2024 Post-Construction Monitoring Study for the Bitter Ridge Wind Farm Jay County, Indiana

Final Report

August 1 – October 15, 2024

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WEST

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 Indiana bat and northern long-eared bat (hereafter, Covered Species) from the US Fish and Wildlife Service dated June 15, 2021. From 2021 through 2023, monitoring studies were completed to estimate Covered Species take using the Evidence of Absence (EoA) framework as outlined in the Habitat Conservation Plan (HCP). The take estimate assessment conducted at the end of the 2023 study period showed that the estimated cumulative take was below the permitted take level for both Covered Species, but that the annual take rate for Indiana bats exceeded the short-term adaptive management threshold defined in the HCP. Therefore, adaptive management was enacted during the 2024 fall season, in the form of an increase of curtailment rates to 5.5 meters (m) per second cut-in speed from August 1 – October 15, 2024. Western EcoSystems Technology, Inc., completed a post-construction monitoring (PCM) study during this period of increased curtailment to assess how the adaptive management affected the take rate of the Covered Species.

The overall goal of this 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 estimate Covered Species take using the EoA framework as outlined in the HCP and to assess how the adaptive management enacted in 2024 affected the take of the Covered Species, particularly Indiana bats. This report presents the results of the study conducted within the Project from August 1 – October 15, 2024.

Standardized carcass searches were completed for bats at three plot types: cleared plots, uncleared plots, and road and pad plots. Technicians searched gravel road and pad plots at 37 turbines out to a distance of 100 m (328 feet [ft]) from the turbine and detection-dog teams searched cleared plots at eight turbines and uncleared plots at seven turbines. Cleared and uncleared plots were searched out to a radius of 70 m (230-ft). Searcher efficiency and carcass persistence trials were also conducted to correct for carcass detection and scavenger removal bias.

The most commonly found bat species were silver-haired bat (120 carcasses; 41.4%) and eastern red bat (89; 30.7%), followed by big brown bat (52; 17.9%) and hoary bat (25; 8.6%). Species composition recorded at the Project was similar to the first three years of ITP monitoring conducted from 2021 – 2023. The annual probability of detection (*g*) distribution for the entire 2024 year had a mean of 0.13 (95% Credible Interval: 0.12 – 0.14). During the study, 290 bat fatalities were found. The overall bat fatality rate was 15.48 bats per megawatt (90% Confidence Interval: 9.56 – 26.29) during the study period.

Two Indiana bat carcasses were found during PCM surveys: one on September 5, 2024, at Turbine 21, and one on September 17, 2024, at Turbine 33. No northern long-eared bat carcasses were found. Based on ITP monitoring to date, cumulative take to-date, M^* at $\alpha = 0.5$ (50^{th} credible bound), is estimated to be 39 Indiana bats and zero 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 take rate (λ) at the Project was 11.09 Indiana bats and 0.58 northern long-eared bats. The probability that the annual take rate exceeded the expected annual take rate for Indiana bat (11.09) was greater than 95%, exceeding the short-term adaptive management trigger. Pursuant to HCP Section 5.4.3, Bitter Ridge may elect to begin considering further adaptive management responses.

REPORT PARTICIPANTS

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REPORT REFERENCE

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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 [US Fish and Wildlife Service (USFWS), dated June 15, 2021]) for the federally listed endangered Indiana bat (*Myotis sodalis*; USFWS 1967) and northern long-eared bat (*M. septentrionalis* [USFWS 2023]; hereafter Covered Species). The ITP requires the Project to minimize impacts to Covered Species. The ITP also requires monitoring to determine if the level of impact exceeds authorized amounts of take, and to determine if further adaptive management is necessary to further reduce impacts.

From 2021 through 2023 Western EcoSystems Technology, Inc. (WEST), completed post-construction monitoring (PCM) studies designed to achieve a probability of detection, or *g*, of 0.25 each year. The objectives of these studies were to estimate Covered Species take using the Evidence of Absence (EoA) framework as outlined in the Habitat Conservation Plan (HCP). The take estimate assessment conducted at the end of the 2023 study period showed that the estimated cumulative take was below the permitted take level for both Covered Species, but that the annual take rate for Indiana bats exceeded the short-term adaptive management threshold defined in the HCP. Therefore, adaptive management was enacted during the 2024 fall season, in the form of an increase of curtailment rates to 5.5 meters per second (m/s) cut-in speed from August 1 – October 15, 2024. In support of adaptive management, WEST completed a PCM study during this period of increased curtailment to assess how the adaptive management affected the take rate of the Covered Species.

This report presents the results of the study conducted within the Project from August 1 – October 15, 2024; the Covered Species take assessment in this report also incorporates the results of the June 21 – October 15, 2021, study (Murray et al. 2022),the results of the April 1 – October 15, 2022 study (Murray et al. 2023) and the results of the April 1 – October 15, 2023 study (DuBridge et al. 2024). Bird fatalities were recorded but were not the focus of this ITP study, and no analysis of avian fatality rates is included in this report.

PERMIT AREA

The Project is located in Jay County, Indiana, on 8,971.7 hectares (22,169.5 acres) of private land approximately nine kilometers (six miles) southwest of Portland, Indiana (Permit Area; 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 (2024), the primary land cover type within the Project is cultivated crops, which covers 79.4% of the Permit Area, followed by deciduous forest (8.8%), low intensity developed areas (5.0%), hay/pasture (3.5%), and developed open space (2.0%). The remaining land cover types compose less than 1.5% of total land cover (Table 1).

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. In 2024, the Project followed the minimization regime prescribed in the HCP during the spring and summer seasons; in the spring (April 1 – May 15, turbines were feathered below the cut-in speed of 3.0 m/s. The HCP identified 37 turbines within 305 m (1,000 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/s and temperatures were above 10 degrees Celsius (°C) from May 16 – July 31. The remaining 15 turbines were feathered below the cut-in speed of 3.0 m/s during the summer. Because no adaptive management was enacted during spring or summer, no fatality monitoring was conducted in those seasons.

During the 2024 fall migration (August 1 – October 15) period, adaptive management occurred and all turbines were feathered from half an hour before sunset to half an hour after sunrise when wind speeds were below 5.5 m/s; and temperatures were above 10 °C; this is an increase in curtailment in the fall migration period compared to the 5.0 m/s curtailment indicated in the HCP and implemented for the first three years of operation. The PCM conducted in 2024 occurred during this August 1 – October 15 period of increased curtailment.

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	7,119.3	17,592.2	79.4
Deciduous Forest	789.5	1,950.8	8.8
Developed, Low Intensity	446.2	1,102.7	5.0
Hay/Pasture	310.1	766.2	3.5
Developed, Open Space	182.1	450.0	2.0
Developed, Medium Intensity	37.4	92.3	0.4
Woody Wetlands	29.9	74.0	0.3
Barren Land	27.3	67.5	0.3
Open Water	14.4	35.6	0.2
Emergent Herbaceous Wetlands	5.9	14.7	0.1
Developed, High Intensity	3.8	9.5	<0.1
Mixed Forest	2.6	6.4	<0.1
Herbaceous	2.0	4.9	<0.1
Shrub/Scrub	0.9	2.2	<0.1
Evergreen Forest	0.2	0.4	<0.1
Total	**8,971.7**	**22,169.5**	**100**

Data from the National Land Cover Database (2024).

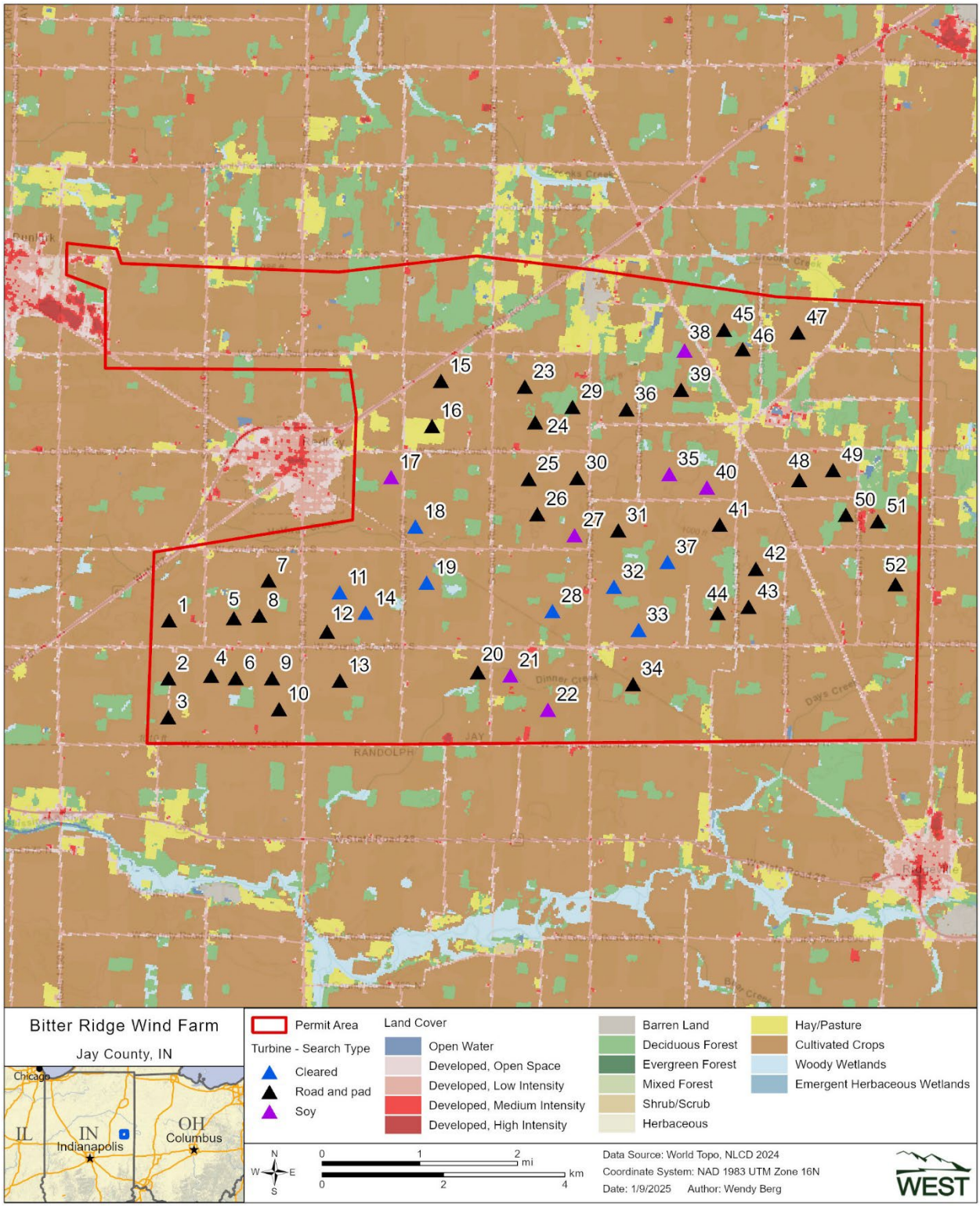

Figure 1. Turbine locations by fall search type and surrounding land cover at the Bitter Ridge Wind Farm, Jay County, Indiana. Road and pad plots were searched for all turbines in spring.

METHODS

WEST conducted surveys utilizing the same level of effort (number, type and size of plots, and search frequency) as what was conducted during the fall period in 2023 (DuBridge et al. 2024). The outline of the plan was emailed to the USFWS by Bitter Ridge on May 20, 2024, and USFWS approval of the proposed plan was given via return email on the same date (J. Wieringa, USFWS, pers. comm.).

Standardized Carcass Searches

Number of Turbines Sampled, Search Frequency, and Plot Size

Technicians and detection-dog teams conducted standardized carcass searches (carcass searches) from August 1 – October 15, 2024. Search effort was designed to take advantage of available detection-dog teams and to maximize effort when the greatest number of Covered Species were expected to occur (Table 2).

Table 2. Search effort by plot type at the Bitter Ridge Wind Farm, Jay County, Indiana.

Season	Plot Type	Search Interval	Number of Turbines	Search Team
Fall (August 1 – October 15)	100-m road and pad plot	Twice weekly	37	Technician
	70-m uncleared plot	Twice weekly	7	Detection-dog team
	70-m cleared plot	Twice weekly	8	Detection-dog team

m = meter.

All 52 turbines were searched twice per week during the fall (Table 2). A technician searched gravel road and pad areas (road and pad plots) under 37 turbines to a distance of 100 m from the turbine (Figure 1). A detection-dog team searched seven turbines as uncleared plots with a 70-m radius and eight turbines as cleared plots with a 70-m radius (Table 2, Figure 1).

During the fall study period, vegetation at cleared plots was mowed within 10 to 15 centimeters(four to six inches) in height and maintained by Project staff to enhance detectability of carcasses. Uncleared plots were vegetated with soybeans (*Glycine max*).

Search Methods

All personnel were trained to follow the Bitter Ridge search protocol, including proper handling and reporting of carcasses. Carcass searches began at 7:00 AM and ended by 4:00 PM to comply with site safety protocols during the 2024 field season.

Technician Searches

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 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.

Detection-dog Teams

Detection-dog teams searched cleared and uncleared plots for bat carcasses. Detection dogs were considered candidates for carcass searches if the dogs met temperament, basic obedience, and requirements towards the ability to detect bat carcasses. Temperament characteristics that are sought after are high-energy dogs, with a high food or toy drive, and eagerness to please the handler. Prior to conducting searches at Bitter Ridge, handlers trained the 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 performance. The detection-dog coordinator conducted a 2-day field evaluation of each detection-dog team; after teams achieved a searcher efficiency of 75% or greater for 30 bats during evaluation trials, the teams were approved to conduct 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 German shepherd and two golden retrievers.

Prior to each search, handlers determined the survey start points and the number of transects needed to cover the plot after considering 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 and/or handlers 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 the carcass 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 (with range finder), azimuth from turbine, location of carcass as Global Positioning System (GPS) coordinates (latitude and longitude), ground cover 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. Carcasses found in non-search areas (e.g., outside of a plot boundary) and those recorded as incidental discoveries (found outside of a scheduled search) were documented following the same protocol for those found during standard searches, but these carcasses were not included in analysis.

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

- Intact—a complete carcass, that was not badly decomposed, and showed no sign of being fed upon by a predator or scavenger.
- Scavenged—an entire carcass that showed 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 was heavily infested by insects.
- Dismembered—an entire carcass that was found in multiple pieces distributed more than 1 m apart from one another due to scavenging or other reasons.
- Injured—a bat or bird that was 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 that were found at one location, indicating predation or scavenging of a bird carcass.

Bat carcasses were collected under the Project's ITP (ESPER0014119), WEST's Federal Native Endangered and Threatened Species Recovery Permit (ES234121-10), and WEST's Indiana Special Purpose Salvage Permit (2263). 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 were left in place. Injured bats were not taken to rehabilitation facilities or euthanized but were left in place after data was safely collected.

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. These samples were submitted to a USFWS-approved laboratory, 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 the forearms measured over 41 millimeters long) were identified to the closest genus or type 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 feathers. A federally permitted bat biologist (Meredith Hoggatt [ESPER0039249]) 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 of any species listed as endangered or threatened under the Endangered Species Act of 1973, or any state-listed threatened or endangered species. Bat carcasses are planned to be delivered to the bat repository with the Illinois Natural History Survey at University of Illinois Urbana-Champaign in February 2025, as directed by the USFWS Indiana Ecological Services Field Office in Bloomington, Indiana.

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*), hoary bats (*Lasiurus cinereus*), and silver-haired bats (*Lasionycteris noctivagans*) that had previously been found on site. A minimum of 20 bat carcasses were placed per plot type. Multiple trials were conducted during the fall study period 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 (technicians or detection-dogs) 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. Forty-three 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 on each plot type to incorporate the effects of varying weather and climatic conditions on carcass persistence. 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 at one time to avoid potential over-seeding and attracting scavengers.

