Post-Construction Monitoring
Bat Fatality Study
for the High Prairie Renewable Energy Center
Schuyler and Adair Counties, Missouri

Year 5 Report
April – October 2025

Prepared for:

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ACRONYMS AND ABBREVIATIONS

α	shape
β	scale
τ	expected take rate
λ	mean annual take rate
AICc	corrected Akaike Information Criterion
Ameren	Ameren Missouri
carcass search	standardized carcass search
CI	confidence interval
Covered Species	Indiana bat, northern long-eared bat, and little brown bat
CP	carcass persistence
CPT	carcass persistence trial
CrI	credible interval
DWP	density-weighted proportion
EoA	Evidence of Absence
full plot	circular full plot
g	probability of detection
GenEst	Generalized Estimator of Mortality
GUI	Graphical User Interface
HCP	Habitat Conservation Plan
HPREC	High Prairie Renewable Energy Center
ITP	Incidental Take Permit
k	detection reduction factor
m	meter
M*	cumulative take
m/s	meter per second
MDC	Missouri Department of Conservation
mi	mile
min	minute
MW	megawatt
NAU	Northern Arizona University
PCM	post-construction bat fatality monitoring
plot type	search area (circular cleared plot or road and pad)
QA/QC	quality assurance and quality control
road and pad	gravel turbine pad and access road
rpm	rotation per minute
SEEF	searcher efficiency
SOCC	Species of Conservation Concern
Stantec	Stantec Consulting Services, Inc.
T	permitted take
USFWS	US Fish and Wildlife Service
WEST	Western EcoSystems Technology, Inc.
Year 1	2021 compliance monitoring

α	shape
Year 2	2022 compliance monitoring
Year 3	2023 compliance monitoring
Year 4	2024 compliance monitoring
Year 5	2025 compliance monitoring

1 INTRODUCTION

Ameren Missouri (Ameren) owns and operates the 175-turbine High Prairie Renewable Energy Center (HPREC) in Schuyler and Adair counties, Missouri (Figure 1). Ameren obtained an Incidental Take Permit (ITP; ESPER0011567) for the federally listed endangered Indiana bat,[1] federally listed endangered northern long-eared bat, and little brown bat (currently under review for federal listing; hereafter, collectively referred to as the Covered Species) from the US Fish and Wildlife Service (USFWS) on May 14, 2021. Compliance monitoring is required by terms of the ITP to determine if take of Covered Species identified in the HPREC Habitat Conservation Plan (HCP; Stantec Consulting Services, Inc. [Stantec] 2021b) is within the limits authorized by the ITP, and to evaluate the need for adaptive management measures. HPREC completed compliance monitoring in 2021, 2022, 2023, and 2024 (Years 1–4) under the ITP (Stantec 2021a, 2022, 2023, Gabrey et al. 2024) and this report includes the monitoring results for 2025 (Year 5).

Ameren contracted Western EcoSystems Technology, Inc. (WEST), to develop and implement a Year 5 post-construction fatality monitoring (PCM) study at the HPREC. The PCM study was designed to fulfill the monitoring commitments described in Section 7.0 of the HPREC HCP (Stantec 2021b). The objectives of this study were to 1) estimate the number of Covered Species fatalities using the Evidence of Absence (EoA) framework (Huso et al. 2018, Dalthorp et al. 2017), 2) determine if adaptive management was triggered, and 3) estimate the overall bat fatality rate using the Generalized Estimator of Mortality (GenEst). This report presents the results of Year 5 study conducted at HPREC from April 1 – October 31, 2025.

2 PROJECT DESCRIPTION

The HPREC is a 400-megawatt (MW) wind facility owned by Ameren that became operational in December 2020, and consists of 163 Vestas V120 turbines and 12 Vestas V112 turbines. The 2.2-MW V120 turbines have a hub height of 92 meters (m) and rotor diameter of 120 m. The 3.45-MW V112 turbines have a hub height of 94 m and rotor diameter of 112 m.

The permit area, as defined in the HCP, encompasses 46,083 hectares in Schuyler and Adair counties, Missouri. Land use within the permit area is primarily agricultural. Land cover consists mostly of pasture, hayfields, and row crops; forested areas are scattered throughout, mostly along rivers and streams.

[1] See Appendix A for scientific names of all bat species.

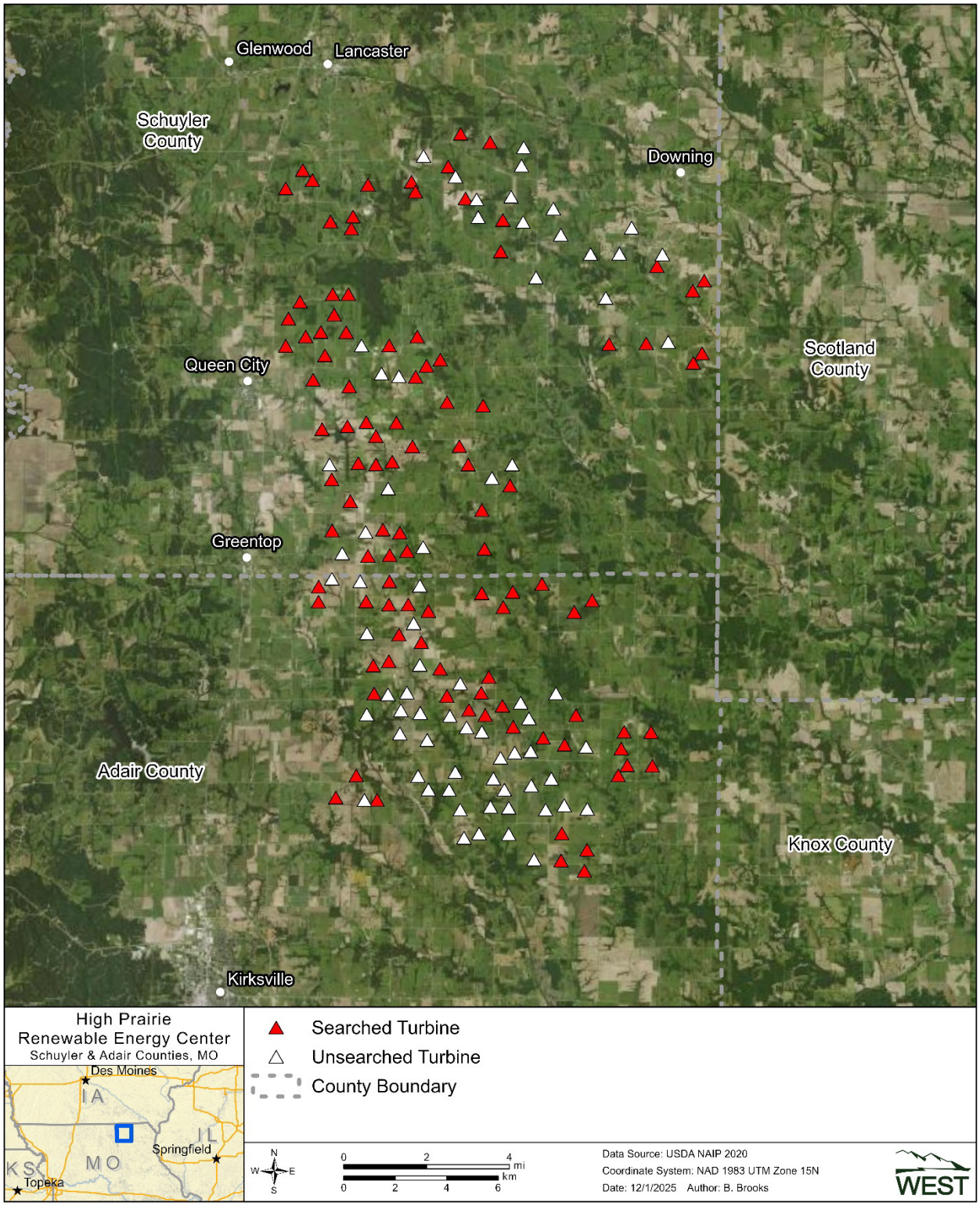

Figure 1. Location of searched and unsearched turbines at the High Prairie Renewable Energy Center, Schuyler and Adair counties, Missouri.

3 METHODS

The HCP and ITP require the HPREC to maintain take of Covered Species within authorized levels (Section 6.2.6 of the HCP) and to adhere to adaptive management commitments (Section 7.5 of the HCP). PCM was conducted at all turbines[2] that operated at night at any point during the monitoring period (April 1 – October 31) to meet these requirements (Figure 1).

Turbines operated at a cut-in speed of 8.0 m per second (m/s) when no bats of any species, regardless of their coverage under the ITP, were detected by the EchoSense[3] system each night, from 45 minutes (min) before sunset to 45 min after sunrise. The number of nighttime-operating turbines varied within and across seasons (Table 1). Ameren voluntarily ceased all nighttime operations on the afternoon of August 28, 2025, following the discovery of a second Indiana bat fatality during the monitoring period (Table 1). PCM searches continued through August 30, 2025, to ensure that all turbines that had been operating at night at the time of the shutdown were searched once following the voluntary shutdown.

The PCM study consisted of three primary monitoring components: 1) standardized carcass searches (carcass searches) around turbines, 2) searcher efficiency (SEEF) trials to estimate the probability a carcass was found by technicians and dog-handler teams, and 3) carcass persistence (CP) trials (CPT) to estimate the average length of time a carcass remained in the search area for possible detection. In addition, a search area adjustment was calculated to account for carcasses that fell outside of search areas. The methodologies of each of these components and associated analysis are described below.

Table 1. Summary of nighttime operations and curtailment regime at the High Prairie Renewable Energy Center, Adair and Schuyler counties, Missouri, during the 2025 monitoring period (April 1 – October 31, 2025).

Season	Date Range	Number of Turbines Operating at Night	Number of Turbines Not Operating at Night	Curtailment
Spring	April 1 – April 20	42	133	8.0 m/s + EchoSense
	April 21 – May 9	68	107	8.0 m/s + EchoSense
	May 10 – May 14	62	113	8.0 m/s + EchoSense
Summer	May 15 – June 4	62	113	8.0 m/s + EchoSense
	June 5 – July 14	79	96	8.0 m/s + EchoSense
	July 15 – August 15	84	91	8.0 m/s + EchoSense
Fall	August 16 – August 17	84	91	8.0 m/s + EchoSense
	August 18 – August 27	99	76	8.0 m/s + EchoSense
	August 28 – October 31	0	175	N/A

m/s = meters per second; N/A = not applicable.

[2] All nighttime operations were paused on August 28, 2025; however searches were conducted at 61 turbines on August 29 and 30 to ensure those turbines were searched once following the shutdown. No turbines were searched from August 31 – October 31, 2025.

[3] EchoSense (EchoSense, LLC, Saratoga Springs, New York, https://www.echosensellc.com/) is a form of acoustic-triggered smart curtailment designed to minimize bat fatalities at wind facilities.

3.1 Study Design

A description of the study design is presented in Table 2, and details of the number of turbines that were searched, search frequency, type of search area (plot type), and search methods (technician-only or detection-dog team) are described below. Number of turbines searched varied within and among seasons, which were defined as follows: spring (April 1 – May 14), summer (May 15 – August 15) and fall (August 16 – October 31; Table 2). Although the number of operating turbines varied across the monitoring period, all turbines that operated at night were searched. Throughout the 2025 monitoring period, 105 of the 175 turbines were searched at least once. However, the maximum number of turbines searched during any season was 99 in fall (Table 2). Some turbines were operating earlier in the year and then were voluntarily removed from operations after final consultations with USFWS/MDC on the updated maternity colony adaptive management framework (Figure 1). Searches were conducted during the day, beginning as early as one half hour after sunrise, between April 1 and August 30, 2025 (Table 2).

3.1.1 Search Areas

Searches were conducted within two types of search areas (plot types): gravel turbine pads and access roads (road and pads) and circular full plots (full plots). Turbines were assigned a plot type by Ameren, based on landowner participation. Road and pads included the gravel pad around the base of the turbine, all gravel roads, and a 1-m buffer within a 95-m radius centered on the turbine base. Full plots included a 60-m radius circle centered on the turbine. Vegetation within all full plots was regularly mowed to maintain a vegetation height of approximately 15 centimeters. Throughout the monitoring period, between 66% and 71% of searched turbines were searched as full plots, and between 34% and 29% were searched as road and pads (Table 2).

