Post-Construction Monitoring Study for the Meadow Lake Wind Resource Area Benton and White Counties, Indiana

Year 3 Final Report

April 1 – May 15 and August 1 – October 15, 2023

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WEST

EXECUTIVE SUMMARY

Meadow Lake Wind Farm I-VI, LLCs are operating the Meadow Lake Wind Resource Area (Project). This report details the post-construction monitoring studies conducted in 2023, consistent with the Project's Habitat Conservation Plan (HCP) and Incidental Take Permit (ITP; ESPER0005174) for Indiana and northern long-eared bats (Covered Species). The Project obtained the ITP on March 3, 2021 and has since completed three full years of monitoring (2021–2023). Monitoring was conducted in spring and fall of 2023 to complete the initial three years of compliance monitoring. Turbines were operated to feather turbine blades under manufacturer's cut-in speed during spring and under increased cut-in speeds during fall migration per the Project's HCP.

Post-construction monitoring was completed consistent with the study plan, which was approved by US Fish and Wildlife Service on February 15, 2023. The study plan was designed to achieve a 25% probability of detecting a single bat carcass (*g* of 0.25) for the 111 wind turbines at Meadow Lake Wind Farm V and Meadow Lake Wind Farms VI (i.e., a study-wide *g*). The effort required to target a *g* of 0.25 at 111 turbines was spread between all phases and 414 turbines at the Project. The objectives of this study were to estimate take for the Covered Species using the Evidence of Absence (EoA) framework as outlined in the HCP and to determine if adaptive management was necessary to maintain compliance with the Project's ITP.

Standardized carcass searches for bat carcasses were completed at three plot types: cleared plots, uncleared plots, and road and pads, and were conducted by two types of searchers: technician and detection-dog team (consisting of one dog trained to detect carcasses and one handler). The frequency of searches varied across seasons, with more searches occurring when take of Covered Species was considered more likely to occur. Searcher efficiency and carcass persistence trials were also conducted during each season to correct for detection and scavenger bias.

No Covered Species were found at the Project. One tricolored bat, which is state-endangered and federally proposed as for listing as endangered, was found at the Project on September 9, 2023. Seven evening bats, a state-endangered species, were also found. Four hundred and eighty-four bats were found during the study. The most commonly found bat species were eastern red bat (60.3%) and silver-haired bat (22.1%).

The site-wide g was 0.085 (95% confidence interval: 0.079–0.091). Based on the data collected to date (2021, 2022, and 2023 studies), the EoA model estimated the mean annual fatality rates were 2.41 Indiana bats and 2.41 northern long-eared bats. The probability that the annual take rate exceeded the expected annual take rate was 0.00 for Indiana bat and 0.12 for northern long-eared bat. The cumulative take estimates through 2023 were two Indiana bat fatalities and two northern long-eared bat fatalities. The estimated levels of Indiana bat and northern long-eared bat take were below levels authorized within the ITP. No adaptive management actions are necessary at this time.

STUDY PARTICIPANTS

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REPORT REFERENCE

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INTRODUCTION

Meadow Lake Wind Farm I-VI, LLCs (collectively, Meadow Lake Wind Farm), subsidiaries of EDP Renewables North America, LLC (EDPR), are operating the Meadow Lake Wind Resource Area (MLWRA or Project) in Benton and White counties, Indiana. EDPR obtained an Incidental Take Permit (ITP; ESPER0005174, dated March 3, 2021) for the federally listed endangered Indiana bat (*Myotis sodalis*) and the federally endangered northern long-eared bat (*M. septentrionalis*; hereafter Covered Species) from the US Fish and Wildlife Service (USFWS). The Project completed two full years of monitoring as required by the ITP (2021–2022); this report presents the results of the third year of compliance monitoring conducted under the ITP from April 1 – May 15, 2023 and August 1 – October 15, 2023. The objectives of this study were to estimate take of the Covered Species using the Evidence of Absence (EoA) framework as outlined in the Habitat Conservation Plan (HCP) and determine if adaptive management was necessary to maintain compliance with the Project's ITP.

STUDY AREA

The primary land cover type within 0.40 kilometer (0.25 mile) of the turbines (i.e., within the Permit Area) is cultivated crops, which cover 96.9% of the Permit Area. The next most common land cover is developed areas (e.g., farmsteads) that collectively compose approximately 2.5% of the site. All other land cover types collectively make up less than one percent of the total land cover (Figure 1; National Land Cover Database 2019, 2021). Six phases make up the MLWRA. Turbine capacities within the MLWRA range from 1.5 megawatts (MW) to 3.6 MW, with hub heights ranging from 79 to 105 meters (m; 259 to 344 feet [ft]), and rotor diameters ranging from 80 m to 136 m (262 to 446 ft; Table 1). All turbines are within the migratory range of the Covered Species, and EDPR adjusted turbine operations during the spring and fall migration periods to minimize impacts to the Covered Species (Table 2).

Table 1. Phases, turbines, and operational dates of the Meadow Lake Wind Resource Area, Benton and White counties, Indiana.

Phase	Turbine Type	Number of Turbines	Commercial Operational Date	Hub Height (m)	Rotor Diameter (m)
I	Vestas V82 1.65 MW	121	2009	80	82
II	Acciona AW-82 1.5MW	66	2010	80	82
III	GE 1.5 SLE 1.5 MW	69	2010	80	80
IV	Suzlon S88 2.1 MW	47	2010	79	88
V	Vestas V110 2.0 MW	50	2017	95	110
VI	Vestas V110 2.0 MW	12	2019	95	110
	Vestas V136 3.6 MW	49	2019	105	136

m = meter; MW = megawatt.

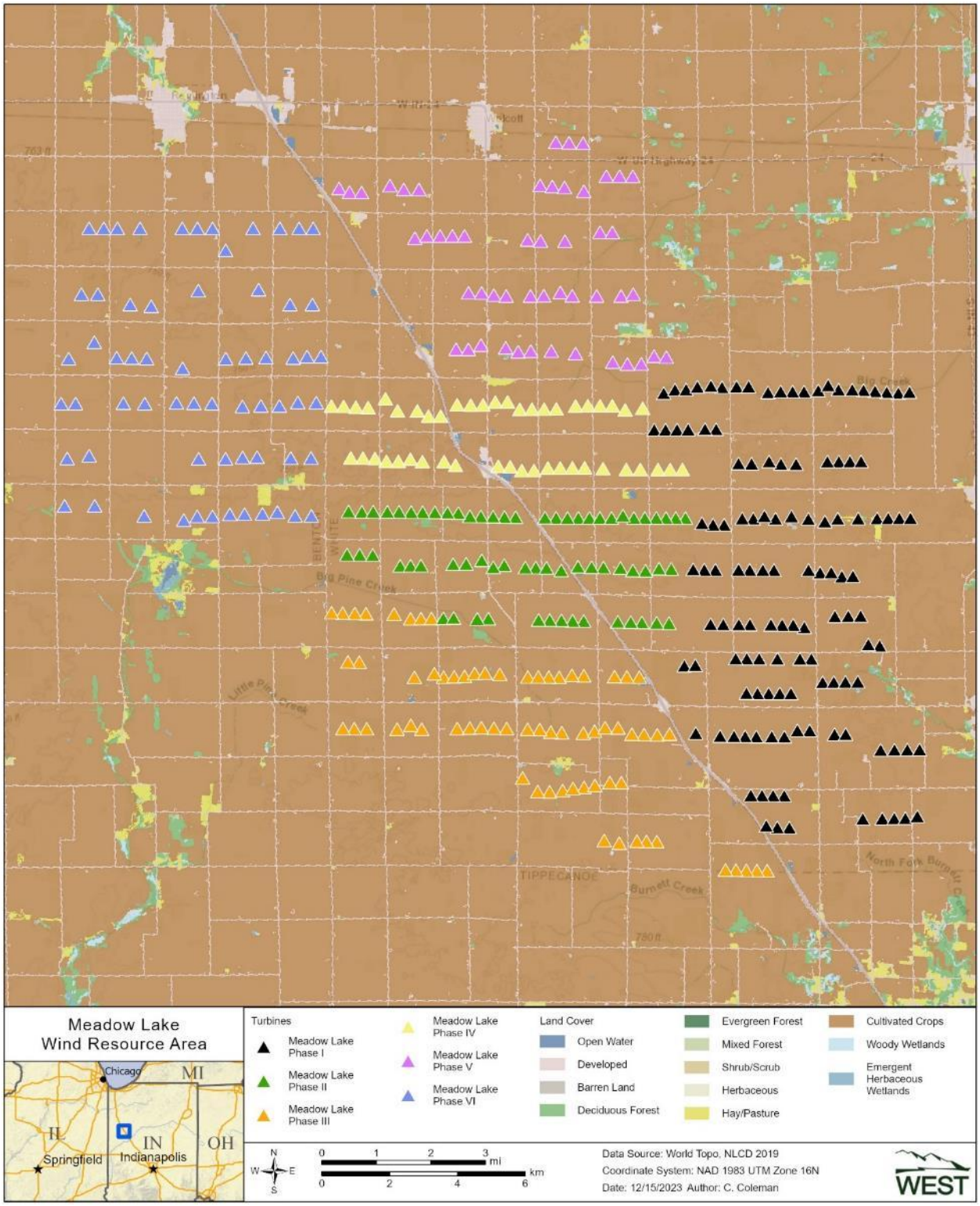

Figure 1. Turbine locations and surrounding land cover at the Meadow Lake Wind Resource Area in Benton and White counties, Indiana.

Table 2. Seasonal turbine operations regime at the Meadow Lake Wind Resource Area, Benton and White counties, Indiana.

Season	Turbines	Time of Day	Cut-In Speed	Feathering Below Cut-In[1]?	Temperature Threshold[2]
Spring (April 1 – May 15)	All	0.5 hour before sunset to 0.5 hour after sunrise	Manufacturer's Cut-in Speed[3]	Yes	10° C
Summer (May 16 – July 31)	All	0.5 hour before sunset to 0.5 hour after sunrise	Manufacturer's Cut-in Speed[3]	Yes	10° C
Fall (August 1 – October 15)	All	0.5 hour before sunset to 0.5 hour after sunrise	5.0 m/s	Yes	10° C
Winter (October 16 – March 31)	All	Normal turbine operation			

[1] Feathering means that turbine blades will be pitched into the wind such that they spin at less than one rotation per minute.

[2] Turbines will be feathered below cut-in when temperatures are above the threshold.

[3] The manufacturer's cut-in wind speed is 3.0 meters (m)/second (s; 9.8 feet [ft]/s) to 4.0 m/s (13.1 ft/s) across the Project turbines.

METHODS

As specified in the HCP, Western EcoSystems Technology, Inc. (WEST) designed the monitoring effort for the 111 wind turbines at Meadow Lake Wind Farms V and VI (i.e., study-wide *g*). The effort required to target a *g* of 0.25 at 111 turbines was spread across all phases and 414 turbines at the Project. WEST used Project-specific data from previous post-construction monitoring studies at the Project to develop a study plan that targeted a probability of detection (*g*) of 0.25 (Rodriguez et al. 2022) to meet the monitoring commitments in the HCP. WEST submitted a study plan to the USFWS on January 31, 2023, and received approval on February 15, 2023 (J. Kemnitz, USFWS, pers. comm.).

Standardized Carcass Searches

Number of Turbines Sampled, Search Frequency, and Plot Size

Technicians and detection-dog teams conducted standardized carcass searches from April 1 – May 15 and August 1 – October 15, 2023. Search effort varied by season (Table 3, Figure 2), and was designed to maximize effort when the greatest number of Covered Species were expected to occur.

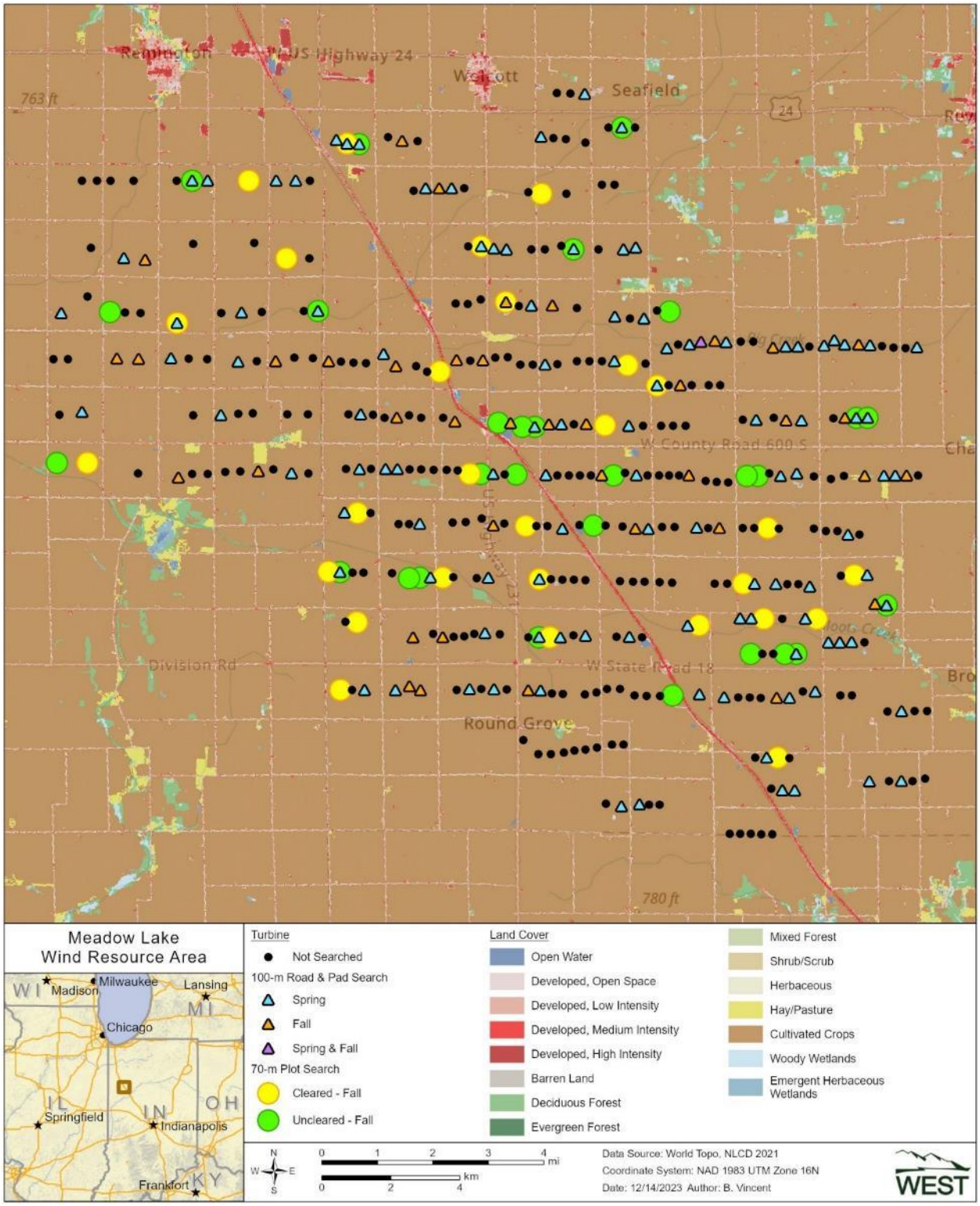

Figure 2. Turbine by plot type and surrounding land cover at the Meadow Lake Wind Resource Area in Benton and White counties, Indiana.

Table 3. Search effort by season and plot type at the Meadow Lake Wind Resource Area, Benton and White counties, Indiana.

Season	Plot Type	Search Interval	Number of Turbines	Search Team
Spring (April 1–May 15)	100-m road and pad	7 days	111	Technician
Fall (August 1–October 15)	100-m road and pad	7 days	55	Technician
	70-m cleared plot	7 days	28	Detection dog
	70-m uncleared plot	7 days	28	Detection dog

A technician searched the gravel road and pad areas (road and pad plots) under all 111 turbines to a distance of 100 m (328 ft) from the turbine, once per week during the spring (Table 3). One hundred and eleven turbines were searched once per week during the fall (Table 3). A technician searched 55 turbines as road and pad plots to a distance of 100 m from the turbine (Figure 3). Detection-dog teams searched 28 turbines where crops were regularly mowed within a 70-m radius (70-m cleared plots; Figure 4) and 28 turbines as uncleared plots with a 70-m radius (70-m uncleared plots; Figure 5).

During the fall, vegetation at 70-m cleared plots was mowed and maintained by Project staff within 10 to 15 cm (four to six inches) in height to enhance detectability of carcasses. Uncleared plots were vegetated with soybeans (*Glycine max*). A cross pattern, approximately 1.5-m (4.9-ft) wide, was mowed into the uncleared soybean plots to assist with plot access.

Figure 3. Representative photo of conditions of a 100-meter road and pad plot.

Figure 4. Representative photo of vegetation conditions in a 70-meter cleared plot.

Figure 5. Representative photo of vegetation conditions in a 70-meter uncleared plot.

Search Methods

WEST used two types of search methods: a technician, or human only visual search, and a detection-dog team or olfactory search, where the team consisted of one technician/handler and one dog. All personnel were trained to follow the Project's study plan, including proper handling and reporting of carcasses. Carcass searches were conducted during the day, beginning as early as first light.

Road and Pad Searches —Technician Searches

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

Plot Searches — Detection-dog Team

Detection-dog teams searched 70-m cleared and 70-m uncleared plots for bat carcasses. Prior to each search, handlers determined the survey start points and number of transects needed to cover the plot after accounting for wind speed and direction, as well as crop row direction and density (when applicable). Handlers oriented the detection dog to start searches perpendicular to the wind to maximize scent detection. Both windspeed and crop density can affect dispersal of the target odor (i.e., bat carcasses) across the search area. To maximize detection rates during an olfactory search, transect width varied with vegetation density and wind speed, ranging from 5–10 m (16–33 ft) apart in densely vegetated areas, to 10–15 m (33–49 ft) in shorter vegetation. Detection dogs were rewarded with either a food reward or a short play session when they correctly alerted to a bird or bat carcass.

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 and/or bird carcasses. Temperament characteristics sought after were high-energy and a high food or toy drive. Prior to conducting searches at the Project, 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). Detection dogs were initially trained with either cotton scent swabs that had been rubbed on bat carcasses or directly with dehydrated bat carcasses at increasing distances over a period of three to four weeks. Once the detection dog achieved a passing grade of 80% or higher in a scent recognition test, consisting of ten blind trial lineups using bat carcasses, the dog and handler were evaluated in the field to measure their performance. The detection dog coordinator conducted a two-day field evaluation of each detection-dog team. After teams achieved a searcher efficiency of 75% or greater for 15–30 bats placed during blind evaluation trials, the teams were approved to conduct standardized carcass searches. Because the objective of the study was to focus on detecting bat carcasses, dogs were not explicitly trained on native bird carcasses; however, all detection dogs alerted on bird carcasses in the field, and handlers rewarded bird finds in the field to encourage future alerts to bird carcasses. Breeds used

at Project as detection dogs included one Pudelpointer, one Feist, and one Doberman pinscher/Belgian Malinois mix.

Data Collection

Technicians recorded the date, start and end times, technician name, turbine number, type of search and if any fatalities were found for each scheduled search. When a carcass was found, technicians placed a flag near it and continued the search. After searching the entire plot, the technician returned to record information for each carcass on a data sheet, including the date and time, species, sex and age (when possible), technician name, turbine number, measured distance from turbine, azimuth from turbine, location of carcass using Geographic Coordinate System (latitude and longitude), habitat surrounding carcass, carcass condition, and estimated time of death (e.g., less than one day, two days).

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

- Intact—a carcass that is complete, not badly decomposed, and shows no sign of being fed upon by a predator or scavenger.
- Scavenged—an entire carcass that shows signs of being fed upon by a predator or scavenger, or a portion(s) of a carcass in one location (e.g., wings, skeletal remains, portion of a carcass, etc.), or a carcass that has been heavily infested by insects.
- Dismembered—a carcass found in multiple pieces distributed more than 1.0 m (3.3 ft) apart from one another due to scavenging or other reasons.
- Injured—a bat or bird found alive.

For bird carcasses, the following category was also used:

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

Technicians took digital photographs of each carcass, including any visible injuries, and surrounding habitat. No bird carcasses were collected, but a marker was placed next to each bird carcass to avoid duplicate counting. Bat carcasses were collected under the Project's ITP (ESPER0005174), WEST's Federal Native Endangered and Threatened Species Recovery Permit (ES234121), and WEST's State Special Purpose Salvage Permit (2263). Technicians placed each bat carcass in a re-sealable plastic bag labeled with a unique carcass identification number, turbine number, and date, for storage in a freezer on site. Leather gloves covered by nitrile or latex gloves were used to handle all bat carcasses to eliminate possible transmission of rabies or other zoonotic diseases. Live, injured bats were recorded and considered fatalities for analysis purposes when observed in search areas, and were handled in accordance with permit conditions (left in place).

Carcasses found in non-search areas (e.g., outside of a plot boundary) or outside of the scheduled study period, were recorded as incidental discoveries and documented following the same protocol for those found during standard searches.

Carcass Identification and Agency Notification

Identification of bird carcasses were verified by biologists with significant field experience in identification of birds and their feathers. The USFWS and the Indiana Department of Natural Resources were notified within 24 hours of positive identification of any state or federally listed species. A permitted bat biologist (ESPER0039249) verified the identifications of all bat carcasses in hand or by photo at the end of the surveys and delivered the carcasses to the USFWS Indiana Field Office and the Illinois Natural History Survey repository at the end of the study.

Tissue samples collected from heavily scavenged or decomposed carcasses that could not be positively identified and had potential to be a Covered Species were submitted to a USFWS-approved laboratory, East Stroudsburg University Wildlife Genetics Institute for identification. Bat carcasses that were heavily scavenged but did not have potential to be a Covered Species (i.e., fur was present on the wing or forearms measured greater than 42 millimeters [1.7 inches]) were identified to the closest genus or group possible and were not sent off for further identification.

Bias Trials

Searcher Efficiency Trials

The objective of the searcher efficiency trials was to estimate the probability that a carcass was found by searchers. Searcher efficiency trials were conducted in the same areas where carcass searches occurred. Technicians and detection-dog teams conducting carcass surveys did not know when searcher efficiency trials were being conducted or the location of the trial carcasses. Trial carcasses consisted of eastern red bats (*Lasiurus borealis*), big brown bats (*Eptesicus fuscus*), and silver-haired bats (*Lasionycteris noctivagans*) that had previously been found on site. One hundred and twenty-eight carcasses were placed across all seasons and plot types to account for differences in search conditions by plot type and season.

Multiple trials were conducted in each season to incorporate potential changes in plot conditions on searcher efficiency over time. Each trial carcass was discreetly marked with a black zip-tie and/or a piece of electrical tape around the upper forelimb for identification as a study carcass. Carcasses were dropped from waist-height or higher and allowed to land in a random posture. The trial administrator walked in a meandering path and dropped trial carcasses for detection dogs 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. For technician trials, the trial administrator placed carcasses prior to searchers' arrival at a plot, either the night before or the morning of searches depending on work schedules.