Technicians monitored the trial carcasses over a 30-day period according to the following schedule, as closely as possible. Carcasses were checked daily for the first four days, then on days 7, 10, 14, 21, and 30. Trial carcasses were monitored until the carcasses 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 cleared plots using a Juniper Systems Geode submeter GPS unit. Soy plot boundaries were mapped via desktop geographic information system (GIS) software based on turbine location and size of plot, and road and pad plot boundaries, recorded during previous search years were used. 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. EoA was used with data collected in the field to estimate the overall probability of detecting a bat carcass, the take rate of Covered Species, and the number of Covered Species fatalities that occurred. 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 efficiency and CPTs, the seasonal arrival distribution of bats, and the detection reduction factor (*k;* described below).

Fatality Rate Estimation

Carcasses included in the fatality rate estimation were found within the search plots and had an estimated time of death within the study period. Fatality estimates were calculated for bats using GenEst (a generalized estimator of fatality; Dalthorp et al. 2018, Simonis et al. 2018). To obtain an overall estimate of fatality, each carcass included in the analysis was adjusted to account for searcher efficiency, carcass persistence, a detection reduction factor (also referred to as "*k*"; see below), and search area adjustment. Estimates and 90% Confidence Intervals (CI) were calculated using a parametric bootstrap (Dalthorp et al. 2018).

Searcher Efficiency Estimation

Data collected during searcher efficiency trials were used to estimate the probability that bat carcasses were detected by searchers. Estimates of searcher efficiency were used to adjust carcass counts for detection bias. Searcher efficiency is the probability of a carcass being detected by a searcher given the carcass was available to be found. 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 plot type, we modeled searcher efficiency using logistic regression, while accounting for the detection reduction factor *k* (Dalthorp et al. 2018). Searcher efficiency was estimated separately for technicians and detection-dog teams to account for different modes of detection (i.e., technicians use sight, whereas dogs use scent). Covariates for these logit regression models included plot type (for detection-dog teams only). 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-supported model was selected as the most parsimonious model (i.e., model with the fewest parameters) 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 0 to 1. When *k* is 0, it implies a carcass that was missed on the first search would never be found on subsequent searches. A *k* of 1 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 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. Models of carcass persistence were used to adjust carcass counts for removal bias by estimating the average probability a carcass persisted through the search interval (i.e., the time between scheduled searches). The persistence of a carcass was modeled using an interval-censored survival regression for each size class using exponential, loglogistic, lognormal, and Weibull distributions (Kalbfleisch and Prentice 2002, Dalthorp et al. 2018). As with searcher efficiency, carcass persistence models were estimated separately by search team (i.e., plots searched by technicians versus plots searched by detection-dog teams) to account for different modes of detection and different plot types. Plot type (cleared plot and uncleared plot) was included as a potential covariate for the detection-dog model. No covariates were included for the technician model. The best-supported model was selected as the most parsimonious model (i.e., model with the fewest parameters) 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% CI of β) were used as inputs in the EoA Single Class module.

Search Area Adjustment

The search area adjustment accounted for unsearched areas beneath turbines and was calculated as a probability that ranged from 0 to 1. For example, a search area adjustment of 0.75 meant that an estimated 75% of carcasses fell within the search plots. The search area adjustment was estimated by multiplying the predicted proportion of carcasses occurring within each 1-m annulus around the base of the turbine (according to the carcass-density distribution) and the proportion of area searched within that 1-m annulus. The product of these two components for each annulus was summed over all 1-m annuli from the turbine base to the maximum predicted fall distance.

Unsearched areas were due to survey obstacles such as ground cover (e.g., tall crops) or terrain, or areas where carcasses fell outside the search plots (e.g., a carcass landed 80 m [262 ft] away from the turbine on a plot searched out to 70 m from the turbine base). The proportion of area searched was calculated in a GIS program as the amount of area searched divided by the total area searched at each 1-m annulus around the turbine.

The carcass-density distribution predicts the likelihood a carcass fell a given distance from the turbine base and can be estimated using a number of analysis methods. 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. Truncation accounts for carcasses beyond the search radius and weights account for unequal search effort. Weights were based on probability of detection and the proportion of area searched in each 1-m annulus around the turbine. Distributions considered were normal, gamma, Gompertz, and Weibull (parameterized according to R Development Core Team [2016], Yee and Moler [2020]). The best-supported model was selected as the most parsimonious model (i.e., model with the fewest parameters) within two AICc units of the model with the lowest AICc value.

Carcasses Excluded from Area Adjustment Calculations

Fatalities were excluded from the area adjustment used in both the EoA and the all-bat fatality estimates 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 incidentally on a plot 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**), the mean annual take rate (λ), and evaluate the probability that the estimated annual take rate (λ) exceeded the expected annual take rate (τ) for Indiana bat and northern long-eared bat. Estimates were calculated using the Single Class, Multiple Class, and Multiple Years modules of EoA (Dalthorp et al. 2017).

The probability of detection (*g*) was estimated using the bias corrections for searcher efficiency, carcass persistence, the area adjustment, the fraction by which searcher efficiency was reduced with each successive search (*k*), and the phenology of bat fatalities (i.e., proportion of fatalities expected to occur during each season). Searcher efficiency, carcass persistence probability, and the search area adjustment ("area correction" in EoA) were estimated as described above. The fraction to which searcher efficiency was reduced with each successive search, or *k*, was set to 0.67, as assumed in the HCP. The *Myotis* arrival proportions were set to 0.07 in spring, 0.36 in summer, and 0.57 in fall, as described in the Project's study plan.

The EoA Single Class module was used to estimate the 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 road and pad plots), with weights for each class (density-weighted proportion, or "DWP" in the EoA software) defined by the within-season sampling fraction. The EoA Multiple Years Module was then used to estimate the site-wide, cumulative detection probability for monitoring periods in 2021, 2022, 2023, and 2024. The results from the Multiple Years module (Ba and Bb parameters for the detection probability to date) were used to estimate *M** (the median cumulative take over the life of the permit) and mean annual take rate λ and its 95% CI. The mean annual take rate λ was used to evaluate the short-term adaptive management trigger, and the cumulative take estimate *M** was used to evaluate the long-term adaptive management trigger (see *Adaptive Management Triggers* section below).

The EoA Multiple Years Module requires the input rho (ρ), which weights the years for combining Beta distribution parameters based on relative risk to a given species. Risk is informed by facility operations (i.e., temporal gaps in turbine operations) or changes in operation characteristics (e.g., changes to cut-in speeds). In 2021, the Project ITP was issued part way through the summer season. To account for the incomplete summer season, the 2021 ρ was calculated using DWP as determined by the product of seasonal arrival proportions, turbine risk weights, and relative turbine operations. The summer season was split to reflect that only a portion of the summer was searched. DWPs were rescaled to sum to one, so the adjusted unsearched (representing spring and the portion of summer that was unsearched) DWP was 0.21, the adjusted searched portion of summer DWP was 0.15, and the adjusted fall DWP was 0.64. The DWP for the portion of summer that was searched (0.15) was combined with the fall DWP (0.64) to yield a ρ of 0.79 for 2021. This means that 79% of total annual risk occurred during the permit term and was observed in monitoring data from 2021. In 2022 and 2023, the Project was fully operational for all seasons, so ρ was set to 1. Surveys in 2024 were only completed in the fall season, but *g* was estimated for the full risk period. To account for the higher cut-in speed (5.5 m/s) used during fall, rho was adjusted for 2024 by assuming a reduction of 16.5% in bat mortality rate by operating at a cut-in speed of 5.5 m/s instead of 5.0 m/s in the fall (Whitby et al. 2024). DWP as a product of arrival proportions and turbine risk weights was used again to calculate ρ for 2024. The fall DWP (0.64) was multiplied by the reduction factor of 0.835 (16.5% decrease for 5.5 m/s) and then added to the full summer DWP (0.285) and the full spring DWP (0.078) to yield a ρ value of 0.89 for 2024.

Adaptive Management Triggers

The estimates from the EoA analysis were used to test two adaptive management triggers: a short-term test of whether the estimated take rate exceeded the expected take rate and a long-term test of whether permitted take had been met (Dalthorp and Huso 2015). Both the short- and long-term triggers were tested individually for each of the Covered Species.

Evidence of Absence Short-term Trigger

The EoA short-term trigger is designed as an early warning signal that the Project may be on the path to exceeding permitted take (T) by the end of the permit term. The short-term trigger is designed to determine if an adaptive management response is needed to prevent the cumulative take estimate from actuating a response to the long-term trigger test. The short-term trigger tests

if the estimated annual take rate (λ) exceeded the expected take rate (τ = T ÷ years in permit) at a confidence level of α = 0.05, per the HCP. Data from all four monitoring periods were used in this analysis (2021, 2022, 2023, and 2024) along with the values of ρ listed above (0.79, 1.0, 1.0, and 0.89, respectively). For estimates of λ, it was necessary to rescale the EoA-produced estimates to represent four full years of operation and monitoring using the sum of these ρ values due to limitations with the EoA graphical user interface. It was necessary to scale the annual rate threshold (τ) to represent the level of risk in the moving average estimate of λ for adaptive management triggers associated with λ.

The Project's short-term trigger is designed to evaluate a rolling window of seven years of PCM data. The short-term trigger would be met if within any 7-year rolling window the estimated take rate exceeds the expected take rate with 95% confidence. As noted above, data collected during the first three years of the ITP indicated that the Indiana bat take rate exceeded the expected annual take rate, so following Section 5.4.3 of the HCP adaptive management was implemented sooner than the end of the first 7-year window, and evaluation of the short-term trigger occurred after the implementation of the adaptive management.

Evidence of Absence Long-term Trigger

The EoA long-term trigger is designed to test if the cumulative take to date is equal to or greater than the permitted take (T). Per the HCP, cumulative take to date (*M**) was estimated at a confidence level of α = 0.5 (using the median, or 50th credible bound, of the posterior distribution of estimated mortality). If the cumulative take to date at α = 0.5 is less than the total permitted take (*M** < T), then the Project is in compliance with the ITP. If the cumulative take to date at α = 0.5 is greater than or equal to the total permitted take (*M** ≥ T), then the take limit has been met and the Project must enact avoidance measures.

RESULTS

Standardized Carcass Searches

During fall monitoring, 1,085 searches were conducted (Table 3). Sixty searches (approximately 5%) were missed due to turbine maintenance, weather constraints, and/or safety hazards. Two hundred ninety bat carcasses and 48 bird carcasses were found during 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 August 1 – October 15, 2024.

Season	Plot Type	Search Interval	Number of Searches
Fall (August 1 – October 15)	100-m road and pad plot	Twice weekly	771
	70-m cleared plot	Twice weekly	166
	70-m uncleared plot	Twice weekly	148

m = meter.

Species Composition

The most commonly found bat species were silver-haired bat (120; 41.4%) and eastern red bat (89 carcasses; 30.7%), followed by big brown bat (52; 17.9%) and hoary bat (25; 8.6%). The remaining species composed less than 2.0% of the total bats found. (Table 4; Appendix A). Species composition recorded at the Project was similar to ITP monitoring conducted from 2021 – 2023. Five heavily scavenged bats (e.g., wing membrane only, bones, or partial carcasses) were sent for identification via DNA analysis; DNA analysis identified these as four silver-haired bats, and one Indiana bat. The majority of bat carcasses were recorded on plots searched by detection dog teams (Table 5).

Table 4. Number and percent (%) of bat carcasses found at the Bitter Ridge Wind Farm, Jay County, Indiana, from August 1 – October 15, 2024.

	Included in Area Correction		Outside Search Area*		Outside Study Period*		Total	
Species	**Total**	**%**	**Total**	**%**	**Total**	**%**	**Total**	**%**
silver-haired bat	117	43.0	3	42.9	0	0	120	41.4
eastern red bat	82	30.1	1	14.3	6	54.5	89	30.7
big brown bat	46	16.9	2	28.6	4	36.4	52	17.9
hoary bat	23	8.5	1	14.3	1	9.1	25	8.6
eastern red bat or Seminole bat	2	0.7	0	0	0	0	2	0.7
Indiana bat	2	0.7	0	0	0	0	2	0.7
Total	**272**	**100**	**7**	**100**	**11**	**100**	**290**	**100**

* Carcasses not included in analysis.

Sums may not equal total values shown due to rounding.

Table 5. Species composition by search type for bat carcasses* found at the Bitter Ridge Wind Farm, Jay County, Indiana, from August 1 – October 15, 2024.

	100-m Road and Pad		70-m Cleared Plot		70-m Uncleared Plot	
Species	**# of Carcasses**	**%**	**# of Carcasses**	**%**	**# of Carcasses**	**%**
silver-haired bat	24	35.8	53	44.9	40	46.0
eastern red bat	24	35.8	36	30.5	22	25.3
big brown bat	10	14.9	19	16.1	17	19.5
hoary bat	8	11.9	8	6.8	7	8.0
eastern red bat or Seminole bat	1	1.5	1	0.8	0	0
Indiana bat	0	0	1	0.8	1	1.1
Total	**67**	**100**	**118**	**100**	**87**	**100**

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

Sums may not equal total values shown due to rounding.

m = meter.

Two Indiana bat carcasses were found during PCM surveys: one on September 5, 2024, at Turbine 21, and one on September 17, 2024, at Turbine 33 (Figure 2). The Indiana bats were identified by a permitted bat biologist (ES234121-10) and reported to the USFWS and IDNR on September 17 and October 2. The carcass found at Turbine 21 on September 5 was originally identified as an unidentified *Myotis* and a sample was sent for DNA testing for verification of species. Verification of Indiana bat DNA was received from Dr. Jane Huffman of the Wildlife Genetics Institute on October 2, 2024. The estimated time of death for the Indiana bat found at

Turbine 21 was two to three days prior to discovery; while the Indiana bat found at Turbine 33 was determined to have died zero to one days prior to discovery. DNA analysis identified the Indiana bat carcass found on September 5 at Turbine 21 as a female and the Indiana bat carcass found on September 17 at Turbine 33 was male.

No northern long-eared bat carcasses were found during the study. No tricolored bats (*Perimyotis subflavus*), little brown bats (*Myotis lucifugus*), or state-listed bat species were found in 2024.

Carcasses for Area Adjustment Analysis

Eighteen of the 290 bats found during monitoring season were excluded from modeling the area correction; seven bat carcasses were excluded from analysis because the carcasses were found off plot. Another 11 bats were excluded because the estimated time of death was prior to the start of the surveys (Table 4).