3.1.2 Search Methods

Carcass searches for bats were conducted using two search methods: a human technician (i.e., technician-only visual searches) and a detection-dog team (olfactory search), where a team consisted of one handler and one dog. All personnel were trained to follow the HPREC's study plan, including proper handling and reporting of carcasses. Road and pads were searched by technicians only, while full plots were searched by technicians or detection-dog teams. Detection-dog teams searched 99–100% of full plots in spring, 75–99% of full plots during summer, and 64–75% of full plots during fall (Table 2).

3.1.2.1 Technician-only Visual Searches

Road and pads were searched by technicians walking along the edge of all gravel access roads and pads, while scanning towards the center and 1.0 m off to the side (Figure 2). Full plots were searched by technicians walking transects spaced 5.0 m apart, while scanning out to 2.5 m on either side (Figure 2). Direction of travel at full plots alternated between north-south oriented transects one day followed by east-west oriented transects the next. During all technician-only visual searches, technicians looked for carcasses while walking at a pace of 45.0–60.0 m per min within the search areas.

Table 2. Summary of nighttime operations, plot type, and search method at the High Prairie Renewable Energy Center, Adair and Schuyler counties, Missouri, between April 1 – October 31, 2025.

Season	Date Range	Number of Operational Nights	Number of Turbines Operating at Night	Number of Turbines Searched by Plot Type (Search Method)			Frequency (Searches per Week)
				Full Plot (Detection-dog Team)	Full Plot (Technician-only)	Road and Pads (Technician-only)	
Spring	April 1 – 20	20	42[1]	30	0	12	2
	April 21 – 23	3	68	47	0	21	2
	April 24 – May 9	16	68	46	1	21	2
	May 10 – 14	5	62	43	1	18	2
Summer	May 15 – June 4	21	62	40	4	18	2
	June 5 – July 14	40	79	42	10	27	2
	July 15 – August 15	32	84	42	14	28	2
Fall	August 16 – 17	2	84	42	14	28	2
	August 18 – 27	10	99	42	23	34	2
	August 28 – October 31[2]	0	0	–	–	–	–

[1.] Although Turbine C-13 operated at night during spring, only one carcass search was conducted due to the presence of cattle in the search area. Consequently, this plot was removed from the spring fatality estimates due to the small sample size.
[2.] All turbines were paused on August 28, 2025; however, scheduled searches continued through August 30, 2025, to ensure all operational turbines were searched once following the voluntary shutdown.

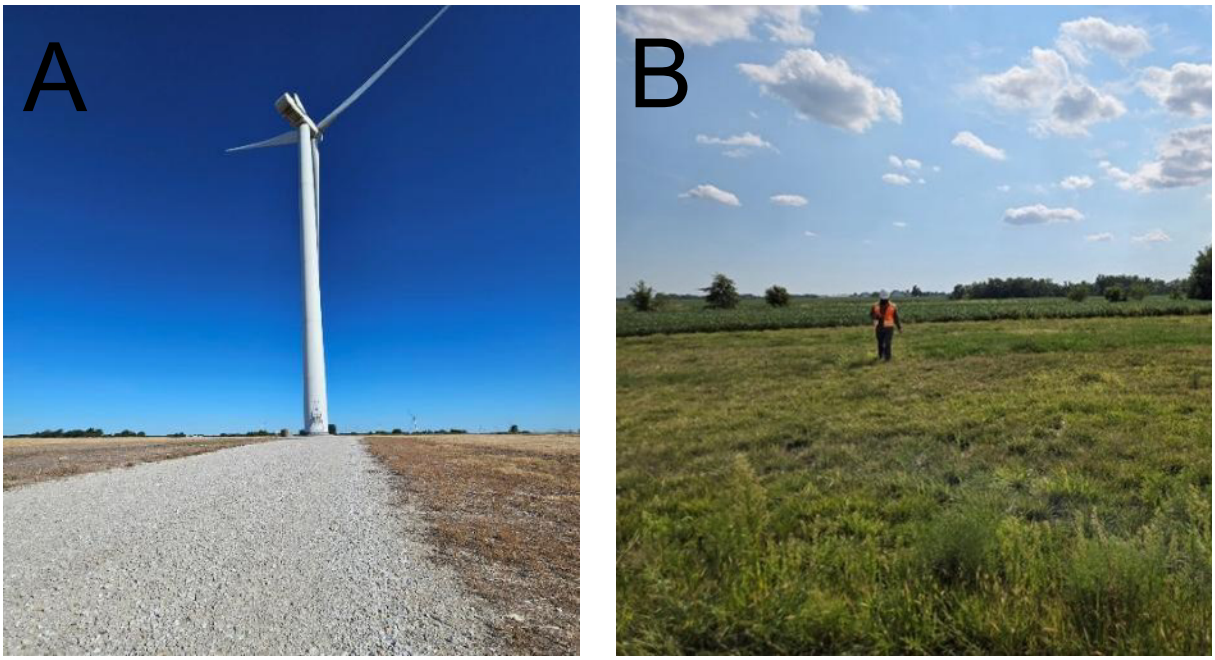

Figure 2. Representative photographs of technician-only visual search areas conditions on road and pads (A) and full plots (B) at the High Prairie Renewable Energy Center, Adair and Schuyler counties, Missouri.

3.1.2.2 Detection-dog Team Searches

Turbines assigned to be searched by detection-dog teams were chosen in consideration of dog and handler safety to avoid potential hazards (e.g., frequent cattle [*Bos taurus*] grazing, thorny vegetation, or frequently water-logged areas), to the extent practicable. In general, detection-dog full plots, once selected, were only searched by detection-dog teams throughout the monitoring period. Four turbines searched by detection-dog teams in spring were reassigned to technician-only full plots for summer and fall due to the presence of cattle on the full plot.

Prior to each search, dog handlers determined the survey start points and the number of transects needed to cover the plot after considering wind speed and direction, humidity, and vegetation density. Handlers oriented the detection dog to start searches perpendicular to the wind to maximize the probability of scent detection. Windspeed and vegetation density can affect dispersal of the target odor (i.e., bat carcasses) across the area to be searched. To maximize detection rates during a detection-dog search, transect width varied with windspeed and vegetation density and ranged from five to 10 m apart in densely vegetated areas to 10–15 m in shorter vegetation. Detection dogs were rewarded with either a food reward or a short play session when they correctly alerted to a bat carcass.

3.1.2.2.1 Detection-dog Team Evaluation

Detection dogs were considered candidates for carcass searches if they met basic temperament and obedience criteria and demonstrated the trainability to detect bat carcasses. Temperament characteristics sought after were high energy and a high food or toy drive. Prior to conducting carcass searches at the HPREC, handlers trained their detection dogs on the scent of bat carcasses following methods derived from search and rescue programs and drug detection

(Kay 2012, Helfers 2017). Dogs were initially trained with dehydrated bat carcasses, placed at increasing distances over a period of four weeks. Once the dog achieved 80% or higher in a scent recognition test, consisting of 10 blind trial lineups using dehydrated bats, the dog and handler were evaluated in the field to measure their performance. A detection dog coordinator conducted a field evaluation of each detection-dog team. After teams achieved a SEEF of 75% or greater for a minimum of 12 bats placed during evaluation trials, the teams were approved to conduct carcass searches. Breeds comprising the detection-dog teams included one each of German shepherd, Dutch shepherd, Belgian Tervuren, and rough collie, and two Labrador retrievers (Figure 3).

Figure 3. Photographs of detection-dog teams at the High Prairie Renewable Energy Center, Adair and Schuyler counties, Missouri.

3.2 Field Methods

Technicians and detection-dog teams trained in proper search techniques conducted carcass searches from April 1 – August 30, 2025. Bat carcasses found by technicians or dog-detection teams were recorded by the methods described below, whether they were found during carcass searches or incidentally.

3.2.1 Data Collection

Technicians and dog-handlers recorded the date, search start and end times, technician name or dog-handler name, turbine number, plot type, and if any carcasses were found during each carcass search. All bat carcasses found were recorded. Data recorded for carcasses included the following:

- an identification code
- species, sex, age, and reproductive condition (when identifiable)

- date and time
- Universal Transverse Mercator location
- measured distance and direction from turbine
- estimated time of death
- any comments that indicated possible cause of death
- photograph(s) of carcass as found, including any visible injuries and surrounding habitat
- location of bat carcass plotted on a map
- condition (e.g., intact, scavenged, dismembered, feather spot, injured)
    - Intact – a carcass that was completely intact, 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 scavenging or was heavily infested by insects, or portion(s) of a carcass in one location (e.g., wings)
    - Dismembered – a carcass with missing limbs or a carcass that was found in multiple pieces distributed more than one m apart from one another due to scavenging or other reasons
    - Injured – a live bat

All bat carcasses or injured bats found were collected or handled in accordance with federal and state permit conditions. All injured bats were considered fatalities for analysis. Bat carcasses were collected under the HPREC's ITP (ESPER0011567), WEST's Federal Native Endangered and Threatened Species Recovery Permit (ES234141), and Missouri Collection/Salvage Permits (68126, 67602, 68127, 68128, 68129, 68209, 68130, 68131, 68132). Technicians placed bat carcasses in a resealable plastic bag labeled with a unique carcass identification number, turbine number, and date, and stored them in a freezer on site. Technicians wore rubber and leather gloves to handle all bat carcasses to eliminate possible transmission of rabies or other diseases. The USFWS was notified when a carcass of a federally listed threatened or endangered species was found, and the Missouri Department of Conservation (MDC) was notified when a state-listed as endangered or threatened species or Species of Conservation Concern (SOCC; MDC 2025) was found.

Federally permitted bat biologists verified all bat carcass identifications. Tissue samples were collected from carcasses that were identified as a Covered Species and sent to a USFWS-approved laboratory, the Bat Ecology and Genetics Lab at Northern Arizona University (NAU; 2025) for deoxyribonucleic acid (DNA) confirmation.

3.2.2 Searcher Efficiency Trials

The objective of SEEF trials was to collect data to estimate the probability that technicians and detection-dog teams detected bat carcasses. SEEF trials were placed on multiple days within each season to account for variability in detection associated with changes in conditions, such as vegetation, topography, or weather (e.g., rain and/or cloud cover, muddy plots), and to account for individual technician and detection-dog team detection variability.

A minimum of 20 carcasses were placed per search method (i.e., technician-only and detection-dog team) and per plot type (i.e., road and pad and full plot), in spring and summer. Fewer SEEF trials were placed during the fall due to the voluntary turbine shutdown on August 28. Due to a limited number of available bat carcasses, 10 house mouse (*Mus musculus*) carcasses were used as surrogates for bat carcasses during the first spring road and pad SEEF trial. Bat carcasses were placed for all other SEEF trials. Bat carcasses used for SEEF trials consisted of carcasses previously found on site or obtained from other PCM projects in Missouri. Carcasses of Covered Species or of federally or state-listed as threatened or endangered species were not used for bias trials.

The bias trial administrator placed SEEF carcasses in plots before scheduled searches so that technicians and detection-dog teams conducting the searches did not know when or where SEEF carcasses were placed. To the extent practicable, SEEF carcasses for technicians were placed in the morning, prior to the start of that day's scheduled searches, to minimize the risk of carcass removal. When morning placement was not possible, SEEF carcasses were placed the night before scheduled searches. For detection-dog teams, the bias trial administrator walked in a meandering path and dropped carcasses the day prior to the next search to allow time for the scent to pool and disperse prior to scheduled searches, and to eliminate a direct scent trail. Trial carcasses were placed within the plot using randomly selected distances and bearings from the turbine.

