cleared plot	scavenged	yes
9/17/2021	horned lark	24	40	carcass search	70-m cleared plot	dismembered	yes
9/17/2021	unidentified passerine	27	46	carcass search	70-m cleared plot	scavenged	yes
9/20/2021	American redstart	50	20	carcass search	70-m cleared plot	scavenged	yes
9/20/2021	horned lark	22	19	carcass search	70-m cleared plot	scavenged	yes
9/20/2021	magnolia warbler	25	17	carcass search	70-m cleared plot	scavenged	yes
9/20/2021	unidentified warbler	16	17	carcass search	70-m cleared plot	scavenged	yes
9/21/2021	horned lark	18	37	carcass search	70-m cleared plot	scavenged	yes
9/23/2021	horned lark	37	20	carcass search	70-m cleared plot	intact	yes
9/27/2021	unidentified flycatcher	10	14	carcass search	70-m cleared plot	intact	yes
9/28/2021	magnolia warbler	85	34	carcass search	100-m road and pad	dismembered	no
9/30/2021	American redstart	68	17	carcass search	70-m cleared plot	scavenged	yes
9/30/2021	horned lark	51	17	carcass search	70-m cleared plot	scavenged	yes
9/30/2021	killdeer	29	17	carcass search	70-m cleared plot	intact	yes
10/2/2021	turkey vulture	5	39	incidental	100-m road and pad	scavenged	no
10/4/2021	horned lark	33	14	carcass search	70-m cleared plot	intact	yes
10/4/2021	horned lark	34	14	carcass search	70-m cleared plot	intact	yes
10/4/2021	Tennessee warbler	6	2	carcass search	100-m road and pad	scavenged	no
10/5/2021	turkey vulture	8	39	carcass search	100-m road and pad	scavenged	no
10/7/2021	golden-crowned kinglet	41	11	carcass search	70-m cleared plot	scavenged	yes
10/7/2021	horned lark	13	13	carcass search	70-m cleared plot	intact	yes

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Found Date	Common Name	Distance from Turbine (m)	Search Location	Search Type	Search Area Type	Physical Condition	Dog Aided Search
10/7/2021	horned lark	40	14	carcass search	70-m cleared plot	intact	yes
10/7/2021	killdeer	6	15	carcass search	100-m road and pad	dismembered	no
10/12/2021	turkey vulture	67	40	carcass search	70-m cleared plot	scavenged	yes
10/14/2021	killdeer	6	12	carcass search	100-m road and pad	dismembered	no
10/15/2021	horned lark	36	33	carcass search	70-m cleared plot	intact	yes

** Carcass was found outside the search area
m = meters

Appendix B. Truncated Weighted Likelihood Area Adjustment Estimate Model Fitting Results

Appendix B1. Search area adjustment models for bats from the Bitter Ridge Wind Farm, Jay County, Indiana, from June 21 – October 15, 2021.

Distribution	AICc	Delta AICc
Gompertz	17,869.20	0*
normal	17,958.73	89.53
Rayleigh	18,074.34	205.15
Weibull	18,076.29	207.09
gamma	18,261.41	392.21

* Selected model.

AICc = corrected Akaike Information Criterion.

Appendix B2. Truncated weighted maximum likelihood search area estimates for the Bitter Ridge Wind Farm, Jay County, Indiana, from June 21 – October 15, 2021.

Season	Search Area Type	Distribution	Parameter 1	Parameter 2	Area Correction
Summer	100-m road and pad	Gompertz	0.0466	0.0074	0.08
	70-m cleared plot	Gompertz	0.0466	0.0074	0.96
	70-m uncleared plot	Gompertz	0.0466	0.0074	0.98
Fall	100-m road and pad	Gompertz	0.0466	0.0074	0.09
	70-m cleared plot	Gompertz	0.0466	0.0074	0.96

m = meters.

n = 524 bats.

Appendix C. Inputs for Single Class and Multiple Class Modules in Evidence of Absence

Appendix C1. Inputs needed to run Evidence of Absence: Single Class Module for the Bitter Ridge Wind Farm, Jay County, Indiana, from June 21 – October 15, 2021.

					Searcher Efficiency		Carcass Persistence[1]	
Season	Plot Type	Search interval (I)	Number of searches[2]	Spatial Coverage (a)	Carcasses available	Carcasses found	Shape (α)	Scale (β)
summer	70-m cleared plots	3.5	12	0.96	63	48	1.9	24.7
summer	100-m road and pads	3.5	12	0.08	34	31	1.9	8.73
summer	70-m uncleared plots	3.5	12	0.98	63	48	1.9	24.09
fall	70-m cleared plots	3.5	22	0.96	63	48	0.97	38.21
fall	100-m road and pads	3.5	22	0.09	34	31	0.97	13.5

[1]A loglogistic distribution was used for carcass persistence distribution
[2]This shows the actual number of searches. If using the EoA Graphical User Interface, it is necessary to add a search to each of the values because the EoA Graphical User Interface automatically subtracts one search as a clearing search.

Appendix C2. Inputs needed to run Evidence of Absence to combine across plot types within seasons: Multiple Class Module for the Bitter Ridge Wind Farm, Jay County, Indiana, from 2021.

Season	Plot Type	Ba	Bb	Within-season Sampling Fraction (DWP)
summer	70-m cleared plots	125.32	19.91	0.38
summer	100-m road and pads	490.07	5822.37	0.41
summer	70-m uncleared plots	123.01	16.14	0.22
fall	70-m cleared plots	143.71	28.47	0.27
fall	100-m road and pads	425.56	5418.99	0.73

Appendix C3. Inputs needed to run the Evidence of Absence to combine across seasons: Multiple Class Module for the Bitter Ridge Wind Farm, Jay County, Indiana, from 2021.

Season	Ba	Bb	Arrival Proportions (DWP)
Summer (June 21 – July 30)	894.49	734.47	0.2
Fall (August 1 – October 15)	872.1	2265.82	0.8

Appendix C4. Inputs needed to run the Evidence of Absence: Multiple Years Module for the Bitter Ridge Wind Farm, Jay County, Indiana, from 2021.

Year	Ba	Bb	Weights (ρ)
2021	1559.98	3145.32	1