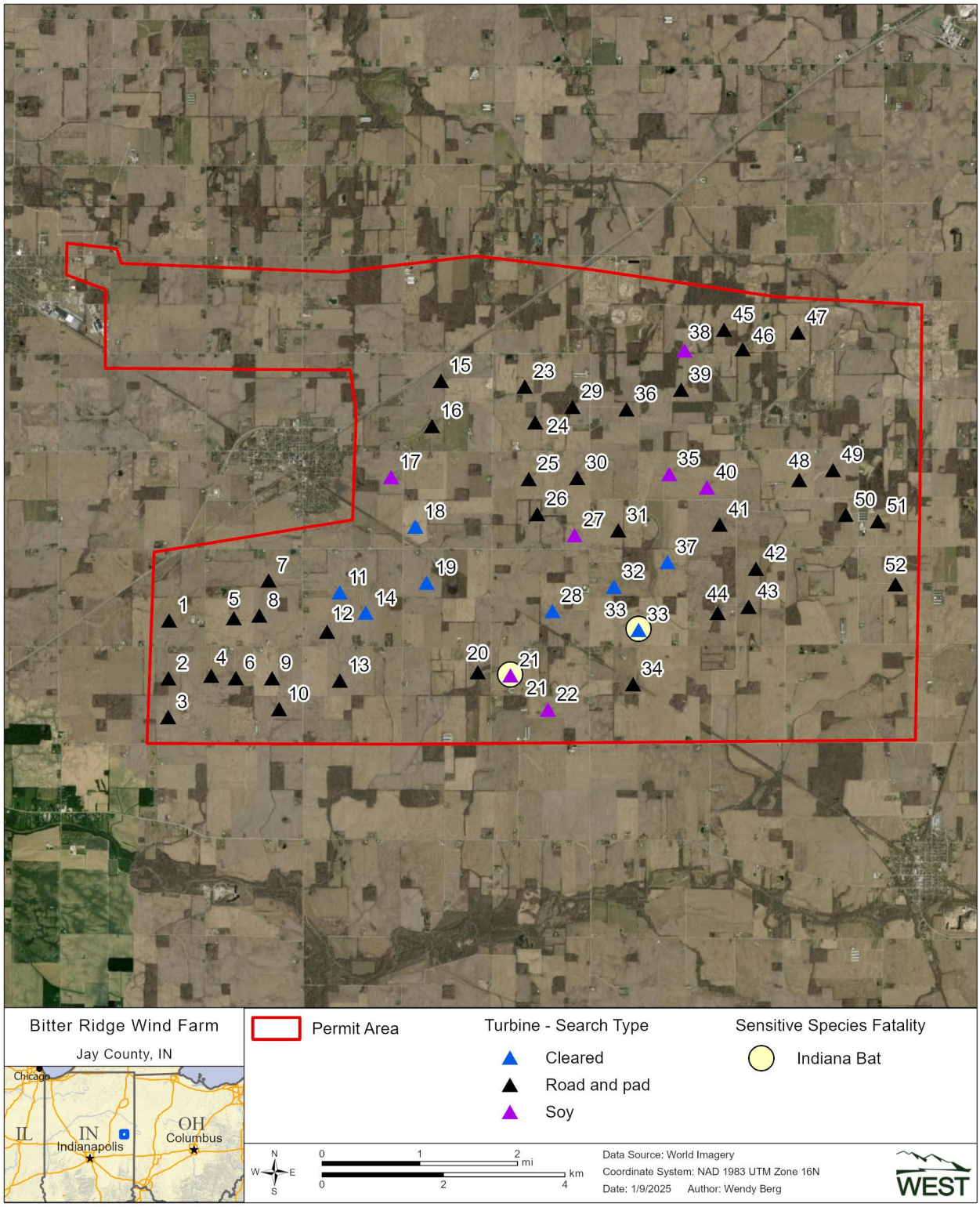

Figure 2. Location of state- and federally listed bat carcasses in relation to turbines at the Bitter Ridge Wind Farm, Jay County, Indiana, from August 1 – October 15, 2024.

Bias Trials

Searcher Efficiency Trials

Sixty-four bats were placed for searcher efficiency trials on six separate dates (August 19 and 26; September 16; October 8, 10, and 14, 2024), and 60 bats were available for search teams to find across all plot types. Overall searcher efficiency rates ranged from 55.6% on 70-m uncleared plots searched by dog teams to 80.0% on 70-m cleared plots (Table 6). The best-fit model for searcher efficiency on 70-m plots did not support the inclusion of plot type as a covariate, meaning there was not a statistically substantial difference between searcher efficiency rates on uncleared and cleared plots (Table 7). There were no covariates to test for the best-fit model for searcher efficiency on 100-m road and pad plots (Table 8). The inputs for the 70-m plots were 38 available carcasses and 26 found carcasses. The inputs for road and pad plots were 22 available carcasses and 16 found carcasses (Table 6).

Table 6. Searcher efficiency results by plot type at the Bitter Ridge Wind Farm, Jay County, Indiana, from August 1 – October 15, 2024.

Season	Plot Type	Number Placed	Number Available	Number Found	Percent (%) Found
Fall	70-m cleared plot*	20	20	16	80.0
	70-m uncleared plot*	20	18	10	55.6
	100-m road and pad plot	24	22	16	72.7
Overall 70-m plot*		**40**	**38**	**26**	**68.4**
Overall		**64**	**60**	**42**	**70.0**

m = meter.

* Detection-dog teams searched 70-m plots.

Table 7. Searcher efficiency models for 70-meter detection-dog searched plots at the Bitter Ridge Wind Farm, Jay County, Indiana, from August 1 – October 15, 2024.

Covariates	*k* Value	AICc	Delta AICc
Plot Search Type	*k* fixed at 0.67	49.09	0
No Covariates	*k* fixed at 0.67	49.51	0.42*

* Selected model.

AICc = Corrected Akaike Information Criterion; Delta AICc = Change in AICc.

n = 38.

Table 8. Searcher efficiency models for 100-meter technician searched road and pad plots at the Bitter Ridge Wind Farm, Jay County, Indiana, from August 1 – October 15, 2024.

Covariates	*k* Value	AICc	Delta AICc
No covariates	0.67	27.98	0*

* Selected model.

AICc = corrected Akaike Information Criterion; Delta AICc = Change in AICc.

n = 22.

Carcass Persistence Trials

Fifteen carcasses were placed to estimate carcass persistence on road and pad plots searched by a technician and 30 carcasses were placed to estimate carcass persistence on detection-dog searched cleared and uncleared plots combined. Two carcasses placed for carcass persistence trials on roads and pads were removed from the study due to extended turbine maintenance preventing staff from checking them on schedule. The best-fit model for carcass persistence rates on road and pad plots followed an exponential distribution with no covariates (Table 9). The best-fit model for carcass persistence rates on detection-dog searched plots had plot search type as a covariate with an exponential distribution and suggests bat carcass persistence rates varied between cleared and uncleared plots (Table 10). The estimated median carcass persistence times ranged from 4.22 days on 100-m road and pad plots, 8.43 days on 70-m cleared plots, and 34.21 days on 70-m uncleared plots (Table 11). The average probability a carcass persisted through a 3.7-day average search interval on 100-m road and pad plots was 0.75 (90% CI: 0.64 – 0.83). The average probability a carcass persisted through a 3.7-day search average interval was 0.86 (90%CI: 0.79 – 0.91) on 70-m cleared and 0.96 (90% CI: 0.93 – 0.98) on uncleared plots (Table 12, Figure 3).

Table 9. Carcass persistence models with covariates and distributions for technician searched road and pad plots at the Bitter Ridge Wind Energy Project, Jay County, Indiana, from August 1 – October 15, 2024.

Location Covariates	Scale Covariates	Distribution	AICc	Delta AICc
No Covariates	–	exponential	58.57	0*
No Covariates	No Covariates	Weibull	61.40	2.83
No Covariates	No Covariates	lognormal	64.15	5.58
No Covariates	No Covariates	loglogistic	64.60	6.03

* Selected model.

AICc = Corrected Akaike Information Criterion; Delta AICc = Change in AICc.

n = 13.

Table 10. Carcass persistence models with covariates and distributions for detection-dog searched plots at the Bitter Ridge Wind Energy Project, Jay County, Indiana, from August 1 – October 15, 2024.

Location Covariates	Scale Covariates	Distribution	AICc	Delta AICc
Plot Search Type	–	exponential	121.02	0*
Plot Search Type	No Covariates	Weibull	123.49	2.47
Plot Search Type	Plot Search Type	Weibull	126.11	5.09
Plot Search Type	No Covariates	loglogistic	126.57	5.55
Plot Search Type	No Covariates	lognormal	128.24	7.22
No Covariates	–	exponential	128.57	7.55
Plot Search Type	Plot Search Type	loglogistic	128.80	7.78
Plot Search Type	Plot Search Type	lognormal	129.02	8.00
No Covariates	No Covariates	Weibull	130.51	9.49
No Covariates	No Covariates	loglogistic	132.25	11.23
No Covariates	No Covariates	lognormal	132.56	11.54

Table 10. Carcass persistence models with covariates and distributions for detection-dog searched plots at the Bitter Ridge Wind Energy Project, Jay County, Indiana, from August 1 – October 15, 2024.

Location Covariates	Scale Covariates	Distribution	AICc	Delta AICc
No Covariates	Plot Search Type	Weibull	132.98	11.96
No Covariates	Plot Search Type	lognormal	133.35	12.33
No Covariates	Plot Search Type	loglogistic	133.66	12.64

* Selected model.

AICc = Corrected Akaike Information Criterion; Delta AICc = Change in AICc.

n = 30.

Table 11. Carcass persistence top models with covariates, distributions, and model parameters for the Bitter Ridge Wind Farm, Jay County, Indiana, from August 1 – October 15, 2024.

Plot Search Type	Distribution	Estimated Median Removal Times (days)	Parameter 1	Parameter 2	Dog Aided?
100-m road and pad plot	exponential*	4.22	rate_R = 0.164	–	no
70-m cleared plot**	exponential*	8.43	rate_R = 0.082	–	Yes
70-m uncleared plot**	exponential*	34.21	rate_R = 0.020	–	Yes

* Parameterization follows the base R parameterization for this distribution.

** Searched by detection-dog teams.

m = meter.

Table 12. Probability a carcass would persist through the search interval for the Bitter Ridge Wind Farm, Jay County, Indiana, from August 1 – October 15, 2024.

Season	Plot Type	Search Interval (days)	Average Probability of Persistence Through Search Interval	90% Confidence Interval
Fall	100-m road and pad plot	Twice Weekly (3.7)	0.75	0.64 – 0.83
	70-m cleared plot*	Twice Weekly (3.7)	0.86	0.79 – 0.91
	70-m uncleared plot*	Twice Weekly (3.7)	0.96	0.93 – 0.98

m = meter.

* 70-m plots searched by detection-dog team.

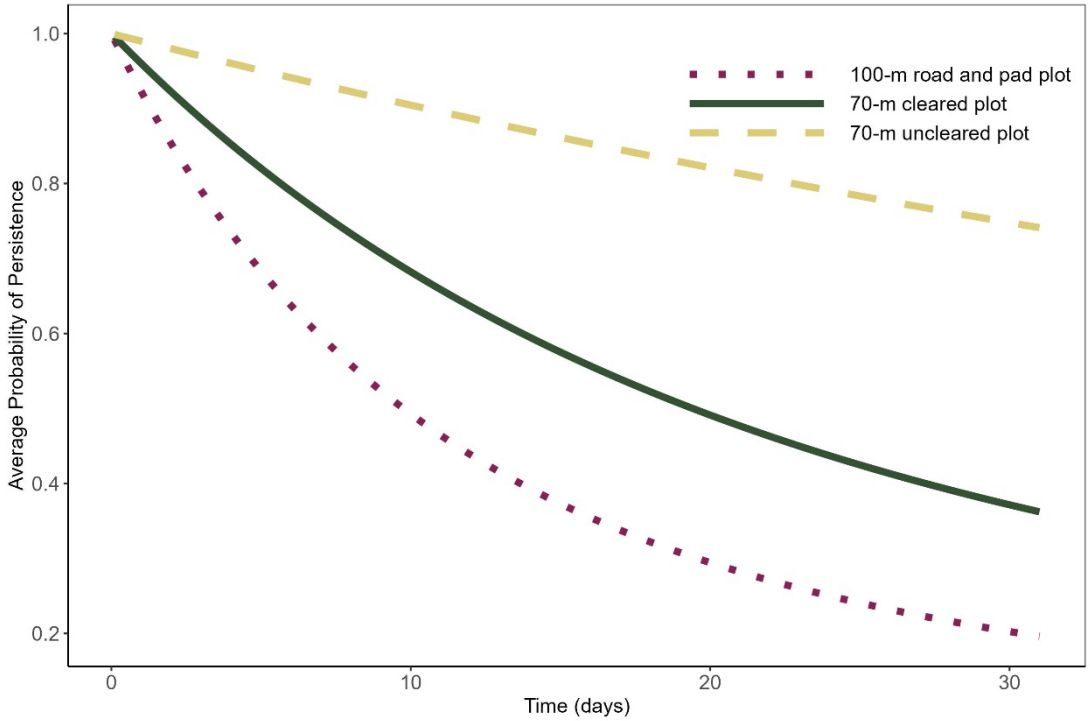

Figure 3. The average probability of persistence by plot type, in days, at the Bitter Ridge Wind Farm, Jay County, Indiana, from August 1 – October 15, 2024.

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 B1). The TWL area correction for bats was estimated to be 0.86 for 70-m plots, and 0.05 for 100-m road and pad plots (Appendix B2; Figure 4).

Adjusted Overall Bat Fatality Estimates

Bat fatality estimates were calculated for the study period. The overall fatality estimate for the study was 15.48 bats per MW (90% CI: 9.56 – 26.29; Table 13).

Table 13. Overall bat fatality rates per turbine and megawatt using GenEst for studies conducted at the Bitter Ridge Wind Farm, Jay County, Indiana, from August 1 – October 15, 2024.

Bat Fatality Estimate per Turbine	90% Confidence Interval	Bat Fatality Estimate per Megawatt	90% Confidence Interval
43.66	26.97 – 74.14	15.48	9.56 – 26.29

GenEst = a generalized estimator of fatality.

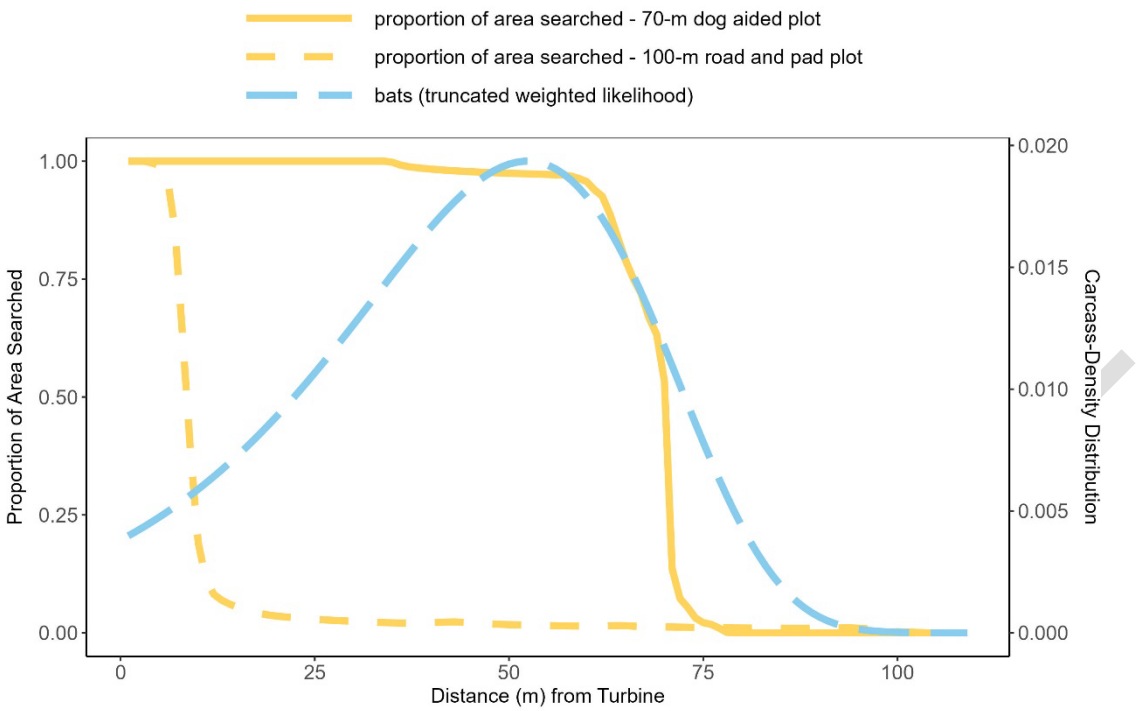

Figure 4. Density of bat carcasses per area searched at all road and pad plots, cleared plots, and uncleared plots at the Bitter Ridge Wind Farm, Jay County, Indiana, from August 1 – October 15, 2024.