Prior to placement, each SEEF carcass was marked discreetly with a black zip-tie and/or a piece of electrical tape around the upper forelimb for identification as a trial carcass after it was found. The bias trial administrator dropped SEEF carcasses from waist height or higher and allowed them to land in a random posture. Technicians and detection dog teams had one chance to locate trial carcasses during the first search following carcass placement. The number and location of trial carcasses found during the subsequent search were recorded, and the number of trial carcasses available during each search was determined immediately after each trial by the trial administrator.

3.2.3 Carcass Persistence Trials

The objective of CPT was to collect data to estimate the length of time (in days) a carcass would persist, or be available for detection, in the field. The data collected were used to adjust for the potential bias of carcasses removed prior to carcass searches. CPTs were conducted throughout the study period to incorporate the effects of varying weather, climatic conditions, and scavenger densities. Possible means of carcass removal included scavenging or agricultural practices, such as being plowed into a field. Estimates of CP were incorporated into the estimates of the probability of detection (*g*) to account for carcasses removed from the plot. Only bat carcasses were used for CPTs across all seasons.

Twenty CPT carcasses were placed for each plot type (i.e., full plot and road and pad) and search method (i.e., detection-dog team and technician-only) during spring and summer. Fewer carcasses were placed during the fall due to the voluntary turbine shutdown on August 28 (detection-dog full plots, six carcasses; technician-only full plots, six carcasses; road and pads,

eight carcasses). Trial carcasses were marked discreetly with a black zip-tie and/or piece of electrical tape around the upper forelimb for recognition by technicians and other personnel. All carcasses were dropped from waist height and allowed to land in a random posture within the plot. Carcasses utilized in CPTs were previously frozen hoary, eastern red, evening, silver-haired, and big brown bats.

No more than two trial carcasses were placed on a plot during a trial to avoid potential over-seeding and attracting scavengers. CPT carcasses were monitored over a 30-day period according to the following schedule: every day for the first seven days, then on days 10, 14, 21, and 30. The condition of carcasses was recorded each time the CPT carcasses were checked. The schedule varied slightly depending on weather and coordination with other monitoring work. Detection-dog teams checked CPT carcasses on the full plots they searched to determine when carcasses were removed, while technicians determined the status of CPT carcasses placed on technician-searched full plots and road and pads. Carcasses were monitored until they were completely removed (were not found on two consecutive checks), or until the trial period ended. Following the 30-day period, any remaining evidence of carcasses was removed.

3.2.4 Search Area Mapping

Technicians recorded the boundaries of road and pads and full plots using a Juniper Geode sub-meter Global Positioning System unit. A 62-m radius projection was applied to assist in delineating boundaries of full plots in those instances where plot boundaries were not readily apparent. The additional two m were added to the radius to account for the width of the turbine tower. Unsearchable areas within plot boundaries were also mapped. Plot boundaries were used to verify if carcasses were found inside the plots, to account for unsearched areas within plots, and to inform the distribution of carcasses around turbines to estimate the number of carcasses that fell inside search areas.

3.3 Data Management

3.3.1 Data Compilation and Storage

A Microsoft® SQL Server database was specifically developed to store, organize, and retrieve monitoring data. Data were keyed into the electronic database using a pre-defined format to facilitate subsequent quality assurance and quality control (QA/QC) and data analysis. All data forms and electronic files were retained according to WEST's data retention policy.

3.3.2 Quality Assurance and Quality Control

WEST implemented QA/QC measures at all stages of the study, including in the field, during data entry and analysis, and report writing. Multiple reviews were conducted as QA/QC measures throughout the study-life cycle. Following searches, technicians were responsible for inspecting data forms for completeness, accuracy, and legibility. If errors or anomalies were found within the data, follow-up measures were implemented, including discussions and review of field data with field technicians and/or Project Managers. If any errors, omissions, or problems were identified in later stages of analysis or report writing, they were traced back to the raw data forms where appropriate changes and measures were implemented and documented.

4 STATISTICAL ANALYISIS

GenEst (Dalthorp et al. 2018) was used to calculate bias correction factors (SEEF and CP), which, along with an area correction estimate and carcass data, were used to estimate the site-wide fatality rate (fatalities/turbine and fatalities/MW) for all bat species combined and for individual species. The EoA framework (Huso et al. 2018, Dalthorp et al. 2017) was used to estimate the probability of detection (*g*), the take rate of Covered Species, and the number of Covered Species fatalities that occurred, to determine if take thresholds were exceeded and whether adaptive management was warranted.

4.1 Bias Estimation

4.1.1 Searcher Efficiency Estimation

Data collected during SEEF trials were used to estimate the probability that bat carcasses were detected by searchers. Estimates of SEEF were used to adjust carcass counts for detection bias. SEEF is the probability of a carcass being detected by a technician given the carcass was available to be found. Estimates of SEEF were obtained using a logit regression model (Dalthorp et al. 2018). SEEF 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 (explanatory variables of interest) for these logit regression models included plot type and season for the technician models, and season for the detection-dog team models. Models were selected 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.

The change in SEEF between successive searches was defined by a parameter called the detection reduction factor (*k*) that ranged from zero to one. A *k* of zero implies a carcass missed on the first search will never be found. A *k* of one implies SEEF remains constant no matter how many times a carcass is missed. The detection reduction factor is a required parameter for GenEst; however, data were not collected to estimate *k*. Huso et al. (2017) estimated *k* to be 0.67 for bats, and this value was assumed for this analysis. The Single Class Module of EoA uses the raw SEEF data (i.e., number of found and available trial carcasses) to inform the overall *g*. SEEF data were input into the EoA software and stratified according to the model selection results.

4.1.2 Carcass Persistence Estimation

Data collected during CPTs were used to model the amount of time, in days, carcasses remained available within plots. Models of CP 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 bat carcass was modeled using an interval-censored survival regression, using exponential, log-logistic, lognormal, and Weibull distributions (Kalbfleisch and Prentice 2002, Dalthorp et al. 2018). Persistence was estimated for each search method (technician-only searches and detection-dog team searches) to account for different modes of detection, as dogs are often able to detect smaller fragments of carcasses than

are technicians. Covariates were fit to each of the parameters of the distributions and included season and plot type for the technician models, and season for the detection-dog team models. 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 (shape (α) and scale (β), including the 95% [CI] of β) were used as inputs in the EoA Single Class module. The EoA software requires the 95% CI for β regardless of the CI selected for the take estimates.

4.1.3 Search Area Adjustment Estimate

The search area adjustment (often referred to as the density-weighted proportion, or DWP; Simonis et al. 2018) accounted for unsearched areas beneath turbines and was calculated as a probability that ranged from zero to one. For example, a search area adjustment of 0.75 meant that an estimated 75% of carcasses fell within plot boundaries. The search area adjustment was estimated by multiplying the predicted proportion of carcasses occurring within each 10-m annulus around the base of the turbine (according to the carcass density distribution) and the average proportion of area searched within that 10-m annulus. The product of these two components for each annulus was summed over all 10-m annuli from the turbine base to the maximum predicted fall distance (100 m) for each plot type.

The predicted portion of carcasses occurring within each 10-m annulus was calculated by multiplying carcasses found during the study period by the average proportion of area searched within each 10-m annulus to get an adjusted number of carcasses for the annulus. The adjusted number of carcasses from the current study (Year 5) was added to the Year 4 report's predicted portions of carcasses (Gabrey et al. 2024) per 10-m annulus to increase the sample size, create a better understanding of the overall site fatality distribution, and for consistency with Stantec's Year 1 report (Stantec 2021a).

The average proportion of the area searched within each 10-m annulus was weighted by the number of searches at each turbine. Therefore, the proportion of area searched for all turbines at each 10-m annulus was multiplied by the fraction of total searches that occurred at that turbine and then summed to get an average proportion of area searched for each annulus.

Unsearched areas were due to survey obstacles such as ground cover (e.g., tall crops), terrain, or areas where carcasses fell outside the plot boundary (e.g., a carcass landed 70 m away from the turbine on a plot searched out to 60 m from the turbine base). The proportion of area searched was calculated in a geographic information system as the amount of area searched divided by the total area searched at each 1-m annulus around the turbine. Each 1-m annulus was averaged with each annulus that fell into the same 10-m annulus at each turbine to create our annuli used in the previously mentioned calculations. The carcass-density distribution predicts the likelihood that a carcass fell a given distance from the turbine base. The median area adjustment values across all turbines for each plot type were used as inputs in the EoA Single Class Module.

4.2 GenEst Fatality Rate Estimation

Carcasses included in the GenEst fatality rate estimation were found within the search plots and had an estimated time of death within the study period (April 1 – October 31). Fatality rates were estimated for all bat species, for the entire study period, using GenEst (Dalthorp et al. 2018, Simonis et al. 2018). To obtain an overall estimate of bat fatality rates, each carcass included in the analysis was adjusted to account for SEEF, CP, the detection reduction factor, and search area adjustment. Estimates and 90% CIs were calculated using a parametric bootstrap (Dalthorp et al. 2018).

Fatality estimates generated by Horvitz-Thompson type estimators, such as GenEst, become increasingly uncertain as the number of carcasses in a given category approaches zero. Korner-Nievergelt et al. (2011) showed that for several estimators that predate GenEst, fewer than 10 carcasses included in the analysis for a category resulted in substantially more uncertain estimates. Huso et al. (2018) recommended against the use of the Huso estimator if there were fewer than five carcasses per category, and Rabie et al. (2021) demonstrated that GenEst is guaranteed to produce unreliable CIs when expected carcass counts were less than three per category. To provide a conservative threshold for interpreting GenEst results, estimates for a category based on fewer than five fatalities are not presented with CIs to signal the weak inference provided by these estimates.

4.3 Evidence of Absence

The EoA modeling framework (Huso et al. 2018, Dalthorp et al. 2017) was used with data collected in the field to estimate *g*, the take rate of the Covered Species (λ), the number of Covered Species fatalities that occurred (or cumulative take [M*]), and to determine if take thresholds were exceeded. Data used in the EoA model included number of Covered Species carcasses, along with the search area adjustment, the results of SEEF and CP analyses, the detection reduction factor, and the seasonal arrival distribution (see Section 4.3.2).

4.3.1 Detection Probability, Density-weighted Proportion, and Weights

The monitoring and bias trial data were separated into search strata, where each search stratum was defined by several turbines that were searched, plot type, search method, search frequency, the proportion of days in the study period, and a weight that represented the relative risk within the stratum to estimate $g_{stratum}$. Strata were defined to ensure all the factors that defined them were identical within strata. The EoA Single Class module was used to estimate $g_{stratum}$ in each search stratum. This resulted in Ba and Bb parameters that defined the beta distribution of $g_{stratum}$ in each stratum. Unsearched areas were treated as distinct strata and assigned a detection probability of 10^{-5} by setting the beta distribution parameters to Ba = 0.01 and Bb = 1,000.

The Multiple Class module of the EoA Graphical User Interface (GUI) was then used three times: once to develop the distribution of *g* for each subseason ($g_{subseason}$), by combining $g_{stratum}$ (e.g., road and pads, full plots, or unsearched areas); once to develop the distribution of *g* for each season (g_{season}), by combining $g_{subseason}$; and once to develop the distribution of *g* for the study period, by combining g_{season}. Each calculation was completed using the appropriate weights.

Weights ("DWP" in the software) represent the relative fatality risk within each search stratum or season and are used for combining detection probabilities. For each stratum, the DWP was calculated as the product of several different weights, which are described in the sections below. DWP within seasons and subseasons were re-scaled to sum to one before calculating seasonal and subseasonal detection probabilities, respectively, as required by the EoA GUI.

DWP for combining across strata within subseasons were calculated using the sampling fraction. DWP for combining across subseasons within seasons were calculated using the arrival proportions, re-scaled so that all subseason weights sum to one within a season. DWP for combining across seasons within the study period were calculated using the seasonal arrival proportions.

4.3.2 Arrival Proportions

The proportion of annual Covered Species fatalities expected within a season is called the arrival proportion and was used to weight the contributions of detection probability from different subseasons and seasons in the overall *g* estimate. Arrival proportions were calculated using all observed bat species fatalities as surrogates for the Covered Species at the HPREC during Year 5 monitoring. Subseasonal weights were estimated by dividing the number of all bat fatalities included in the analysis by the *g* for that subseason, which provides an index of fatality risk that is adjusted for search effort. These weights were then re-scaled to sum to one across all subseasons. Seasonal weights were calculated by summing the subseasonal arrival weight within each season.