Searchers had one chance to locate trial carcasses during the first search after carcass placement. The number and location of trial carcasses found during the search were recorded, and the number of trial carcasses available for detection was determined immediately after each trial by the person responsible for distributing the carcasses.

Carcass Persistence Trials

The objective of carcass persistence trials was to estimate the average probability a carcass would persist, or be available for detection, in the field, given the search interval. Carcasses could be removed by scavenging or rendered undetectable by typical farming activities. Fifty-four trial carcasses were left in place from searcher efficiency trials and to measure carcass persistence. A minimum of 15 trial carcasses were placed in each season and plot type to incorporate the effects of varying weather and scavenger densities on carcass persistence. No more than three trial carcasses were placed on a plot to avoid potential over-seeding and attracting scavengers.

Technicians monitored the trial carcasses over a 30-day period according to the following schedule, as closely as possible. Carcasses were checked daily for the first four days, then on day 7, 10, 14, 20, and 30. Trial carcasses were monitored until they were completely removed, or the trial period ended. Detection-dog teams were used on the 70-m cleared and uncleared plots to determine when carcasses were removed, while technicians determined the status of carcasses placed on 100-m roads and pads.

Search Area Mapping

Technicians recorded the boundaries of 100-m roads and pads and 70-m cleared plots using an Eos sub-meter global positioning satellite unit. Unsearchable areas within plot boundaries were also mapped. The plot boundaries were used to verify if carcasses were found inside the search areas and to inform the distribution of carcasses around turbines to estimate the number of carcasses that fell inside or outside of search areas. A 72-m (236-ft) radius projection was applied to 70-m uncleared plots. The additional 2.0 m (6.6 ft) were added to the radius to account for the width of the turbine tower.

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 the Covered Species. EoA was used with data collected in the field to estimate the overall probability of detecting a bat fatality, the take rate of Covered Species, and the number of Covered Species carcasses that occurred. Data used in the EoA model included number of Covered Species fatalities, the searched area adjustment (“DWP” in the software), the results of searcher efficiency

and carcass persistence trials, the seasonal arrival distribution of bats (described below), and the detection reduction factor (*k*; described below).

Searcher Efficiency Estimation

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). EoA uses raw searcher efficiency data (e.g., number of found and available trial carcasses) to inform overall probability of detection. However, to determine if searcher efficiency data should be pooled, or separated by strata such as season and/or plot type, we modeled searcher efficiency using logistic regression. For both technicians and detection-dog team models, model selection was completed using an information theoretic approach known as AICc, or corrected Akaike Information Criterion (Burnham and Anderson 2002). The best model was selected as the most parsimonious model within two AICc units of the model with the lowest AICc value. Searcher efficiency data were input into the EoA software according to the model selection results.

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

Carcass Persistence Rate Estimation

Data collected during carcass persistence trials were used to estimate the probability carcasses remained available to be located by the searcher, given the search interval (i.e., the time between scheduled searches). The average probability a carcass persisted was estimated using an interval-censored survival regression with four potential distributions: exponential, log-logistic, lognormal, and Weibull distributions (Kalbfleisch and Prentice 2002, Dalthorp et al. 2018). As with searcher efficiency, carcass persistence models were estimated separately by search team (i.e., plots searched by technicians vs. plots searched by detection-dog teams) to account for different modes of detection. Season was included as a potential covariate for the technician model, and plot type was included as a potential covariate for the detection dog model. The best model was selected as the most parsimonious model within two AICc units of the model with the lowest AICc value. The parameter estimates of the selected model (α [shape] and β [scale], including the 95% confidence interval [CI] of β) were used as inputs in the EoA Single Class module.

Search Area Adjustment

The search area adjustment accounted for unsearched areas beneath turbines, and was calculated as a probability that ranged from zero to one. The search area adjustment was estimated as the product of the proportion of searched area around each turbine and a carcass-density distribution. The proportion of area searched was calculated in a Geographic Information System as the amount of area searched divided by the total area searched at each 1.0-m annulus around the turbine. A truncated weighted maximum likelihood (TWL) modeling approach (Khokan et al. 2013) was used to estimate the carcass-density distribution using site-specific

fatality locations. The TWL approach uses weights based on probability of detection and the proportion of area searched in each 1.0-m annulus around the turbine. Due to the variation in turbine sizes (hub heights range from 80–105 m and blade lengths range from 82–136 m in diameter), carcass-density distribution models were fit for each turbine type separately and compared to models fit data pooled across all turbine types. Distributions considered were normal, gamma, Gompertz, and Weibull (parameterized according to R Development Core Team [2016] and Yee [2015]). The best model was selected using AICc. Fitted models were checked for validity and excluded from consideration if the estimated variance was negative or infinite, if the statistical fitting algorithm returned indicated an error, or if the fitted distribution indicated less than 5% of carcasses within the maximum search radius (after Dalthorp and Huso 2023). The best model was selected using AICc after excluding invalid models.

Carcasses Excluded from Analysis

Fatalities were excluded from the analysis 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 TWL fitting procedure accounts for unsearched areas. Carcasses found prior to the start of surveys (e.g., a carcass found on a plot in the spring that was estimated to have died prior to April 1) were also excluded because the carcass occurred outside of the study period. Note that carcasses found on a plot incidentally (e.g., found by maintenance personnel) were included in the analysis if that plot had a scheduled search in the future, but within the same season. 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 search area adjustment, but would be included in the EoA fatality estimate following Dalthorp et al. (2020).

Covered Species Take and Detection Probability Estimates

EoA was used to estimate the median cumulative take to-date (*M**), mean annual take rate (λ), and evaluate the probability that the estimated take rate (λ) exceeded the expected take rate (τ) for Indiana bat and northern long-eared bat (i.e., Covered Species). Estimates were calculated using the EoA method (Dalthorp et al. 2017), using the Single Class, Multiple Class, and Multiple Years modules of EoA.

The *g* was estimated using the bias corrections for searcher efficiency, carcass persistence, and search area, and the seasonality of risk the Covered Species, which per the HCP, was 11% in the spring and 89% in the fall. The seasonal risk was used to weight the contributions of detection probability from different seasons in the overall g estimate.

The study period was separated into search strata, where each search stratum was defined by a number of turbines and a length of time. Within each search stratum all of the bias corrections were the same. For example, in spring all road and pad searches at V136 3.6 MW turbines had the same searcher efficiency, carcass persistence, and search area. The EoA Single Class module was used to estimate the detection probability in each search stratum. This resulted in alpha (α) and beta (β) parameters that defined the beta distribution of detection probability in each stratum.

Each search stratum potentially had a different number of turbines and turbine operations, and a different amount of risk to the Covered Species (i.e. arrival proportion) compared to other search strata. To combine search strata together, these factors contributed a weight to each stratum. A search stratum with 9 turbines had less weight than a search stratum with 43 turbines. The EoA Multiple Class module was used to combine detection probability distributions across strata. In the software, stratum weights were called "DWP". The module was used three times, first to combine plot search type strata within each season (i.e, for fall, combining 70-m cleared plots, 70-m uncleared plots, and roads and pads), second to combine season strata, and third to combine searched and unsearched turbines at the Project level.

The weights for combining the plot search type strata within each season were the within-season sampling fraction (i.e the proportion of turbines in fall which were searched as roads and pads) multiplied by the relative operation of turbines (i.e. the proportion of fall road and pad turbines that were operating). Any turbines with low search effort within any season were part of an "unsearched" stratum, and the beta distribution parameters were set to Ba = 0.01 and Bb = 1,000 (a detection probability of 10^{-5}). The weights were standardized to sum to one within each season.

Bat mortality is consistently higher in the fall compared to other seasons (Lloyd et al. 2023, Arnett et al. 2008). Therefore, it was important to account for differing amounts of risk by season. Differing risk by seasons based on the carcass arrival proportions from the Midwest Wind Energy Multi-Species HCP (USFWS 2016) were 11% in spring, 89% in fall. The weights for combining season strata were carcass arrival proportions multiplied by relative operation of turbines for each season. The weights were standardized to sum to 1 across seasons.

The results of the first two Multiple Class module runs were the parameters for the beta distribution of detection probability for searched turbines. A third run of the Multiple Class module combined searched and unsearched turbines. The weights for combining the searched and unsearched turbines were the proportion of searched and unsearched turbines. The parameters for the beta distribution for unsearched turbines were set to Ba = 0.01 and Bb = 1,000 (a detection probability of 10^{-5}). A study-wide *g* (the overall probability of detection limited to the turbines sampled during monitoring) and site-wide *g* (the overall probability of detection for all turbines) were calculated based on the 111 turbines studied and 414 total turbines, respectively.

Each year of the study potentially had different impacts to the Covered Species depending on the operation of the turbines. Inoperable turbines were not considered to have risk; therefore, it was important to account for differences in turbine operations between years. Given that turbines at every project undergo routine maintenance, operations were considered normal unless the proportion of operational turbines was less than 0.9 during the study period. The Multiple Years Module was used to estimate the site-wide, cumulative detection probability from 2021–2023. The EoA Multiple Years Module weighted the years using the turbine operation proportion for that year. In the software the year weights were called rho (ρ). In 2021 and 2022, the Project was fully operational for both seasons, so ρ was set to 1. In 2023, there were comparatively longer periods of turbine down-time across the facility; the value for ρ in 2023 was 0.74.

The results from the Multiple Years module (Ba and Bb parameters for the detection probability for the permit term to date) were used to estimate *M** (the median cumulative take over the life of the permit), λ (the underlying annual take rate over the past three monitoring periods) and its 95% CI, the probability that $\lambda > \tau$, where τ is the authorized take number divided by the number of years in the permit, and the probability that $M^* \geq T$, where T is the permitted amount of take for each species. Appendix D shows how the compliance metrics were calculated using the EoA Graphical User Interface.[1]

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 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. The Project's short-term trigger was designed to evaluate a rolling window of six years of post-construction monitoring data. If, within any six-year rolling window, the estimated take rate exceeded the expected take rate with 95% confidence, the short-term trigger would be met, indicating that the minimization plan in the HCP may need to be adjusted to ensure that the median cumulative take estimate (*M**) remains within the permitted limit over the ITP term. Three years of data were used in this analysis, 2021–2023.

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 no changes are necessary. If the cumulative take to date at α = 0.5 is greater than or equal to the total permitted take ($M^* \geq T$), then the take limit has been met and the Project must enact avoidance measures.

RESULTS

Standardized Carcass Searches

A total of 1,830 searches were conducted during the spring and fall monitoring seasons; 48 searches (less than 3%) were missed due to turbine maintenance, weather constraints, and/or safety hazards (Appendix A).

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

No federally listed bat species were found. One tricolored bat carcass (*Perimyotis subflavus*; federally proposed listed as endangered and state-listed as endangered; 0.2%) and seven evening bat (*Nycticeius humeralis;* state-listed as endangered) carcasses (1.4%) were found (Appendix A). No other federally or state-listed bat species were found.

Four hundred and eighty-four bat carcasses and 100 bird carcasses were found during surveys and incidentally (Appendix A). The most commonly found bat species were eastern red bats (292 carcasses; 60.3%) and silver-haired bats (107 carcasses; 22.1%), followed by hoary bats (*L. cinereus*; 44 carcasses; 9.1%) and big brown bats (25 carcasses; 5.2%). Seven evening bats (1.4%), four unidentified *Lasiurus* bats (*Lasiurus* spp.; 1.0%), three eastern red bats or Seminole bats (*L. seminolus*; 0.6%), and one tricolored bat (0.2%) were also found (Appendix A). Eight heavily scavenged bats (e.g., wing membrane only, bones, or partial carcasses) were sent off for identification via deoxyribonucleic acid (DNA) analysis; three were identified as silver-haired bat, two were identified as evening bat, two were identified as eastern red bat, and one was identified as big brown bat.

Statistical Analysis

Bias Trials

Searcher Efficiency Trials

One-hundred and twenty-eight bats were placed for searcher efficiency trials on 10 separate dates, and 110 were available for search teams to find across all plot types (Appendix B). 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 meaningful difference between searcher efficiency rates on uncleared and cleared plots (Appendix B). The best-fit model for searcher efficiency on roads and pads did not support the inclusion of season as a covariate, meaning there was not a statistically meaningful difference between searcher efficiency rates across seasons (Appendix B). Searcher efficiency rates were 96.0% on roads and pads, and 69.5% on 70-m plots searched by detection-dog teams (Table 4).

Table 4. Searcher efficiency results by plot type at the Meadow Lake Wind Resource Area in Benton and White counties, Indiana, from April 1 – May 15 and August 1 – October 15, 2023.

Plot Type	Number Placed	Number Available	Number Found	% Found
Overall 70-meter Plots (Cleared and Uncleared)	69	59	41	69.5
Overall Roads and Pads	28	25	24	96.0

Carcass Persistence Trials

Sixty-six carcasses were placed to estimate carcass persistence. The best-fit model for carcass persistence rates on 70-m cleared and uncleared plots searched by detection dogs was a Weibull distribution with no covariates, which suggests carcass persistence did not vary by plot type (Appendix B). The best-fit model for carcass persistence on roads and pads did not support the inclusion of season as a covariate, meaning there was not a statistically meaningful difference between searcher efficiency rates across seasons (Appendix C).The average probability that a

carcass persisted through a seven-day search interval was 0.68 (90% CI: 0.61–0.74) on road and pads in all seasons, and 0.77 (90% CI: 0.66–0.86) on cleared and uncleared 70-m plots in the fall (Figure 6).

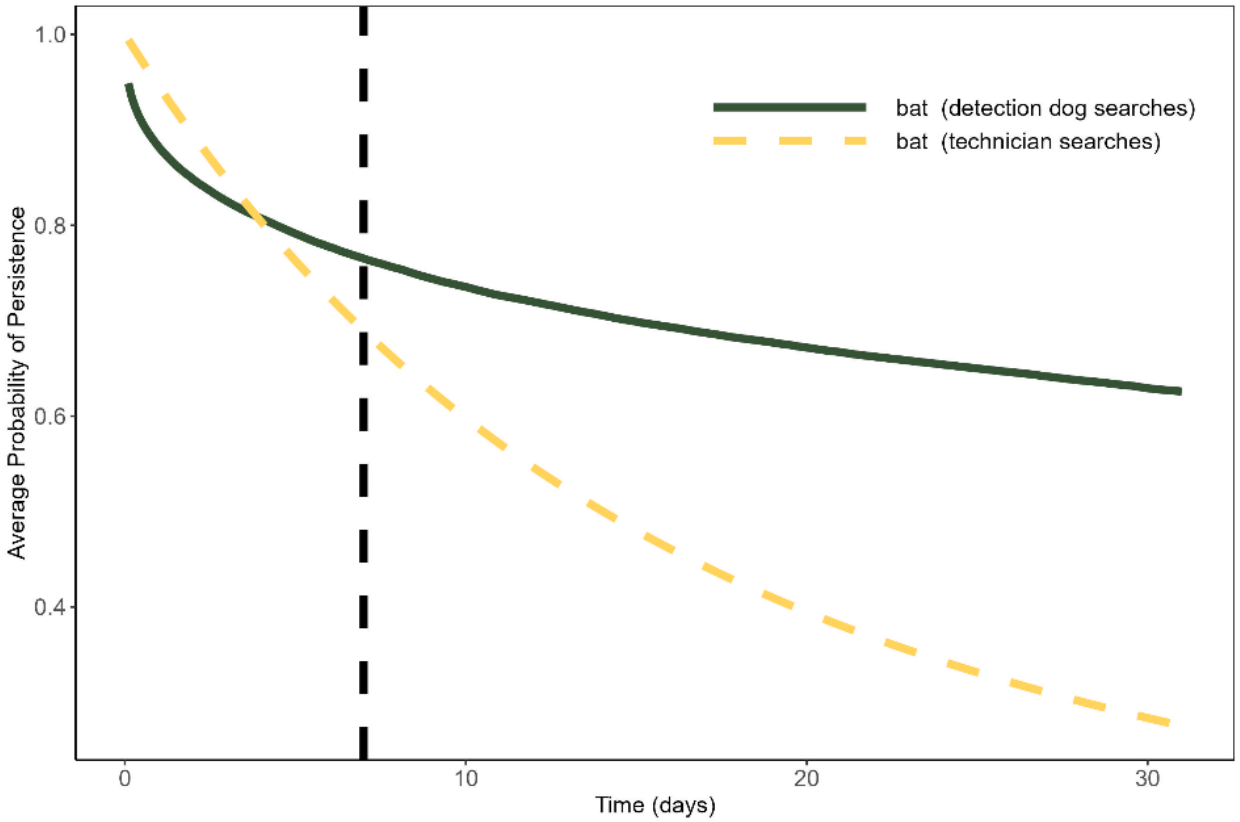

Figure 6. The average probability of persistence, in days, at a weekly search interval at Meadow Lake Wind Resource Area in Benton and White counties, Indiana, from April 1 – May 15 and August 1 – October 15, 2023.

Note: The vertical dotted lines indicate the 7-day search interval used in this study.

Search Area Adjustment

Thirty-two of the 484 bats found during the study period were excluded from modeling the search area adjustment for EoA. Nine bat carcasses were excluded from analysis because they were found off plot. Another 23 bats were excluded because their estimated time of death was prior to the start of surveys (Appendix C).

The best-fit model for the distribution of bats with respect to distance from turbine base included turbine type as a covariate, suggesting that the distribution of bats varied across turbine types (Appendix C). Therefore, there were multiple TWL search area adjustments for bats for all plot types. The TWL search area adjustment for bats at 100-m roads and pads was estimated to range between 0.07–0.13 (Table 5). The TWL search area adjustment for bats at 70-m plots was estimated to range between 0.99–1.00 (Table 5, and Appendix C).

Table 5. Truncated weighted maximum likelihood search area adjustment estimates for the Meadow Lake Wind Resource Area, Benton and White counties, Indiana, from April 1 – May 15 and August 1 – October 15, 2023.

Turbine Type *	Number of Bats*	Search Area Type	Distribution	Parameter 1	Parameter 2	Search Area Adjustment
GE 1.5 SLE	6	100-m road and pad	Weibull	3.9616	42.6879	0.07
1.5 MW	59	70-m plot	Weibull	3.9616	42.6879	1
Acciona AW-82 1.5 MW	1	100-m road and pad	Normal	31.871	15.6951	0.11
	64	70-m plot	Normal	31.871	15.6951	0.99
Vestas V82 1.65 MW	3	100-m road and pad	Normal	31.1769	12.1264	0.08
	80	70-m plot	Normal	31.1769	12.1264	1
Suzlon S88 2.1 MW	5	100-m road and pad	Gompertz	0.0834	0.0014	0.08
	51	70-m plot	Gompertz	0.0834	0.0014	1
Vestas V110 2.0 MW	5	100-m road and pad	Normal	34.6055	14.8198	0.13
	72	70-m plot	Normal	34.6055	14.8198	0.99
Vestas V136 3.6 MW	15	100-m road and pad	Normal	36.1957	12.0931	0.13
	91	70-m plot	Normal	36.1957	12.0931	1

* Number of bats included in the area adjustment analysis by turbine type and plot type.

Number of turbines searched by turbine type were as follows: GE 1.5 SLE 1.5 MW, n = 26; Acciona AW 82 1.5 MW, n = 24; Vestas V821.65 MW, n = 67; Suzlon S88 2.1 MW, n = 21; Vestas V110 2.0 MW, n = 23; Vestas V136 3.6MW, n = 25. Total sums to 168 due to differences between the individual turbines searched in spring versus fall.

m = meter.

Covered Species Take Estimates

No Covered Species carcasses were found during the study. No Indiana bats and no northern long-eared bats have been found to date under the ITP. The study-wide *g* distribution achieved for the 2023 monitoring period was 0.326 (95% CI: 0.302–0.350). The site-wide *g* was 0.085 (95% CI: 0.079–0.091; Table 6). 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 D.

Table 6. Probability of detection (*g*), Ba, and Bb, for the Meadow Lake Wind Resource Area, Benton and White counties, Indiana, from 2021 to 2023.

Year	Ba*	Bb*	*g*	95% CI
2021	1,605.22	15,648.767	0.093	0.089–0.097
2022	738.487	13,602.956	0.051	0.048–0.055
2023	662.58	7,135.601	0.085	0.079–0.091
λ and Short-term Trigger (Last 3 Years)	2,890.31	35,292.841	0.076	0.073–0.078
*M** and Long-term Trigger (Cumulative)	2,890.31	35,292.841	0.076	0.073–0.078

* 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.

CI = confidence interval.

Mean annual take rates based on 2021–2023 were 2.41 (95% CI: 0.00–12.11) Indiana bats per year and 2.41 (95% CI: 0–12.11) northern long-eared bats per year (Table 7). The expected average annual take rates reported in the HCP were 25.1 Indiana bats per year and 5.8 northern long-eared bats per year.

Cumulative take under the ITP to-date (2021–2023), *M*,* at α = 0.5 (50th credible bound), was two Indiana bats and two northern long-eared bats (Table 8). The total take permitted by the ITP is 727 Indiana bats and 167 northern long-eared bats over the 29-year permit term.

Adaptive Management Triggers

Evidence of Absence Short-term Trigger

The short-term trigger assesses the probability that the estimated take rate exceeded the expected take rate, Pr(λ > τ). At a 95% confidence level (α = 0.05), Pr(λ > τ) must be greater than or equal to 0.95 for the short-term trigger to fire. For Indiana bat, Pr(λ > τ) = 0 and northern long-eared bat, Pr(λ > τ) = 0.12 (Table 7). Neither probability meets or exceeds 0.95, indicating the short-term trigger was not met and no adaptive management actions are necessary (Table 7; Figure 7).

Table 7. Probability the estimated take rates exceeded the expected take rates for studies conducted within the rolling average interval at the Meadow Lake Wind Resource Area, Benton and White counties, Indiana, ITP Years 1–3 (2021–2023).

Species	Mean λ (95% CI)	Expected Take Rate (τ)	Pr(λ > τ) *	Short-Term Trigger Fires at α = 0.05?
Indiana bat	2.41 (0–12.11)	25.1	0.00	No
northern long-eared bat	2.41 (0–12.11)	5.8	0.12	No

* Pr(λ > τ) reads, "the probability that λ (the annual take rate) is greater than τ (the expected annual take rate based on the total permitted take, used as a threshold for adaptive management)." If this probability is less than 0.95 (e.g., α = 0.05 for a 1-sided test), then no adaptive management is triggered because there is not sufficient evidence that the estimated annual take rate is greater than the expected annual take rate.