Indiana Bat and Northern Long-eared Bat Take Estimates

Evidence of Absence Framework

Two Indiana bats and no northern long-eared bat carcasses were found during the study. The probability of detection achieved during the fall 2024 period had a mean of 0.22 (95% Credible Interval (CrI): 0.20 – 0.24; Appendix C5). The overall probability of detection distribution achieved for the 2024 bat risk period (spring through fall) had a mean of 0.13 (95% CrI: 0.12 – 0.14; Table 14). The overall probability of detection distribution achieved over four years of ITP level monitoring had a mean of 0.23 (95% CrI: 0.23 – 0.24; Table 14). 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 with screenshots of the EoA programing found in Appendix D.

Table 14. Annual and overall probabilities of detection (*g*), Ba, Bb, and ρ for the Bitter Ridge Wind Farm, Jay County, Indiana, from 2021 – 2024.

Year	Ba*	Bb*	ρ**	*g*	95% Credible Interval
2021	1,538.45	3,126.41	0.79	0.33	0.32 – 0.34
2022	1,683.20	4,506.24	1.00	0.27	0.26 – 0.28
2023	713.94	2,677.41	1.00	0.21	0.20 – 0.22
2024	372.49	2,519.96	0.9	0.13	0.12 – 0.14
Overall	**3,987.28**	**13,139.25**	**–**	**0.23**	**0.23 – 0.24**

* 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.

** ρ is the weight in the weighted average that is used to combine the probability of detection distributions across years.

Sums may not equal total values shown due to rounding.

The expected average annual take rates for the Covered Species 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 2024 adaptive management monitoring during the fourth year of ITP compliance monitoring, take to-date, *M** at α = 0.5 (50th credible bound), is estimated to be 39 Indiana bats and zero northern long-eared bats (Table 15). 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 11.09 (95% CI: 5.19 – 19.18) Indiana bats per year and 0.58 (95% CI: 0 – 32.93) northern long-eared bats per year (Table 15). Based on these data, the probability that estimated annual take exceeded expected annual take did not exceed 95% for northern long-eared bat, but Indiana bat annual take did exceed the 95% short-term adaptive management trigger. Therefore, adaptive management responses warrant consideration in accordance with HCP Section 5.4.3.

Table 15. Cumulative take estimate to date using Evidence of Absence for studies conducted at Bitter Ridge Wind Farm, Jay County, Indiana, in 2021, 2022, 2023 and 2024.

Species	Cumulative Take (M*)	Mean Annual Take Rate (λ)
Indiana bat	39 (50th credible bound)	11.09 (95% CI: 5.19 – 19.18)
northern long-eared bat	0 (50th credible bound)	0.58 (95% CI: 0 – 32.93)

CI = confidence interval.

DISCUSSION

During the study, a total of 290 bat fatalities were found. The overall bat fatality rate was 15.48 bats per MW (90% CI: 9.56 – 26.29). The most commonly found bat species were silver-haired bat (43.0%), eastern red bat (30.1%), big brown bat (16.9%), and hoary bat (8.5%). Species composition recorded at the Project was similar to previous studies during PCM at Bitter Ridge from 2021 – 2023.

The overall probability of detection (*g*) distribution for 2024 had a mean of 0.13 (95% CrI: 0.12 – 0.14). CPTs indicated persistence times in 2024 were longer than the shortest search interval, confirming that a twice weekly search interval in fall was sufficient to detect the majority of bat

carcasses. The area adjustment data from Bitter Ridge indicated that nearly all bat fatalities occurred within 70 m of turbines.

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 11.09 Indiana bats and 0.58 northern long-eared bat. The probability that the annual take rate exceeded the short-term thresholds for northern long-eared bat did not exceed 95%, but the probability did exceed 95% for Indiana bat. Adaptive management in the form of an increase of cut in speed from 5.0 m/s to 5.5 m/s took place in the fall migration season in 2024. With the assessment indicating that the short-term adaptive management threshold is still being exceeded for Indiana bats, Bitter Ridge may elect to begin considering further adaptive management responses per HCP Section 5.4.3.

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Appendix A. Carcasses Found during the 2024 Post-Construction Monitoring Surveys at the Bitter Ridge Wind Farm

Appendix A. Complete listing of carcasses found at the Bitter Ridge Wind Farm, Jay County, Indiana, from August 1, 2024 – October 15, 2024.

Found Date	Species	Distance from Turbine (m)	Turbine	Search Type	Search Area Type	Physical Condition	Aided Search
Bats							
08/01/2024	big brown bat	9	1	carcass search	100-m road and pad plot	scavenged	no
08/01/2024	big brown bat	20	25	carcass search	100-m road and pad plot	scavenged	no
08/01/2024	big brown bat	25	27	carcass search	70-m uncleared plot	scavenged	yes*
08/01/2024	big brown bat	1	41	carcass search	100-m road and pad plot	scavenged	no
08/01/2024	big brown bat	6	43	carcass search	100-m road and pad plot	scavenged	no
08/01/2024	eastern red bat	42	22	carcass search	70-m uncleared plot	scavenged	yes*
08/01/2024	eastern red bat	10	29	carcass search	100-m road and pad plot	scavenged	no
08/01/2024	eastern red bat	16	37	carcass search	70-m cleared plot	scavenged	yes*
08/01/2024	eastern red bat	5	42	carcass search	100-m road and pad plot	scavenged	no
08/01/2024	hoary bat	5	26	carcass search	100-m road and pad plot	scavenged	no
08/01/2024	hoary bat	20	27	carcass search	70-m uncleared plot	scavenged	yes*
08/02/2024	eastern red bat	2	14	carcass search	70-m cleared plot	scavenged	yes*
08/02/2024	eastern red bat	8	14	carcass search	70-m cleared plot	scavenged	yes*
08/02/2024	eastern red bat	12	6	carcass search	100-m road and pad plot	scavenged	no
08/02/2024	eastern red bat	10	9	carcass search**	100-m road and pad plot	scavenged	no
08/06/2024	big brown bat	12	9	carcass search**	100-m road and pad plot	intact	no
08/08/2024	big brown bat	7	22	carcass search	70-m uncleared plot	intact	yes*
08/08/2024	eastern red bat	22	11	carcass search	70-m cleared plot	scavenged	yes*
08/09/2024	big brown bat	18	18	carcass search	70-m cleared plot	scavenged	yes*
08/09/2024	eastern red bat	8	29	carcass search	100-m road and pad plot	scavenged	no
08/09/2024	eastern red bat	2	29	carcass search	100-m road and pad plot	scavenged	no
08/09/2024	eastern red bat	5	40	carcass search	70-m uncleared plot	scavenged	yes*
08/12/2024	eastern red bat	3	19	carcass search	70-m cleared plot	scavenged	yes*
08/12/2024	silver-haired bat	13	14	carcass search	70-m cleared plot	intact	yes*
08/13/2024	eastern red bat	24	27	carcass search	70-m uncleared plot	scavenged	yes*
08/13/2024	eastern red bat	57	33	carcass search	70-m cleared plot	scavenged	yes*
08/13/2024	hoary bat	25	38	carcass search	70-m uncleared plot	scavenged	yes*
08/15/2024	big brown bat	37	17	carcass search	70-m uncleared plot	scavenged	yes*
08/15/2024	eastern red bat	38	14	carcass search	70-m cleared plot	scavenged	yes*
08/15/2024	hoary bat	3	22	carcass search	70-m uncleared plot	intact	yes*
08/15/2024	silver-haired bat	4	17	carcass search	70-m uncleared plot	scavenged	yes*
08/16/2024	big brown bat	27	38	carcass search	70-m uncleared plot	scavenged	yes*
08/16/2024	big brown bat	6	43	carcass search	100-m road and pad plot	scavenged	no
08/16/2024	eastern red bat	38	13	carcass search	100-m road and pad plot	intact	no
08/16/2024	eastern red bat	9	29	carcass search	100-m road and pad plot	scavenged	no

Appendix A. Complete listing of carcasses found at the Bitter Ridge Wind Farm, Jay County, Indiana, from August 1, 2024 – October 15, 2024.

Found Date	Species	Distance from Turbine (m)	Turbine	Search Type	Search Area Type	Physical Condition	Aided Search
08/16/2024	eastern red bat	53	33	carcass search	70-m cleared plot	scavenged	yes*
08/16/2024	eastern red bat	32	38	carcass search	70-m uncleared plot	scavenged	yes*
08/16/2024	eastern red bat	42	40	carcass search	70-m uncleared plot	scavenged	yes*
08/16/2024	eastern red bat	69	40	carcass search	70-m uncleared plot	scavenged	yes*
08/16/2024	eastern red bat	52	40	carcass search	70-m uncleared plot	scavenged	yes*
08/16/2024	eastern red bat	9	46	carcass search	100-m road and pad plot	scavenged	no
08/16/2024	eastern red bat	4	47	carcass search	100-m road and pad plot	scavenged	no
08/16/2024	eastern red bat	3	50	carcass search	100-m road and pad plot	scavenged	no
08/19/2024	big brown bat	27	17	carcass search	70-m uncleared plot	scavenged	yes*
08/19/2024	eastern red bat	5	1	carcass search	100-m road and pad plot	intact	no
08/19/2024	eastern red bat	25	11	carcass search	70-m cleared plot	scavenged	yes*
08/19/2024	eastern red bat	7	14	carcass search	70-m cleared plot	intact	yes*
08/19/2024	eastern red bat	18	19	carcass search	70-m cleared plot	scavenged	yes*
08/19/2024	eastern red bat	20	19	carcass search	70-m cleared plot	scavenged	yes*
08/19/2024	eastern red bat	13	19	carcass search	70-m cleared plot	intact	yes*
08/19/2024	eastern red bat	8	22	carcass search	70-m uncleared plot	scavenged	yes*
08/20/2024	big brown bat	41	18	carcass search	70-m cleared plot	scavenged	yes*
08/20/2024	big brown bat	53	27	carcass search	70-m uncleared plot	scavenged	yes*
08/20/2024	big brown bat	49	27	carcass search	70-m uncleared plot	intact	yes*
08/20/2024	big brown bat	15	28	carcass search	70-m cleared plot	scavenged	yes*
08/20/2024	big brown bat	15	33	carcass search	70-m cleared plot	scavenged	yes*
08/20/2024	big brown bat	2	39	carcass search	100-m road and pad plot	scavenged	no
08/20/2024	big brown bat	3	39	carcass search	100-m road and pad plot	scavenged	no
08/20/2024	big brown bat	10	39	carcass search	100-m road and pad plot	scavenged	no
08/20/2024	big brown bat	22	39	carcass search	100-m road and pad plot	scavenged	no
08/20/2024	big brown bat	0	43	carcass search	100-m road and pad plot	scavenged	no
08/20/2024	eastern red bat	28	18	carcass search	70-m cleared plot	scavenged	yes*
08/20/2024	eastern red bat	14	28	carcass search	70-m cleared plot	scavenged	yes*
08/20/2024	eastern red bat	36	28	carcass search	70-m cleared plot	scavenged	yes*
08/20/2024	eastern red bat	4	29	carcass search	100-m road and pad plot	scavenged	no
08/20/2024	eastern red bat	61	40	carcass search	70-m uncleared plot	scavenged	yes*
08/20/2024	eastern red bat	7	42	carcass search	100-m road and pad plot	scavenged	no
08/20/2024	eastern red bat	2	47	carcass search	100-m road and pad plot	scavenged	no
08/20/2024	eastern red bat	51	48	carcass search	100-m road and pad plot	scavenged	no
08/20/2024	eastern red bat or Seminole bat	62	34	carcass search	100-m road and pad plot	scavenged	no
08/22/2024	big brown bat	48	11	carcass search	70-m cleared plot	scavenged	yes*

Appendix A. Complete listing of carcasses found at the Bitter Ridge Wind Farm, Jay County, Indiana, from August 1, 2024 – October 15, 2024.

Found Date	Species	Distance from Turbine (m)	Turbine	Search Type	Search Area Type	Physical Condition	Aided Search
08/22/2024	big brown bat	17	19	carcass search	70-m cleared plot	scavenged	yes*
08/22/2024	big brown bat	4	19	carcass search	70-m cleared plot	scavenged	yes*
08/22/2024	eastern red bat	13	11	carcass search	70-m cleared plot	scavenged	yes*
08/22/2024	hoary bat	36	14	carcass search	70-m cleared plot	scavenged	yes*
08/23/2024	big brown bat	18	32	carcass search	70-m cleared plot	scavenged	yes*
08/23/2024	big brown bat	12	40	carcass search	70-m uncleared plot	scavenged	yes*
08/23/2024	eastern red bat	39	18	carcass search	70-m cleared plot	scavenged	yes*
08/23/2024	eastern red bat	16	27	carcass search	70-m uncleared plot	scavenged	yes*
08/23/2024	eastern red bat	50	28	carcass search	70-m cleared plot	scavenged	yes*
08/23/2024	eastern red bat	31	28	carcass search	70-m cleared plot	scavenged	yes*
08/23/2024	eastern red bat	22	31	carcass search	100-m road and pad plot	scavenged	no
08/23/2024	eastern red bat	27	38	carcass search	70-m uncleared plot	scavenged	yes*
08/23/2024	eastern red bat	29	38	carcass search	70-m uncleared plot	scavenged	yes*
08/23/2024	eastern red bat	10	5	carcass search	100-m road and pad plot	scavenged	no
08/23/2024	hoary bat	63	37	carcass search	70-m cleared plot	scavenged	yes*
08/26/2024	big brown bat	18	17	carcass search	70-m uncleared plot	scavenged	yes*
08/26/2024	eastern red bat	8	1	carcass search	100-m road and pad plot	scavenged	no
08/26/2024	eastern red bat	13	1	carcass search	100-m road and pad plot	scavenged	no
08/26/2024	eastern red bat	25	19	carcass search	70-m cleared plot	scavenged	yes*
08/26/2024	eastern red bat	10	22	carcass search	70-m uncleared plot	scavenged	yes*
08/26/2024	eastern red bat	3	4	carcass search	100-m road and pad plot	scavenged	no
08/26/2024	silver-haired bat	23	19	carcass search	70-m cleared plot	scavenged	yes*
08/27/2024	big brown bat	16	15	carcass search**	100-m road and pad plot	injured	no
08/27/2024	big brown bat	6	49	carcass search	100-m road and pad plot	scavenged	no
08/27/2024	eastern red bat	24	29	carcass search	100-m road and pad plot	scavenged	no
08/27/2024	eastern red bat	51	32	carcass search	70-m cleared plot	scavenged	yes*
08/27/2024	eastern red bat	26	32	carcass search	70-m cleared plot	scavenged	yes*
08/27/2024	eastern red bat	61	33	carcass search	70-m cleared plot	scavenged	yes*
08/27/2024	eastern red bat	24	40	carcass search	70-m uncleared plot	scavenged	yes*
08/27/2024	hoary bat	74	13	carcass search	100-m road and pad plot	scavenged	no
08/27/2024	hoary bat	23	28	carcass search	70-m cleared plot	scavenged	yes*
08/29/2024	big brown bat	23	11	carcass search	70-m cleared plot	scavenged	yes*
08/29/2024	big brown bat	5	21	carcass search	70-m uncleared plot	dismembered	yes*
08/29/2024	hoary bat	28	11	carcass search	70-m cleared plot	scavenged	yes*
08/29/2024	hoary bat	2	2	carcass search	100-m road and pad plot	scavenged	no
08/29/2024	hoary bat	8	2	carcass search	100-m road and pad plot	scavenged	no

Appendix A. Complete listing of carcasses found at the Bitter Ridge Wind Farm, Jay County, Indiana, from August 1, 2024 – October 15, 2024.