4.3.3 Take Estimates

The Multiple Years module of EoA was used to estimate the following:

- median cumulative take to-date ($M^*_{2021–2025}$, based on monitoring from Years 1 – 5)
- median annual take (M^*_{2025})
- mean annual take rate (λ)
- projected take estimate ($M^*_{projected}$)

The cumulative take to-date ($M^*_{2021–2025}$) was calculated using monitoring data from Years 1 – 5. The median annual take (M^*_{2025}) and mean annual take rate (λ) were calculated using monitoring data from Year 5, alone. The median projected take estimate ($M^*_{projected}$) was calculated using monitoring data from Years 1 – 5 and assumed one more year of ITP monitoring will occur with a detection probability of 0.2 and the same relative risk as seen in Year 5.

The EoA Multiple Years Module requires the input ρ, which weights the years appropriately for combining beta distribution parameters. This value was calculated using the same approach as in previous years. Turbine rotor speed (rotations per min [rpm]) data was recorded in 10-min intervals for all turbines between April 1 – October 31, where each interval was categorized as operational if the rpm value was greater than one. The calculations for ρ were limited to turbine rpm data between sunset and sunrise, and when wind speeds were less than 15 m/s. The number of operational 10-min nighttime periods were summed monthly. These sums of 10-min operational

intervals were then weighted by the monthly relative number of acoustic bat passes recorded at 35 turbines by the EchoSense system in Year 5. These weighted sums were then converted to turbine-hours of operation that likely posed risk to bats.

The resulting number of weighted hours with rotor speeds over one rpm was 1,536 for Year 5, representing an approximately 16% decrease in relative mortality risk compared to the 1,829 weighted hours in Year 1. Therefore, a ρ of 0.84 was used for Year 5 (Table 3).

Table 3. Calculated number of hours at night when turbine rotor speeds exceeded one rotation per minute (rpm) from 2021–2025, weighted by the monthly rate of acoustic bat passes detected by EchoSense from 2022–2025, at the High Prairie Renewable Energy Center, Schuyler and Adair counties, Missouri.

Year	Total Hours with Rotor Speeds >1 rpm	Hours with Rotor Speeds >1 rpm (weighted by bat activity)	ρ
2021	51,326	1,829	1.00
2022	2,759	128	0.07
2023	4,983	370	0.20
2024	8,714	1,151	0.63
2025	13,222	1,536	0.84

4.3.3.1 Adaptive Management Triggers

The estimates from the EoA analysis were used to test two adaptive management triggers: 1) a short-term test of whether the estimated take rate exceeded the expected take rate and 2) a long-term test of whether permitted take (T) had been met (Dalthorp and Huso 2015). Both the short- and long-term triggers were tested individually for each of the Covered Species. Maternity colony adaptive management triggers are evaluated separately in the *2025 Maternity Colony Take Allocation and Adaptive Management for Indiana bat at the High Prairie Renewable Energy Center Memorandum* (Maternity Colony Memo; WEST 2025a).

4.3.3.1.1 Evidence of Absence Short-term Trigger

The EoA short-term trigger is designed as an early warning signal that the HPREC may be on a trajectory to exceed the 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 exceeding the permitted take. The short-term trigger tests if the estimated annual take rate (λ) exceeded the expected take rate (τ = T ÷ years in permit) at a credible level of α = 0.5, per the HCP (Stantec 2021b). The HPREC's short-term trigger is designed to evaluate cumulative take within one year of PCM. If, within any study year, the estimated take rate exceeds the expected take rate with 50% probability, the short-term trigger would be met, indicating the minimization plan in the HCP may need to be adjusted to ensure the median cumulative take estimate remains within the permitted limit over the ITP term. Only data from Year 5 were used to evaluate this trigger.

4.3.3.1.2 Evidence of Absence Long-term Trigger

The EoA long-term trigger was designed to test if the cumulative take to-date was equal to or greater than the permitted take (T). Per the HCP, median cumulative take to-date ($M^*_{2021–2025}$) was estimated at a credible level of α = 0.5 (using the median, or 50th credible bound, of the posterior

distribution of estimated fatality). If the median cumulative take to-date ($M^*_{2021–2025}$) at α = 0.5 was less than the total permitted take ($M^*_{2021–2025} < T$), then the HPREC was in compliance with the ITP. If the median cumulative take to-date ($M^*_{2021–2025}$) at α = 0.5 was greater than or equal to the total permitted take ($M^*_{2021–2025} \geq T$), then the take limit has been exceeded and the HPREC must enact avoidance measures or amend their ITP.

5 RESULTS

5.1 All Bats

5.1.1 Standardized Carcass Searches

There were 3,117 road and pad and full plot searches completed between April 1 – October 31, 2025. All 3,117 searches (100%) were conducted at turbines with nighttime operations (Table 4). Additionally, 99 scheduled searches were missed due to turbine maintenance, cattle present at the plot, aerial spraying, electric fences, or weather.

Table 4. Number of searches conducted, by plot type and search method, at the High Prairie Renewable Energy Center, Schuyler and Adair counties, Missouri, from April 1 – October 31, 2025.

Plot Type	Search Method	Total	%
Full plot	Detection-dog Team	1,727	55.4
Full plot	Technician-only	1,024	32.9
Road and pad	Technician-only	366	11.7
Total	**N/A**	**3,117**	**100**

% = percent; N/A = not applicable.

Forty-five bat carcasses were found during scheduled carcass searches, all by detection-dog teams (Table 5; Appendix B). One carcass was found incidentally on a technician-searched full plot, and one was found incidentally at an unsearched turbine. The average search interval in all seasons was 3.5 days (Table 6).

Table 5. Number of bat carcasses found during or incidental to standardized carcass searches, by plot type and search method, at the High Prairie Renewable Energy Center, Schuyler and Adair counties, Missouri.

Plot Type	Search Method	Scheduled Searches	%	Incidental	%	Total	%
Full plot	Detection-dog Team	45	100	0	0	45	95.7
Full plot	Technician-only	0	0	1[1]	50	1	2.1
Road and pad	Technician-only	0	0	0	0	0	0
Other	Incidental	0	0	1	50	1	2.1
Total	**N/A**	**45**	**100**	**2**	**100**	**47**	**100**

[1] indicates a carcass found on a plot that was searched once as a detection dog full plot before being re-assigned as a technician only full plot. Because only one search had been conducted before the plot was reassigned, the carcass was classified as incidental on that search and assumed to have been found during the next search, which occurred after the plot was reassigned.

% = percent; N/A = not applicable.

Table 6. Summary of post-construction bat fatality monitoring conducted at the High Prairie Renewable Energy Center in Schuyler and Adair counties, Missouri, from April 1 – October 31, 2025.

Season	Dates	Number of Turbines Operating at Night	Number of Searches	Average Search Interval (days)	Number of Bats Found during Searches	Number of Bats Found Incidentally[1]	Total
Spring	April 1 – 20	42	244	3.5	8	0	8
	April 21 – May 14	62–68[2]	449	3.5	6	0	6
Summer	May 15 – June 4	62	366	3.5	1	1	2
	June 5 – July 14	79	906	3.5	5	0	5
	July 15 – August 15	84	759	3.5	13	1	14
Fall	August 16 – 17	84	4	3.5	1	0	1
	August 18 – 27	99	292	3.5	6	0	6
	August 28 – August 30	0	97	3.5	5	0	5
	August 31 – October 31	0	0	N/A	N/A	N/A	N/A
Total	**April 1 – October 31**	**N/A**	**3,117**	**N/A**	**45**	**2**	**47**

1. Incidental finds include carcasses found during on-site activities other than scheduled carcass searches.

2. Sixty-eight turbines operated at night from April 21 – May 9, 2025, and 62 from May 10 – May 14, 2025.

N/A = not applicable.

5.1.2 Species Composition

Forty-seven carcasses, representing at least six bat species, were found during carcass searches or incidentally (Table 7; Appendix B). Forty bat carcasses were found during scheduled searches or incidentally within search plots and were included in the GenEst analysis (Table 7; Appendix B). The remaining seven carcasses were excluded because they were found incidentally at an unsearched turbine or outside search plot boundaries, or the estimated time of death was outside the study period (Table 7).

Table 7. Species composition of bat carcasses found at the High Prairie Renewable Energy Center in Schuyler and Adair counties, Missouri, between April 1 – October 31, 2025.

	Included in Fatality Estimates		Outside Search Plots		Outside Study Period		Total	
Species	**Count**	**%**	**Count**	**%**	**Count**	**%**	**Count**	**%**
eastern red bat	11	27.5	3	50.0	0	0	14	29.8
big brown bat	8	20.0	1	16.7	0	0	9	19.1
hoary bat	7	17.5	0	0	0	0	7	14.9
evening bat	6	15.0	0	0	0	0	6	12.8
silver-haired bat	3	7.5	2	33.3	1	100	6	12.8
Indiana bat	2	5.0	0	0	0	0	2	4.3
unidentified non-*Myotis*	2	5.0	0	0	0	0	2	4.3
unidentified *Lasiurus* bat	1	2.5	0	0	0	0	1	2.1
Overall Bats	**40**	**100**	**6**	**100**	**1**	**100**	**47**	**100**

% = percent.

Carcasses of one Covered Species (Indiana bat) and two SOCC (MDC 2025; hoary and silver-haired bat) were found (Table 8). More bats were found during summer (21 carcasses), compared to spring (14) and fall (12). It should be noted that fall searches were only from August 16 – August 30 and did not include a full fall season as turbines voluntarily stopped operating August 28, 2025. Eastern red bat, big brown bat, and hoary bat together accounted for 63.8% of all bat carcasses found and 65.0% of bat carcasses included in the fatality estimates (Table 8).

Table 8. Seasonal distribution of all bat carcasses found incidentally or during scheduled searches, and number included in fatality rate estimates calculated for the High Prairie Renewable Energy Center in Schuyler and Adair counties, Missouri, from April 1 – October 31, 2025.

	Number Found (Number Included in Fatality Estimates)			
Species	**Spring**	**Summer**	**Fall**	**Total**
big brown bat	3 (3)	5 (4)	1 (1)	9 (8)
eastern red bat	4 (2)	6 (5)	4 (4)	14 (11)
evening bat	2 (2)	2 (2)	2 (2)	6 (6)
hoary bat[1]	1 (1)	4 (4)	2 (2)	7 (7)
Indiana bat[2, 3]	0	0	2 (2)	2 (2)
silver-haired bat[1]	3 (1)	2 (1)	1 (1)	6 (3)

Table 8. Seasonal distribution of all bat carcasses found incidentally or during scheduled searches, and number included in fatality rate estimates calculated for the High Prairie Renewable Energy Center in Schuyler and Adair counties, Missouri, from April 1 – October 31, 2025.

	Number Found (Number Included in Fatality Estimates)			
Species	**Spring**	**Summer**	**Fall**	**Total**
unidentified *Lasiurus* bat	0	1 (1)	0	1 (1)
unidentified non-*Myotis*	1 (1)	1 (1)	0	2 (2)
Overall Bats	**14 (10)**	**21(18)**	**12 (12)**	**47 (40)**

1. State-listed as a Species of Conservation Concern (Missouri Department of Conservation 2025).
2. Federally and state-listed as endangered.
3. Covered Species.

5.1.3 Searcher Efficiency Estimation

One hundred fifty-two carcasses were placed for SEEF trials using either bat carcasses or bat surrogates. Overall searcher efficiency rates (percent of available carcasses found by searchers) ranged from 41.67% on technician-only full plots found to 98.04% on road and pads (Table 9).

Table 9. Searcher efficiency results by plot type, search method, and season at the High Prairie Renewable Energy Center, Schuyler and Adair counties, Missouri, from April 1 – October 31, 2025.