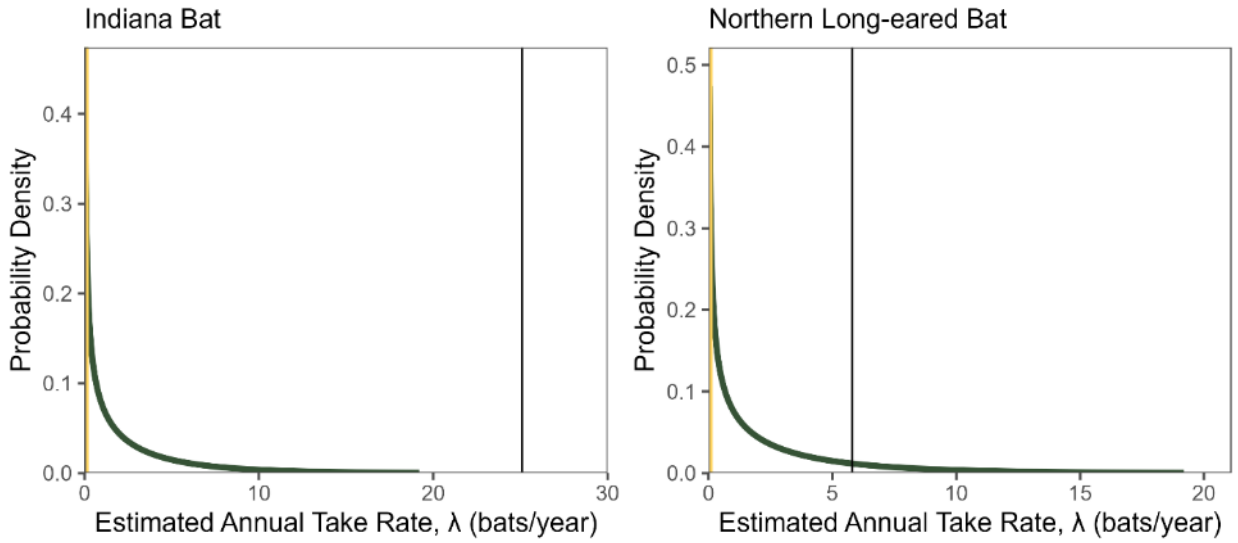

Figure 7. Estimated annual take rate (λ), in bats per year at the Meadow Lake Wind Resource Area, Benton and White counties, Indiana, ITP Years 1–3 (2021–2023).

Note: The yellow region of the posterior distributions shows the region of the lower 5% quantile of the distributions (yellow region may not be visible when the posterior distribution is skewed heavily toward zero). The vertical line marks the expected take rate. The short-term trigger evaluates whether the vertical line falls within or to the left of the yellow region of the posterior distributions. For both species, the short-term trigger was not met because the vertical line (expected take rate) is not within or to the left of the yellow regions. In other words, the probability that estimated take rate is greater than the expected take rate does not exceed 95%.

Evidence of Absence Long-term Trigger

The estimated cumulative take to date, M^* at $\alpha = 0.5$ (50th credible bound), is below the total permitted take for both Covered Species (Table 8). The long-term trigger was not met, and Meadow Lake Wind Farm is in compliance for both species because $M^* < T$ for both species. Therefore, an avoidance response is not necessary.

Table 8. Cumulative take estimates to date using Evidence of Absence for studies conducted within the ITP term to date the Meadow Lake Wind Resource Area, Benton and White counties, Indiana, ITP Years 1–3 (2021–2023).

Species	Cumulative take (M*)	Permitted Take (T)	Long-term Trigger Fires at α = 0.5?
Indiana bat (50th credible bound)	2	727	No
northern long-eared bat (50th credible bound)	2	167	No

CONCLUSIONS

The post-construction monitoring effort completed in 2023 was consistent with the HCP's monitoring requirements and the Project's 2023 study plan. No Covered Species carcasses were found despite a high probability of detection in 2023. Estimates of potential take for the Covered Species were below the levels authorized by the ITP and no adaptive management was necessary.

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Appendix A. Carcasses Found During the 2023 Post-Construction Monitoring Surveys

Appendix A1. Carcasses found at the Meadow Lake Wind Resource Area in Benton and White counties, Indiana, from April 1 – May 15 and August 1 – October 15, 2023.

Found Date	Common Name	Distance from Turbine (m)	Turbine	Search Type	Plot Type	Physical Condition
04/10/2023	eastern red bat	28	314	carcass search	100-m road and pad	scavenged
04/13/2023	big brown bat	36	515	carcass search	100-m road and pad	intact
04/14/2023	silver-haired bat	57	408	carcass search	100-m road and pad	scavenged
04/28/2023	silver-haired bat	44	634	carcass search	100-m road and pad	intact
05/01/2023	hoary bat	37	338	carcass search	100-m road and pad	scavenged
05/02/2023	silver-haired bat	40	634	carcass search	100-m road and pad	injured
05/09/2023	silver-haired bat	38	363	carcass search	100-m road and pad	scavenged
07/31/2023	big brown bat	0	84	incidental	70-m plot	scavenged
07/31/2023	eastern red bat	48	81	incidental	70-m plot	scavenged
07/31/2023	eastern red bat	50	81	incidental	70-m plot	scavenged
07/31/2023	hoary bat	38	66	incidental	70-m plot	scavenged
07/31/2023	hoary bat	28	66	incidental	70-m plot	scavenged
07/31/2023	hoary bat	51	84	incidental	70-m plot	dismembered
07/31/2023	hoary bat	20	84	incidental	70-m plot	scavenged
08/01/2023	big brown bat	36	514	carcass search	70-m plot	scavenged
08/01/2023	big brown bat	40	632	carcass search	100-m road and pad	scavenged
08/01/2023	eastern red bat	33	435	carcass search	70-m plot	scavenged
08/01/2023	eastern red bat	14	622	carcass search	100-m road and pad	scavenged
08/01/2023	eastern red bat	34	629	carcass search	100-m road and pad	scavenged
08/02/2023	eastern red bat	30	218	carcass search	70-m plot	scavenged
08/02/2023	eastern red bat	65	308	carcass search	70-m plot	scavenged
08/02/2023	eastern red bat	2	639	carcass search	100-m road and pad	scavenged
08/02/2023	eastern red bat	0	653	carcass search	100-m road and pad	scavenged
08/04/2023	big brown bat	14	90	carcass search	70-m plot	scavenged
08/04/2023	eastern red bat	8	328	carcass search	70-m plot	scavenged
08/04/2023	eastern red bat	22	48	carcass search	70-m plot	scavenged
08/04/2023	eastern red bat	33	606	carcass search	70-m plot	scavenged
08/04/2023	eastern red bat	32	660	carcass search	70-m plot	scavenged
08/04/2023	unidentified lasiurus bat	32	91	carcass search	70-m plot	scavenged
08/05/2023	big brown bat	26	505	carcass search	70-m plot	scavenged
08/05/2023	big brown bat	15	538	carcass search	70-m plot	scavenged
08/05/2023	eastern red bat	24	350	carcass search	70-m plot	scavenged
08/05/2023	eastern red bat	15	515	carcass search	70-m plot	scavenged
08/05/2023	eastern red bat	57	520	carcass search	70-m plot	scavenged
08/05/2023	eastern red bat	24	520	carcass search	70-m plot	scavenged

Appendix A1. Carcasses found at the Meadow Lake Wind Resource Area in Benton and White counties, Indiana, from April 1 – May 15 and August 1 – October 15, 2023.

Found Date	Common Name	Distance from Turbine (m)	Turbine	Search Type	Plot Type	Physical Condition
08/05/2023	eastern red bat	37	520	carcass search	70-m plot	scavenged
08/05/2023	eastern red bat	45	520	carcass search	70-m plot	scavenged
08/05/2023	eastern red bat	52	538	carcass search	70-m plot	scavenged
08/05/2023	hoary bat	60	416	carcass search	70-m plot	scavenged
08/05/2023	hoary bat	12	416	carcass search	70-m plot	scavenged
08/05/2023	hoary bat	38	505	carcass search	70-m plot	scavenged
08/07/2023	eastern red bat	31	627	carcass search	70-m plot	scavenged
08/07/2023	eastern red bat	43	658	carcass search	100-m road and pad	intact
08/07/2023	eastern red bat	24	660	carcass search	70-m plot	scavenged
08/08/2023	eastern red bat	53	413	carcass search	100-m road and pad	scavenged
08/08/2023	evening bat	17	308	carcass search	70-m plot	scavenged
08/09/2023	eastern red bat	5	616	carcass search	100-m road and pad	intact
08/10/2023	eastern red bat	48	219	incidental	70-m plot	injured
08/10/2023	eastern red bat	16	219	incidental	70-m plot	scavenged
08/10/2023	eastern red bat	31	29	carcass search	70-m plot	scavenged
08/10/2023	eastern red bat	38	416	carcass search	70-m plot	scavenged
08/10/2023	eastern red bat	60	416	carcass search	70-m plot	scavenged
08/10/2023	hoary bat	37	28	carcass search	70-m plot	scavenged
08/11/2023	eastern red bat	31	78	carcass search	70-m plot	scavenged
08/11/2023	hoary bat	18	66	carcass search	70-m plot	intact
08/15/2023	big brown bat	41	241	carcass search	70-m plot	scavenged
08/15/2023	big brown bat	40	604	carcass search	70-m plot	scavenged
08/15/2023	eastern red bat	41	241	carcass search	70-m plot	scavenged
08/15/2023	eastern red bat	14	266	carcass search	70-m plot	scavenged
08/15/2023	eastern red bat	29	302	carcass search	70-m plot	scavenged
08/15/2023	eastern red bat	41	307	carcass search	70-m plot	intact
08/15/2023	eastern red bat	40	307	carcass search	70-m plot	scavenged
08/15/2023	eastern red bat	35	308	carcass search	70-m plot	scavenged
08/15/2023	eastern red bat	26	308	carcass search	70-m plot	scavenged
08/15/2023	eastern red bat	57	316	carcass search	70-m plot	scavenged
08/15/2023	eastern red bat	53	441	incidental**	n/a	intact
08/15/2023	eastern red bat	59	515	carcass search	70-m plot	scavenged
08/15/2023	eastern red bat	39	515	carcass search	70-m plot	scavenged
08/15/2023	eastern red bat	20	520	carcass search	70-m plot	scavenged
08/15/2023	eastern red bat	33	622	carcass search	100-m road and pad	intact
08/15/2023	eastern red bat	40	639	carcass search	100-m road and pad	scavenged

Appendix A1. Carcasses found at the Meadow Lake Wind Resource Area in Benton and White counties, Indiana, from April 1 – May 15 and August 1 – October 15, 2023.

Found Date	Common Name	Distance from Turbine (m)	Turbine	Search Type	Plot Type	Physical Condition
08/15/2023	eastern red bat	18	651	carcass search	100-m road and pad	scavenged
08/15/2023	eastern red bat	35	661	carcass search	70-m plot	dismembered
08/15/2023	evening bat	29	350	carcass search	70-m plot	intact
08/15/2023	evening bat	15	606	carcass search	70-m plot	scavenged
08/15/2023	hoary bat	63	241	carcass search	70-m plot	scavenged
08/15/2023	hoary bat	9	345	carcass search	100-m road and pad	scavenged
08/15/2023	hoary bat	47	530	carcass search	70-m plot	scavenged
08/17/2023	eastern red bat	25	219	carcass search	70-m plot	scavenged
08/17/2023	eastern red bat	45	219	carcass search	70-m plot	scavenged
08/17/2023	eastern red bat	29	27	carcass search	70-m plot	scavenged
08/17/2023	eastern red bat	50	27	carcass search	70-m plot	scavenged
08/17/2023	eastern red bat	1	28	carcass search	70-m plot	scavenged
08/17/2023	eastern red bat	14	402	carcass search	70-m plot	scavenged
08/17/2023	eastern red bat	28	402	carcass search	70-m plot	scavenged
08/17/2023	eastern red bat	34	435	carcass search	70-m plot	scavenged
08/17/2023	eastern red bat or Seminole bat	5	209	carcass search	100-m road and pad	scavenged
08/17/2023	hoary bat	36	218	carcass search	70-m plot	scavenged
08/17/2023	silver-haired bat	29	27	carcass search	70-m plot	scavenged
08/17/2023	silver-haired bat	18	49	carcass search	70-m plot	dismembered
08/18/2023	big brown bat	26	430	carcass search	70-m plot	scavenged
08/18/2023	eastern red bat	42	430	carcass search	70-m plot	scavenged
08/18/2023	eastern red bat	60	430	carcass search	70-m plot	scavenged
08/18/2023	eastern red bat	28	59	carcass search	70-m plot	scavenged
08/18/2023	eastern red bat	46	73	carcass search	70-m plot	scavenged
08/18/2023	eastern red bat	46	73	carcass search	70-m plot	scavenged
08/18/2023	eastern red bat	15	78	carcass search	70-m plot	scavenged
08/18/2023	evening bat	37	430	carcass search	70-m plot	scavenged
08/21/2023	eastern red bat	27	512	carcass search	100-m road and pad	scavenged
08/21/2023	eastern red bat	26	535	incidental	100-m road and pad	scavenged
08/21/2023	eastern red bat	21	538	carcass search	70-m plot	scavenged
08/21/2023	eastern red bat	29	538	carcass search	70-m plot	scavenged
08/21/2023	eastern red bat	47	606	carcass search	70-m plot	scavenged
08/21/2023	eastern red bat	43	613	carcass search	70-m plot	scavenged
08/21/2023	eastern red bat	58	624	carcass search	70-m plot	scavenged
08/21/2023	eastern red bat	42	624	carcass search	70-m plot	scavenged
08/21/2023	eastern red bat	32	661	carcass search	70-m plot	scavenged

Appendix A1. Carcasses found at the Meadow Lake Wind Resource Area in Benton and White counties, Indiana, from April 1 – May 15 and August 1 – October 15, 2023.

Found Date	Common Name	Distance from Turbine (m)	Turbine	Search Type	Plot Type	Physical Condition
08/21/2023	eastern red bat	54	661	carcass search	70-m plot	scavenged
08/21/2023	hoary bat	30	434	carcass search	100-m road and pad	scavenged
08/21/2023	hoary bat	9	624	carcass search	70-m plot	scavenged
08/21/2023	silver-haired bat	49	606	incidental	70-m plot	scavenged
08/22/2023	eastern red bat	30	215	carcass search	70-m plot	scavenged
08/22/2023	eastern red bat	38	218	carcass search	70-m plot	scavenged
08/22/2023	eastern red bat	47	251	carcass search	70-m plot	scavenged
08/22/2023	eastern red bat	47	262	carcass search	70-m plot	scavenged
08/22/2023	eastern red bat	44	308	carcass search	70-m plot	scavenged
08/22/2023	eastern red bat	45	315	carcass search	70-m plot	scavenged
08/22/2023	eastern red bat	47	315	carcass search	70-m plot	scavenged
08/22/2023	eastern red bat	29	315	carcass search	70-m plot	scavenged
08/22/2023	eastern red bat	50	326	carcass search	70-m plot	scavenged
08/22/2023	eastern red bat	36	350	carcass search	70-m plot	scavenged
08/22/2023	eastern red bat	46	604	carcass search	70-m plot	scavenged
08/22/2023	eastern red bat	21	604	carcass search	70-m plot	scavenged
08/22/2023	eastern red bat	50	604	carcass search	70-m plot	scavenged
08/22/2023	hoary bat	13	251	carcass search	70-m plot	scavenged
08/22/2023	silver-haired bat	32	251	carcass search	70-m plot	dismembered
08/22/2023	silver-haired bat	44	514	carcass search	70-m plot	intact
08/23/2023	eastern red bat	21	416	carcass search	70-m plot	scavenged
08/23/2023	eastern red bat	28	435	carcass search	70-m plot	intact
08/23/2023	eastern red bat	36	436	carcass search	70-m plot	scavenged
08/23/2023	eastern red bat	37	438	carcass search	70-m plot	scavenged
08/23/2023	eastern red bat	46	536	carcass search	70-m plot	scavenged
08/23/2023	eastern red bat	53	536	carcass search	70-m plot	scavenged
08/23/2023	evening bat	30	266	carcass search	70-m plot	intact
08/23/2023	hoary bat	50	536	carcass search	70-m plot	intact
08/23/2023	silver-haired bat	23	536	carcass search	70-m plot	scavenged
08/24/2023	big brown bat	20	441	incidental**	n/a	scavenged
08/24/2023	eastern red bat	31	27	carcass search	70-m plot	scavenged
08/24/2023	eastern red bat	28	27	carcass search	70-m plot	intact
08/24/2023	eastern red bat	15	322	incidental**	n/a	intact
08/24/2023	eastern red bat	50	323	carcass search	100-m road and pad	scavenged
08/24/2023	eastern red bat	22	48	carcass search	70-m plot	scavenged
08/24/2023	eastern red bat	48	49	carcass search	70-m plot	scavenged

Appendix A1. Carcasses found at the Meadow Lake Wind Resource Area in Benton and White counties, Indiana, from April 1 – May 15 and August 1 – October 15, 2023.

Found Date	Common Name	Distance from Turbine (m)	Turbine	Search Type	Plot Type	Physical Condition
08/24/2023	eastern red bat	40	639	carcass search	100-m road and pad	scavenged
08/24/2023	eastern red bat	31	651	carcass search	100-m road and pad	scavenged
08/24/2023	eastern red bat	20	658	carcass search	100-m road and pad	scavenged
08/24/2023	eastern red bat	22	76	carcass search	70-m plot	scavenged
08/24/2023	hoary bat	17	639	carcass search	100-m road and pad	intact
08/25/2023	big brown bat	46	78	carcass search	70-m plot	scavenged
08/25/2023	eastern red bat	37	28	carcass search	70-m plot	scavenged
08/25/2023	eastern red bat	32	402	carcass search	70-m plot	scavenged
08/25/2023	eastern red bat	25	402	carcass search	70-m plot	scavenged
08/25/2023	eastern red bat	49	402	carcass search	70-m plot	intact
08/25/2023	eastern red bat	20	402	carcass search	70-m plot	scavenged
08/25/2023	eastern red bat	19	402	carcass search	70-m plot	scavenged
08/25/2023	eastern red bat	24	430	carcass search	70-m plot	scavenged
08/25/2023	eastern red bat	34	430	carcass search	70-m plot	scavenged
08/25/2023	eastern red bat	25	430	carcass search	70-m plot	scavenged
08/25/2023	eastern red bat	41	430	carcass search	70-m plot	scavenged
08/25/2023	eastern red bat	42	66	carcass search	70-m plot	scavenged
08/25/2023	eastern red bat	15	73	carcass search	70-m plot	scavenged
08/25/2023	eastern red bat	34	73	carcass search	70-m plot	scavenged
08/25/2023	eastern red bat	31	78	carcass search	70-m plot	scavenged
08/25/2023	hoary bat	38	28	carcass search	70-m plot	scavenged
08/25/2023	hoary bat	47	66	carcass search	70-m plot	scavenged
08/25/2023	hoary bat	46	78	carcass search	70-m plot	scavenged
08/25/2023	silver-haired bat	30	78	carcass search	70-m plot	scavenged
08/26/2023	big brown bat	30	91	carcass search	70-m plot	scavenged
08/26/2023	eastern red bat	53	111	carcass search	70-m plot	scavenged
08/26/2023	eastern red bat	52	111	carcass search	70-m plot	scavenged
08/28/2023	big brown bat	41	661	carcass search	70-m plot	scavenged
08/28/2023	eastern red bat	35	35	carcass search	100-m road and pad	intact
08/28/2023	eastern red bat	37	432	incidental**	n/a	scavenged
08/28/2023	eastern red bat	41	434	carcass search	100-m road and pad	intact
08/28/2023	eastern red bat	17	514	carcass search	70-m plot	scavenged
08/28/2023	eastern red bat	69	515	carcass search	70-m plot	dismembered
08/28/2023	eastern red bat	38	515	carcass search	70-m plot	scavenged
08/28/2023	eastern red bat	7	515	carcass search	70-m plot	scavenged
08/28/2023	eastern red bat	62	515	carcass search	70-m plot	scavenged

Appendix A1. Carcasses found at the Meadow Lake Wind Resource Area in Benton and White counties, Indiana, from April 1 – May 15 and August 1 – October 15, 2023.

Found Date	Common Name	Distance from Turbine (m)	Turbine	Search Type	Plot Type	Physical Condition
08/28/2023	eastern red bat	47	515	carcass search	70-m plot	scavenged
08/28/2023	eastern red bat	27	515	carcass search	70-m plot	scavenged
08/28/2023	eastern red bat	34	520	carcass search	70-m plot	scavenged
08/28/2023	eastern red bat	17	520	carcass search	70-m plot	scavenged
08/28/2023	eastern red bat	41	520	carcass search	70-m plot	scavenged
08/28/2023	eastern red bat	48	530	carcass search	70-m plot	scavenged
08/28/2023	eastern red bat	40	530	carcass search	70-m plot	dismembered
08/28/2023	eastern red bat	47	530	carcass search	70-m plot	scavenged
08/28/2023	eastern red bat	35	530	carcass search	70-m plot	scavenged
08/28/2023	eastern red bat	6	535	carcass search	100-m road and pad	scavenged
08/28/2023	eastern red bat	42	538	carcass search	70-m plot	scavenged
08/28/2023	eastern red bat	51	604	carcass search	70-m plot	scavenged
08/28/2023	eastern red bat	43	604	carcass search	70-m plot	scavenged
08/28/2023	eastern red bat	22	604	carcass search	70-m plot	scavenged
08/28/2023	eastern red bat	59	604	carcass search	70-m plot	scavenged
08/28/2023	eastern red bat	56	604	carcass search	70-m plot	scavenged
08/28/2023	eastern red bat	42	604	carcass search	70-m plot	scavenged
08/28/2023	eastern red bat	20	604	carcass search	70-m plot	scavenged
08/28/2023	eastern red bat	31	604	carcass search	70-m plot	scavenged
08/28/2023	eastern red bat	58	604	carcass search	70-m plot	scavenged
08/28/2023	eastern red bat	38	606	carcass search	70-m plot	scavenged
08/28/2023	eastern red bat	33	613	carcass search	70-m plot	scavenged
08/28/2023	eastern red bat	47	619	carcass search	70-m plot	scavenged
08/28/2023	eastern red bat	34	624	carcass search	70-m plot	scavenged
08/28/2023	eastern red bat	58	624	carcass search	70-m plot	scavenged
08/28/2023	eastern red bat	36	624	carcass search	70-m plot	scavenged
08/28/2023	eastern red bat	35	624	carcass search	70-m plot	scavenged
08/28/2023	eastern red bat	53	624	carcass search	70-m plot	scavenged
08/28/2023	eastern red bat	7	624	carcass search	70-m plot	scavenged
08/28/2023	eastern red bat	30	624	carcass search	70-m plot	scavenged
08/28/2023	eastern red bat	37	627	carcass search	70-m plot	scavenged
08/28/2023	eastern red bat	39	660	carcass search	70-m plot	scavenged
08/28/2023	hoary bat	25	619	carcass search	70-m plot	intact
08/28/2023	silver-haired bat	34	604	carcass search	70-m plot	scavenged
08/28/2023	silver-haired bat	42	624	carcass search	70-m plot	scavenged
08/29/2023	eastern red bat	19	241	carcass search	70-m plot	scavenged

Appendix A1. Carcasses found at the Meadow Lake Wind Resource Area in Benton and White counties, Indiana, from April 1 – May 15 and August 1 – October 15, 2023.