Found Date	Species	Distance from Turbine (m)	Turbine	Search Type	Search Area Type	Physical Condition	Aided Search
08/30/2024	big brown bat	42	27	carcass search	70-m uncleared plot	scavenged	yes*
08/30/2024	big brown bat	32	32	carcass search	70-m cleared plot	scavenged	yes*
08/30/2024	big brown bat	25	32	carcass search	70-m cleared plot	scavenged	yes*
08/30/2024	big brown bat	2	33	carcass search	70-m cleared plot	scavenged	yes*
08/30/2024	big brown bat	59	33	carcass search	70-m cleared plot	scavenged	yes*
08/30/2024	eastern red bat	8	13	carcass search	100-m road and pad plot	intact	no
08/30/2024	eastern red bat	39	27	carcass search	70-m uncleared plot	scavenged	yes*
08/30/2024	eastern red bat	34	33	carcass search	70-m cleared plot	scavenged	yes*
08/30/2024	eastern red bat	5	42	carcass search	100-m road and pad plot	injured	no
08/30/2024	hoary bat	31	32	carcass search	70-m cleared plot	scavenged	yes*
08/30/2024	silver-haired bat	16	27	carcass search	70-m uncleared plot	scavenged	yes*
08/30/2024	silver-haired bat	39	34	carcass search**	100-m road and pad plot	scavenged	no
08/30/2024	silver-haired bat	13	8	carcass search	100-m road and pad plot	intact	no
09/02/2024	big brown bat	31	22	carcass search	70-m uncleared plot	scavenged	yes*
09/02/2024	eastern red bat	46	11	carcass search	70-m cleared plot	scavenged	yes*
09/02/2024	eastern red bat	22	11	carcass search	70-m cleared plot	scavenged	yes*
09/02/2024	eastern red bat	38	14	carcass search	70-m cleared plot	scavenged	yes*
09/02/2024	hoary bat	6	3	carcass search	100-m road and pad plot	intact	no
09/02/2024	silver-haired bat	53	11	carcass search	70-m cleared plot	intact	yes*
09/02/2024	silver-haired bat	31	14	carcass search	70-m cleared plot	intact	yes*
09/02/2024	silver-haired bat	35	14	carcass search	70-m cleared plot	intact	yes*
09/02/2024	silver-haired bat	29	17	carcass search	70-m uncleared plot	intact	yes*
09/02/2024	silver-haired bat	6	17	carcass search	70-m uncleared plot	intact	yes*
09/02/2024	silver-haired bat	35	19	carcass search	70-m cleared plot	intact	yes*
09/02/2024	silver-haired bat	7	2	carcass search	100-m road and pad plot	intact	no
09/02/2024	silver-haired bat	23	21	carcass search	70-m uncleared plot	scavenged	yes*
09/02/2024	silver-haired bat	8	3	carcass search	100-m road and pad plot	intact	no
09/03/2024	big brown bat	7	18	carcass search	70-m cleared plot	intact	yes*
09/03/2024	big brown bat	62	37	carcass search	70-m cleared plot	scavenged	yes*
09/03/2024	eastern red bat	6	15	carcass search	100-m road and pad plot	scavenged	no
09/03/2024	eastern red bat	63	18	carcass search	70-m cleared plot	intact	yes*
09/03/2024	eastern red bat	31	35	carcass search	70-m uncleared plot	scavenged	yes*
09/03/2024	silver-haired bat	37	18	carcass search	70-m cleared plot	intact	yes*
09/03/2024	silver-haired bat	26	28	carcass search	70-m cleared plot	scavenged	yes*
09/03/2024	silver-haired bat	52	28	carcass search	70-m cleared plot	intact	yes*
09/03/2024	silver-haired bat	39	33	carcass search	70-m cleared plot	scavenged	yes*

Appendix A. Complete listing of carcasses found at the Bitter Ridge Wind Farm, Jay County, Indiana, from August 1, 2024 – October 15, 2024.

Found Date	Species	Distance from Turbine (m)	Turbine	Search Type	Search Area Type	Physical Condition	Aided Search
09/03/2024	silver-haired bat	27	34	carcass search	100-m road and pad plot	scavenged	no
09/03/2024	silver-haired bat	43	37	carcass search	70-m cleared plot	scavenged	yes*
09/03/2024	silver-haired bat	36	38	carcass search	70-m uncleared plot	scavenged	yes*
09/03/2024	silver-haired bat	46	38	carcass search	70-m uncleared plot	scavenged	yes*
09/03/2024	silver-haired bat	39	38	carcass search	70-m uncleared plot	scavenged	yes*
09/03/2024	silver-haired bat	75	40	carcass search**	70-m uncleared plot	scavenged	yes*
09/03/2024	silver-haired bat	21	5	carcass search	100-m road and pad plot	scavenged	no
09/03/2024	silver-haired bat	13	8	carcass search	100-m road and pad plot	intact	no
09/03/2024	silver-haired bat	8	8	carcass search	100-m road and pad plot	scavenged	no
09/05/2024	Indiana bat	67	21	carcass search	70-m uncleared plot	scavenged	yes*
09/05/2024	eastern red bat	10	19	carcass search	70-m cleared plot	scavenged	yes*
09/05/2024	silver-haired bat	33	14	carcass search	70-m cleared plot	scavenged	yes*
09/05/2024	silver-haired bat	25	14	carcass search	70-m cleared plot	scavenged	yes*
09/05/2024	silver-haired bat	49	17	carcass search	70-m uncleared plot	scavenged	yes*
09/05/2024	silver-haired bat	33	17	carcass search	70-m uncleared plot	scavenged	yes*
09/05/2024	silver-haired bat	40	21	carcass search	70-m uncleared plot	scavenged	yes*
09/06/2024	big brown bat	6	49	carcass search	100-m road and pad plot	scavenged	no
09/06/2024	eastern red bat	29	33	carcass search	70-m cleared plot	scavenged	yes*
09/06/2024	eastern red bat	40	52	carcass search	100-m road and pad plot	scavenged	no
09/06/2024	hoary bat	11	27	carcass search	70-m uncleared plot	scavenged	yes*
09/06/2024	hoary bat	43	33	carcass search	70-m cleared plot	scavenged	yes*
09/06/2024	hoary bat	4	34	carcass search	100-m road and pad plot	injured	no
09/06/2024	silver-haired bat	10	10	carcass search**	100-m road and pad plot	scavenged	no
09/06/2024	silver-haired bat	7	28	carcass search	70-m cleared plot	scavenged	yes*
09/06/2024	silver-haired bat	17	33	carcass search	70-m cleared plot	scavenged	yes*
09/06/2024	silver-haired bat	25	33	carcass search	70-m cleared plot	scavenged	yes*
09/06/2024	silver-haired bat	47	33	carcass search	70-m cleared plot	scavenged	yes*
09/06/2024	silver-haired bat	16	33	carcass search	70-m cleared plot	scavenged	yes*
09/06/2024	silver-haired bat	9	36	carcass search	100-m road and pad plot	scavenged	no
09/06/2024	silver-haired bat	3	42	carcass search	100-m road and pad plot	scavenged	no
09/06/2024	silver-haired bat	50	7	carcass search	100-m road and pad plot	intact	no
09/06/2024	silver-haired bat	7	8	carcass search	100-m road and pad plot	intact	no
09/09/2024	silver-haired bat	1	21	carcass search	70-m uncleared plot	intact	yes*
09/09/2024	silver-haired bat	7	4	carcass search	100-m road and pad plot	intact	no
09/10/2024	eastern red bat	6	31	carcass search	100-m road and pad plot	intact	no
09/10/2024	hoary bat	11	38	carcass search	70-m uncleared plot	scavenged	yes*

Appendix A. Complete listing of carcasses found at the Bitter Ridge Wind Farm, Jay County, Indiana, from August 1, 2024 – October 15, 2024.

Found Date	Species	Distance from Turbine (m)	Turbine	Search Type	Search Area Type	Physical Condition	Aided Search
09/10/2024	silver-haired bat	32	28	carcass search	70-m cleared plot	dismembered	yes*
09/10/2024	silver-haired bat	29	33	carcass search	70-m cleared plot	scavenged	yes*
09/10/2024	silver-haired bat	11	40	carcass search	70-m uncleared plot	scavenged	yes*
09/12/2024	eastern red bat	40	11	carcass search	70-m cleared plot	scavenged	yes*
09/12/2024	silver-haired bat	38	19	carcass search	70-m cleared plot	scavenged	yes*
09/12/2024	silver-haired bat	28	19	carcass search	70-m cleared plot	intact	yes*
09/12/2024	silver-haired bat	13	21	carcass search	70-m uncleared plot	intact	yes*
09/13/2024	big brown bat	4	29	carcass search	100-m road and pad plot	intact	no
09/13/2024	hoary bat	29	37	carcass search	70-m cleared plot	intact	yes*
09/13/2024	hoary bat	7	42	carcass search	100-m road and pad plot	intact	no
09/13/2024	silver-haired bat	8	13	carcass search	100-m road and pad plot	scavenged	no
09/13/2024	silver-haired bat	34	18	carcass search	70-m cleared plot	scavenged	yes*
09/13/2024	silver-haired bat	21	18	carcass search	70-m cleared plot	dismembered	yes*
09/13/2024	silver-haired bat	30	32	carcass search	70-m cleared plot	scavenged	yes*
09/13/2024	silver-haired bat	56	32	carcass search	70-m cleared plot	scavenged	yes*
09/13/2024	silver-haired bat	47	32	carcass search	70-m cleared plot	scavenged	yes*
09/13/2024	silver-haired bat	42	38	carcass search	70-m uncleared plot	scavenged	yes*
09/13/2024	silver-haired bat	4	38	carcass search	70-m uncleared plot	scavenged	yes*
09/13/2024	silver-haired bat	22	38	carcass search	70-m uncleared plot	scavenged	yes*
09/16/2024	eastern red bat	60	17	carcass search	70-m uncleared plot	scavenged	yes*
09/16/2024	hoary bat	60	17	carcass search	70-m uncleared plot	scavenged	yes*
09/16/2024	silver-haired bat	34	14	carcass search	70-m cleared plot	scavenged	yes*
09/16/2024	silver-haired bat	45	14	carcass search	70-m cleared plot	scavenged	yes*
09/16/2024	silver-haired bat	36	21	carcass search	70-m uncleared plot	scavenged	yes*
09/16/2024	silver-haired bat	40	21	carcass search	70-m uncleared plot	scavenged	yes*
09/16/2024	silver-haired bat	24	21	carcass search	70-m uncleared plot	scavenged	yes*
09/16/2024	silver-haired bat	26	21	carcass search	70-m uncleared plot	scavenged	yes*
09/17/2024	Indiana bat	42	33	carcass search	70-m cleared plot	scavenged	yes*
09/17/2024	big brown bat	5	27	carcass search	70-m uncleared plot	scavenged	yes*
09/17/2024	big brown bat	46	37	carcass search	70-m cleared plot	scavenged	yes*
09/17/2024	big brown bat	10	37	carcass search	70-m cleared plot	scavenged	yes*
09/17/2024	big brown bat	53	38	carcass search	70-m uncleared plot	scavenged	yes*
09/17/2024	eastern red bat	53	40	carcass search	70-m uncleared plot	scavenged	yes*
09/17/2024	hoary bat	9	36	carcass search	100-m road and pad plot	scavenged	no
09/17/2024	hoary bat	11	38	carcass search	70-m uncleared plot	intact	yes*
09/17/2024	hoary bat	25	43	carcass search**	100-m road and pad plot	scavenged	no

Appendix A. Complete listing of carcasses found at the Bitter Ridge Wind Farm, Jay County, Indiana, from August 1, 2024 – October 15, 2024.

Found Date	Species	Distance from Turbine (m)	Turbine	Search Type	Search Area Type	Physical Condition	Aided Search
09/17/2024	silver-haired bat	31	18	carcass search	70-m cleared plot	scavenged	yes*
09/17/2024	silver-haired bat	43	23	carcass search	100-m road and pad plot	intact	no
09/17/2024	silver-haired bat	16	28	carcass search	70-m cleared plot	scavenged	yes*
09/17/2024	silver-haired bat	42	28	carcass search	70-m cleared plot	scavenged	yes*
09/17/2024	silver-haired bat	36	32	carcass search	70-m cleared plot	intact	yes*
09/17/2024	silver-haired bat	46	33	carcass search	70-m cleared plot	scavenged	yes*
09/17/2024	silver-haired bat	36	33	carcass search	70-m cleared plot	scavenged	yes*
09/17/2024	silver-haired bat	39	37	carcass search	70-m cleared plot	scavenged	yes*
09/17/2024	silver-haired bat	23	38	carcass search	70-m uncleared plot	scavenged	yes*
09/19/2024	big brown bat	8	14	carcass search	70-m cleared plot	scavenged	yes*
09/19/2024	hoary bat	3	21	carcass search	70-m uncleared plot	intact	yes*
09/19/2024	silver-haired bat	32	11	carcass search	70-m cleared plot	scavenged	yes*
09/19/2024	silver-haired bat	47	22	carcass search	70-m uncleared plot	scavenged	yes*
09/20/2024	silver-haired bat	34	18	carcass search	70-m cleared plot	intact	yes*
09/20/2024	silver-haired bat	38	27	carcass search	70-m uncleared plot	scavenged	yes*
09/20/2024	silver-haired bat	32	27	carcass search	70-m uncleared plot	scavenged	yes*
09/20/2024	silver-haired bat	57	33	carcass search	70-m cleared plot	scavenged	yes*
09/20/2024	silver-haired bat	40	40	carcass search	70-m uncleared plot	scavenged	yes*
09/23/2024	silver-haired bat	55	21	carcass search	70-m uncleared plot	scavenged	yes*
09/24/2024	eastern red bat	53	27	carcass search	70-m uncleared plot	scavenged	yes*
09/24/2024	eastern red bat or Seminole bat	45	33	carcass search	70-m cleared plot	scavenged	yes*
09/24/2024	silver-haired bat	21	33	carcass search	70-m cleared plot	scavenged	yes*
09/25/2024	silver-haired bat	22	32	carcass search	70-m cleared plot	scavenged	yes*
09/26/2024	big brown bat	35	22	carcass search	70-m uncleared plot	scavenged	yes*
09/26/2024	eastern red bat	8	22	carcass search	70-m uncleared plot	scavenged	yes*
09/27/2024	eastern red bat	17	27	carcass search	70-m uncleared plot	scavenged	yes*
09/27/2024	silver-haired bat	72	12	carcass search	100-m road and pad plot	intact	no
09/27/2024	silver-haired bat	34	18	carcass search	70-m cleared plot	scavenged	yes*
09/27/2024	silver-haired bat	9	27	carcass search	70-m uncleared plot	scavenged	yes*
09/27/2024	silver-haired bat	61	32	carcass search	70-m cleared plot	scavenged	yes*
09/27/2024	silver-haired bat	5	52	carcass search	100-m road and pad plot	intact	no
09/30/2024	big brown bat	47	21	carcass search	70-m uncleared plot	scavenged	yes*
09/30/2024	big brown bat	43	21	carcass search	70-m uncleared plot	scavenged	yes*
09/30/2024	silver-haired bat	32	17	carcass search	70-m uncleared plot	scavenged	yes*
09/30/2024	silver-haired bat	20	21	carcass search	70-m uncleared plot	scavenged	yes*
10/01/2024	big brown bat	20	38	carcass search	70-m uncleared plot	scavenged	yes*

Appendix A. Complete listing of carcasses found at the Bitter Ridge Wind Farm, Jay County, Indiana, from August 1, 2024 – October 15, 2024.