Plot Type (Search Method)	Season	Number Placed	Number Available	Number Found	% Found
Road and Pad (Technician-only)	Spring[1]	24	23	23	100
	Summer	28	21	21	100
	Fall	9	7	6	85.71
	Overall	**61**	**51**	**50**	**98.04**
Full Plot (Technician-only)	Spring	N/A[2]	N/A	N/A	N/A
	Summer	34	22	9	40.91
	Fall	3	2	1	50.00
	Overall	**37**	**24**	**10**	**41.67**
Full Plot (Detection-dog Team)	Spring	22	21	20	95.24
	Summer	24	21	17	80.95
	Fall	8	6	6	100
	Overall	**54**	**48**	**43**	**89.58**

1. Due to limited availability of bat carcasses in spring, 10 house mouse (*Mus musculus*) carcasses were used as bat surrogates during the first spring trial on road and pads; bat carcasses were used for all other trials.
2. No turbines were searched as technician-only full plots in spring.

% = percent; N/A = not applicable.

SEEF was modeled separately for technicians and detection-dog teams. The best supported model for SEEF estimates for technician-only searches included plot type as a covariate (Appendix C1), while the best supported model for detection-dog team full plots included no covariates (Appendix C2). Modeled SEEF rates were 0.98 (90% CI = 0.90–1.00) for road and pads, 0.42 (90% CI = 0.27–0.59) for technician-only full plots, and 0.90 (90% CI = 0.80–0.95) for detection-dog team full plots.

5.1.4 Carcass Persistence Estimation

CP rates were modeled separately for plots searched by technicians and plots searched by detection-dog teams. One hundred and twenty bat carcasses were used to estimate CP, including 74 at technician-searched plots (26 on full plots and 48 on road and pads) and 46 at detection-dog team plots. The best-supported model for CP at technician-searched plots included no covariates (Appendix C3) and the best supported model for detection-dog team plots also included no covariates (Appendix C4). Persistence was longer on detection-dog searched plots (13.26 days) than on technician-only searched plots (6.80 days; Appendix C5).

5.1.5 Search Area Adjustment

Forty bat carcasses found during Year 5 were included in the modeling for the search area adjustment (Table 7). Approximately 1% of the area within full plots was unsearchable and accounted for within the search area adjustment. These data were combined with the 157 bat carcasses found during monitoring in Year 1 (Stantec 2021a) and 11 found in Year 4 (Gabrey et al. 2024) to calculate the search area adjustment for the Year 5 analysis. All full plots have a search area adjustment of 0.74 while road and pads have a search area adjustment of 0.09 (Appendix C6).

5.1.6 Estimated Fatality Rates – Generalized Estimator of Mortality

Estimated fatality rates and 90% CIs for all bat species combined were calculated per MW and per turbine for each plot type, search method, and season. Estimated fatality rates were calculated based on the estimated SEEF, CP, *k* (detection reduction factor), and search area adjustment.

5.1.6.1 Bat Fatality Rates

Forty bat carcasses were included in the fatality rate estimates (Table 8) which were calculated using the adjustment factors in Appendix D. Spring fatality rate estimates were highest for technician-only full plots while summer and fall fatality rate estimates were highest for detection-dog team full plots (Table 10; Appendix D). Overall bat fatality estimates were less than 0.4 bat/MW and less than 1.0 bat/turbine (Table 11).

Table 10. Estimated fatality rates and 90% confidence intervals (CIs), by plot type, search method, and season, from studies conducted at the High Prairie Renewable Energy Center, Schuyler and Adair counties, Missouri, between April 1 – October 31, 2025.

	Spring		Summer		Fall	
	41–68 turbines[1]		62–84 turbines[1]		99 turbines	
Plot Type (Search Method)	**Estimate**	**90% CI**	**Estimate**	**90% CI**	**Estimate**	**90% CI**
Fatalities/Turbine						
Road and Pad (Technician-only)	0	N/A*	0	N/A*	0	N/A*
Full Plot (Technician-only)	5.29	N/A*	0.16	N/A*	0	N/A*
Full Plot (Detection-dog Team)	0.37	0.20–0.53	0.75	0.52–0.97	0.43	0.26–0.59
All Plot Types	0.33	0.17–0.55	0.40	0.29–0.53	0.18	0.11–0.25
Fatalities/Megawatt						
Road and Pad (Technician-only)	0	N/A*	0	N/A*	0	N/A*
Full Plot (Technician-only)	2.40	N/A*	0.06	N/A*	0	N/A*
Full Plot (Detection-dog Team)	0.16	0.09–0.23	0.31	0.21–0.40	0.18	0.11–0.24

Table 10. Estimated fatality rates and 90% confidence intervals (CIs), by plot type, search method, and season, from studies conducted at the High Prairie Renewable Energy Center, Schuyler and Adair counties, Missouri, between April 1 – October 31, 2025.

	Spring		Summer		Fall	
	41–68 turbines[1]		62–84 turbines[1]		99 turbines	
Plot Type (Search Method)	Estimate	90% CI	Estimate	90% CI	Estimate	90% CI
All Plot Types	0.14	0.07–0.24	0.17	0.12–0.22	0.08	0.05–0.11

[1.] Indicates the minimum and maximum number of turbines included in the fatality estimates for each season.

* CIs for plot type/season not calculated because the observed carcass count is less than five.

% = percent; N/A = not applicable.

Table 11. Overall fatality rates per megawatt and per turbine, by plot type and search method, at the High Prairie Renewable Energy Center, Schuyler and Adair counties, Missouri, from April 1 – October 31, 2025.

	Per Megawatt Estimates		Per Turbine Estimates	
Plot Type (Search Method)	Estimate	90% CI	Estimate	90% CI
Road and Pad (Technician-only)	0	N/A*	0	N/A*
Full Plot (Technician-only)	2.47	N/A*	5.45	N/A*
Full Plot (Detection-dog Team)	0.64	0.50-0.80	1.54	1.20-1.92
All Plot Types	0.39	0.29-0.51	0.91	0.68-1.20

* Confidence intervals (CIs) not calculated because the observed carcass count is less than five.

% = percent; N/A = not applicable.

5.1.6.2 Species-specific Fatality Rates

The number of bat carcasses found varied by species, from two for Indiana bat to 11 for eastern red bat (Table 12). Three carcasses of non-Covered Species could not be identified to species, including two unidentified non-*Myotis* carcasses and one unidentified *Lasiurus* carcass (Table 14). Estimated total number of fatalities by species varied from 3.24 for Indiana bat to 18.15 for eastern red bat (Table 14).

Table 12. Bat fatality estimates, by species, calculated using GenEst, from the High Prairie Renewable Energy Center, Schuyler and Adair counties, Missouri, between April – October 31, 2025.

Species	Total Found	Total Estimated Fatalities (90% CI)	Fatalities per Turbine (90% CI)	Fatalities per Megawatt (90% CI)
big brown bat	8	16.66 (8.10–31.00)	0.25 (0.11–0.46)	0.10 (0.05–0.19)
eastern red bat	11	18.15 (12.29–24.47)	0.25 (0.17–0.34)	0.11 (0.07–0.15)
evening bat	6	9.77 (5.39–14.25)	0.12 (0.07–0.18)	0.05 (0.03–0.07)
hoary bat	7	11.46 (6.34–15.98)	0.14 (0.08–0.20)	0.06 (0.03–0.08)
Indiana bat	2	3.24 (N/A*)	0.03 (N/A*)	0.01 (N/A*)
silver-haired bat	3	3.59 (N/A*)	0.04 (N/A*)	0.02 (N/A*)
unidentified non-*Myotis*	2	3.03 (N/A*)	0.06 (N/A*)	0.03 (N/A*)
unidentified *Lasiurus*	1	1.37 (N/A*)	0.02 (N/A*)	0.01 (N/A*)

* Confidence intervals (CIs) not calculated because the observed carcass count is less than five.

% = percent; N/A = not applicable.

5.2 Covered Species

Two Indiana bat carcasses and zero northern long-eared bat or little brown bat carcasses were found during surveys in 2025 (Table 7; Appendix B). One Indiana bat carcass, found on August 25, 2025, at Turbine F-07 within a full plot, was determined through DNA analysis to be a female (Figure 4; Appendix B). A second Indiana bat was found within a full plot at Turbine H-01 on August 28, 2025, and determined through DNA analysis to be a male (Figure 4; Appendix B). Both Indiana bat carcasses were found by detection-dog teams (Appendix B).

Twelve Indiana bats, one little brown bat, and zero northern-long-eared bat carcasses have been found, to-date, under the ITP at operational turbines, and count toward the ITP take limit (Figure 4). Two Indiana bats were found during 2024 at non-operational turbines (C-10 and B-08), and were considered an unforeseen circumstance, and do not count toward the ITP take limit. A male Indiana bat carcass at Turbine E-05 was found in 2020 when the Project was testing and commissioning turbines under a Technical Assistance Letter and is also not included in the HPREC's cumulative take estimates or any adaptive management triggers under the HCP.

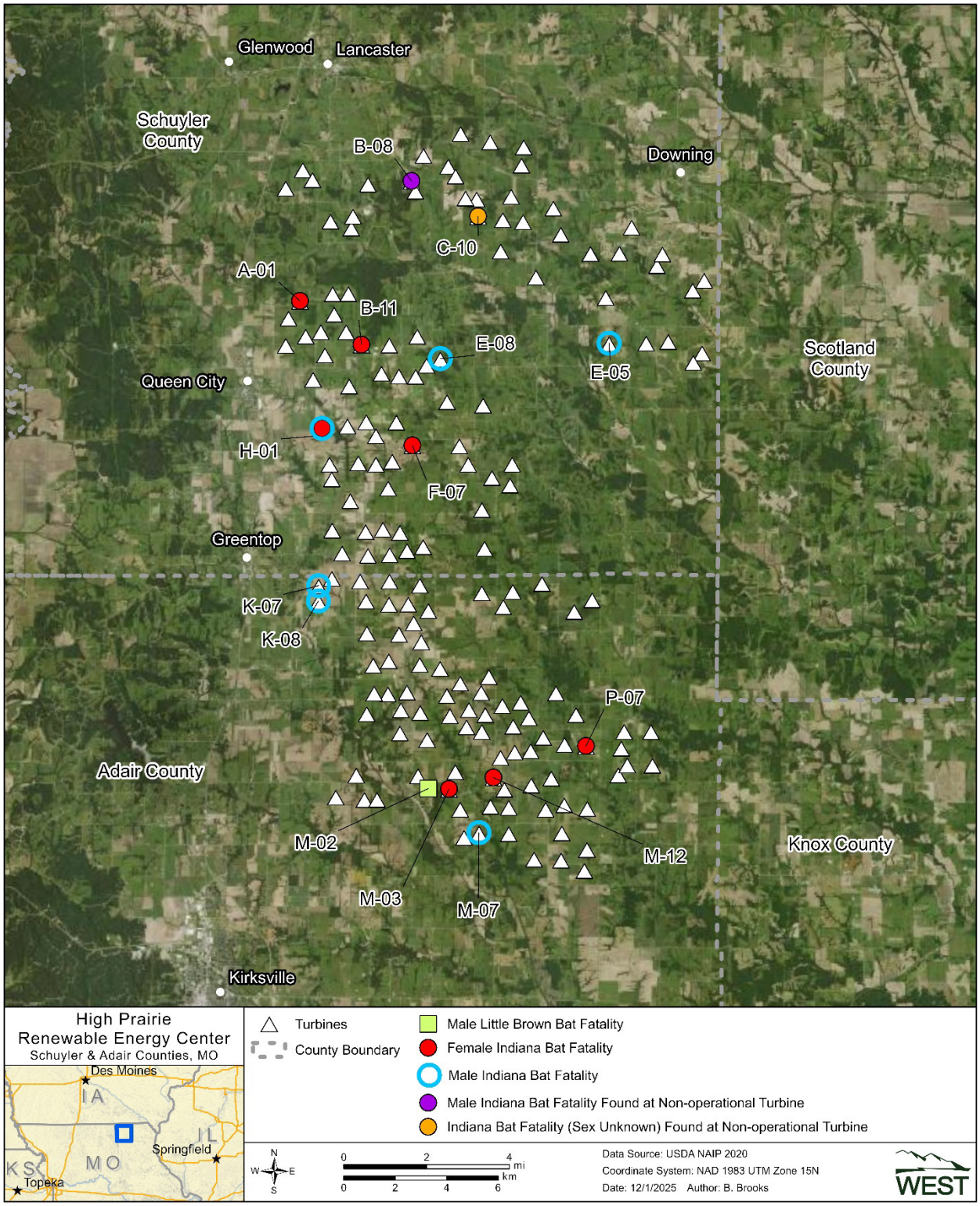

Figure 4. Location of fatalities of Covered Species during the Incidental Take Permit period (2021–2025) at the High Prairie Renewable Energy Center, Schuyler and Adair counties, Missouri.