Found Date	Common Name	Distance from Turbine (m)	Turbine	Search Type	Plot Type	Physical Condition
08/29/2023	eastern red bat	45	241	carcass search	70-m plot	scavenged
08/29/2023	eastern red bat	42	241	carcass search	70-m plot	scavenged
08/29/2023	eastern red bat	26	251	carcass search	70-m plot	scavenged
08/29/2023	eastern red bat	28	262	carcass search	70-m plot	scavenged
08/29/2023	eastern red bat	60	266	carcass search	70-m plot	dismembered
08/29/2023	eastern red bat	36	266	carcass search	70-m plot	scavenged
08/29/2023	eastern red bat	30	307	carcass search	70-m plot	scavenged
08/29/2023	eastern red bat	25	308	carcass search	70-m plot	scavenged
08/29/2023	eastern red bat	26	308	carcass search	70-m plot	scavenged
08/29/2023	eastern red bat	50	315	carcass search	70-m plot	scavenged
08/29/2023	eastern red bat	20	315	carcass search	70-m plot	scavenged
08/29/2023	eastern red bat	41	315	carcass search	70-m plot	scavenged
08/29/2023	eastern red bat	49	326	carcass search	70-m plot	scavenged
08/29/2023	eastern red bat	20	326	carcass search	70-m plot	scavenged
08/29/2023	eastern red bat	13	326	carcass search	70-m plot	scavenged
08/29/2023	eastern red bat	50	326	carcass search	70-m plot	scavenged
08/29/2023	eastern red bat	14	350	carcass search	70-m plot	scavenged
08/29/2023	silver-haired bat	50	241	carcass search	70-m plot	dismembered
08/29/2023	silver-haired bat	51	307	carcass search	70-m plot	scavenged
08/31/2023	big brown bat	32	547	carcass search	70-m plot	scavenged
08/31/2023	eastern red bat	65	219	carcass search	70-m plot	scavenged
08/31/2023	eastern red bat	34	27	carcass search	70-m plot	scavenged
08/31/2023	eastern red bat	16	28	carcass search	70-m plot	scavenged
08/31/2023	eastern red bat	68	402	carcass search	70-m plot	scavenged
08/31/2023	eastern red bat	37	402	carcass search	70-m plot	scavenged
08/31/2023	eastern red bat	43	436	carcass search	70-m plot	scavenged
08/31/2023	eastern red bat	66	438	carcass search	70-m plot	scavenged
08/31/2023	eastern red bat	15	438	carcass search	70-m plot	scavenged
08/31/2023	eastern red bat	42	547	carcass search	70-m plot	scavenged
08/31/2023	evening bat	46	402	carcass search	70-m plot	dismembered
08/31/2023	hoary bat	31	402	carcass search	70-m plot	scavenged
08/31/2023	silver-haired bat	31	219	carcass search	70-m plot	scavenged
08/31/2023	silver-haired bat	37	219	carcass search	70-m plot	intact
08/31/2023	silver-haired bat	22	435	carcass search	70-m plot	intact
08/31/2023	silver-haired bat	18	436	carcass search	70-m plot	scavenged
08/31/2023	silver-haired bat	14	49	carcass search	70-m plot	intact

Appendix A1. Carcasses found at the Meadow Lake Wind Resource Area in Benton and White counties, Indiana, from April 1 – May 15 and August 1 – October 15, 2023.

Found Date	Common Name	Distance from Turbine (m)	Turbine	Search Type	Plot Type	Physical Condition
08/31/2023	silver-haired bat	23	622	carcass search	100-m road and pad	scavenged
09/01/2023	eastern red bat	48	430	carcass search	70-m plot	scavenged
09/01/2023	eastern red bat	22	430	carcass search	70-m plot	scavenged
09/01/2023	eastern red bat	24	59	carcass search	70-m plot	scavenged
09/01/2023	eastern red bat	36	59	carcass search	70-m plot	scavenged
09/01/2023	eastern red bat	46	66	carcass search	70-m plot	scavenged
09/01/2023	eastern red bat	30	66	carcass search	70-m plot	scavenged
09/01/2023	eastern red bat	28	66	carcass search	70-m plot	scavenged
09/01/2023	eastern red bat	22	73	carcass search	70-m plot	scavenged
09/01/2023	eastern red bat	17	78	carcass search	70-m plot	scavenged
09/01/2023	eastern red bat or Seminole bat	22	94	carcass search	70-m plot	dismembered
09/01/2023	hoary bat	36	66	carcass search	70-m plot	scavenged
09/01/2023	silver-haired bat	16	84	carcass search	70-m plot	scavenged
09/01/2023	unidentified lasiurus bat	63	111	carcass search	70-m plot	dismembered
09/04/2023	big brown bat	33	514	carcass search	70-m plot	scavenged
09/04/2023	eastern red bat	24	35	carcass search	100-m road and pad	intact
09/04/2023	eastern red bat	42	515	carcass search	70-m plot	scavenged
09/04/2023	eastern red bat	54	515	carcass search	70-m plot	scavenged
09/04/2023	eastern red bat	57	515	carcass search	70-m plot	dismembered
09/04/2023	eastern red bat	67	515	carcass search	70-m plot	scavenged
09/04/2023	eastern red bat	42	520	carcass search	70-m plot	scavenged
09/04/2023	eastern red bat	52	538	carcass search	70-m plot	scavenged
09/04/2023	eastern red bat	50	604	carcass search	70-m plot	scavenged
09/04/2023	eastern red bat	52	604	carcass search	70-m plot	scavenged
09/04/2023	eastern red bat	47	604	carcass search	70-m plot	scavenged
09/04/2023	eastern red bat	65	604	carcass search	70-m plot	scavenged
09/04/2023	eastern red bat	34	624	carcass search	70-m plot	scavenged
09/04/2023	eastern red bat	39	627	carcass search	70-m plot	scavenged
09/04/2023	eastern red bat	42	660	carcass search	70-m plot	scavenged
09/04/2023	eastern red bat	54	661	carcass search	70-m plot	scavenged
09/04/2023	silver-haired bat	4	515	carcass search	70-m plot	scavenged
09/04/2023	silver-haired bat	28	604	carcass search	70-m plot	scavenged
09/04/2023	silver-haired bat	28	604	carcass search	70-m plot	scavenged
09/04/2023	silver-haired bat	21	604	carcass search	70-m plot	intact
09/04/2023	silver-haired bat	15	606	carcass search	70-m plot	dismembered
09/04/2023	silver-haired bat	5	619	carcass search	70-m plot	intact

Appendix A1. Carcasses found at the Meadow Lake Wind Resource Area in Benton and White counties, Indiana, from April 1 – May 15 and August 1 – October 15, 2023.

Found Date	Common Name	Distance from Turbine (m)	Turbine	Search Type	Plot Type	Physical Condition
09/04/2023	silver-haired bat	53	624	carcass search	70-m plot	scavenged
09/04/2023	silver-haired bat	30	624	carcass search	70-m plot	scavenged
09/04/2023	silver-haired bat	25	624	carcass search	70-m plot	scavenged
09/04/2023	silver-haired bat	16	660	carcass search	70-m plot	scavenged
09/04/2023	silver-haired bat	41	660	carcass search	70-m plot	intact
09/04/2023	unidentified lasiurus bat	53	661	carcass search	70-m plot	dismembered
09/05/2023	big brown bat	54	251	carcass search	70-m plot	scavenged
09/05/2023	eastern red bat	13	241	carcass search	70-m plot	scavenged
09/05/2023	eastern red bat	30	251	carcass search	70-m plot	scavenged
09/05/2023	eastern red bat	43	308	carcass search	70-m plot	scavenged
09/05/2023	eastern red bat	50	505	carcass search	70-m plot	scavenged
09/05/2023	hoary bat	19	215	carcass search	70-m plot	scavenged
09/05/2023	hoary bat	43	326	carcass search	70-m plot	scavenged
09/05/2023	silver-haired bat	17	215	carcass search	70-m plot	scavenged
09/05/2023	silver-haired bat	30	251	carcass search	70-m plot	scavenged
09/05/2023	silver-haired bat	35	302	carcass search	70-m plot	dismembered
09/05/2023	silver-haired bat	16	302	carcass search	70-m plot	scavenged
09/05/2023	silver-haired bat	25	302	carcass search	70-m plot	scavenged
09/05/2023	silver-haired bat	48	302	carcass search	70-m plot	scavenged
09/05/2023	silver-haired bat	45	308	carcass search	70-m plot	scavenged
09/05/2023	silver-haired bat	40	326	carcass search	70-m plot	scavenged
09/06/2023	eastern red bat	23	266	carcass search	70-m plot	scavenged
09/06/2023	eastern red bat	51	266	carcass search	70-m plot	scavenged
09/06/2023	eastern red bat	16	266	carcass search	70-m plot	scavenged
09/06/2023	eastern red bat	41	328	carcass search	70-m plot	scavenged
09/06/2023	hoary bat	40	315	carcass search	70-m plot	scavenged
09/06/2023	silver-haired bat	52	266	carcass search	70-m plot	scavenged
09/06/2023	silver-haired bat	64	266	carcass search	70-m plot	scavenged
09/06/2023	silver-haired bat	28	266	carcass search	70-m plot	scavenged
09/06/2023	silver-haired bat	31	315	carcass search	70-m plot	scavenged
09/06/2023	silver-haired bat	39	315	carcass search	70-m plot	scavenged
09/06/2023	silver-haired bat	41	315	carcass search	70-m plot	scavenged
09/07/2023	big brown bat	46	536	carcass search	70-m plot	dismembered
09/07/2023	eastern red bat	8	208	carcass search	70-m plot	scavenged
09/07/2023	eastern red bat	25	219	carcass search	70-m plot	scavenged
09/07/2023	eastern red bat	33	219	carcass search	70-m plot	scavenged

Appendix A1. Carcasses found at the Meadow Lake Wind Resource Area in Benton and White counties, Indiana, from April 1 – May 15 and August 1 – October 15, 2023.

Found Date	Common Name	Distance from Turbine (m)	Turbine	Search Type	Plot Type	Physical Condition
09/07/2023	eastern red bat	28	219	carcass search	70-m plot	scavenged
09/07/2023	eastern red bat	48	27	carcass search	70-m plot	scavenged
09/07/2023	eastern red bat	5	28	carcass search	70-m plot	scavenged
09/07/2023	eastern red bat	38	339	carcass search	100-m road and pad	intact
09/07/2023	eastern red bat	14	547	carcass search	70-m plot	scavenged
09/07/2023	eastern red bat	45	547	carcass search	70-m plot	scavenged
09/07/2023	eastern red bat	27	638	carcass search	100-m road and pad	scavenged
09/07/2023	hoary bat	0	218	carcass search	70-m plot	scavenged
09/07/2023	hoary bat	26	436	carcass search	70-m plot	scavenged
09/07/2023	silver-haired bat	10	208	carcass search	70-m plot	dismembered
09/07/2023	silver-haired bat	18	219	incidental	70-m plot	scavenged
09/07/2023	silver-haired bat	37	27	carcass search	70-m plot	scavenged
09/07/2023	silver-haired bat	10	28	carcass search	70-m plot	scavenged
09/07/2023	silver-haired bat	23	416	carcass search	70-m plot	scavenged
09/07/2023	silver-haired bat	41	536	carcass search	70-m plot	scavenged
09/07/2023	silver-haired bat	40	629	carcass search	100-m road and pad	scavenged
09/07/2023	tricolored bat	16	536	carcass search	70-m plot	scavenged
09/08/2023	eastern red bat	42	111	carcass search	70-m plot	scavenged
09/08/2023	eastern red bat	32	73	carcass search	70-m plot	scavenged
09/08/2023	eastern red bat	55	73	carcass search	70-m plot	dismembered
09/08/2023	eastern red bat	50	84	carcass search	70-m plot	scavenged
09/08/2023	eastern red bat	28	90	carcass search	70-m plot	scavenged
09/08/2023	eastern red bat	24	91	carcass search	70-m plot	intact
09/11/2023	big brown bat	20	619	carcass search	70-m plot	scavenged
09/11/2023	eastern red bat	11	535	carcass search	100-m road and pad	scavenged
09/11/2023	eastern red bat	40	604	carcass search	70-m plot	dismembered
09/11/2023	eastern red bat	39	604	carcass search	70-m plot	scavenged
09/11/2023	eastern red bat	7	619	carcass search	70-m plot	scavenged
09/11/2023	eastern red bat	39	62	carcass search	100-m road and pad	scavenged
09/11/2023	eastern red bat	25	624	carcass search	70-m plot	scavenged
09/11/2023	eastern red bat	68	624	carcass search	70-m plot	scavenged
09/11/2023	eastern red bat	69	624	carcass search	70-m plot	scavenged
09/11/2023	hoary bat	32	538	carcass search	70-m plot	scavenged
09/11/2023	hoary bat	14	613	carcass search	70-m plot	intact
09/11/2023	silver-haired bat	28	505	carcass search	70-m plot	dismembered
09/11/2023	silver-haired bat	23	515	carcass search	70-m plot	scavenged

Appendix A1. Carcasses found at the Meadow Lake Wind Resource Area in Benton and White counties, Indiana, from April 1 – May 15 and August 1 – October 15, 2023.

Found Date	Common Name	Distance from Turbine (m)	Turbine	Search Type	Plot Type	Physical Condition
09/11/2023	silver-haired bat	43	530	carcass search	70-m plot	scavenged
09/11/2023	silver-haired bat	38	604	carcass search	70-m plot	scavenged
09/11/2023	silver-haired bat	33	606	carcass search	70-m plot	scavenged
09/11/2023	silver-haired bat	44	606	carcass search	70-m plot	scavenged
09/11/2023	silver-haired bat	31	619	carcass search	70-m plot	intact
09/11/2023	silver-haired bat	56	619	carcass search	70-m plot	scavenged
09/11/2023	silver-haired bat	27	624	carcass search	70-m plot	intact
09/11/2023	silver-haired bat	17	624	carcass search	70-m plot	scavenged
09/11/2023	silver-haired bat	40	660	carcass search	70-m plot	scavenged
09/11/2023	silver-haired bat	40	660	carcass search	70-m plot	scavenged
09/11/2023	silver-haired bat	47	660	carcass search	70-m plot	scavenged
09/11/2023	silver-haired bat	2	661	carcass search	70-m plot	intact
09/11/2023	unidentified lasiurus bat	23	624	carcass search	70-m plot	scavenged
09/12/2023	big brown bat	42	302	carcass search	70-m plot	scavenged
09/12/2023	eastern red bat	47	251	carcass search	70-m plot	scavenged
09/12/2023	eastern red bat	54	326	carcass search	70-m plot	scavenged
09/12/2023	eastern red bat	51	326	carcass search	70-m plot	scavenged
09/12/2023	eastern red bat or Seminole bat	28	251	carcass search	70-m plot	scavenged
09/12/2023	hoary bat	37	266	carcass search	70-m plot	scavenged
09/12/2023	silver-haired bat	36	251	carcass search	70-m plot	scavenged
09/12/2023	silver-haired bat	33	350	carcass search	70-m plot	intact
09/14/2023	eastern red bat	27	218	carcass search	70-m plot	scavenged
09/14/2023	eastern red bat	23	347	incidental**	n/a	intact
09/14/2023	eastern red bat	35	402	carcass search	70-m plot	scavenged
09/14/2023	eastern red bat	25	435	carcass search	70-m plot	scavenged
09/14/2023	eastern red bat	69	438	carcass search	70-m plot	scavenged
09/14/2023	eastern red bat	42	48	carcass search	70-m plot	scavenged
09/14/2023	hoary bat	43	29	carcass search	70-m plot	scavenged
09/14/2023	hoary bat	19	438	carcass search	70-m plot	scavenged
09/14/2023	silver-haired bat	22	438	carcass search	70-m plot	scavenged
09/15/2023	big brown bat	31	208	carcass search	70-m plot	scavenged
09/15/2023	eastern red bat	21	208	carcass search	70-m plot	scavenged
09/15/2023	eastern red bat	42	59	carcass search	70-m plot	scavenged
09/15/2023	eastern red bat	53	66	carcass search	70-m plot	scavenged
09/15/2023	eastern red bat	13	84	carcass search	70-m plot	scavenged
09/15/2023	eastern red bat	26	84	carcass search	70-m plot	scavenged

Appendix A1. Carcasses found at the Meadow Lake Wind Resource Area in Benton and White counties, Indiana, from April 1 – May 15 and August 1 – October 15, 2023.

Found Date	Common Name	Distance from Turbine (m)	Turbine	Search Type	Plot Type	Physical Condition
09/15/2023	hoary bat	44	91	carcass search	70-m plot	scavenged
09/15/2023	silver-haired bat	17	208	carcass search	70-m plot	scavenged
09/15/2023	silver-haired bat	43	76	carcass search	70-m plot	scavenged
09/15/2023	silver-haired bat	11	91	carcass search	70-m plot	scavenged
09/18/2023	big brown bat	42	520	carcass search	70-m plot	scavenged
09/18/2023	eastern red bat	30	514	carcass search	70-m plot	scavenged
09/18/2023	hoary bat	42	520	carcass search	70-m plot	scavenged
09/18/2023	silver-haired bat	33	515	carcass search	70-m plot	scavenged
09/18/2023	silver-haired bat	29	515	carcass search	70-m plot	intact
09/18/2023	silver-haired bat	39	520	carcass search	70-m plot	scavenged
09/18/2023	silver-haired bat	25	538	carcass search	70-m plot	scavenged
09/18/2023	silver-haired bat	37	604	carcass search	70-m plot	intact
09/18/2023	silver-haired bat	17	606	carcass search	70-m plot	scavenged
09/18/2023	silver-haired bat	36	624	carcass search	70-m plot	scavenged
09/18/2023	unidentified lasiurus bat	12	538	carcass search	70-m plot	dismembered
09/19/2023	eastern red bat	44	215	carcass search	70-m plot	scavenged
09/19/2023	eastern red bat	42	251	carcass search	70-m plot	scavenged
09/19/2023	eastern red bat	51	251	carcass search	70-m plot	scavenged
09/19/2023	eastern red bat	63	316	carcass search	70-m plot	scavenged
09/19/2023	eastern red bat	56	326	carcass search	70-m plot	scavenged
09/19/2023	eastern red bat	24	326	carcass search	70-m plot	scavenged
09/19/2023	eastern red bat	34	350	carcass search	70-m plot	scavenged
09/19/2023	silver-haired bat	46	215	carcass search	70-m plot	scavenged
09/19/2023	silver-haired bat	37	251	carcass search	70-m plot	scavenged
09/19/2023	silver-haired bat	40	251	carcass search	70-m plot	scavenged
09/19/2023	silver-haired bat	16	251	carcass search	70-m plot	intact
09/19/2023	silver-haired bat	22	251	carcass search	70-m plot	scavenged
09/19/2023	silver-haired bat	69	328	carcass search	70-m plot	scavenged
09/21/2023	eastern red bat	18	27	carcass search	70-m plot	scavenged
09/21/2023	eastern red bat	55	435	carcass search	70-m plot	scavenged
09/21/2023	eastern red bat	38	90	carcass search	70-m plot	scavenged
09/21/2023	hoary bat	27	219	carcass search	70-m plot	scavenged
09/21/2023	silver-haired bat	44	29	carcass search	70-m plot	scavenged
09/22/2023	hoary bat	27	439	carcass search	100-m road and pad	scavenged
09/22/2023	hoary bat	36	78	carcass search	70-m plot	scavenged
09/22/2023	silver-haired bat	26	651	carcass search	100-m road and pad	scavenged

Appendix A1. Carcasses found at the Meadow Lake Wind Resource Area in Benton and White counties, Indiana, from April 1 – May 15 and August 1 – October 15, 2023.

Found Date	Common Name	Distance from Turbine (m)	Turbine	Search Type	Plot Type	Physical Condition
09/25/2023	eastern red bat	19	520	carcass search	70-m plot	scavenged
09/25/2023	eastern red bat	17	606	carcass search	70-m plot	intact
09/25/2023	eastern red bat	11	606	carcass search	70-m plot	scavenged
09/25/2023	silver-haired bat	49	520	carcass search	70-m plot	scavenged
09/26/2023	eastern red bat	26	302	carcass search	70-m plot	scavenged
09/26/2023	eastern red bat	20	315	carcass search	70-m plot	scavenged
09/26/2023	eastern red bat	37	350	carcass search	70-m plot	scavenged
09/26/2023	hoary bat	64	303	carcass search	70-m plot	scavenged
09/26/2023	hoary bat	44	303	carcass search	70-m plot	scavenged
09/28/2023	eastern red bat	63	28	carcass search	70-m plot	scavenged
09/28/2023	eastern red bat	28	29	carcass search	70-m plot	intact
09/28/2023	eastern red bat	41	436	carcass search	70-m plot	scavenged
09/28/2023	hoary bat	51	416	carcass search	70-m plot	scavenged
09/29/2023	eastern red bat	12	430	carcass search	70-m plot	scavenged
09/29/2023	eastern red bat	28	59	carcass search	70-m plot	scavenged
09/29/2023	hoary bat	56	430	carcass search	70-m plot	scavenged
10/02/2023	big brown bat	59	520	carcass search	70-m plot	scavenged
10/02/2023	big brown bat	26	530	carcass search	70-m plot	scavenged
10/02/2023	eastern red bat	11	514	carcass search	70-m plot	scavenged
10/02/2023	eastern red bat	77	530	carcass search**	70-m plot	intact
10/02/2023	silver-haired bat	14	660	carcass search	70-m plot	scavenged
10/03/2023	eastern red bat	37	350	carcass search	70-m plot	scavenged
10/03/2023	silver-haired bat	37	316	carcass search	70-m plot	scavenged
10/05/2023	eastern red bat	34	218	carcass search	70-m plot	scavenged
10/05/2023	eastern red bat	19	435	carcass search	70-m plot	scavenged
10/05/2023	eastern red bat	59	536	carcass search	70-m plot	scavenged
10/05/2023	eastern red bat	45	547	carcass search	70-m plot	scavenged
10/06/2023	eastern red bat	37	84	carcass search	70-m plot	scavenged
10/06/2023	eastern red bat	26	90	carcass search	70-m plot	scavenged
10/06/2023	evening bat	18	78	carcass search	70-m plot	scavenged
10/06/2023	silver-haired bat	30	84	carcass search	70-m plot	intact
10/06/2023	silver-haired bat	35	90	carcass search	70-m plot	intact
10/06/2023	silver-haired bat	68	94	carcass search	70-m plot	intact
10/09/2023	eastern red bat	4	626	incidental**	n/a	scavenged
10/09/2023	eastern red bat	61	627	carcass search	70-m plot	intact
10/09/2023	eastern red bat	45	661	carcass search	70-m plot	scavenged

Appendix A1. Carcasses found at the Meadow Lake Wind Resource Area in Benton and White counties, Indiana, from April 1 – May 15 and August 1 – October 15, 2023.