Found Date	Species	Distance from Turbine (m)	Turbine	Search Type	Search Area Type	Physical Condition	Aided Search
10/01/2024	eastern red bat	65	32	carcass search	70-m cleared plot	scavenged	yes*
10/01/2024	eastern red bat	52	32	carcass search	70-m cleared plot	scavenged	yes*
10/01/2024	eastern red bat	56	33	carcass search	70-m cleared plot	scavenged	yes*
10/01/2024	eastern red bat	53	33	carcass search	70-m cleared plot	scavenged	yes*
10/01/2024	silver-haired bat	1	1	carcass search	100-m road and pad plot	scavenged	no
10/01/2024	silver-haired bat	37	33	carcass search	70-m cleared plot	scavenged	yes*
10/01/2024	silver-haired bat	8	38	carcass search	70-m uncleared plot	scavenged	yes*
10/01/2024	silver-haired bat	49	38	carcass search	70-m uncleared plot	intact	yes*
10/01/2024	silver-haired bat	1	4	carcass search	100-m road and pad plot	intact	no
10/01/2024	silver-haired bat	54	40	carcass search	70-m uncleared plot	scavenged	yes*
10/01/2024	silver-haired bat	66	8	carcass search	100-m road and pad plot	scavenged	no
10/03/2024	big brown bat	6	19	carcass search	70-m cleared plot	scavenged	yes*
10/03/2024	eastern red bat	45	11	carcass search	70-m cleared plot	scavenged	yes*
10/03/2024	eastern red bat	47	17	carcass search	70-m uncleared plot	intact	yes*
10/03/2024	silver-haired bat	31	22	carcass search	70-m uncleared plot	scavenged	yes*
10/03/2024	silver-haired bat	3	6	carcass search	100-m road and pad plot	injured	no
10/04/2024	eastern red bat	45	38	carcass search	70-m uncleared plot	scavenged	yes*
10/04/2024	hoary bat	13	18	carcass search	70-m cleared plot	scavenged	yes*
10/04/2024	silver-haired bat	45	28	carcass search	70-m cleared plot	scavenged	yes*
10/04/2024	silver-haired bat	4	38	carcass search	70-m uncleared plot	scavenged	yes*
10/08/2024	eastern red bat	43	19	carcass search	70-m cleared plot	intact	yes*
10/08/2024	eastern red bat	44	33	carcass search	70-m cleared plot	scavenged	yes*
10/08/2024	silver-haired bat	1	20	carcass search	100-m road and pad plot	scavenged	no
10/08/2024	silver-haired bat	54	21	carcass search	70-m uncleared plot	scavenged	yes*
10/08/2024	silver-haired bat	39	33	carcass search	70-m cleared plot	scavenged	yes*
10/08/2024	silver-haired bat	5	4	carcass search	100-m road and pad plot	scavenged	no
10/09/2024	silver-haired bat	30	18	carcass search	70-m cleared plot	scavenged	yes*
10/09/2024	silver-haired bat	57	28	carcass search	70-m cleared plot	scavenged	yes*
10/09/2024	silver-haired bat	9	32	carcass search	70-m cleared plot	scavenged	yes*
10/09/2024	silver-haired bat	23	35	carcass search	70-m uncleared plot	scavenged	yes*
10/10/2024	silver-haired bat	28	14	carcass search	70-m cleared plot	scavenged	yes*
10/11/2024	silver-haired bat	52	18	carcass search	70-m cleared plot	scavenged	yes*
10/11/2024	silver-haired bat	54	34	carcass search	100-m road and pad plot	scavenged	no
10/11/2024	silver-haired bat	48	35	carcass search	70-m uncleared plot	scavenged	yes*
10/11/2024	silver-haired bat	53	38	carcass search	70-m uncleared plot	scavenged	yes*
10/14/2024	silver-haired bat	34	14	carcass search	70-m cleared plot	intact	yes*

Appendix A. Complete listing of carcasses found at the Bitter Ridge Wind Farm, Jay County, Indiana, from August 1, 2024 – October 15, 2024.

Found Date	Species	Distance from Turbine (m)	Turbine	Search Type	Search Area Type	Physical Condition	Aided Search
10/14/2024	silver-haired bat	23	19	carcass search	70-m cleared plot	scavenged	yes*
10/15/2024	silver-haired bat	40	38	carcass search	70-m uncleared plot	scavenged	yes*
10/15/2024	silver-haired bat	6	44	carcass search	100-m road and pad plot	scavenged	no
Birds							
08/01/2024	purple martin	4	12	carcass search	100-m road and pad plot	scavenged	no
08/01/2024	red-winged blackbird	50	27	carcass search	70-m uncleared plot	scavenged	yes*
08/01/2024	unidentified accipiter	37	22	carcass search	70-m uncleared plot	scavenged	yes*
08/06/2024	tree swallow	48	14	carcass search	70-m cleared plot	scavenged	yes*
08/13/2024	horned lark	50	33	carcass search	70-m cleared plot	scavenged	yes*
08/13/2024	horned lark	61	33	carcass search	70-m cleared plot	scavenged	yes*
08/16/2024	unidentified small bird	20	37	carcass search	70-m cleared plot	scavenged	yes*
08/20/2024	unidentified passerine	13	33	carcass search	70-m cleared plot	scavenged	yes*
08/22/2024	killdeer	46	11	carcass search	70-m cleared plot	scavenged	yes*
08/23/2024	horned lark	31	18	carcass search	70-m cleared plot	scavenged	yes*
08/26/2024	chimney swift	14	17	carcass search	70-m uncleared plot	scavenged	yes*
08/26/2024	dickcissel	22	19	carcass search	70-m cleared plot	scavenged	yes*
08/27/2024	horned lark	16	28	carcass search	70-m cleared plot	dismembered	yes*
08/27/2024	horned lark	27	33	carcass search	70-m cleared plot	scavenged	yes*
08/27/2024	horned lark	42	37	carcass search	70-m cleared plot	scavenged	yes*
08/30/2024	horned lark	27	37	carcass search	70-m cleared plot	feather spot	yes*
08/30/2024	unidentified passerine	14	35	carcass search	70-m uncleared plot	scavenged	yes*
09/02/2024	horned lark	38	14	carcass search	70-m cleared plot	scavenged	yes*
09/02/2024	horned lark	30	14	carcass search	70-m cleared plot	scavenged	yes*
09/02/2024	horned lark	43	14	carcass search	70-m cleared plot	scavenged	yes*
09/03/2024	horned lark	15	33	carcass search	70-m cleared plot	scavenged	yes*
09/03/2024	horned lark	30	33	carcass search	70-m cleared plot	scavenged	yes*
09/03/2024	horned lark	16	33	carcass search	70-m cleared plot	feather spot	yes*
09/03/2024	horned lark	48	37	carcass search	70-m cleared plot	feather spot	yes*
09/03/2024	killdeer	52	37	carcass search	70-m cleared plot	feather spot	yes*
09/03/2024	unidentified passerine	61	33	carcass search	70-m cleared plot	scavenged	yes*
09/05/2024	tree swallow	25	11	carcass search	70-m cleared plot	scavenged	yes*
09/06/2024	Tennessee warbler	31	40	carcass search	70-m uncleared plot	scavenged	yes*
09/06/2024	horned lark	56	33	carcass search	70-m cleared plot	scavenged	yes*
09/06/2024	horned lark	5	33	carcass search	70-m cleared plot	scavenged	yes*
09/06/2024	horned lark	47	37	carcass search	70-m cleared plot	feather spot	yes*
09/06/2024	horned lark	53	37	carcass search	70-m cleared plot	feather spot	yes*

Appendix A. Complete listing of carcasses found at the Bitter Ridge Wind Farm, Jay County, Indiana, from August 1, 2024 – October 15, 2024.

Found Date	Species	Distance from Turbine (m)	Turbine	Search Type	Search Area Type	Physical Condition	Aided Search
09/06/2024	unidentified small bird	44	37	carcass search	70-m cleared plot	feather spot	yes*
09/09/2024	ruby-throated hummingbird	6	4	carcass search	100-m road and pad plot	scavenged	no
09/10/2024	horned lark	39	18	carcass search	70-m cleared plot	scavenged	yes*
09/10/2024	horned lark	46	33	carcass search	70-m cleared plot	scavenged	yes*
09/10/2024	horned lark	46	33	carcass search	70-m cleared plot	feather spot	yes*
09/13/2024	horned lark	50	18	carcass search	70-m cleared plot	scavenged	yes*
09/13/2024	horned lark	34	18	carcass search	70-m cleared plot	scavenged	yes*
09/17/2024	European starling	55	18	carcass search	70-m cleared plot	intact	yes*
09/17/2024	horned lark	13	18	carcass search	70-m cleared plot	intact	yes*
09/20/2024	horned lark	15	33	carcass search	70-m cleared plot	feather spot	yes*
09/20/2024	horned lark	46	33	carcass search	70-m cleared plot	feather spot	yes*
09/27/2024	yellow-throated warbler	28	38	carcass search	70-m uncleared plot	scavenged	yes*
10/01/2024	mallard	54	35	carcass search	70-m uncleared plot	scavenged	yes*
10/01/2024	yellow-throated warbler	33	35	carcass search	70-m uncleared plot	scavenged	yes*
10/04/2024	golden-crowned kinglet	45	48	carcass search	100-m road and pad plot	scavenged	no
10/08/2024	magnolia warbler	50	11	carcass search	70-m cleared plot	scavenged	yes*

* Dog aided search.

** Carcass was found outside the search area.

m = meter.

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 August 1 – October 15, 2024.

Distribution	AICc	Delta AICc
Gompertz	17,453.18	0*
normal	17,646.81	193.62
Weibull	17,795.29	342.10
gamma	17,933.41	480.22

* Selected model.

AICc = Corrected Akaike Information Criterion; Delta AICc = Change in AICc.

Appendix B2. Truncated weighted maximum likelihood search area estimates for the Bitter Ridge Wind Farm, Jay County, Indiana, from August 1 – October 15, 2024.

Size Class	Search Area Type	Distribution	Parameter 1	Parameter 2	Area Adjustment
Bat	70-m dog aided plot	Gompertz	0.0487	0.0038	0.86
	100-m road and pad plot	Gompertz	0.0487	0.0038	0.05

m = meter.

n = 272 bats.

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

Appendix C1. Data inputs needed for the Evidence of Absence Single Class Module for the Bitter Ridge Wind Farm, Jay County, Indiana, from August 1, 2024 – October 15, 2024.[1]

Season	Search Area Type[2]	# of Turbines	Search Interval (days)	Average Number of Searches	Spatial Coverage (a)	Searcher Efficiency		Carcass Persistence			
						Carcasses Available	Carcasses Found	Distribution	Shape (α)	Scale (β)	β CI (95%)
Spring	–	52	–	–	–	–	–	–	–	–	–
Summer	–	37	–	–	–	–	–	–	–	–	–
Fall	100-m road and pad plot	37	3.5	21	0.05	22	16	exponential	–	6.09	3.52 – 10.55
Fall	70-m cleared plot	8	3.5	21	0.86	38	26	exponential	–	12.16	7.18 – 20.62
Fall	70-m uncleared plot	7	3.5	21	0.86	38	26	exponential	–	49.35	23.52 – 103.65

1. The detection reduction factor *k* was assumed to equal 0.67 for all strata.

2. Temporal coverage (v) was set to 1 across all strata. Seasonality of risk is accounted for in the Multiple Class Module.

CI = confidence interval; m = meter.

Appendix C2. Weights used for the Evidence of Absence Multiple Class Module to combine detection probability distributions across strata within seasons for the Bitter Ridge Wind Farm, Jay County, Indiana, from August 1, 2024 – October 15, 2024.

Season	Search Area Type	Seasonal Arrival Proportion	Risk Turbine Weight	Sampling Weight	Minimization Weight	Weight (DWP)[1]
Spring	–	0.07	1.00	1.00	1.00	1.00
Summer	–	0.36	0.71	1.00	1.00	1.00
Fall	100-m road and pad plot	0.57	1.00	0.71	0.84	0.71
Fall	70-m cleared plot	0.57	1.00	0.15	0.84	0.15
Fall	70-m uncleared plot	0.57	1.00	0.13	0.84	0.13

1. The density-weighted proportion (DWP) is the fraction of carcasses expected within the stratum.

Appendix C3. Data inputs for the Evidence of Absence Multiple Class Module used to combine detection probability distributions across strata within seasons for the Bitter Ridge Wind Farm, Jay County, Indiana, from August 1, 2024 – October 15, 2024.

Season	Search Area Type	# of Turbines	Weight (DWP)[1]	Ba[2]	Bb[2]	*g* (95% CrI)[3]
Spring	–	52	1.00	0.01	1000.00	0.00 (0.00 – 0.00)
Summer	–	37	1.00	0.01	1000.00	0.00 (0.00 – 0.00)
Fall	100-m road and pad plot	37	0.71	52.38	1516.13	0.03 (0.03 – 0.04)
Fall	70-m cleared plot	8	0.15	49.71	31.01	0.62 (0.51 – 0.72)
Fall	70-m uncleared plot	7	0.13	82.70	30.30	0.73 (0.65 – 0.81)

1. The density-weighted proportion (DWP) is the fraction of carcasses expected within the stratum.

2. Ba and Bb are the α and β parameters of a beta distribution describing the detection probability distribution.

3. CrI = credible interval; *g* = probability of detection.

m = meter.

Appendix C4. Weights used to combine detection probability distributions across seasons within the study period for the Bitter Ridge Wind Farm, Jay County, Indiana, from August 1, 2024 – October 15, 2024.

Season	Seasonal Arrival Proportion	Relative Operation of Turbines	Risk Turbine Weight	Minimization Weight	Re-Scaled Season Weight (DWP)[1]
Spring	0.07	1.00	1.00	1.00	0.09
Summer	0.36	1.00	0.71	1.00	0.32
Fall	0.57	1.00	1.00	0.84	0.59

1. The density-weighted proportions (DWP) is the fraction of carcasses expected within the stratum.

Appendix C5. Data inputs for the Evidence of Absence Multiple Class Module used to combine detection probability distributions across seasons within the study period for the Bitter Ridge Wind Farm, Jay County, Indiana, from August 1, 2024 – October 15, 2024.