Two or more Indiana bat carcasses have been found at one turbine, H-01, over five years of monitoring. Two Indiana bat carcasses, one female and one male, were found at Turbine H-01 in 2024 and 2025 respectively.

The HCP and ITP include adaptive management triggers based on the locations of female Indiana bats found throughout the ITP term, to ensure that take is sustainable within individual maternity colonies. One female Indiana bat was found in Year 5, for a total of seven female Indiana bat fatalities since monitoring began. Four of the seven females have been found in Schuyler County and three in Adair County (Figure 4). As stated above, maternity colony adaptive management triggers are evaluated separately in the Maternity Colony Memo (WEST 2025a); no maternity colony adaptive management triggers have been met in 2025.

5.2.1 Evidence of Absence

Inputs required to run the EoA Single Class and Multiple Class modules are described in Appendix E. Screenshots from the EoA software are available upon request. The *g* achieved in Year 5 of 0.39, and cumulatively across five years of monitoring, exceeded the target of 0.20 recommended within the HCP and ITP (Table 13).

Table 13. Data inputs for the Evidence of Absence Multiple Years Module used to combine detection probability (*g*) distributions across years for the High Prairie Renewable Energy Center, Schuyler and Adair counties, Missouri, from April 1 – October 31, 2025.

Year[2]	Ba[1]	Bb[1]	*g* (95% CrI)	ρ	Carcass Count (X)		
			INBA[3]			NLEB	LBBA
2021	44.98	345.68	0.12 (0.09–0.15)	1.00	7	0	1
2022	72.85	81.53	0.47 (0.39–0.55)	0.07	0	0	0
2023	109.60	157.12	0.41 (0.35–0.47)	0.20	1	0	0
2024	591.01	1,388.48	0.30 (0.28–0.32)	0.63	1	0	0
2025	1,088.27	1,678.18	0.39 (0.38–0.41)	0.84	2	0	0
Short-term Trigger (2025)	1,088.27	1,678.18	0.39 (0.38–0.41)	–	2	0	0
Long-term Trigger (Cumulative)	1,001.10	2,661.70	0.27 (0.26–0.29)	–	11[3]	0	1

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

[2] For this study, data from only the 2025 study period were used to evaluate the short-term trigger.

[3] Per the 2021 annual and summer fatality monitoring reports (Stantec 2021a, 2021c), the June 14, 2021, Indiana bat fatality found at Turbine K-08 was found incidentally, 20 meters from the base of the turbine. Therefore, the total carcass count is 8 Indiana bats for 2021 and the total carcass count for the ITP term (2021 to present) is 12 Indiana bats. However, the 2021 incidental Indiana bat carcass was incorporated into the EoA calculations by modifying the prior distribution and therefore was excluded from the EoA carcass count.

% = percent; CrI = credible interval; INBA = Indiana bat; LBBA = little brown bat; NLEB = northern long-eared bat.

5.2.1.1 Evidence of Absence Short-term Trigger

The short-term trigger assesses whether the estimated mean annual take rate (λ) exceeded the expected take rate (τ) with sufficient probability, $Pr(\lambda \geq \tau) \geq (1 - \alpha)$. At a 50% credible level ($\alpha = 0.5$), $Pr(\lambda \geq \tau)$ must be greater than or equal to 0.5 for the short-term trigger to be required. For Indiana bat fatalities $Pr(\lambda \geq \tau) = 0.16$, northern long-eared bat fatalities $Pr(\lambda \geq \tau) = 0.16$, and little brown bat fatalities $Pr(\lambda \geq \tau) = 0$ (Table 14). None of these probabilities meet or exceed 0.5, indicating the short-term trigger was not met and no adaptive management actions are necessary (Table 14).

Table 14. Probability the estimated take rates exceeded the expected take rates at the High Prairie Renewable Energy Center, Schuyler and Adair counties, Missouri, from April 1 – October 31, 2025.

Species	Mean Annual Take Rate (λ; 95% CrI)	Expected Take Rate (τ)	Pr(λ ≥ τ)[1]	Short-term Trigger Required at α = 0.5?
Indiana bat	7.57 (1.26–19.45)	12.00	0.16	no
northern long-eared bat	1.51 (0–7.61)	3.00	0.16	no
little brown bat	1.51 (0–7.61)	16.00	0	no

CrI = credible interval.

5.2.1.2 Evidence of Absence Long-term Trigger

Cumulative take under the ITP to-date, $M^*_{2021–2025}$, at α = 0.5 (50th credible bound), from operational turbines is less than the permitted take (Table 15) for each of the Covered Species. The long-term trigger was not met, and the HPREC is in compliance because $M^*_{2021–2025} < T$ for each Covered Species (Table 15). Therefore, an avoidance response is not necessary.

Table 15. Summary of the annual and cumulative take estimates for Covered Species at the High Prairie Renewable Energy Center, Schuyler and Adair counties, Missouri, from April 1, 2021 – October 31, 2025.

Species	Annual Take Estimate (M^*_{2025})	Cumulative Take ($M^*_{2021–2025}$)	Permitted Take (T)	Projected Take Estimate ($M^*_{projected}$)	Long-term Trigger Required at α = 0.5?
Indiana bat (50th credible bound)	5	41	72	56	no
northern long-eared bat (50th credible bound)	0	0	18	1	no
little brown bat (50th credible bound)	0	4	96	6	no

5.3 Design Protocols – Future Monitoring

The HCP specifies a target detection probability (*g*) of 0.20 over the 6-year permit term. PCM efforts for Year 6 (2026) will again target an overall *g* of 0.20 or greater, as required by the HCP. The following estimates from monitoring in Years 4 and 5 were used to generate potential monitoring scenarios for 2026:

- SEEF of 0.42 on full plots by technicians and 0.80 by dog teams
- SEEF of 0.97 on road and pads by technicians
- CP of 6.80 days, using the CP distribution calculated from the technician model
- Search area adjustment of 0.74 on full plots and 0.10 on road and pads

Monitoring will occur in 2026 from April 1 – October 31 (unless amended, then from April 1 – October 15) at all operational turbines. Below we describe potential monitoring approaches that are expected to achieve a *g* of 0.20 or higher, assuming the bias correction factors measured in past years are representative of 2026 (Table 16). We have developed the following study design scenarios using reasonable expectations of SEEF and CPT based on past studies. SEEF and

CPT will be measured in each season, and the preliminary results will be provided to the USFWS within the seasonal reports.

Table 16. Projected probabilities of detection (*g*) for differing potential monitoring plans that may be implemented in 2026 at the High Prairie Renewable Energy Center.

Proportion of Plot Types			Search Frequency (Number of Searches per week)		
Technician-only Full Plots	Detection-dog Team Full Plots	Technician-only Road and Pads	2	3	5
0.17	0.47	0.36	0.35	0.38	0.41
0.20	0.40	0.40	0.33	0.35	0.38
0.20	0.30	0.50	0.28	0.30	0.33
0.20	0.20	0.60	0.24	0.25	0.28
0.20	0.10	0.70	0.19	0.20	0.22
0.30	0.10	0.60	0.22	0.23	0.26
0.40	0.10	0.50	0.24	0.27	0.29
0.64	0	0.36	0.26	0.29	0.33

Note: Potential plans that are projected to meet or exceed a *g* of 0.20 are highlighted in green.

6 SUMMARY AND DISCUSSION OF 2025 POST-CONSTRUCTION BAT FATALITY MONITORING AND NEXT STEPS

Monitoring during Year 5 achieved a high probability of detection and exceeded the requirements of the HCP and ITP. The number of estimated Covered Species fatalities remain below the adaptive management triggers specified in the HCP and ITP, and no adaptive management or changes to operations are required.

The cumulative take estimate of Indiana bats from 2021–2025 ($M^*_{2021\text{-}2025}$) of 41 of 72 from operational turbines remains below the overall permitted take number and is consistent with the cumulative take estimate from 2021–2024. A g-value of 0.39 for 2025 was achieved and as the *g*-to-date continues to increase since 2021 and become more precise with additional years of monitoring, we become more certain in the estimated number of fatalities. Carcass counts continue to remain low relative to 2021 despite high detection probabilities, and, therefore, the cumulative take estimates are lower than the permitted take. This may provide evidence for reduced post-construction monitoring in some years for the life-of-the-project permit.

Ameren and WEST are evaluating the existing bat in hand adaptive management triggers and the applicability of the short-term trigger for 2026 (the final year of the HCP and ITP with a full bat active season). This will be summarized in the *Revised Indiana bat in hand triggers at the High Prairie Renewable Energy Center – 2025 end of season update Memorandum* (WEST 2025b) and submitted to the USFWS for approval, along with this report.

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Appendix A. Scientific Names of Covered Species and Bat Species Found during Post-Construction Bat Fatality Monitoring at the High Prairie Renewable Energy Center, Schuyler and Adair Counties, Missouri, from April 1 – October 31, 2025

Appendix A. Scientific names of Covered Species and bat species found during post-construction bat fatality monitoring at the High Prairie Renewable Energy Center, Schuyler and Adair counties, Missouri, from April 1 – October 31, 2025.

Species	Scientific Name
big brown bat	*Eptesicus fuscus*
eastern red bat	*Lasiurus borealis*
evening bat	*Nycticeius humeralis*
hoary bat	*Lasiurus cinereus*
Indiana bat[1]	*Myotis sodalis*
little brown bat[1]	*Myotis lucifugus*
northern long-eared bat[1]	*Myotis septentrionalis*
silver-haired bat	*Lasionycteris noctivagans*

[1.] Indicates a Covered Species, as defined in the Incidental Take Permit and Habitat Conservation Plan.

Appendix B. Details of All Bat Fatalities Found During Post-Construction Bat Fatality Monitoring at the High Prairie Renewable Energy Center in Schuyler and Adair Counties, Missouri, from April 1 – October 31, 2025

Appendix B. Complete listing of carcasses found at the High Prairie Renewable Energy Center, Schuyler and Adair counties, Missouri, from April 1 – October 31, 2025.