Found Date	Common Name	Distance from Turbine (m)	Turbine	Search Type	Plot Type	Physical Condition
10/09/2023	silver-haired bat	63	515	carcass search	70-m plot	dismembered
10/09/2023	silver-haired bat	69	627	carcass search	70-m plot	scavenged
10/09/2023	silver-haired bat	23	661	carcass search	70-m plot	scavenged
10/10/2023	big brown bat	48	328	carcass search	70-m plot	scavenged
10/10/2023	eastern red bat	32	308	carcass search	70-m plot	scavenged
10/10/2023	eastern red bat	48	328	carcass search	70-m plot	scavenged
10/11/2023	eastern red bat	20	49	carcass search	70-m plot	scavenged
10/11/2023	eastern red bat	48	536	carcass search	70-m plot	scavenged
10/11/2023	silver-haired bat	39	416	carcass search	70-m plot	scavenged
10/11/2023	silver-haired bat	56	416	carcass search	70-m plot	scavenged
10/11/2023	silver-haired bat	42	430	carcass search	70-m plot	scavenged
10/11/2023	silver-haired bat	75	436	carcass search**	70-m plot	scavenged
10/11/2023	silver-haired bat	41	436	carcass search	70-m plot	scavenged
10/11/2023	silver-haired bat	50	536	carcass search	70-m plot	scavenged
10/11/2023	silver-haired bat	50	536	carcass search	70-m plot	scavenged
10/12/2023	silver-haired bat	36	347	incidental**	n/a	intact
10/13/2023	silver-haired bat	45	94	carcass search	70-m plot	scavenged
Bird Carcasses						
05/11/2023	mallard	1	89	carcass search	100-m road and pad	scavenged
07/31/2023	red-winged blackbird	51	81	incidental	70-m plot	scavenged
08/01/2023	killdeer	31	436	carcass search	70-m plot	scavenged
08/01/2023	mourning dove	15	632	carcass search	100-m road and pad	scavenged
08/01/2023	vesper sparrow	1	530	carcass search	70-m plot	intact
08/02/2023	mourning dove	52	59	carcass search	70-m plot	dismembered
08/07/2023	common grackle	47	514	carcass search	70-m plot	scavenged
08/10/2023	killdeer	33	436	carcass search	70-m plot	scavenged
08/11/2023	killdeer	0	430	carcass search	70-m plot	scavenged
08/15/2023	horned lark	45	251	incidental	70-m plot	scavenged
08/15/2023	horned lark	47	350	carcass search	70-m plot	scavenged
08/15/2023	horned lark	0	530	carcass search	70-m plot	dismembered
08/17/2023	killdeer	51	101	carcass search	100-m road and pad	feather spot
08/17/2023	killdeer	68	547	carcass search	70-m plot	scavenged
08/18/2023	horned lark	61	111	carcass search	70-m plot	feather spot
08/18/2023	horned lark	55	81	incidental	70-m plot	scavenged
08/18/2023	killdeer	44	111	carcass search	70-m plot	feather spot
08/18/2023	killdeer	2	430	carcass search	70-m plot	scavenged

Appendix A1. Carcasses found at the Meadow Lake Wind Resource Area in Benton and White counties, Indiana, from April 1 – May 15 and August 1 – October 15, 2023.

Found Date	Common Name	Distance from Turbine (m)	Turbine	Search Type	Plot Type	Physical Condition
08/18/2023	red-winged blackbird	5	78	carcass search	70-m plot	scavenged
08/18/2023	rock pigeon	40	111	carcass search	70-m plot	scavenged
08/18/2023	unidentified passerine	7	81	carcass search	70-m plot	scavenged
08/21/2023	house sparrow	42	624	carcass search	70-m plot	scavenged
08/22/2023	horned lark	35	315	carcass search	70-m plot	intact
08/22/2023	horned lark	13	315	carcass search	70-m plot	scavenged
08/22/2023	horned lark	72	350	carcass search**	70-m plot	scavenged
08/25/2023	pine warbler	6	430	carcass search	70-m plot	dismembered
08/26/2023	horned lark	1	111	carcass search	70-m plot	scavenged
08/26/2023	horned lark	50	111	carcass search	70-m plot	scavenged
08/28/2023	Tennessee warbler	67	514	carcass search	70-m plot	scavenged
08/28/2023	horned lark	34	660	carcass search	70-m plot	scavenged
08/28/2023	indigo bunting	0	544	carcass search	100-m road and pad	scavenged
08/28/2023	killdeer	52	660	carcass search	70-m plot	scavenged
08/28/2023	killdeer	57	660	carcass search	70-m plot	scavenged
08/28/2023	unidentified passerine	47	604	carcass search	70-m plot	scavenged
08/29/2023	horned lark	47	266	carcass search	70-m plot	feather spot
08/31/2023	Blackburnian warbler	43	402	carcass search	70-m plot	scavenged
09/01/2023	chestnut-sided warbler	3	430	carcass search	70-m plot	scavenged
09/01/2023	horned lark	25	78	carcass search	70-m plot	scavenged
09/01/2023	rock pigeon	19	111	carcass search	70-m plot	feather spot
09/01/2023	rock pigeon	43	84	carcass search	70-m plot	scavenged
09/01/2023	unidentified swallow	34	84	carcass search	70-m plot	dismembered
09/04/2023	Tennessee warbler	72	538	carcass search**	70-m plot	scavenged
09/04/2023	killdeer	46	515	carcass search	70-m plot	feather spot
09/05/2023	killdeer	65	326	carcass search	70-m plot	feather spot
09/06/2023	killdeer	45	266	carcass search	70-m plot	scavenged
09/07/2023	horned lark	1	402	carcass search	70-m plot	scavenged
09/07/2023	mourning dove	68	547	carcass search	70-m plot	feather spot
09/08/2023	unidentified warbler	49	430	carcass search	70-m plot	dismembered
09/11/2023	Tennessee warbler	65	661	carcass search	70-m plot	scavenged
09/11/2023	horned lark	21	660	carcass search	70-m plot	scavenged
09/11/2023	killdeer	56	624	carcass search	70-m plot	scavenged
09/11/2023	magnolia warbler	43	606	carcass search	70-m plot	scavenged
09/11/2023	unidentified passerine	7	660	carcass search	70-m plot	scavenged
09/11/2023	unidentified warbler	70	624	carcass search	70-m plot	scavenged

Appendix A1. Carcasses found at the Meadow Lake Wind Resource Area in Benton and White counties, Indiana, from April 1 – May 15 and August 1 – October 15, 2023.

Found Date	Common Name	Distance from Turbine (m)	Turbine	Search Type	Plot Type	Physical Condition
09/11/2023	unidentified warbler	49	661	carcass search	70-m plot	scavenged
09/14/2023	unidentified small bird	65	219	carcass search	70-m plot	feather spot
09/14/2023	unidentified vireo	34	536	carcass search	70-m plot	scavenged
09/15/2023	horned lark	6	208	carcass search	70-m plot	scavenged
09/15/2023	ovenbird	31	430	carcass search	70-m plot	scavenged
09/18/2023	killdeer	54	624	carcass search	70-m plot	dismembered
09/18/2023	ruby-crowned kinglet	55	544	carcass search	100-m road and pad	intact
09/18/2023	unidentified small bird	62	514	incidental	70-m plot	scavenged
09/18/2023	unidentified small bird	34	515	carcass search	70-m plot	scavenged
09/18/2023	unidentified small bird	46	604	carcass search	70-m plot	scavenged
09/18/2023	unidentified warbler	50	624	carcass search	70-m plot	scavenged
09/19/2023	horned lark	18	315	carcass search	70-m plot	scavenged
09/19/2023	killdeer	33	328	carcass search	70-m plot	scavenged
09/19/2023	unidentified small bird	14	315	carcass search	70-m plot	scavenged
09/22/2023	horned lark	6	59	carcass search	70-m plot	dismembered
09/22/2023	killdeer	47	81	carcass search	70-m plot	scavenged
09/22/2023	red-eyed vireo	37	431	carcass search	100-m road and pad	scavenged
09/22/2023	unidentified small bird	55	430	carcass search	70-m plot	dismembered
09/25/2023	chimney swift	29	619	carcass search	70-m plot	scavenged
09/25/2023	horned lark	68	308	carcass search	70-m plot	feather spot
09/25/2023	killdeer	21	209	carcass search	100-m road and pad	scavenged
09/25/2023	killdeer	43	619	carcass search	70-m plot	feather spot
09/25/2023	orange-crowned warbler	35	62	carcass search	100-m road and pad	scavenged
09/25/2023	unidentified flycatcher	31	660	carcass search	70-m plot	scavenged
09/25/2023	unidentified small bird	69	624	carcass search	70-m plot	feather spot
09/28/2023	unidentified small bird	58	544	carcass search	100-m road and pad	scavenged
09/28/2023	unidentified warbler	1	653	carcass search	100-m road and pad	scavenged
09/29/2023	unidentified wren	54	430	carcass search	70-m plot	scavenged
10/02/2023	European starling	25	661	carcass search	70-m plot	dismembered
10/02/2023	magnolia warbler	32	514	carcass search	70-m plot	scavenged
10/02/2023	magnolia warbler	10	624	carcass search	70-m plot	dismembered
10/02/2023	unidentified passerine	18	661	carcass search	70-m plot	dismembered
10/02/2023	unidentified passerine	15	661	carcass search	70-m plot	dismembered
10/02/2023	unidentified warbler	31	627	carcass search	70-m plot	dismembered
10/03/2023	unidentified passerine	21	215	carcass search	70-m plot	feather spot
10/06/2023	northern flicker	68	91	carcass search	70-m plot	scavenged

Appendix A1. Carcasses found at the Meadow Lake Wind Resource Area in Benton and White counties, Indiana, from April 1 – May 15 and August 1 – October 15, 2023.

Found Date	Common Name	Distance from Turbine (m)	Turbine	Search Type	Plot Type	Physical Condition
10/09/2023	American redstart	40	538	carcass search	70-m plot	dismembered
10/09/2023	ruby-crowned kinglet	72	606	carcass search**	70-m plot	scavenged
10/09/2023	unidentified swallow	60	627	carcass search	70-m plot	scavenged
10/10/2023	red-tailed hawk	66	328	carcass search	70-m plot	dismembered
10/10/2023	ruby-crowned kinglet	55	350	carcass search	70-m plot	scavenged
10/10/2023	unidentified passerine	62	619	carcass search	70-m plot	scavenged
10/11/2023	golden-crowned kinglet	57	402	carcass search	70-m plot	scavenged
10/11/2023	marsh wren	61	219	carcass search	70-m plot	scavenged
10/11/2023	northern parula	47	435	carcass search	70-m plot	intact
10/11/2023	unidentified passerine	76	435	carcass search**	70-m plot	feather spot

** Carcass was found outside the search area.

Appendix A2. Summary of searches and bat fatalities recorded by season and search area type at the Meadow Lake Wind Resource Area in Benton and White counties, Indiana, from April 1–May 15 and August 1–October 15, 2023.

Season	Search Area Type*	Number of Searched Turbines	Number of Searches	Number of Bats Recorded
Spring	100-m road and pad	111	647	7
Fall	70-m cleared plot	28	298	276
Fall	70-m uncleared plot	28	304	141
Fall	100-m road and pad	55	570	28
Overall		**111**	**1,819**	**452**

* All 70-meter (m) plots were searched by detection-dog teams, and road and pads were searched by technicians.

Appendix B. Searcher Efficiency and Carcass Persistence Model Fitting Results

Appendix B1. Number of searcher efficiency trials placed and found by season and plot type at the Meadow Lake Wind Resource Area in Benton and White counties, Indiana, from April 1 – May 15, and August 1 – October 15, 2023.

Season	Search Area Type	# Placed	# Available	# Found	% Found
Spring	100-m road and pad	31	26	26	100
Fall	100-m road and pad	28	25	24	96.00
Fall	70-m cleared plot	38	31	19	98.04
Fall	70-m uncleared plot	31	28	22	78.57

Appendix B2. Searcher efficiency models for 70-meter plots at the Meadow Lake Wind Resource Area in Benton and White counties, Indiana, from April 1 – May 15 and August 1 – October 15, 2023.

Covariates	k Value	AICc	Delta AICc
No covariates	0.67	74.65	0*
Plot Type	0.67	74.69	0.04

* Selected model.

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

Appendix B3. Searcher efficiency models for 100-meter roads and pads at the Meadow Lake Wind Resource Area in Benton and White counties, Indiana, from April 1 – May 15 and August 1 – October 15, 2023.

Covariates	k Value	AICc	Delta AICc
No covariates	0.67	11.93	0*
Season	0.67	13.66	1.73

* Selected model.

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

Appendix B4. Number of carcass persistence trials placed by season and plot type at the Meadow Lake Wind Resource Area in Benton and White counties, Indiana, from April 1 – May 15 and August 1 – October 15, 2023.

Season	Search Area Type	Number of Carcasses Placed
Spring	100-m road and pad	15
Fall	100-m road and pad	17
Overall Road and Pads Trials		**32**
Fall	70-m cleared plot	19
Fall	70-m uncleared plot	15
Overall 70-m Plot Trials		**34**

m = meter.

Appendix B5. Carcass persistence models with covariates and distributions for bats at 70-meter cleared and uncleared plots at the Meadow Lake Wind Resource Area in Benton and White counties, Indiana, from April 1 – May 15 and August 1 – October 15, 2023.

Location Covariates	Scale Covariates	Distribution	AICc	Delta AICc
No Covariates	Plot Type	loglogistic	112.03	0
No Covariates	Plot Type	lognormal	112.04	0.01
No Covariates	Plot Type	Weibull	112.58	0.55
No Covariates	No Covariates	Weibull	113.89	1.86*
No Covariates	No Covariates	loglogistic	114.02	1.99
No Covariates	No Covariates	lognormal	114.07	2.04
Plot Type	Plot Type	loglogistic	114.61	2.58
Plot Type	Plot Type	lognormal	114.61	2.58
Plot Type	Plot Type	Weibull	114.78	2.75
Plot Type	No Covariates	lognormal	115.55	3.52
Plot Type	No Covariates	loglogistic	115.74	3.71
Plot Type	No Covariates	Weibull	116.09	4.06
No Covariates	–	exponential	128.99	16.96
Plot Type	–	exponential	131	18.97

* Selected model.

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

Appendix B6. Carcass persistence models with covariates and distributions for bats at 100-meter road and pads at the Meadow Lake Wind Resource Area, Benton and White counties, Indiana, from April 1 – May 15 and August 1 – October 15, 2023.

Location Covariates	Scale Covariates	Distribution	AICc	Delta AICc
No Covariates	No Covariates	lognormal	145.87	0
No Covariates	No Covariates	loglogistic	146.3	0.43
No Covariates	–	exponential	146.7	0.83*
No Covariates	No Covariates	Weibull	146.92	1.05
Season	No Covariates	lognormal	148.1	2.23
No Covariates	Season	lognormal	148.29	2.42
Season	No Covariates	loglogistic	148.57	2.7
No Covariates	Season	loglogistic	148.75	2.88
Season	–	exponential	148.78	2.91
Season	No Covariates	Weibull	149.16	3.29
No Covariates	Season	Weibull	149.3	3.43
Season	Season	lognormal	150.7	4.83
Season	Season	loglogistic	151.19	5.32
Season	Season	Weibull	151.76	5.89

* Selected model.

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

Appendix B7. Carcass persistence top model with covariates, distributions, and model parameters for the Meadow Lake Wind Resource Area, Benton and White counties, Indiana, from April 1 – May 15 and August 1 – October 15, 2023.

Plot Search Type	Distribution	Estimated Median Removal Times (days)	Parameter 1	Parameter 2
70-meter cleared and uncleared plots	Weibull[1]	37.66	shape = 0.3855	scale = 97.3196
100-m road and pads	exponential[1,2]	6.14	rate = 0.1129	–

[1] Parameterization follows the base R parameterization for this distribution.

[2] The exponential distribution does not have a scale parameter.

Appendix C. Truncated Weighted Likelihood (TWL) Search Area Adjustment Model Fitting Results

Appendix C1. Number and percent (%) of bat carcasses found and total included in the search area adjustment calculation for the Meadow Lake Wind Resource Area, Benton and White counties, Indiana, from April 1 – May 15 and August 1 – October 15, 2023.

	Included in Search Area Adjustment		Outside Search Area*		Outside Study Period*		Total	
Species	**Total**	**%**	**Total**	**%**	**Total**	**%**	**Total**	**%**
eastern red bat	273	60.4	6	66.67	13	56.52	292	60.3
silver-haired bat	105	23.23	2	22.22	0	0	107	22.1
hoary bat	39	8.63	0	0	5	21.74	44	9.1
big brown bat	20	4.42	1	11.11	4	17.39	25	5.2
evening bat	7	1.55	0	0	0	0	7	1.4
unidentified *Lasiurus* bat	4	0.88	0	0	1	4.35	5	1
eastern red bat or Seminole bat	3	0.66	0	0	0	0	3	0.6
tricolored bat	1	0.22	0	0	0	0	1	0.2
Total	**452**	**99**	**9**	**100**	**23**	**100**	**484**	**100**

* Carcasses not included in analysis.

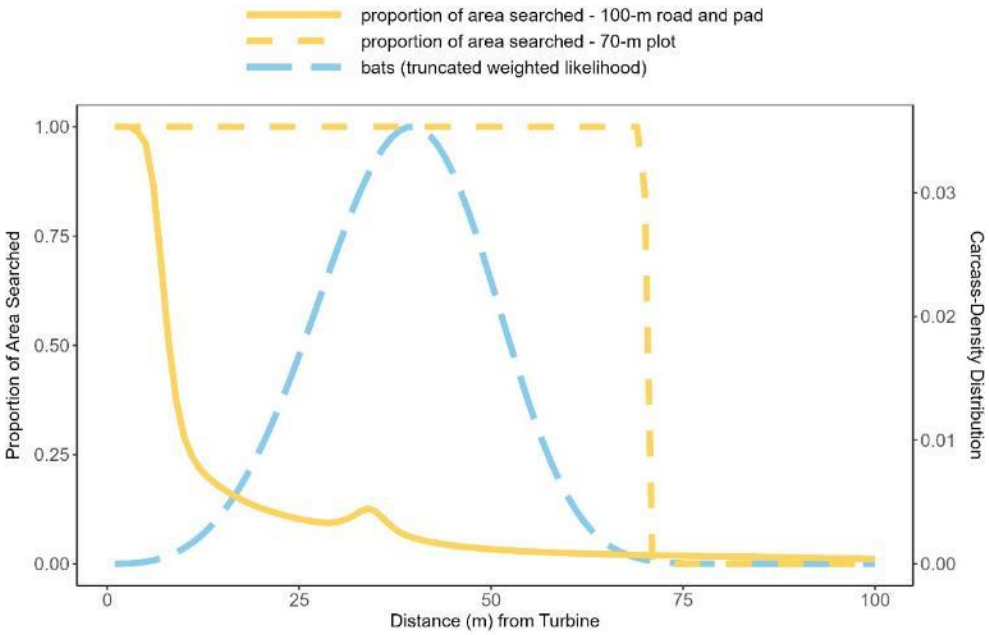
Appendix C2. Stratified search area adjustment models for bats from the Meadow Lake Wind Resource Area, Benton and White counties, Indiana, from April 1 – May 15 and August 1 – October 15, 2023.

GE 1.5 SLE 1.5-MW	Acciona AW-82 1.5-MW	Vestas V82 1.65-MW	Vestas V110 2.0-MW	Suzlon S88 2.1-MW	Vestas V136 3.6-MW	Pooled	AICc	DeltaAICc
Weibull	normal	normal	normal	Gompertz	normal	–	9,454.15	0*
normal	normal	normal	normal	Gompertz	normal	–	9,454.73	0.58
Weibull	normal	normal	Weibull	Gompertz	normal	–	9,455.13	0.97
normal	normal	normal	Weibull	Gompertz	normal	–	9,455.70	1.55
Weibull	Gompertz	normal	normal	Gompertz	normal	–	9,455.93	1.78
normal	Gompertz	normal	normal	Gompertz	normal	–	9,456.51	2.35
–	–	–	–	–	–	normal	9,568.11	113.96
–	–	–	–	–	–	Weibull	9,590.56	136.41
–	–	–	–	–	–	Gompertz	9,610.99	156.84
–	–	–	–	–	–	gamma	9,762.01	307.85

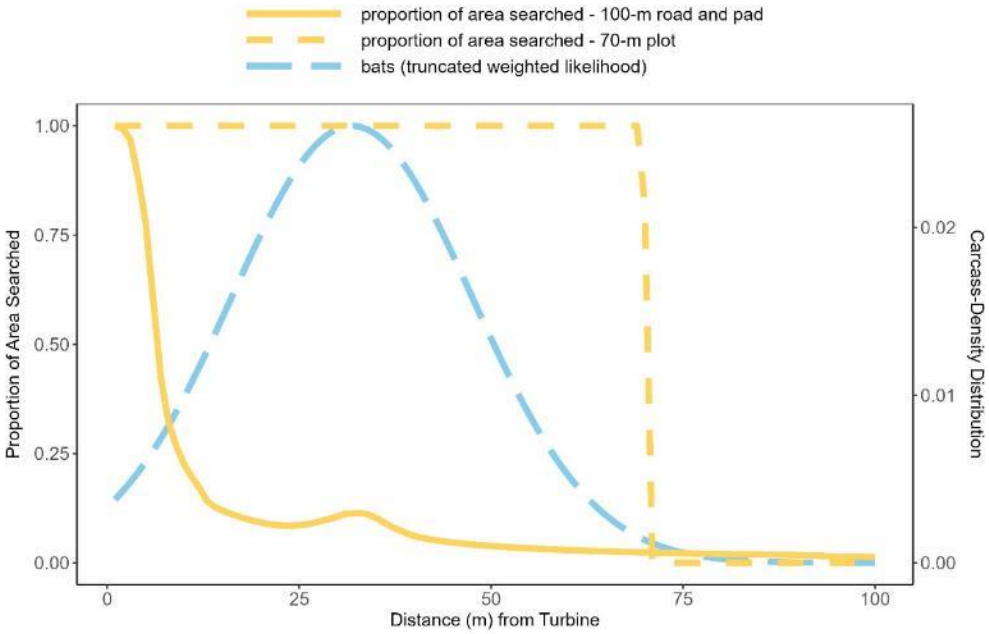
* Selected model.

AICc = corrected Akaike Information Criterion; Delta AICc = change in AICc; MW = megawatt.