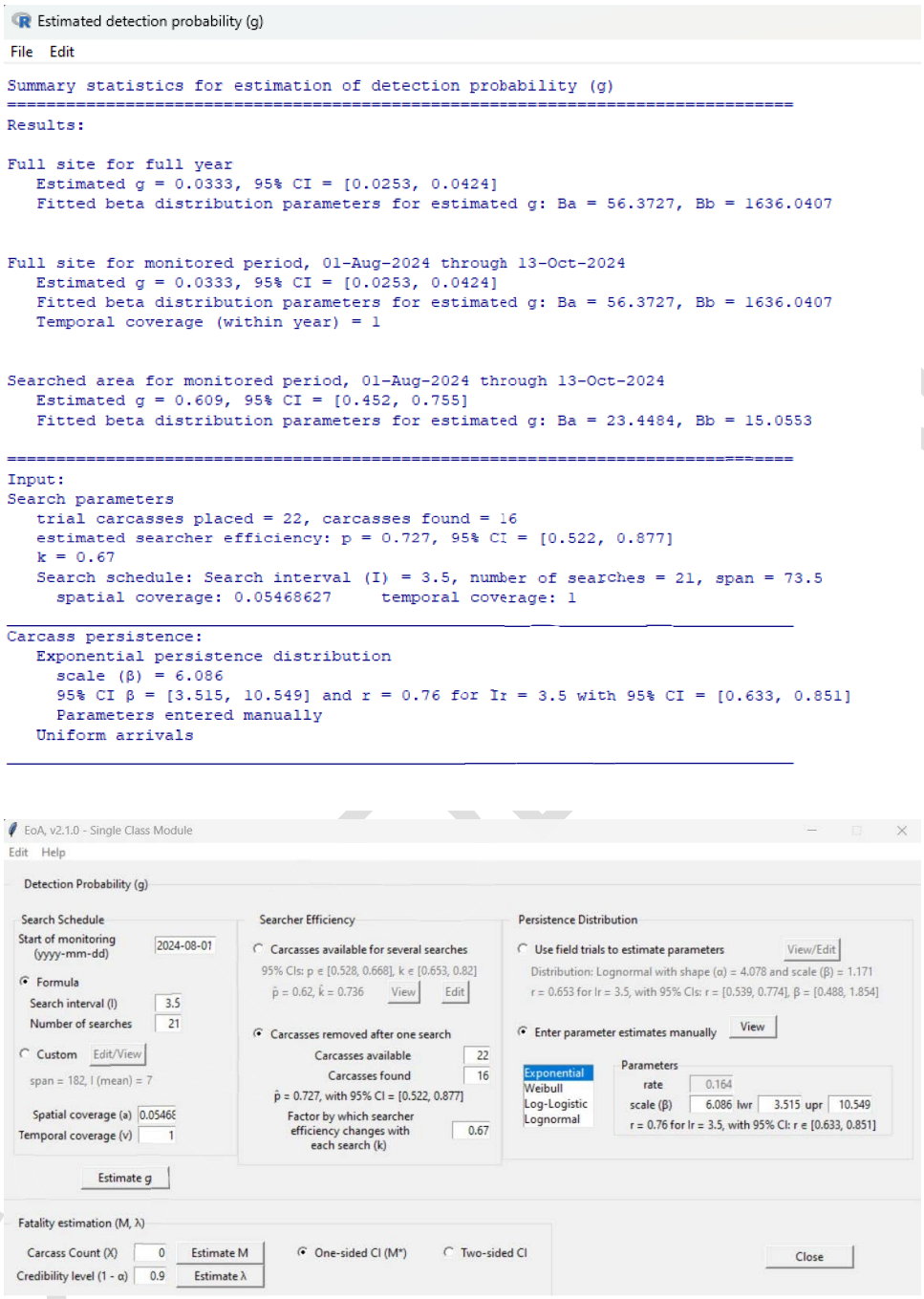
Season	Weight (DWP)[1]	Ba[2]	Bb[2]	*g* (95% CrI)[3]
Spring	0.09	0.01	1000.00	0.00 (0.00 – 0.00)
Summer	0.32	0.01	1000.00	0.00 (0.00 – 0.00)
Fall	0.59	334.65	1207.36	0.22 (0.20 – 0.24)

1. The density-weighted proportion (DWP) is the fraction of carcasses expected within the stratum.

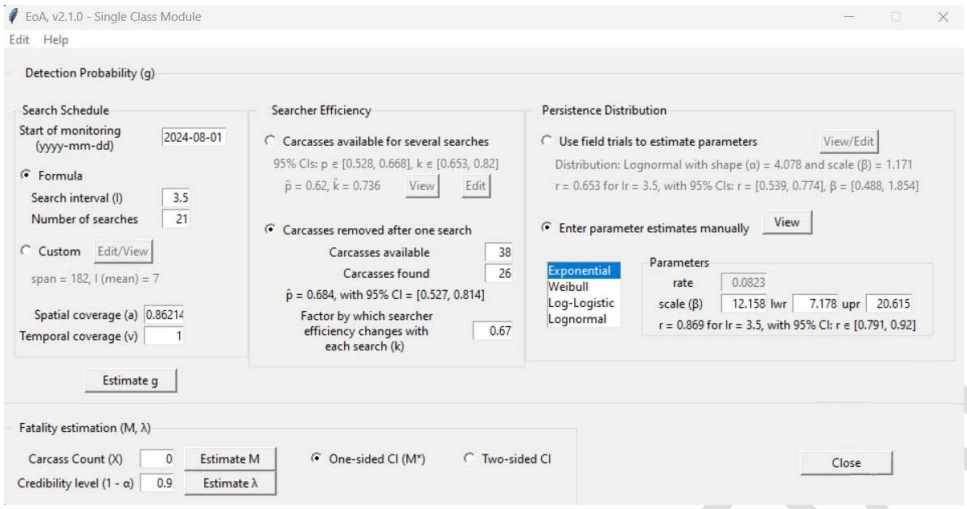
2. Ba and Bb are the α and β parameters of a beta distribution describing the detection probability distribution.

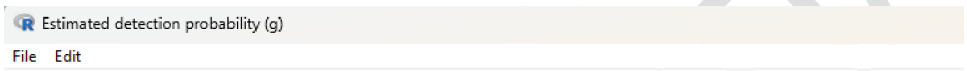
3. CrI = credible interval; *g* = probability of detection.

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



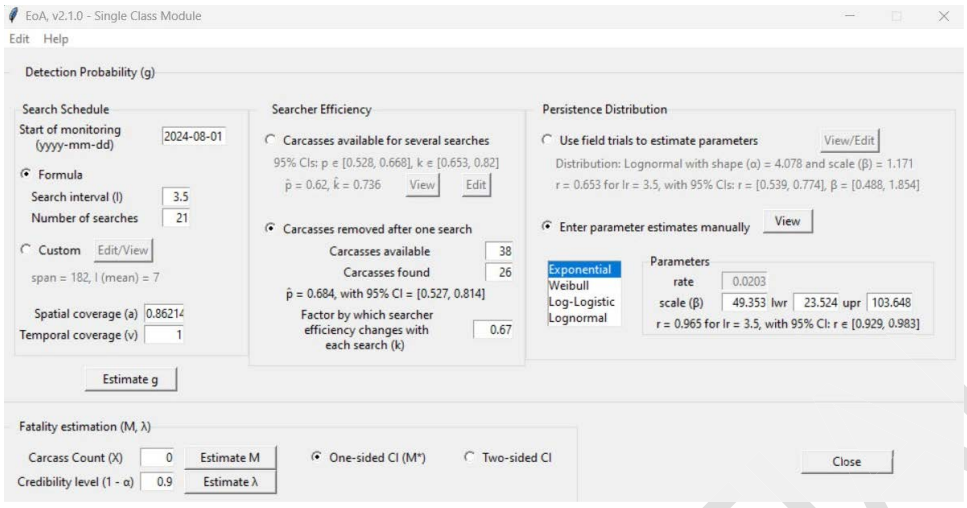
Appendix D1. Screen shot of Evidence of Absence (v2.0.7) graphical user interface, Single Class Module inputs for Fall 2024, for 100-meter road and pad plots at a 3.5-day search interval.





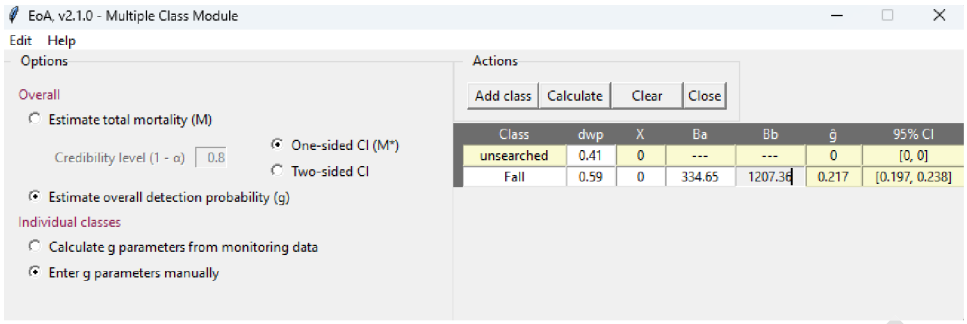

```
Summary statistics for estimation of detection probability (g)
================================================================================
Results:

Full site for full year
   Estimated g = 0.613, 95% CI = [0.509, 0.712]
   Fitted beta distribution parameters for estimated g: Ba = 53.2604, Bb = 33.6079


Full site for monitored period, 01-Aug-2024 through 13-Oct-2024
   Estimated g = 0.613, 95% CI = [0.509, 0.712]
   Fitted beta distribution parameters for estimated g: Ba = 53.2604, Bb = 33.6079
   Temporal coverage (within year) = 1


Searched area for monitored period, 01-Aug-2024 through 13-Oct-2024
   Estimated g = 0.711, 95% CI = [0.587, 0.821]
   Fitted beta distribution parameters for estimated g: Ba = 39.5983, Bb = 16.0822

================================================================================
Input:
Search parameters
   trial carcasses placed = 38, carcasses found = 26
   estimated searcher efficiency: p = 0.684, 95% CI = [0.527, 0.814]
   k = 0.67
   Search schedule: Search interval (I) = 3.5, number of searches = 21, span = 73.5
     spatial coverage: 0.862143     temporal coverage: 1
--------------------------------------------------------------------------------
Carcass persistence:
   Exponential persistence distribution
     scale (β) = 12.158
     95% CI β = [7.178, 20.615] and r = 0.869 for Ir = 3.5 with 95% CI = [0.791, 0.92]
     Parameters entered manually
   Uniform arrivals
--------------------------------------------------------------------------------
```

Appendix D2. Screen shot of Evidence of Absence (v2.0.7) graphical user interface, Single Class Module inputs for Fall 2024, for 70-meter cleared dog-aided plots at a 3.5-day interval.



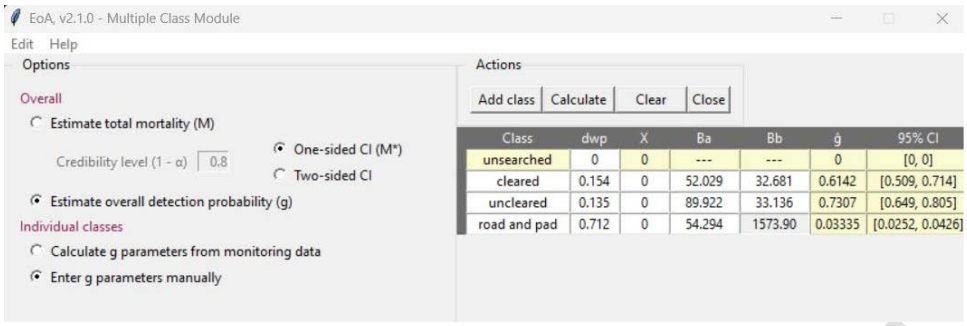

```
Summary statistics for estimation of detection probability (g)
================================================================================
Results:

Full site for full year
   Estimated g = 0.731, 95% CI = [0.653, 0.802]
   Fitted beta distribution parameters for estimated g: Ba = 98.0569, Bb = 36.1499


Full site for monitored period, 01-Aug-2024 through 13-Oct-2024
   Estimated g = 0.731, 95% CI = [0.653, 0.802]
   Fitted beta distribution parameters for estimated g: Ba = 98.0569, Bb = 36.1499
   Temporal coverage (within year) = 1


Searched area for monitored period, 01-Aug-2024 through 13-Oct-2024
   Estimated g = 0.847, 95% CI = [0.751, 0.924]
   Fitted beta distribution parameters for estimated g: Ba = 54.934, Bb = 9.886

================================================================================
Input:
Search parameters
   trial carcasses placed = 38, carcasses found = 26
   estimated searcher efficiency: p = 0.684, 95% CI = [0.527, 0.814]
   k = 0.67
   Search schedule: Search interval (I) = 3.5, number of searches = 21, span = 73.5
     spatial coverage: 0.862143     temporal coverage: 1
--------------------------------------------------------------------------------
Carcass persistence:
   Exponential persistence distribution
     scale (β) = 49.353
     95% CI β = [23.524, 103.648] and r = 0.965 for Ir = 3.5 with 95% CI = [0.929, 0.983]
     Parameters entered manually
   Uniform arrivals
--------------------------------------------------------------------------------
```

Appendix D3. Screen shot of Evidence of Absence (v2.0.7) graphical user interface, Single Class Module inputs for Fall 2024, for 70-meter uncleared dog-aided plots at a 3.5-day search interval.




```
Summary statistics for multiple class estimate
================================================================================
Input: Detection probability, by search class
  Search coverage = 0.59

  Class          DWP     X    Ba      Bb    ghat    95% CI
  unsearched    0.41     0   ---     ---     0   [    0,     0]
  Fall          0.59     0  334.6   1207 0.217 [0.197, 0.238]
================================================================================
Results for full site
--------------------------------------------------------------------------------

Detection probability
  Estimated g = 0.128, 95% CI = [0.116, 0.14]
  Fitted beta distribution parameters for estimated g: Ba = 372.7944, Bb = 2538.6759

Mortality

Test of assumed relative weights (rho)
  Class          Assumed   Fitted (95% CI)
  unsearched      0.410      NA
  Fall            0.590    [0.590, 0.590]
  p = 1 for likelihood ratio test of H0: assumed rho = true rho
```

Appendix D4. Screen shot of Evidence of Absence (v2.0.7) graphical user interface, annual detection probability (*g*) calculation inputs and output for Fall 2024 (n=52), searched at a 3.5-day interval in the fall.

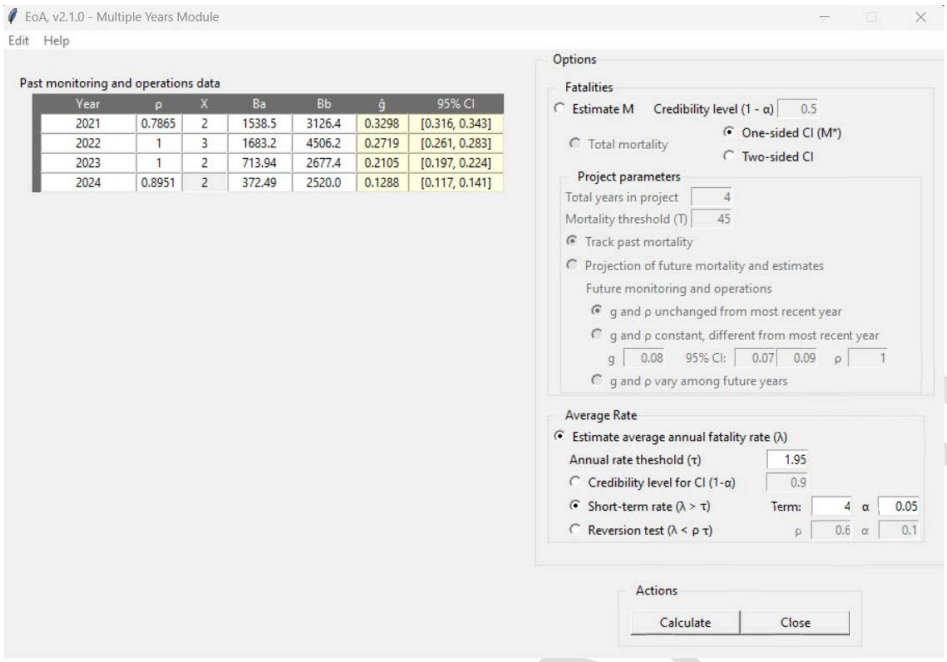


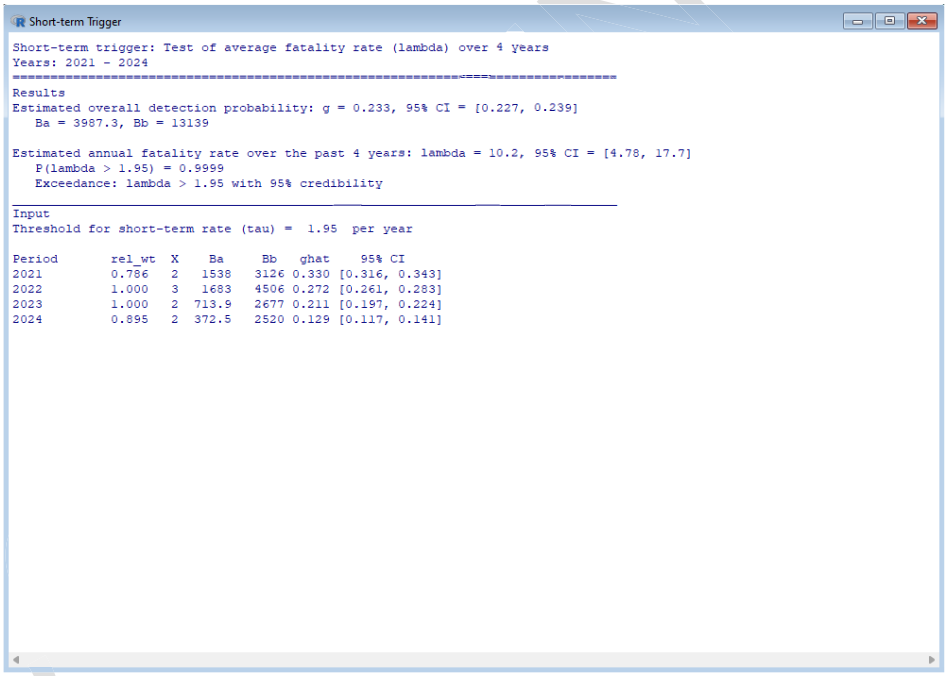
Estimated detection probability (g) for multiple classes