Found Date	Species	Distance from Turbine (m)	Turbine	Search	Plot Type	Physical Condition	Search Method
04/01/2025	silver-haired bat	49	E-05	carcass search**	full plot	scavenged	detection dog-
04/03/2025	eastern red bat	59	D-12	carcass search	full plot	scavenged	detection dog
04/07/2025	eastern red bat	79*	B-01	carcass search**	full plot	intact	detection dog
04/08/2025	eastern red bat	55	L-10	carcass search	full plot	intact	detection dog
04/08/2025	silver-haired bat	93*	K-08	carcass search**	full plot	scavenged	detection dog
04/11/2025	big brown bat	46	K-04	carcass search	full plot	scavenged	detection dog
04/14/2025	eastern red bat	71*	J-07	carcass search**	full plot	scavenged	detection dog
04/17/2025	unidentified non-*Myotis*	55	F-06	carcass search	full plot	dismembered	detection dog
04/21/2025	big brown bat	47	A-09	incidental	full plot	scavenged	technician
04/21/2025	silver-haired bat	52	A-02	carcass search	full plot	scavenged	detection dog
04/30/2025	evening bat	51	H-01	carcass search	full plot	scavenged	detection dog
05/01/2025	big brown bat	40	H-06	carcass search	full plot	scavenged	detection dog
05/06/2025	evening bat	37	L-04	carcass search	full plot	scavenged	detection dog
05/08/2025	hoary bat	54	D-12	carcass search	full plot	scavenged	detection dog
05/19/2025	big brown bat	48	H-01	carcass search	full plot	dismembered	detection dog
06/04/2025	eastern red bat	55	E-01	carcass search	full plot	scavenged	detection dog
06/10/2025	hoary bat	29	J-03	carcass search	full plot	scavenged	detection dog
06/17/2025	eastern red bat	39	R-03	carcass search	full plot	scavenged	detection dog
07/05/2025	silver-haired bat	71*	C-04	carcass search**	full plot	intact	detection dog
07/08/2025	eastern red bat	67*	J-07	carcass search**	full plot	scavenged	detection dog
07/14/2025	hoary bat	42	H-04	carcass search	full plot	scavenged	detection dog
07/15/2025	hoary bat	54	P-04	carcass search	full plot	intact	detection dog
07/17/2025	unidentified non-*Myotis*	39	A-06	carcass search	full plot	scavenged	detection dog
07/29/2025	big brown bat	3	J-01	carcass search	full plot	intact	detection dog
07/30/2025	hoary bat	16	B-08	carcass search	full plot	scavenged	detection dog
07/31/2025	silver-haired bat	50	K-08	carcass search	full plot	scavenged	detection dog
08/01/2025	big brown bat	34	M-08	Incidental**	N/A	scavenged	N/A
08/04/2025	unidentified *Lasiurus* bat	9	F-07	carcass search	full plot	dismembered	detection dog
08/05/2025	eastern red bat	56	K-07	carcass search	full plot	scavenged	detection dog
08/09/2025	big brown bat	32	G-01	carcass search	full plot	scavenged	detection dog
08/09/2025	eastern red bat	49	J-07	carcass search	full plot	scavenged	detection dog
08/11/2025	big brown bat	41	H-01	carcass search	full plot	scavenged	detection dog
08/11/2025	eastern red bat	33	G-10	carcass search	full plot	scavenged	detection dog
08/11/2025	evening bat	11	H-01	carcass search	full plot	scavenged	detection dog
08/14/2025	evening bat	16	H-01	carcass search	full plot	scavenged	detection dog
08/16/2025	hoary bat	58	R-03	carcass search	full plot	scavenged	detection dog

Appendix B. Complete listing of carcasses found at the High Prairie Renewable Energy Center, Schuyler and Adair counties, Missouri, from April 1 – October 31, 2025.

Found Date	Species	Distance from Turbine (m)	Turbine	Search	Plot Type	Physical Condition	Search Method
08/18/2025	eastern red bat	34	G-11	carcass search	full plot	scavenged	detection dog
08/18/2025	evening bat	53	H-01	carcass search	full plot	scavenged	detection dog
08/22/2025	big brown bat	28	J-03	carcass search	full plot	scavenged	detection dog
08/25/2025	Indiana bat	54	F-07	carcass search	full plot	scavenged	detection dog
08/25/2025	eastern red bat	53	A-04	carcass search	full plot	scavenged	detection dog
08/26/2025	hoary bat	40	E-07	carcass search	full plot	scavenged	detection dog
08/28/2025	Indiana bat	47	H-01	carcass search	full plot	scavenged	detection dog
08/28/2025	silver-haired bat	30	H-04	carcass search	full plot	scavenged	detection dog
08/30/2025	eastern red bat	53	B-01	carcass search	full plot	scavenged	detection dog
08/30/2025	eastern red bat	59	F-05	carcass search	full plot	scavenged	detection dog
08/30/2025	evening bat	4	B-08	carcass search	full plot	scavenged	detection dog

* Indicates a carcass found outside search plot boundaries

** Indicates a carcass excluded from the analysis because it was found outside the search plot boundaries, outside the study period, or incidentally at an unsearched turbine

Appendix C. Searcher Efficiency, Carcass Persistence, and Area Adjustment Model Fitting Results at the High Prairie Renewable Energy Center in Schuyler and Adair Counties, Missouri, from April 1 – October 31, 2025

Appendix C1. Searcher efficiency models for trials conducted on technician-only searched plots at the High Prairie Renewable Energy Center, Schuyler and Adair counties, Missouri, from April 1 – October 31, 2025 (n = 75).

Covariates	k Value	AICc	Delta AICc
Plot Type	k fixed at 0.67	46.61	0*
Season	k fixed at 0.67	69.59	22.98
No Covariates	k fixed at 0.67	77.12	30.51

* Selected model.

AICc = corrected Akaike Information Criterion; Delta AICc = change from the minimum AICc.

Appendix C2. Searcher efficiency models for trials conducted on detection-dog team searched plots at from the High Prairie Renewable Energy Center, Schuyler and Adair counties, Missouri, from April 1 – October 31, 2025 (n = 48).

Covariates	k Value	AICc	Delta AICc
No Covariates	k fixed at 0.67	34.16	0*
Season	k fixed at 0.67	36.08	1.92

* Selected model.

AICc = corrected Akaike Information Criterion; Delta AICc = change from the minimum AICc.

Appendix C3. Carcass persistence models with covariates and distributions for trials conducted on technician-only search areas at the High Prairie Renewable Energy Center, Schuyler and Adair counties, Missouri, from April 1 – October 31, 2025 (n = 74).

Location Covariates	Scale Covariates	Distribution	AICc	Delta AICc
No Covariates	No Covariates	loglogistic	362.16	0
Plot Type	–	exponential	363.07	0.91
No Covariates	Season	loglogistic	363.33	1.17
No Covariates	–	exponential	363.76	1.60*
No Covariates	Plot Type	Weibull	363.81	1.65
No Covariates	Plot Type	loglogistic	363.90	1.74
No Covariates	Season	Weibull	364.04	1.88
No Covariates	No Covariates	lognormal	364.08	1.92
No Covariates	Season + Plot Type	Weibull	364.32	2.16
Plot Type	No Covariates	loglogistic	364.32	2.16
Plot Type	Plot Type	Weibull	364.35	2.19
Season	No Covariates	loglogistic	364.63	2.47
Plot Type	No Covariates	Weibull	365.03	2.87
No Covariates	No Covariates	Weibull	365.31	3.15
Plot Type	Season + Plot Type	Weibull	365.47	3.31
Plot Type	No Covariates	lognormal	365.52	3.36
No Covariates	Season + Plot Type	loglogistic	365.57	3.41
No Covariates	Season	lognormal	365.72	3.56
No Covariates	Plot Type	lognormal	366.09	3.93
Plot Type	Plot Type	loglogistic	366.13	3.97
Season	Season	loglogistic	366.26	4.10
Season + Plot Type	No Covariates	loglogistic	366.35	4.19
Season + Plot Type	–	exponential	367.25	5.09
Plot Type	Plot Type	lognormal	367.60	5.44
Season	No Covariates	lognormal	367.79	5.63
Plot Type	Season + Plot Type	loglogistic	367.94	5.78
Season	–	exponential	367.96	5.80
No Covariates	Season + Plot Type	lognormal	367.99	5.83
Season + Plot Type	Plot Type	loglogistic	368.34	6.18
Season + Plot Type	No Covariates	lognormal	368.41	6.25
Season + Plot Type	Season	loglogistic	368.48	6.32
Season	Season + Plot Type	loglogistic	368.51	6.35
Season + Plot Type	Season	Weibull	368.62	6.46
Season	Season	Weibull	368.62	6.46
Season + Plot Type	Plot Type	Weibull	368.68	6.52
Season	Season + Plot Type	Weibull	368.69	6.53

Appendix C3. Carcass persistence models with covariates and distributions for trials conducted on technician-only search areas at the High Prairie Renewable Energy Center, Schuyler and Adair counties, Missouri, from April 1 – October 31, 2025 (n = 74).

Location Covariates	Scale Covariates	Distribution	AICc	Delta AICc
Season + Plot Type	No Covariates	Weibull	369.34	7.18
Season	Season	lognormal	369.54	7.38
Season	No Covariates	Weibull	369.67	7.51
Season + Plot Type	Season + Plot Type	Weibull	369.73	7.57
Plot Type	Season + Plot Type	lognormal	369.96	7.80
Season + Plot Type	Plot Type	lognormal	370.59	8.43
Season + Plot Type	Season + Plot Type	loglogistic	370.86	8.70
Season + Plot Type	Season	lognormal	371.10	8.94
Season	Season + Plot Type	lognormal	371.82	9.66
Season + Plot Type	Season + Plot Type	lognormal	373.58	11.42

* Selected model.

AICc = corrected Akaike Information Criterion; Delta AICc = change from the minimum AICc.

Appendix C4. Carcass persistence models with covariates and distributions for trials conducted on detection-dog team search areas at the High Prairie Renewable Energy Center, Schuyler and Adair counties, Missouri, from April 1 – October 31, 2025 (n = 46).

Location Covariates	Scale Covariates	Distribution	AICc	Delta AICc
No Covariates	No Covariates	lognormal	205.89	0*
No Covariates	No Covariates	loglogistic	206.25	0.36
Season	No Covariates	Weibull	206.66	0.77
Season	–	exponential	206.77	0.88
Season	No Covariates	loglogistic	206.83	0.94
Season	No Covariates	lognormal	207.18	1.29
No Covariates	Season	lognormal	207.72	1.83
Season	Season	lognormal	208.01	2.12
No Covariates	No Covariates	Weibull	208.09	2.20
No Covariates	Season	loglogistic	208.22	2.33
Season	Season	loglogistic	208.51	2.62
No Covariates	–	exponential	209.82	3.93
Season	Season	Weibull	210.02	4.13
No Covariates	Season	Weibull	211.92	6.03

* Selected model.

AICc = corrected Akaike Information Criterion; Delta AICc = change from the minimum AICc.

Appendix C5. Carcass persistence top models with covariates, distributions, and model parameters for the High Prairie Renewable Energy Center, Schuyler and Adair counties, Missouri, from April 1 – October 31, 2025.

Size Class	Distribution	Predicted Median Removal Times (days)	Parameter 1	Parameter 2	Search Type
Bat	lognormal*	13.26	meanlog = 2.585	sdlog = 1.706	detection-dog team
	exponential*	6.80	rate_R = 0.102	–	technician

* Parameterization follows the base R parameterization for this distribution.

Appendix C6. Search area adjustment estimates for the High Prairie Renewable Energy Center, Schuyler and Adair counties, Missouri from April 1 – October 31, 2025.

Size Class	Plot Type	Search Area Adjustment
Bat	full plot	0.74
	road and pad	0.09

Appendix D. Estimated Adjustment Factors, with 90% Confidence Intervals for Studies Conducted at the High Prairie Renewable Energy Center, Schuyler and Adair Counties, Missouri, from April 1 – October 31, 2025

Appendix D1. Estimated fatality rates and adjustment factors, with 90% confidence intervals at technician-only road and pad search areas for studies conducted at the High Prairie Renewable Energy Center, Schuyler and Adair counties, Missouri, from April 1 – October 31, 2025.

	Spring		Summer		Fall	
	41–68 turbines searched		62–84 turbines searched		99 turbines searched	
	Estimate	90% CI	Estimate	90% CI	Estimate	90% CI
Search Area Adjustment						
Bat	0.09	N/A*	0.09	N/A*	0.09	N/A*
Searcher Efficiency						
Bat	0.98	0.90–1.00	0.98	0.90–1.00	0.98	0.90–1.00
Average Probability of a Carcass Persisting Through the Search Interval†						
Bat	0.84	0.81–0.86	0.84	0.81–0.86	0.84	0.81–0.86
Probability of Available and Detected						
Bat	0.52	0.45–0.58	0.52	0.45–0.58	0.52	0.45–0.58
Estimated Fatality Rates (Fatalities/Turbine/Season)						
Bat	0	N/A*	0	N/A*	0	N/A*
Estimated Fatality Rates (Fatalities/megawatt/Season)						
Bat	0	N/A*	0	N/A*	0	N/A*

* Confidence interval (CIs) not calculated because the observed carcass count is less than five.

† The search interval was twice weekly in spring, summer and fall.

% = percent; N/A = not applicable.