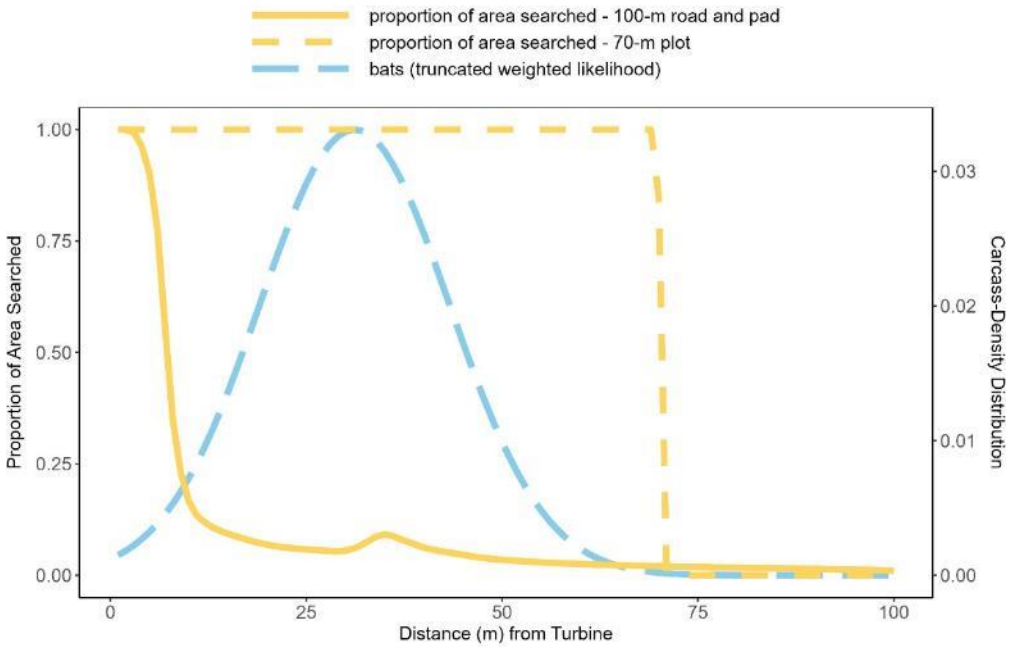
Note: Model output is clipped to display the top ten selected models.



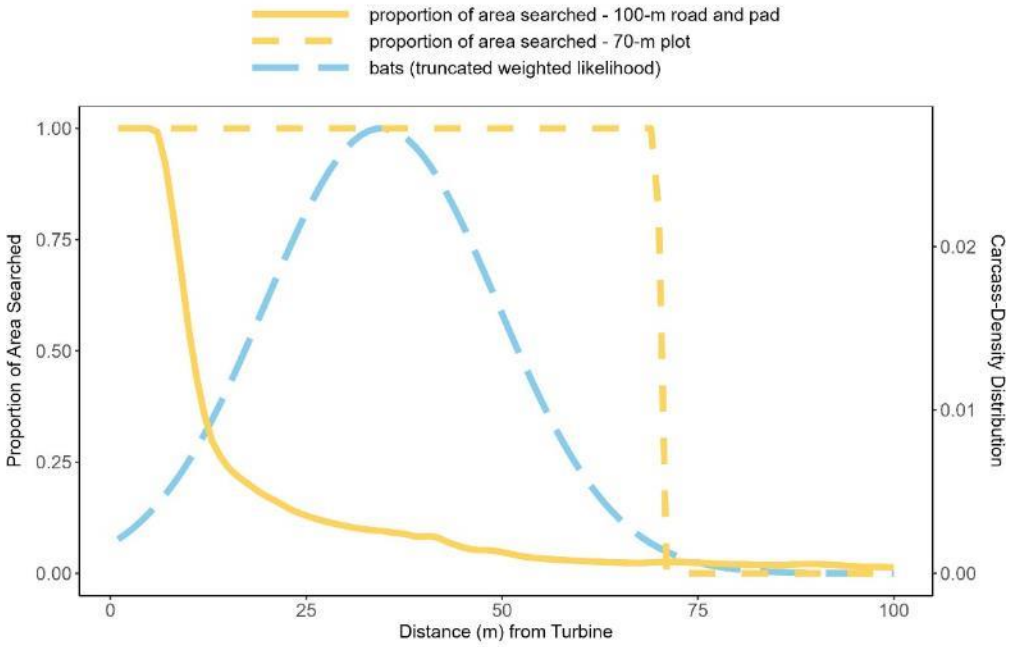
Appendix C3. Density of bat carcasses per area searched at 100-meter (m) road and pads, and 70-m cleared and uncleared plots at GE 1.5 SLE 1.5-megawatt turbines at the Meadow Lake Wind Resource Area, Benton and White counties, Indiana, from April 1 – May 15 and August 1 – October 15, 2023.



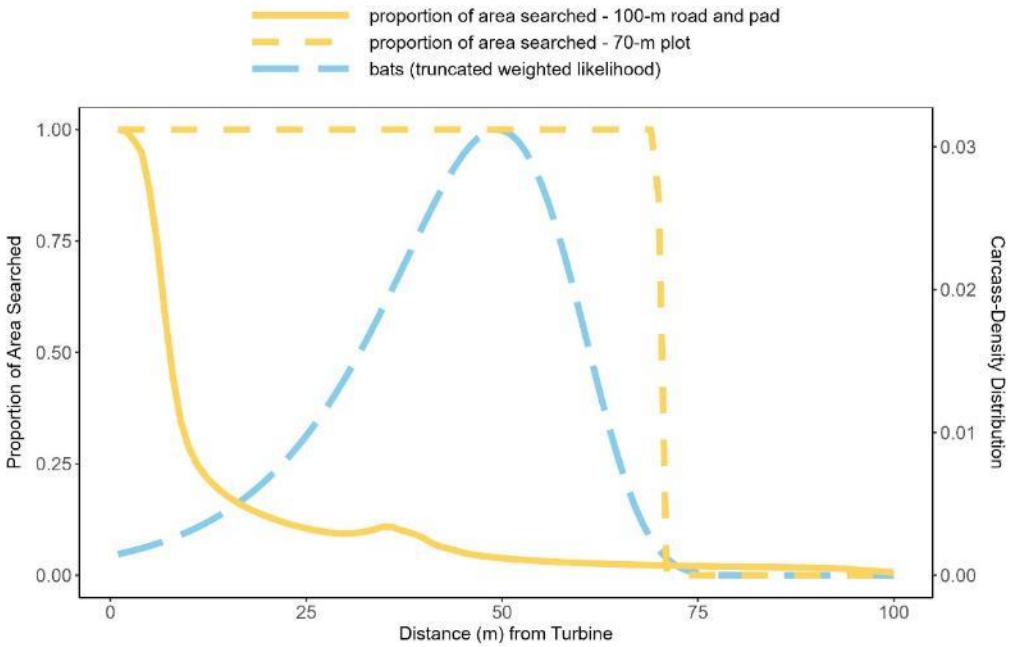
Appendix C4. Density of bat carcasses per area searched at 100-meter (m) road and pads, and 70-m cleared and uncleared plots at Acciona AW-82 1.5-megawatt turbines at the Meadow Lake Wind Resource Area, Benton and White counties, Indiana, from April 1 – May 15 and August 1 – October 15, 2023.



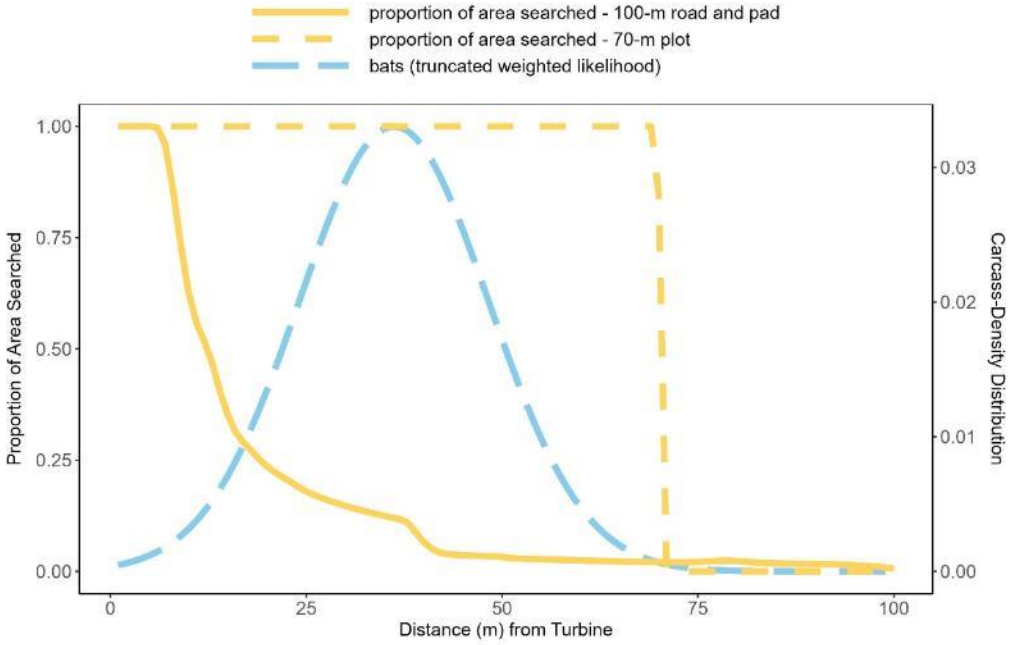
Appendix C5. Density of bat carcasses per area searched at 100-meter (m) road and pads, and 70-m cleared and uncleared plots at Vestas V82 1.65-megawatt turbines at the Meadow Lake Wind Resource Area, Benton and White counties, Indiana, from April 1 – May 15 and August 1 – October 15, 2023.



Appendix C6. Density of bat carcasses per area searched at 100-meter (m) road and pads, and 70-m cleared and uncleared plots at Vestas V110 2.0-megawatt turbines at the Meadow Lake Wind Resource Area, Benton and White counties, Indiana, from April 1 – May 15 and August 1 – October 15, 2023.



Appendix C7. Density of bat carcasses per area searched at 100-meter (m) road and pads, and 70-m cleared and uncleared plots at Suzlon S88 2.1-megawatt turbines at the Meadow Lake Wind Resource Area, Benton and White counties, Indiana, from April 1 – May 15 and August 1 – October 15, 2023.



Appendix C8. Density of bat carcasses per area searched at 100-meter (m) road and pads, and 70-m cleared and uncleared plots at 3.6-megawatt turbines at the Meadow Lake Wind Resource Area, Benton and White counties, Indiana, from April 1 – May 15 and August 1 – October 15, 2023.

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

Appendix D1. Inputs needed to run Evidence of Absence: Single Class Module for the Meadow Lake Wind Resource Area, Benton and White counties, Indiana, from April 1 – May 15 and August 1 – October 15, 2023.*

Season	Plot Type	Turbine MW	Blade Length (m)	Search Interval (I)	Number of Searches	Spatial Coverage (a)	Searcher Efficiency		Carcass Persistence**	
							Carcasses Available	Carcasses Found	Shape (α)	Scale (β)
Spring	100-m road and pad	1.5	38.5	7	7	0.07	51	50	–	8.86
Spring	100-m road and pad	1.5	41	7	7	0.11	51	50	–	8.86
Spring	100-m road and pad	1.65	41	7	7	0.08	51	50	–	8.86
Spring	100-m road and pad	2	55	7	7	0.13	51	50	–	8.86
Spring	100-m road and pad	2.1	44	7	7	0.08	51	50	–	8.86
Spring	100-m road and pad	3.6	68	7	7	0.13	51	50	–	8.86
Fall	70-m plot	1.5	38.5	7	12	1	59	41	0.39	97.32
Fall	70-m plot	1.5	41	7	12	0.99	59	41	0.39	97.32
Fall	70-m plot	1.65	41	7	12	1	59	41	0.39	97.32
Fall	70-m plot	2	55	7	12	0.99	59	41	0.39	97.32
Fall	70-m plot	2.1	44	7	12	1	59	41	0.39	97.32
Fall	70-m plot	3.6	68	7	12	1	59	41	0.39	97.32
Fall	100-m road and pad	1.5	38.5	7	11	0.07	51	50	–	8.86
Fall	100-m road and pad	1.5	41	7	11	0.11	51	50	–	8.86
Fall	100-m road and pad	1.65	41	7	11	0.08	51	50	–	8.86
Fall	100-m road and pad	2	55	7	11	0.13	51	50	–	8.86
Fall	100-m road and pad	2.1	44	7	11	0.08	51	50	–	8.86
Fall	100-m road and pad	3.6	68	7	11	0.13	51	50	–	8.86

* The detection reduction factor (*k)* was assumed to equal 0.67 for all strata, per Huso et al. (2017).

** An exponential distribution was used for carcass persistence on 100-m roads and pads. The 95% upper and lower confidence intervals on β were set to 6.17, 12.69. A Weibull distribution was used for carcass persistence on 70-m cleared and uncleared plots. The 95% upper and lower confidence intervals on β were set to 21.56, 439.22.

m = meter; MW = megawatt; N/A = not applicable.

Temporal coverage was set to one for all strata.

Appendix D2. Inputs needed to run Evidence of Absence model to combine across plot types within each season: Multiple Class Module the Meadow Lake Wind Resource Area, Benton and White counties, Indiana, from April 1 – May 15 and August 1 – October 15, 2023.

Season	Plot Type	Turbine MW	Blade Length (m)	Ba	Bb	Within-Season Sampling Fraction*	Within-Season Relative Operations**	Density-weighted Proportion (DWP)***
Spring	unsearched	–	–	0.01	1,000	0.02	0.89	0.02
Spring	100-m road and pad	1.5	38.5	220.41	4,136.33	0.13	0.95	0.13
Spring	100-m road and pad	1.5	41	215.17	2,729.74	0.11	0.94	0.11
Spring	100-m road and pad	1.65	41	219.58	3,835.13	0.39	0.88	0.38
Spring	100-m road and pad	2	55	211.75	2201.6	0.15	0.95	0.16
Spring	100-m road and pad	2.1	44	219.65	3,857.88	0.08	0.78	0.07
Spring	100-m road and pad	3.6	68	212.29	2,272.73	0.13	0.91	0.13
Fall	70-m plot	1.5	38.5	36.94	19.42	0.08	0.56	0.07
Fall	70-m plot	1.5	41	37.45	20.1	0.08	0.97	0.13
Fall	70-m plot	1.65	41	36.96	19.43	0.14	0.57	0.13
Fall	70-m plot	2	55	37.51	20.17	0.07	0.62	0.07
Fall	70-m plot	2.1	44	37.1	19.62	0.05	0.45	0.04
Fall	70-m plot	3.6	68	37.08	19.6	0.07	0.71	0.08
Fall	100-m road and pad	1.5	38.5	221.12	4,148.63	0.05	0.57	0.05
Fall	100-m road and pad	1.5	41	215.86	2,737.82	0.05	0.77	0.07
Fall	100-m road and pad	1.65	41	220.29	3,846.52	0.17	0.56	0.15
Fall	100-m road and pad	2	55	212.43	2,208.1	0.04	0.65	0.04
Fall	100-m road and pad	2.1	44	220.36	3,869.34	0.09	0.48	0.07
Fall	100-m road and pad	3.6	68	212.97	2,279.45	0.09	0.71	0.1

m = meter; MW = megawatt.

* Within-season sampling fraction represents the proportion of turbines surveyed within that season.

** Within-season turbine operations represents the relative proportion of operational turbine-nights within a stratum.

***Density-weighted proportion is the product of the within-season sampling fraction and the within-season turbine operations, re-scaled to sum to 1 within seasons.

Appendix D3. Inputs needed to run Evidence of Absence model to combine across seasons: Multiple Class Module for the Meadow Lake Wind Resource Area, Benton and White counties, Indiana, from April 1 – May 15 and August 1 – October 15, 2023.

Season	Ba	Bb	Arrival Proportion	Relative Turbine Operation	Weights (DWP)
Spring (April 1 – May 15)	1,036.076	15,100.78	0.11	0.903	0.11
Fall (August 1 – October 15)	428.053	722.107	0.89	0.627	0.89

DWP = Density-weighted proportion.

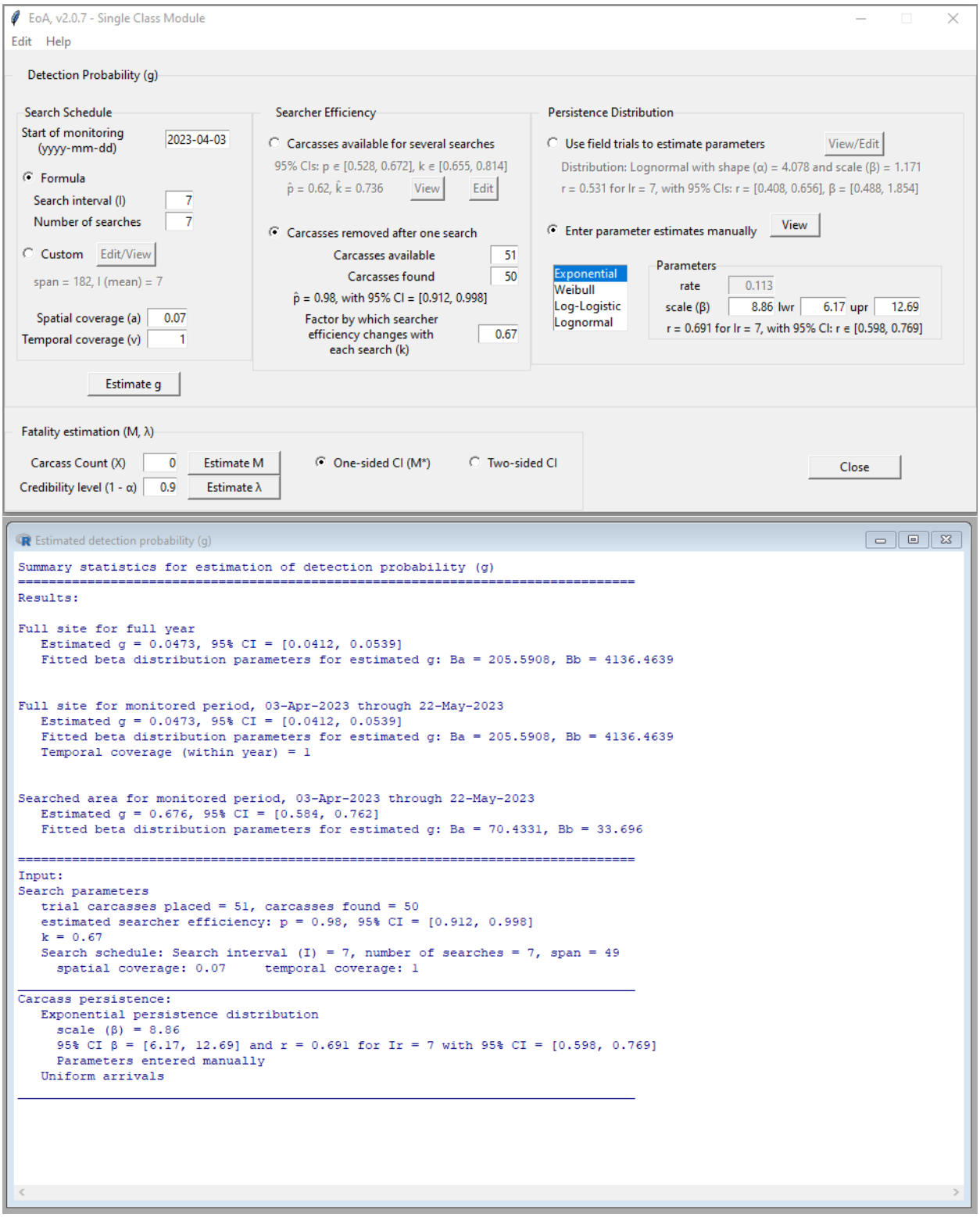
Appendix D4. Inputs needed to run Evidence of Absence model to combine searched and unsearched turbines: Multiple Class Module for the Meadow Lake Wind Resource Area, Benton and White counties, Indiana, from April 1 – May 15 and August 1 – October 15, 2023.

Turbines	Ba	Bb	Weights (DWP)	*g*	90% Confidence Intervals
111 (study turbines)	488.195	1,010.788	0.261	0.326	0.302–0.350
303 (unsearched turbines)	0.010	1,000.000	0.739	0.000	0.000–0.000
414 (site-wide)	**662.58**	**7,135.601**	**N/A**	**0.085**	**0.079–0.091**

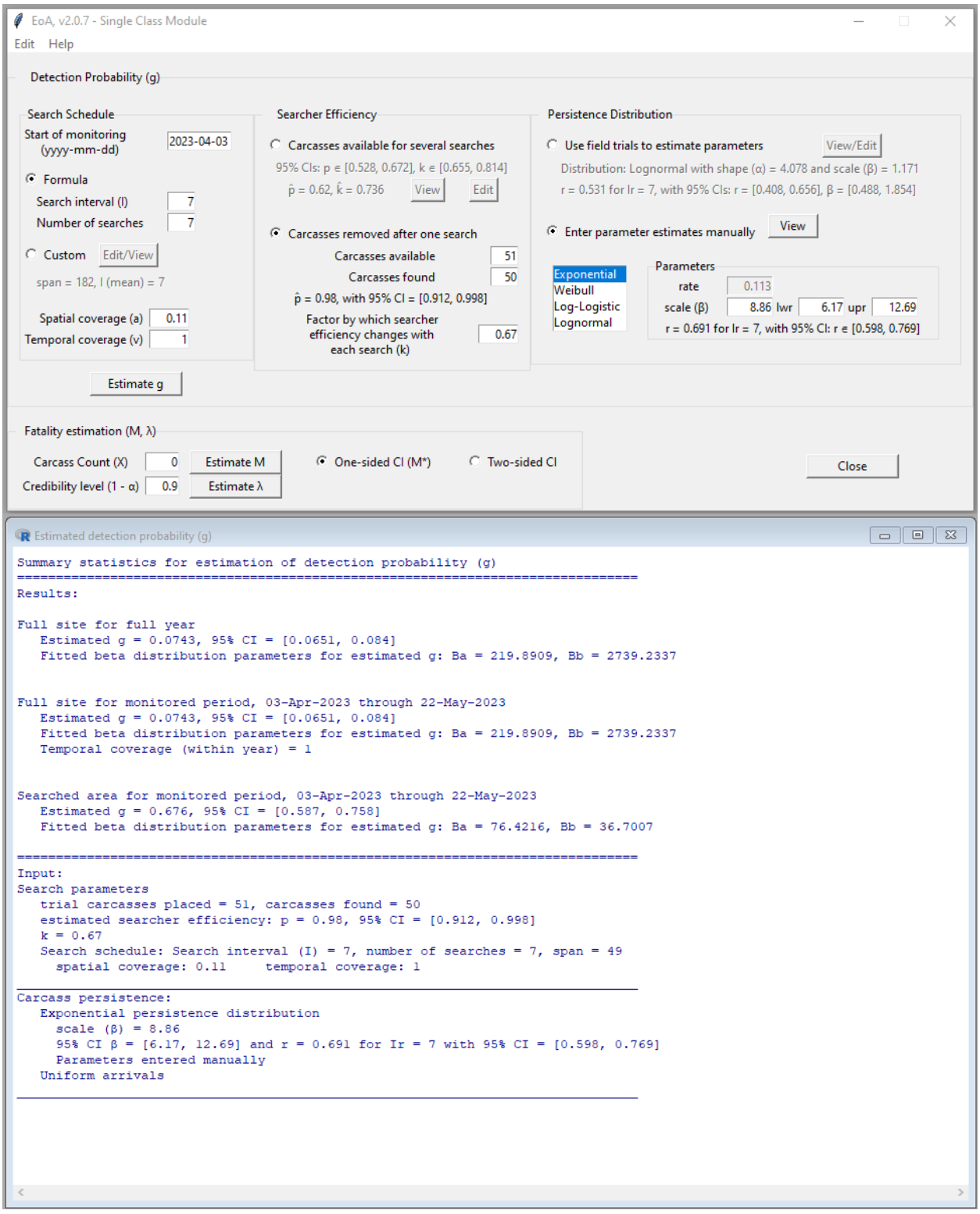
DWP = Density-weighted proportion.