File Edit

```
Summary statistics for multiple class estimate
================================================================================
Input: Detection probability, by search class
  Search coverage = 1

  Class            DWP     X    Ba     Bb   ghat    95% CI
  unsearched         0     0   ---    ---     0   [    0,     0]
  cleared        0.154     0  52.03  32.68 0.614 [0.509, 0.714]
  uncleared      0.135     0  89.92  33.14 0.731 [0.649, 0.805]
  road and pad   0.712     0  54.29   1574 0.033 [0.025, 0.043]
================================================================================
Results for full site
_____________________________________________________________________

Detection probability
  Estimated g = 0.217, 95% CI = [0.197, 0.237]
  Fitted beta distribution parameters for estimated g: Ba = 352.6397, Bb = 1274.2194

Mortality

Test of assumed relative weights (rho)
  Class           Assumed   Fitted (95% CI)
  unsearched       -0.001      NA
  cleared           0.154    [0.000, 0.708]
  uncleared         0.135    [0.000, 0.766]
  road and pad      0.712    [0.049, 0.999]
  p = 1 for likelihood ratio test of H0: assumed rho = true rho
```

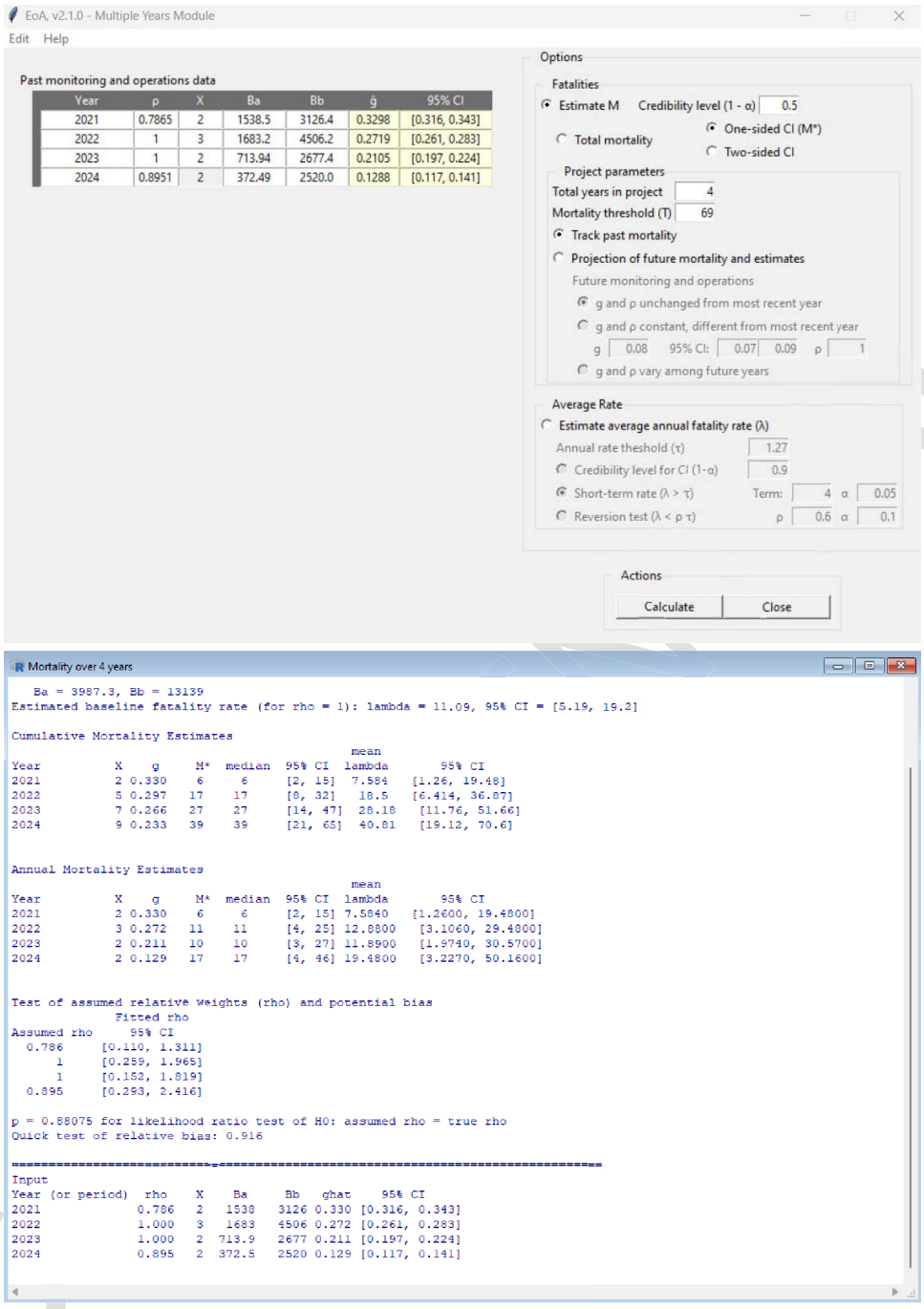
Appendix D5. Screen shot of Evidence of Absence (v2.0.7) graphical user interface, Multiple Class Module inputs and output for Fall 2024 (n=52), searched at a 3.5-day interval in the fall.



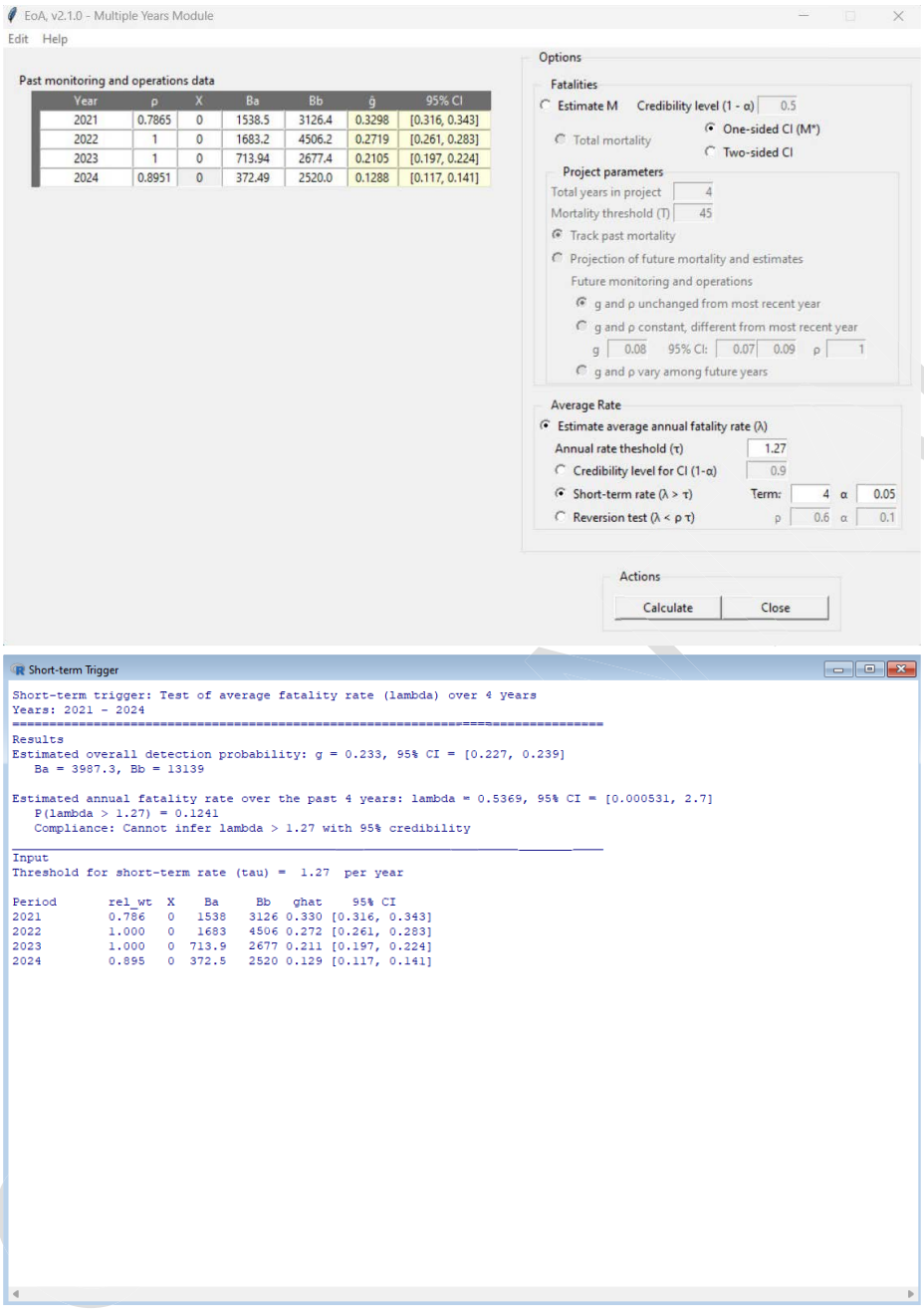


Appendix D6. Screen shot of Evidence of Absence (v2.0.7; EOA) graphical user interface (GUI), Multiple Year Module for Indiana bat rolling average detection probability and short-term adaptive management trigger test. Inputs are based on values reported in the main text.

Although the weight (ρ) column of the Multiple Years Module sums to 3.68, the EoA GUI produces a "year-adjusted λ" by calculating the average annual take rate (λ) over the number of input rows (years) in the multi-year module of the GUI. Because the ρ values associated with each year in the GUI are scaled so that a rho, "ρ" of 1.0 is equivalent to a typical operations year for the wind farm (but 2021 and 2024 were assigned different ρ values), we would like to calculate the "ρ-adjusted λ", but the GUI does not accommodate that calculation. Therefore, the "ρ-adjusted λ", 11.09, is equivalent to the "year-adjusted λ" (10.2 as seen in the output above) divided by the sum of ρ (3.68) multiplied by the number of years (4).

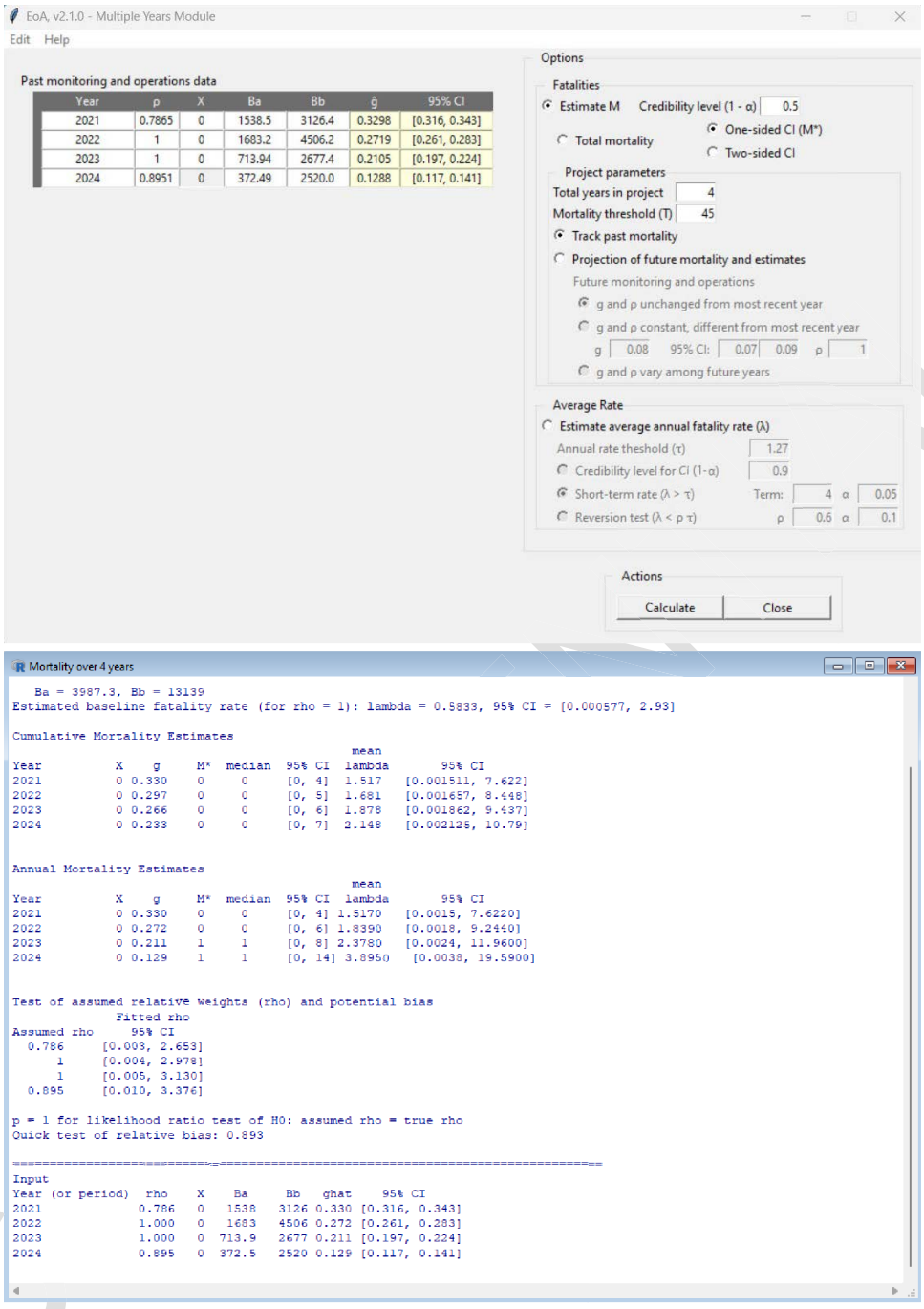


Appendix D7. Screen shot of Evidence of Absence (v2.0.7) graphical user interface, Multiple Year Module for Indiana bat Incidental Take Permit term-to-date detection probability and cumulative take estimate (M*). Inputs are based on values reported in the main text.



Appendix D8. Screen shot of Evidence of Absence (v2.0.7; EOA) graphical user interface (GUI), Multiple Year Module for northern long-eared bat rolling average detection probability and short-term adaptive management trigger test. Inputs are based on values reported in the main text.

Although the weight (ρ) column of the Multiple Years Module sums to 3.68, the EoA GUI produces a "year-adjusted λ" by calculating the average annual take rate (λ) over the number of input rows (years) in the multi-year module of the GUI. Because the ρ values associated with each year in the GUI are scaled so that a rho, "ρ" of 1.0 is equivalent to a typical operations year for the wind farm (but 2021 and 2024 were assigned different ρ values), we would like to calculate the "ρ-adjusted λ", but the GUI does not accommodate that calculation. Therefore, the "ρ-adjusted λ", 0.58, is equivalent to the "year-adjusted λ" (0.537 as seen in the output above) divided by the sum of ρ (3.68) multiplied by the number of years (4).



Appendix D9. Screen shot of Evidence of Absence (v2.0.7) graphical user interface, Multiple Year Module for northern long-eared bat Incidental Take Permit term-to-date detection probability and cumulative take estimate (*M). Inputs are based on values reported in the main text.