Appendix D2. Estimated fatality rates and adjustment factors, with 90% confidence intervals at technician-only circular full plot search areas for studies conducted at the High Prairie Renewable Energy Center, Schuyler and Adair counties, Missouri, from April 1 – October 31, 2025.

	Spring		Summer		Fall	
	41–68 turbines searched		62–84 turbines searched		99 turbines searched	
	Estimate	90% CI	Estimate	90% CI	Estimate	90% CI
Search Area Adjustment						
Bat	0.74	N/A*	0.74	N/A*	0.74	N/A*
Searcher Efficiency						
Bat	0.42	0.27–0.59	0.42	0.27–0.59	0.42	0.27–0.59
Average Probability of a Carcass Persisting Through the Search Interval†						
Bat	0.84	0.81–0.86	0.84	0.81–0.86	0.84	0.81–0.86
Probability of Available and Detected						
Bat	0.24	0.16–0.34	0.24	0.16–0.34	0.24	0.16–0.34
Estimated Fatality Rates (Fatalities/Turbine/Season)						
Bat	5.29	N/A*	0.16	N/A*	0	N/A*
Estimated Fatality Rates (Fatalities/megawatt/Season)						
Bat	2.40	N/A*	0.06	N/A*	0	N/A*

* Confidence interval (CIs) not calculated because the observed carcass count is less than five.

‡

† The search interval was twice weekly in spring, summer and fall.

% = percent; N/A = not applicable.

Appendix D3. Estimated fatality rates and adjustment factors, with 90% confidence intervals at detection-dog team circular full plot search areas for studies conducted at the High Prairie Renewable Energy Center, Schuyler and Adair counties, Missouri, from April 1 – October 31, 2025.

	Spring		Summer		Fall	
	41–68 turbines searched		62–84 turbines searched		99 turbines searched	
	Estimate	90% CI	Estimate	90% CI	Estimate	90% CI
Search Area Adjustment						
Bat	0.74	N/A*	0.74	N/A*	0.74	N/A*
Searcher Efficiency						
Bat	0.90	0.80–0.95	0.90	0.80–0.95	0.90	0.80–0.95
Average Probability of a Carcass Persisting Through the Search Interval†						
Bat	0.89	0.82–0.93	0.89	0.82–0.93	0.89	0.82–0.93
Probability of Available and Detected						
Bat	0.83	0.76–0.90	0.83	0.76–0.90	0.83	0.76–0.90
Estimated Fatality Rates (Fatalities/Turbine/Seasons)						
Bat	0.37	0.20–0.53	0.75	0.52–0.97	0.43	0.26–0.59
Estimated Fatality Rates (Fatalities/megawatt/Seasons)						
Bat	0.16	0.09–0.23	0.31	0.21–0.40	0.18	0.11–0.24

* Confidence interval (CIs) not calculated because the observed carcass count is less than five.

† The search interval was twice weekly in spring, summer and fall.

% = percent; N/A = not applicable.

Appendix E. Inputs for Single Class and Multiple Class Modules in Evidence of Absence at the High Prairie Renewable Energy Center in Adair and Schuyler Counties, Missouri, from April 1 – October 31, 2025.

Appendix E1. Data inputs needed for the Evidence of Absence (EoA) Single Class Module for the High Prairie Renewable Energy Center, Schuyler and Adair counties, Missouri, from April 1 – October 31, 2025.

							Searcher Efficiency[1]		Carcass Persistence[2]				
Season	Plot Type	Search Method	# of Turbines	Search Interval (days)	Average Number of Searches	Spatial Coverage (a)	Carcasses Available	Carcasses Found	Distribution	Shape (α)	Scale (β)	β CI (95%)	r^4
Spring 1	full plot	detection-dog team	29	3.50	6	0.74	48	43	lognormal	2.91	2.59	2.05–3.12	0.89
	road and pad	technician	12	3.50	6	0.09	51	50	exponential	–	9.81	7.72–12.45	0.84
	unsearched[5]	–	1	–	–	–	–	–	–	–	–	–	–
Spring 2	full plot	detection-dog	44	3.50	7	0.74	48	43	lognormal	2.91	2.59	2.05–3.12	0.89
	full plot	technician	1	3.50	4	0.74	24	10	exponential	–	9.81	7.72–12.45	0.84
	road and pad	technician	21	3.50	7	0.09	51	50	exponential	–	9.81	7.72–12.45	0.84
	unsearched[5]	–	2	–	–	–	–	–	–	–	–	–	–
Summer 1	full plot	detection-dog team	40	3.50	6	0.74	48	43	lognormal	2.91	2.59	2.05–3.12	0.89
	full plot	technician	4	3.50	6	0.74	24	10	exponential	–	9.81	7.72–12.45	0.84
	road and pad	technician	18	3.50	6	0.09	51	50	exponential	–	9.81	7.72–12.45	0.84
Summer 2	full plot	detection-dog team	42	3.50	11	0.74	48	43	lognormal	2.91	2.59	2.05–3.12	0.89
	full plot	technician	10	3.50	10	0.74	24	10	exponential	–	9.81	7.72–12.45	0.84
	road and pad	technician	27	3.50	11	0.09	51	50	exponential	–	9.81	7.72–12.45	0.84
Summer 3	full plot	detection-dog team	42	3.50	9	0.74	48	43	lognormal	2.91	2.59	2.05–3.12	0.89
	full plot	technician	14	3.50	9	0.74	24	10	exponential	–	9.81	7.72–12.45	0.84
	road and pad	technician	28	3.50	10	0.09	51	50	exponential	–	9.81	7.72–12.45	0.84
Fall	full plot	detection-dog team	42	3.50	4	0.74	48	43	lognormal	2.91	2.59	2.05–3.12	0.89
	full plot	technician	23	3.50	4	0.74	24	10	exponential	–	9.81	7.72–12.45	0.84
	road and pad	technician	34	3.50	4	0.09	51	50	exponential	–	9.81	7.72–12.45	0.84

1. The detection reduction factor k was assumed to equal 0.67 for all strata.
2. Parameterization follows the EoA parameterization according to Dalthorp, et al. 2017.
3. Temporal coverage (v) was set to 1 across all strata. Seasonality of risk is accounted for in the Multiple Class Module.
4. The probability that a carcass persisted through the search interval.
5. Unsearched turbines are those that were operating at night during a subseason but were not searched during that season because the plots were inaccessible (i.e., cattle or other obstruction present).

Appendix E2. Data inputs for the Evidence of Absence Multiple Class Module used to combine detection probability (*g*) distributions across strata within seasons for the High Prairie Renewable Energy Center, Schuyler and Adair counties, Missouri, from April 1 – October 31, 2025.

Season	Plot Type	Search Method	Number of Turbines	Weight (DWP)[1]	Ba[2]	Bb[2]	*g* (95% CrI)
Spring 1	full plot	detection-dog team	29	0.69	194.06	120.83	0.62 (0.56–0.67)
	road and pad	technician	12	0.29	1,440.14	18,639.76	0.07 (0.07–0.08)
	unsearched	–	1	0.02	0.01	1,000.00	0 (0–0)
Spring 2	full plot	detection-dog team	44	0.65	199.03	123.02	0.62 (0.56–0.67)
	full plot	technician	1	0.01	16.42	34.36	0.32 (0.20–0.46)
	road and pad	technician	21	0.31	1,464.11	18,939.65	0.07 (0.07–0.08)
	unsearched	–	2	0.03	0.01	1,000.00	0 (0–0)
Summer 1	full plot	detection-dog team	40	0.65	194.06	120.83	0.62 (0.56–0.67)
	full plot	technician	4	0.06	17.48	34.20	0.34 (0.22–0.47)
	road and pad	technician	18	0.29	1,440.14	18,639.76	0.07 (0.07–0.08)
Summer 2	full plot	detection-dog team	42	0.53	204.69	124.59	0.62 (0.57–0.67)
	full plot	technician	10	0.13	18.28	33.98	0.35 (0.23–0.48)
	road and pad	technician	27	0.34	1,398.37	18,084.73	0.07 (0.07–0.08)
Summer 3	full plot	detection-dog team	42	0.50	205.62	125.84	0.62 (0.57–0.67)
	full plot	technician	14	0.17	18.15	34.02	0.35 (0.23–0.48)
	road and pad	technician	28	0.33	1,507.04	19,475.77	0.07 (0.07–0.08)
Fal	full plot	detection-dog team	42	0.42	176.40	112.72	0.61 (0.55–0.67)
	full plot	technician	23	0.23	16.42	34.36	0.32 (0.20–0.46)
	road and pad	technician	34	0.34	1,353.16	17,549.24	0.07 (0.07–0.08)

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

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

% = percent; CrI = credible interval.

Appendix E3. Weights used for the Evidence of Absence Multiple Class Module to combine detection probability distributions across strata within seasons for the High Prairie Renewable Energy Center, Schuyler and Adair counties, Missouri, from April 1 – October 31, 2025.

Season	Plot Type	Search Method	Sampling Weight	Weight (DWP)[1]
Spring 1	full plot	detection-dog team	0.69	0.69
	road and pad	technician	0.29	0.29
	unsearched	–	0.02	0.02
Spring 2	full plot	detection-dog team	0.65	0.65
	full plot	technician	0.01	0.01
	road and pad	technician	0.31	0.31
	unsearched	–	0.03	0.03
Summer 1	full plot	detection-dog team	0.65	0.65
	full plot	technician	0.06	0.06
	road and pad	technician	0.29	0.29
Summer 2	full plot	detection-dog team	0.53	0.53
	full plot	technician	0.13	0.13
	road and pad	technician	0.34	0.34
Summer 3	full plot	detection-dog team	0.50	0.50
	full plot	technician	0.17	0.17
	road and pad	technician	0.33	0.33
Fall	full plot	detection-dog team	0.42	0.42
	full plot	technician	0.23	0.23
	road and pad	technician	0.34	0.34

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

Appendix E4. Weights used to combine detection probability distributions across subseasons within seasons for the High Prairie Renewable Energy Center, Schuyler and Adair counties, Missouri, from April 1 – October 31, 2025.

Season	Seasonal Arrival Proportion	Re-scaled Season Weight (DWP)[1]
Spring 1	0.09	0.43
Spring 2	0.12	0.57
Summer 1	0.07	0.14
Summer 2	0.05	0.11
Summer 3	0.35	0.75

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

Appendix E5. Data inputs for the Evidence of Absence Multiple Class Module used to combine detection probability (*g*) distributions across subseasons within seasons for the High Prairie Renewable Energy Center, Schuyler and Adair counties, Missouri, from April 1 – October 31, 2025.

Season	Weight (DWP)[1]	Ba[2]	Bb[2]	*g* (95% CrI)
Spring 1	0.43	308.11	382.68	0.45 (0.41–0.48)
Spring 2	0.57	339.48	455.92	0.43 (0.39–0.46)
Summer 1	0.14	328.76	418.00	0.44 (0.40–0.48)
Summer 2	0.11	354.17	532.82	0.40 (0.37–0.43)
Summer 3	0.75	315.37	488.96	0.39 (0.36–0.43)

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.

% = percent; CrI = credible interval.

Appendix E6. Weights used to combine detection probability distributions across seasons within the study period for the High Prairie Renewable Energy Center, Schuyler and Adair counties, Missouri, from April 1 – October 31, 2025.

Season	Seasonal Arrival Proportion	Re-scaled Season Weight (DWP)[1]
Spring	0.20	0.20
Summer	0.47	0.47
Fall	0.33	0.33

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

Appendix E7. Data inputs for the Evidence of Absence Multiple Class Module used to combine detection probability (*g*) distributions across seasons within the study period for the High Prairie Renewable Energy Center, Schuyler and Adair counties, Missouri, from April 1 – October 31, 2025.

Season	Weight (DWP)[1]	Ba[2]	Bb[2]	*g* (95% CrI)
Spring	0.20	645.04	837.33	0.44 (0.41–0.46)
Summer	0.47	542.10	813.99	0.40 (0.37–0.43)
Fall	0.33	218.93	391.70	0.36 (0.32–0.40)

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.

% = percent; CrI = credible interval.