Appendix D5. Inputs needed to run Evidence of Absence model to combine across years: Multiple Years Module for the site-wide g for the Meadow Lake Wind Resource Area, Benton and White counties, Indiana, from April 1 – May 15 and August 1 – October 15, 2023.

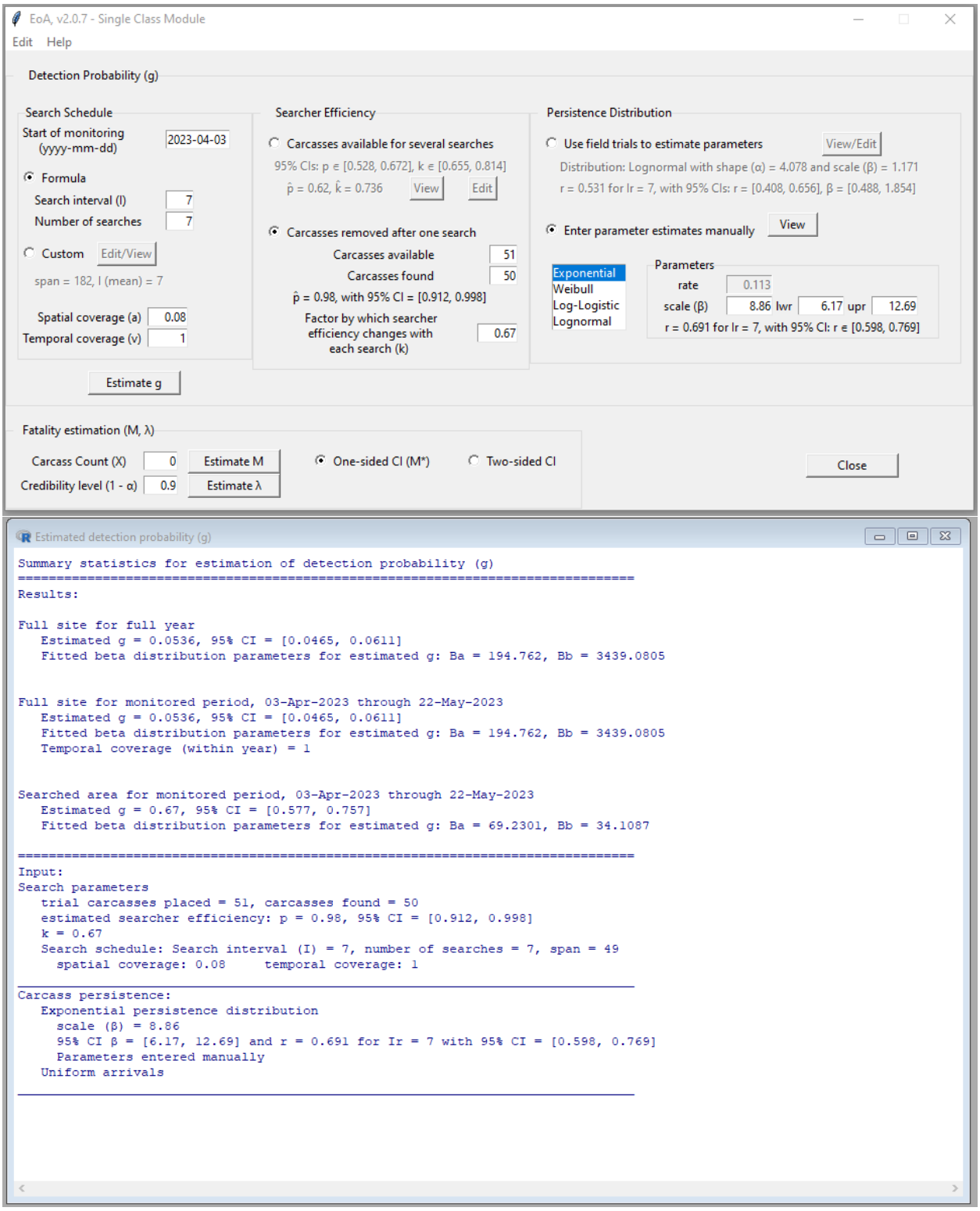
Year	Ba	Bb	Weights (ρ)
2021	1,605.22	15,648.767	1.0
2022	738.487	13,602.956	1.0
2023	662.58	7,135.601	0.74



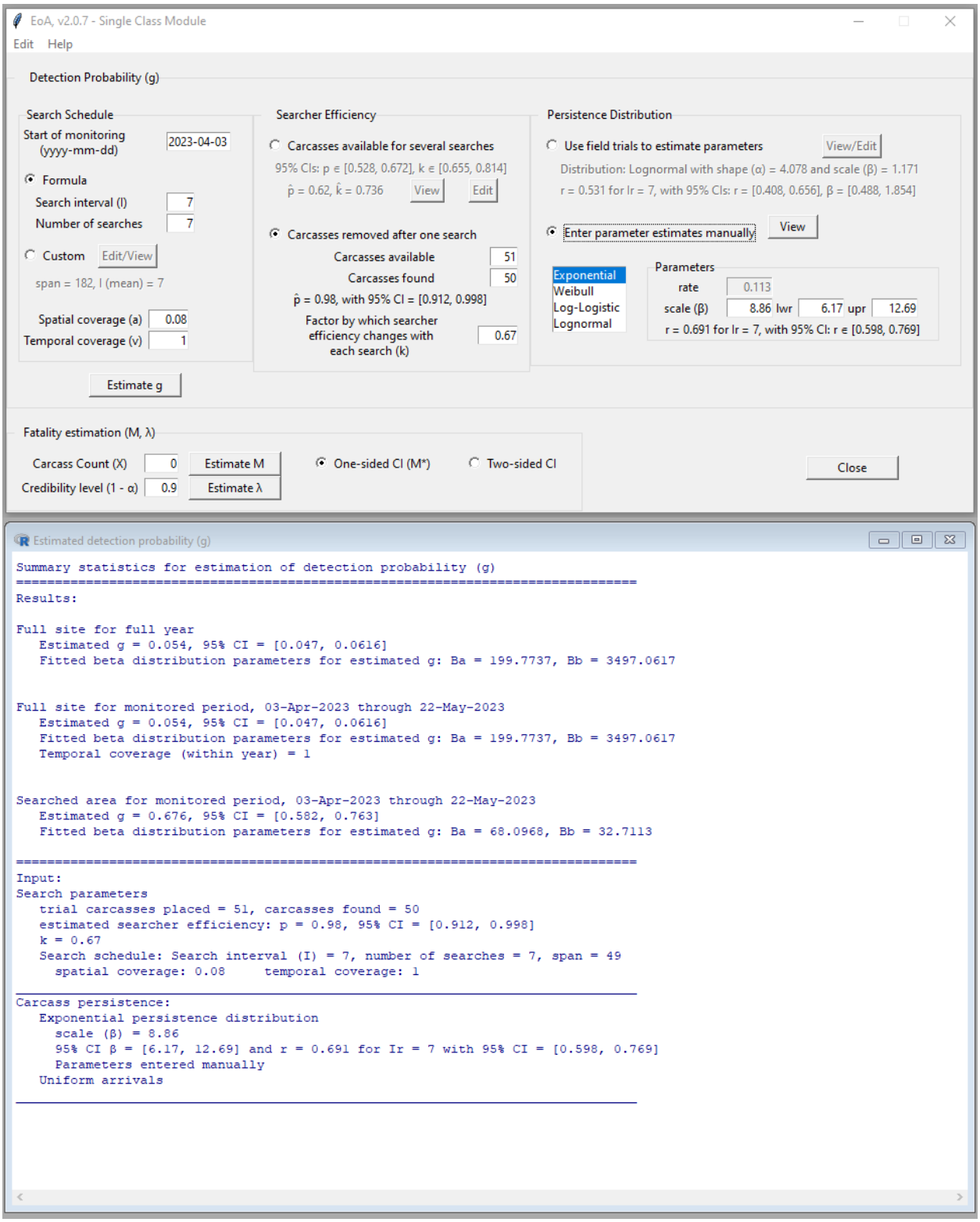
Appendix D6. Screen shot of Evidence of Absence (v2.0.7) graphical user interface, Single Class Module inputs for Spring 2023, 100-meter road and pad searches at 14 GE 1.5 SLE 1.5-megawatt turbines, searched at a 7-day interval.



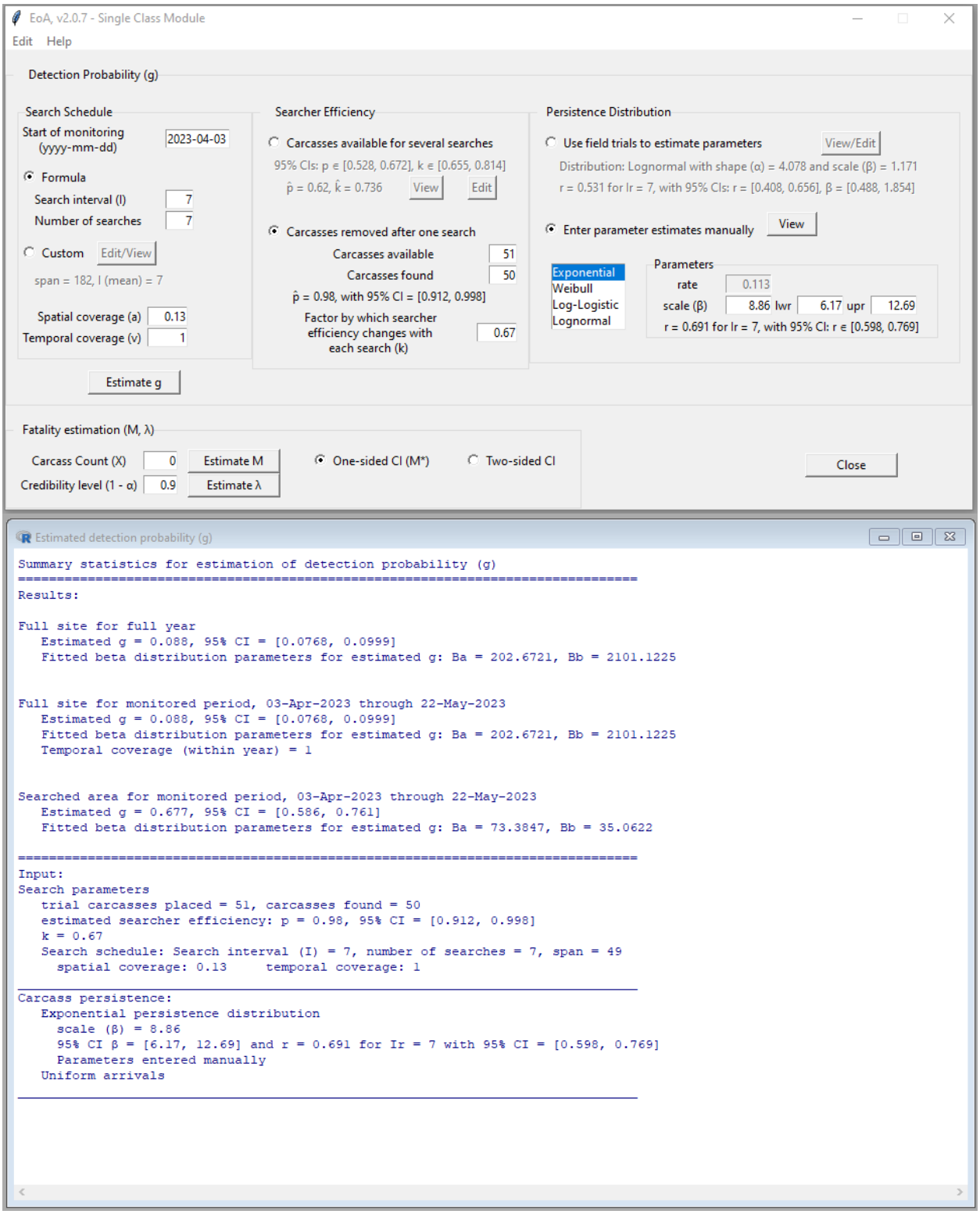
Appendix D7. Screen shot of Evidence of Absence (v2.0.7) graphical user interface, Single Class Module inputs for Spring 2023, 100-meter road and pad searches at 12 Acciona AW-82 1.5-megawatt turbines, searched at a 7-day interval.



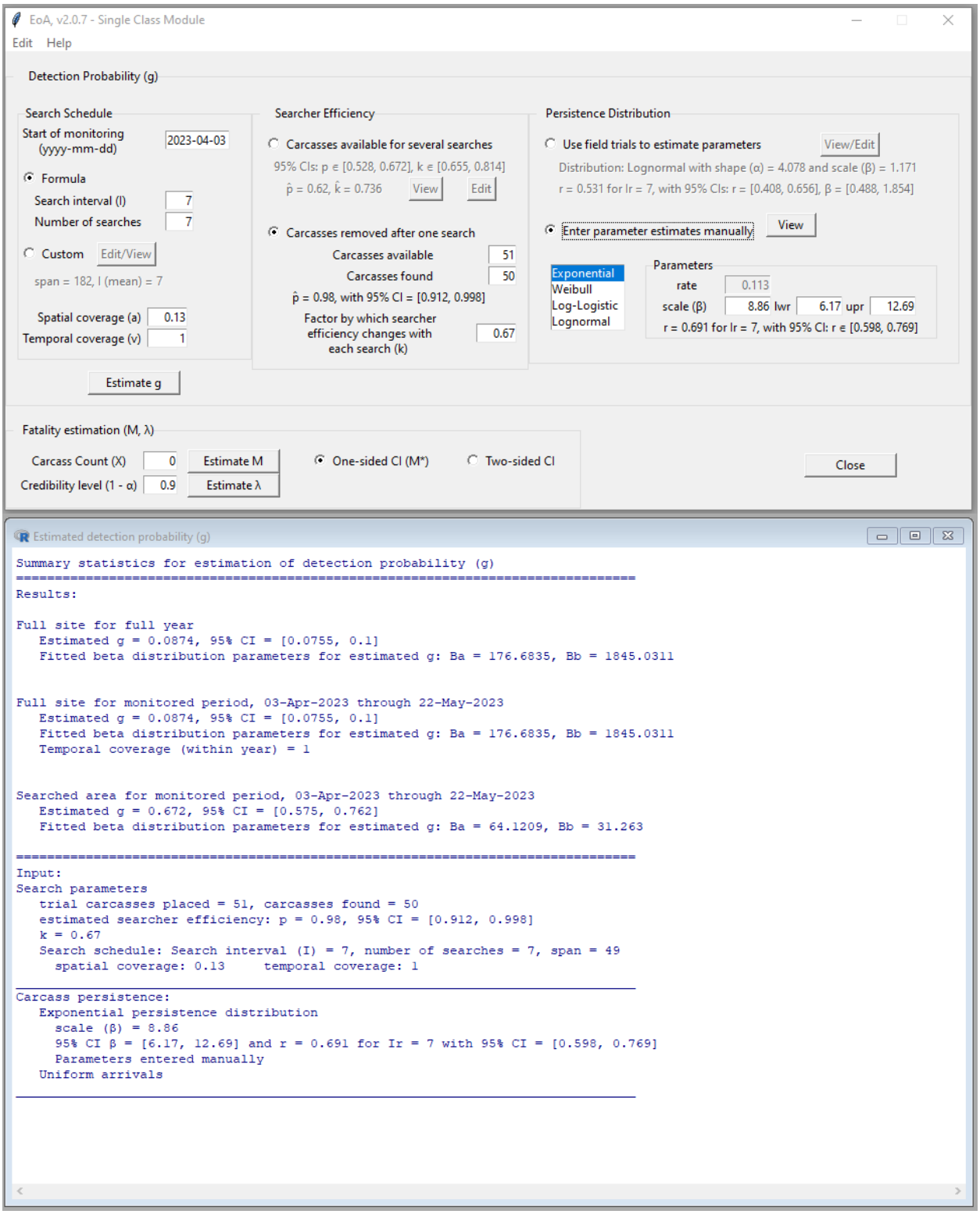
Appendix D8. Screen shot of Evidence of Absence (v2.0.7) graphical user interface, Single Class Module inputs for Spring 2023, 100-meter road and pad searches at 43 Vestas V82 1.65-megawatt turbines, searched at a 7-day interval.



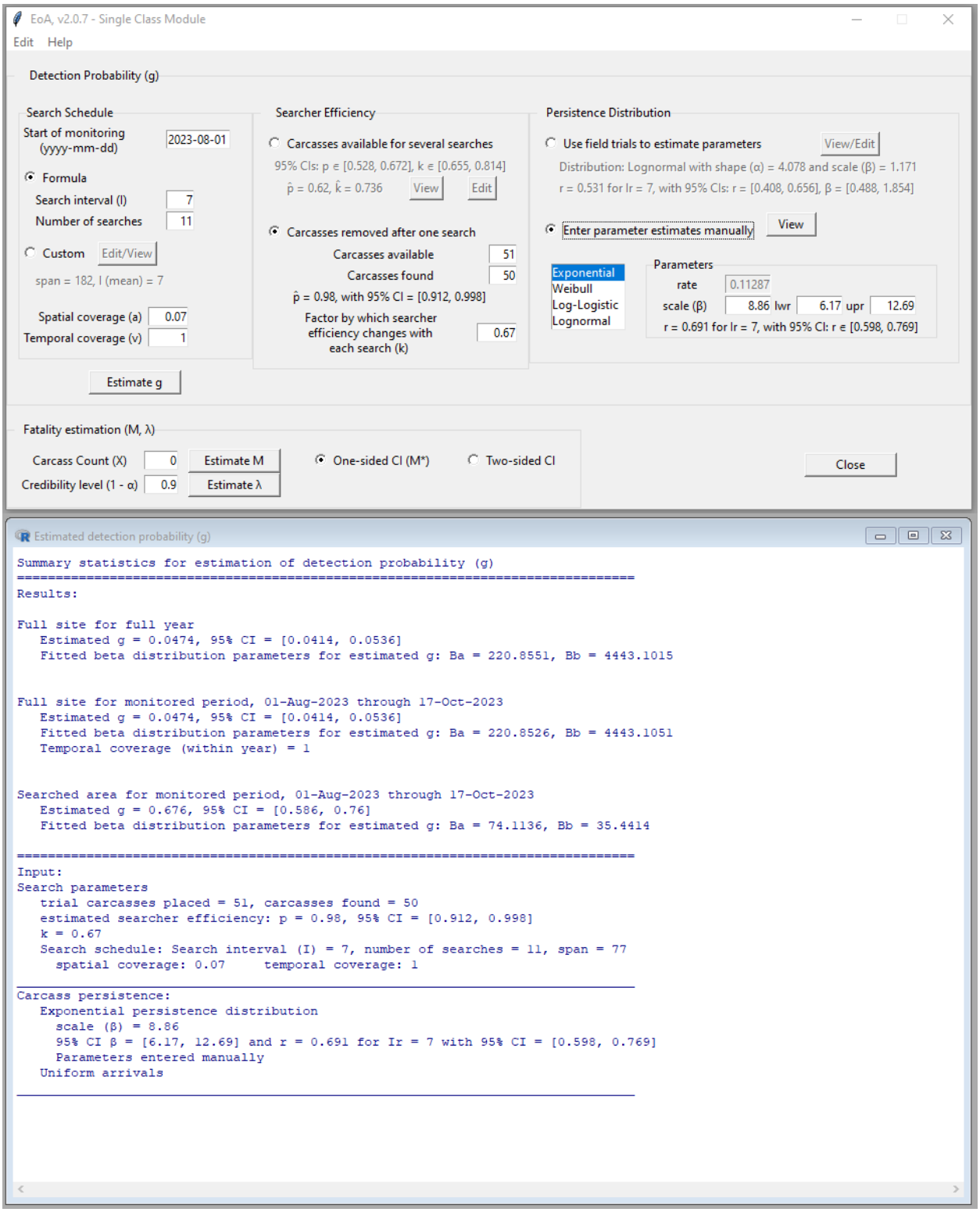
Appendix D9. Screen shot of Evidence of Absence (v2.0.7) graphical user interface, Single Class Module inputs for Spring 2023, 100-meter road and pad searches at nine Suzlon S88 2.1-megawatt turbines, searched at a 7-day interval.



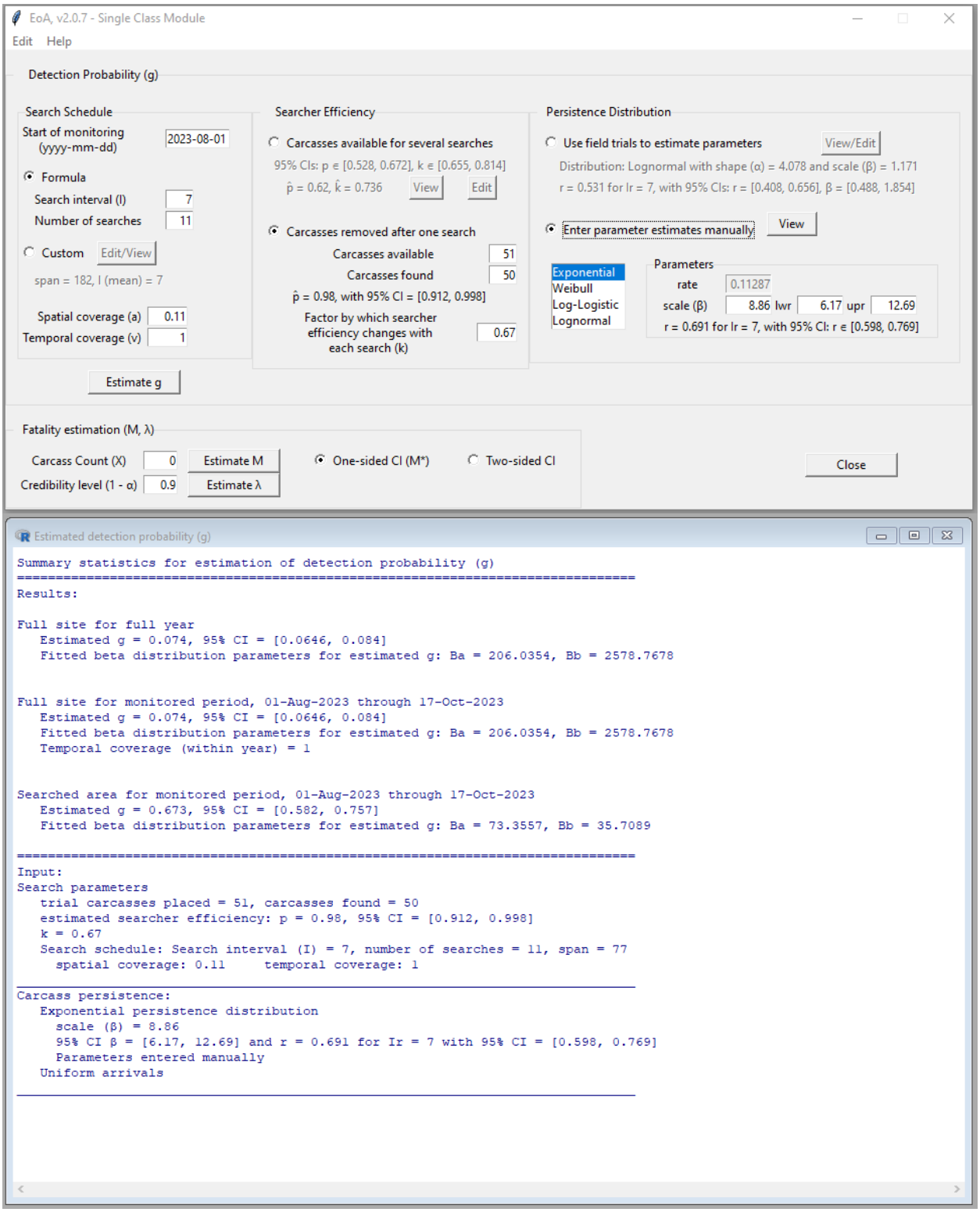
Appendix D10. Screen shot of Evidence of Absence (v2.0.7) graphical user interface, Single Class Module inputs for Spring 2023, 100-meter road and pad searches at 17 Vestas V110 2.0-megawatt turbines, searched at a 7-day interval.



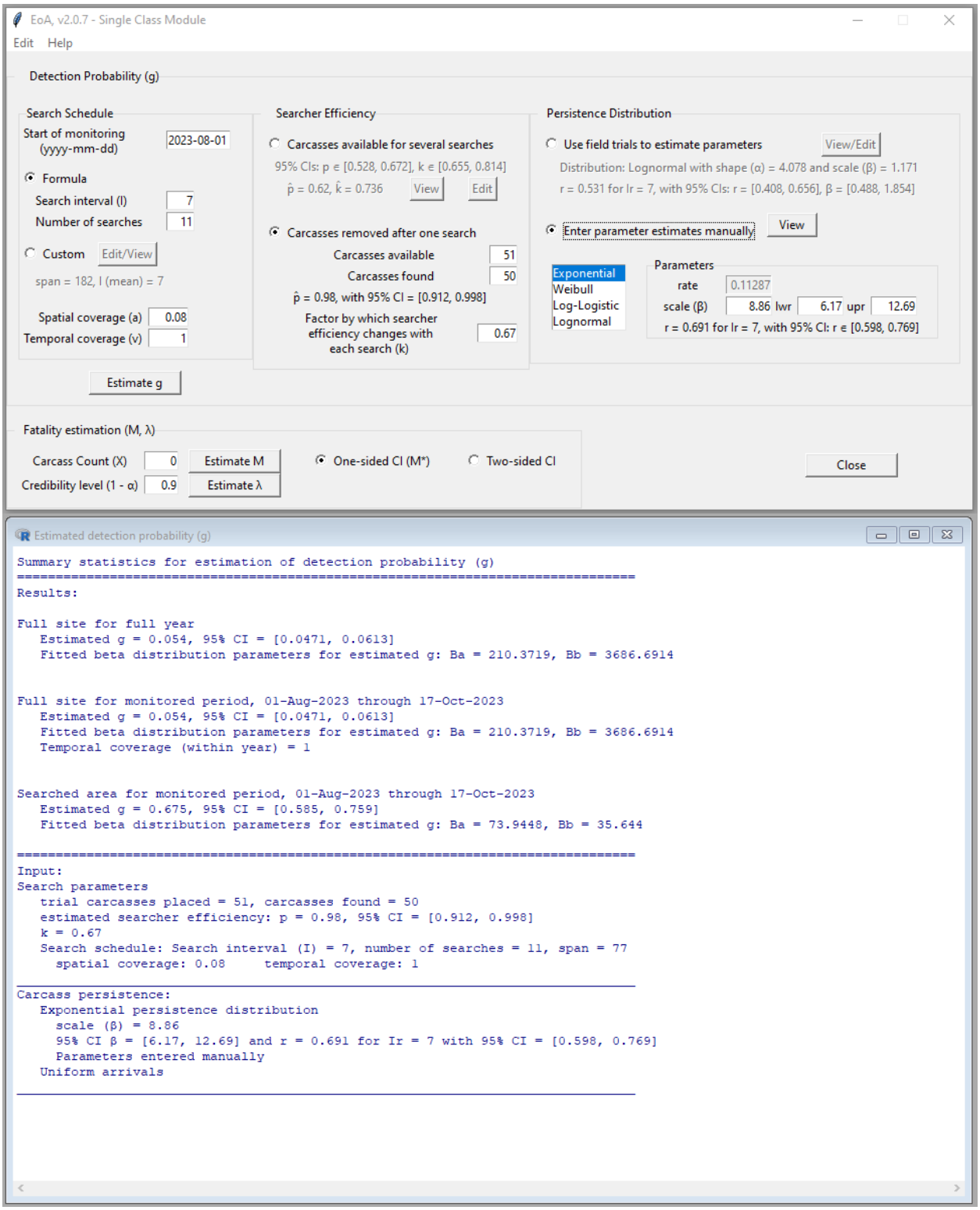
Appendix D11. Screen shot of Evidence of Absence (v2.0.7) graphical user interface, Single Class Module inputs for Spring 2023, 100-meter road and pad searches at 14 Vestas V136 3.6-megawatt turbines, searched at a 7-day interval.



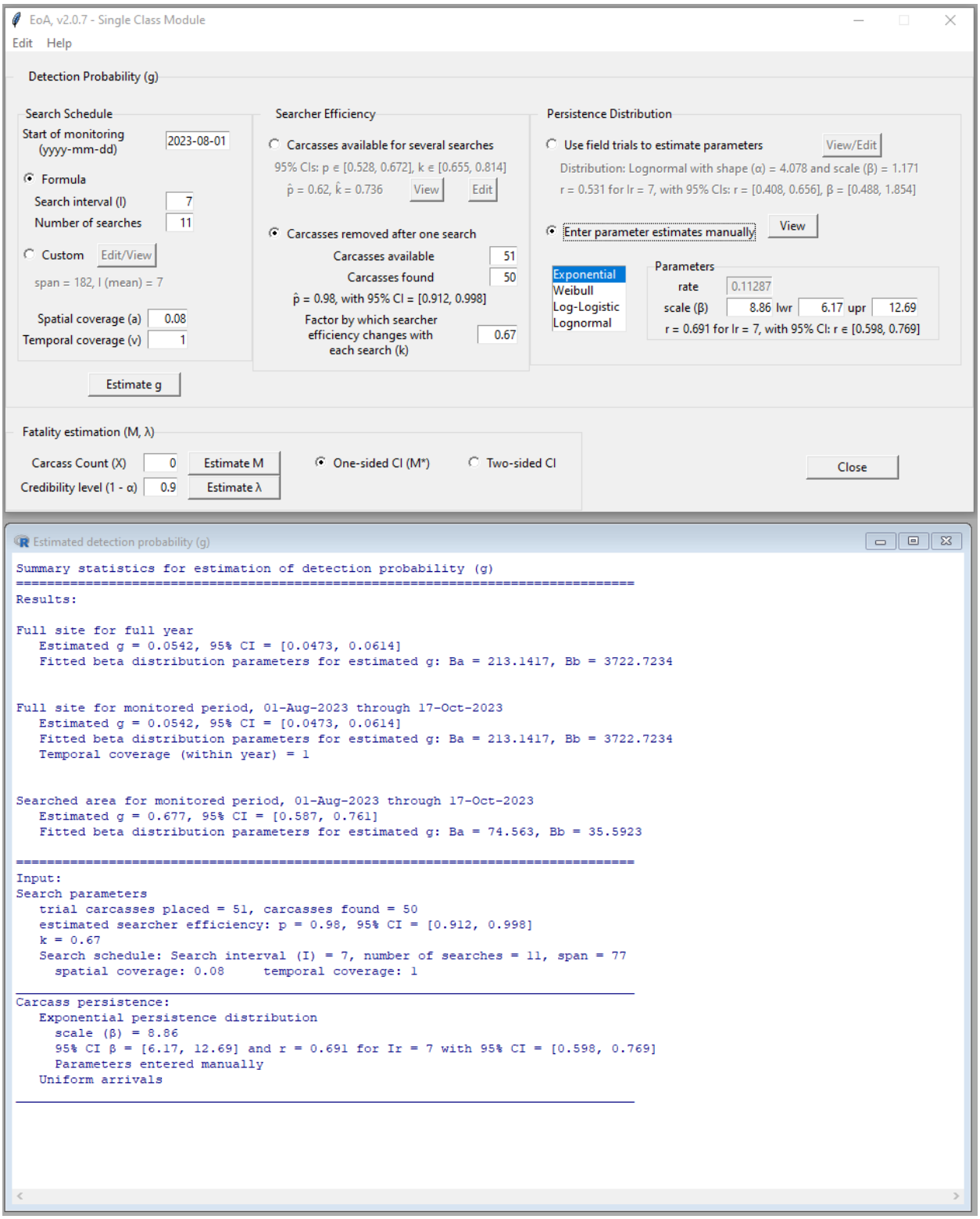
Appendix D12. Screen shot of Evidence of Absence (v2.0.7) graphical user interface, Single Class Module inputs for fall 2023, 100-meter road and pad searches at six GE 1.5 SLE 1.5-megawatt turbines, searched at a 7-day interval.



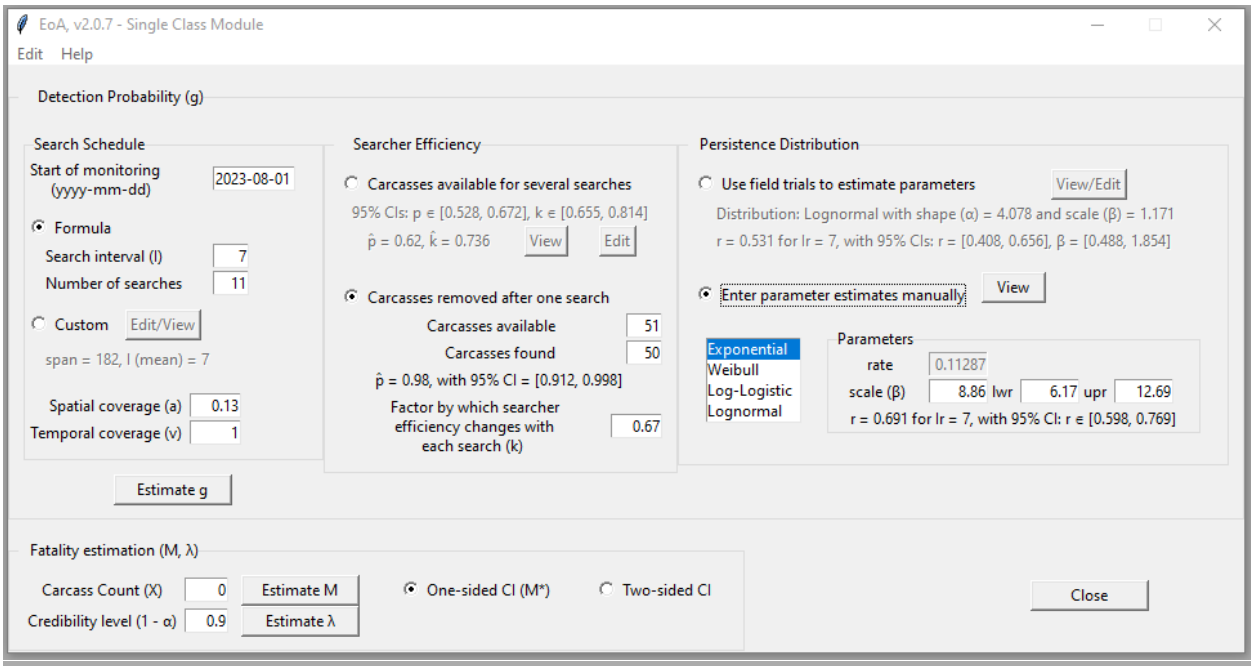
Appendix D13. Screen shot of Evidence of Absence (v2.0.7) graphical user interface, Single Class Module inputs for fall 2023, 100-meter road and pad searches at six Acciona AW-82 1.5-megawatt turbines, searched at a 7-day interval.

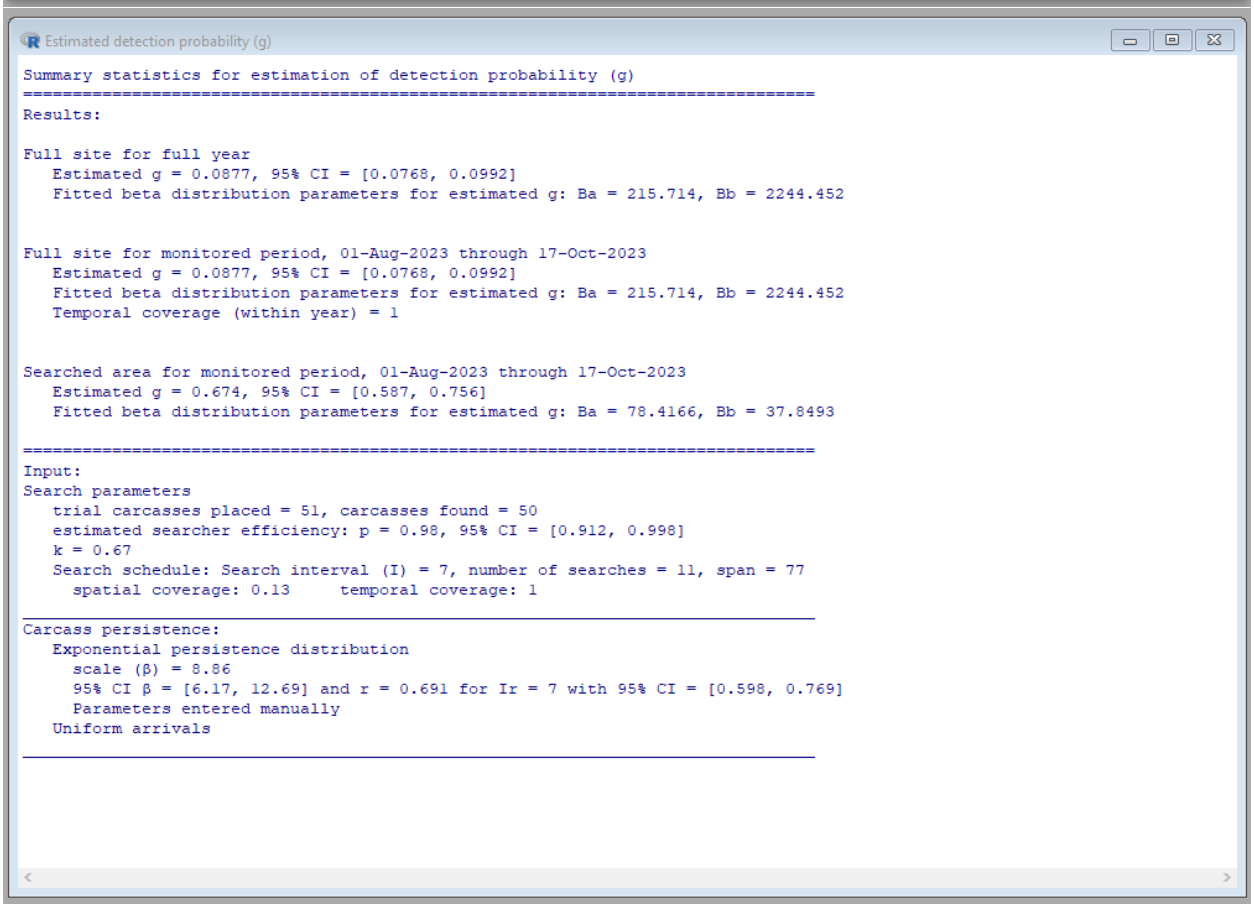


Appendix D14. Screen shot of Evidence of Absence (v2.0.7) graphical user interface, Single Class Module inputs for fall 2023, 100-meter road and pad searches at 19 Vestas V82 1.65-megawatt turbines, searched at a 7-day interval.

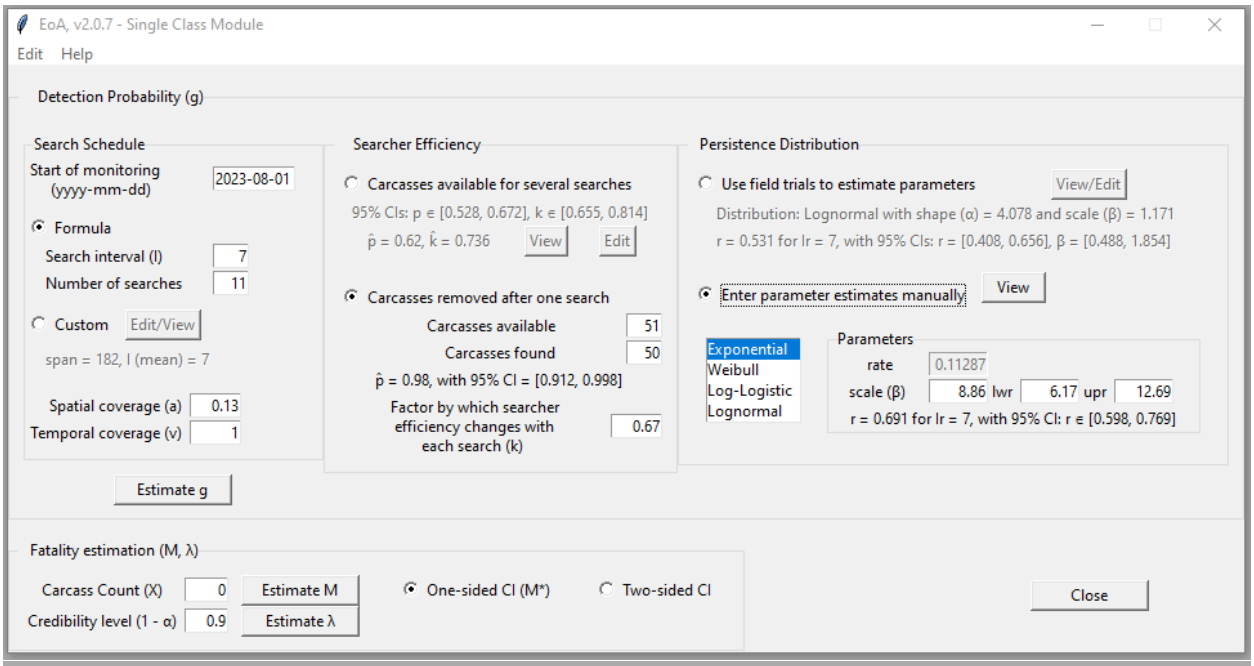


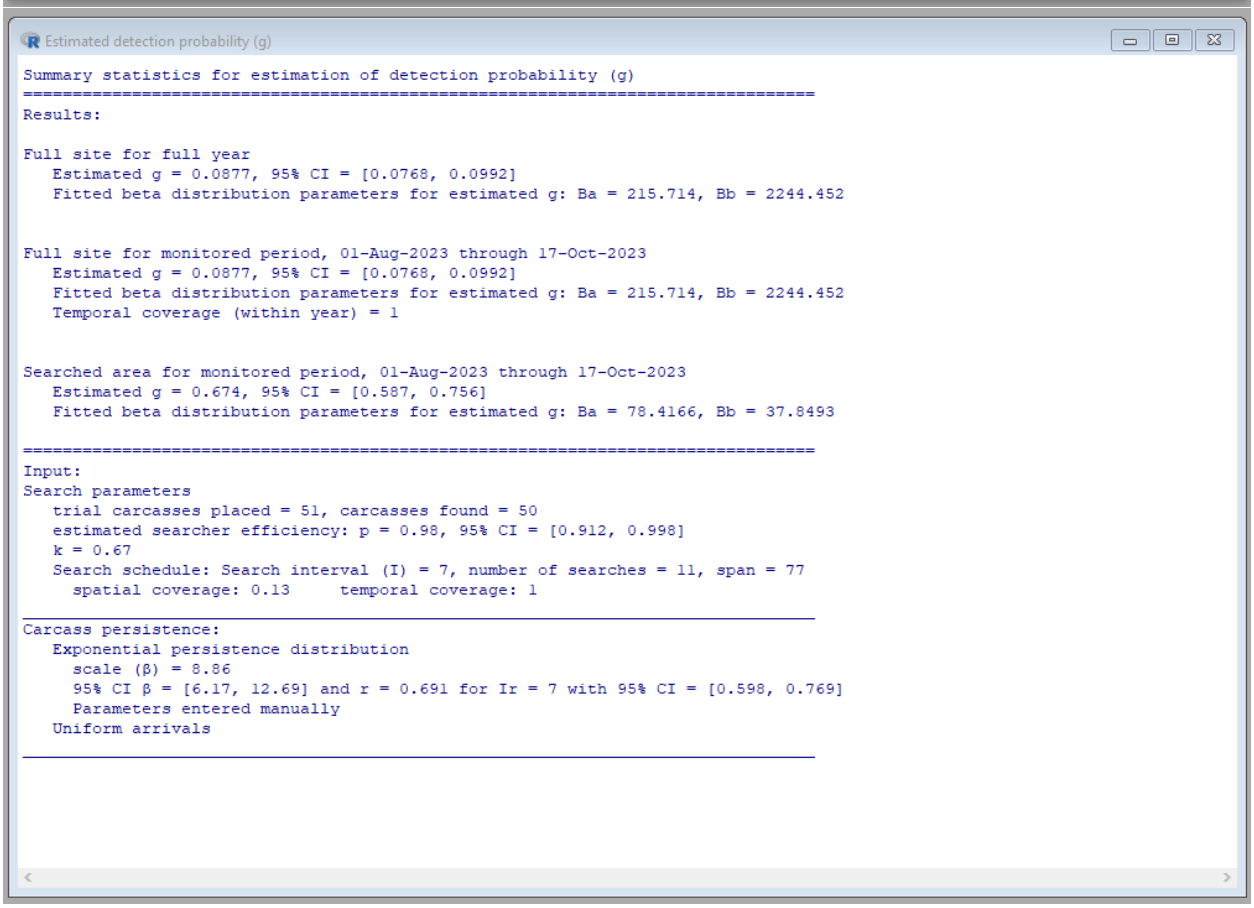
Appendix D15 Screen shot of Evidence of Absence (v2.0.7) graphical user interface, Single Class Module inputs for fall 2023, 100-meter road and pad searches at 10 Suzlon S88 2.1-megawatt turbines, searched at a 7-day interval.



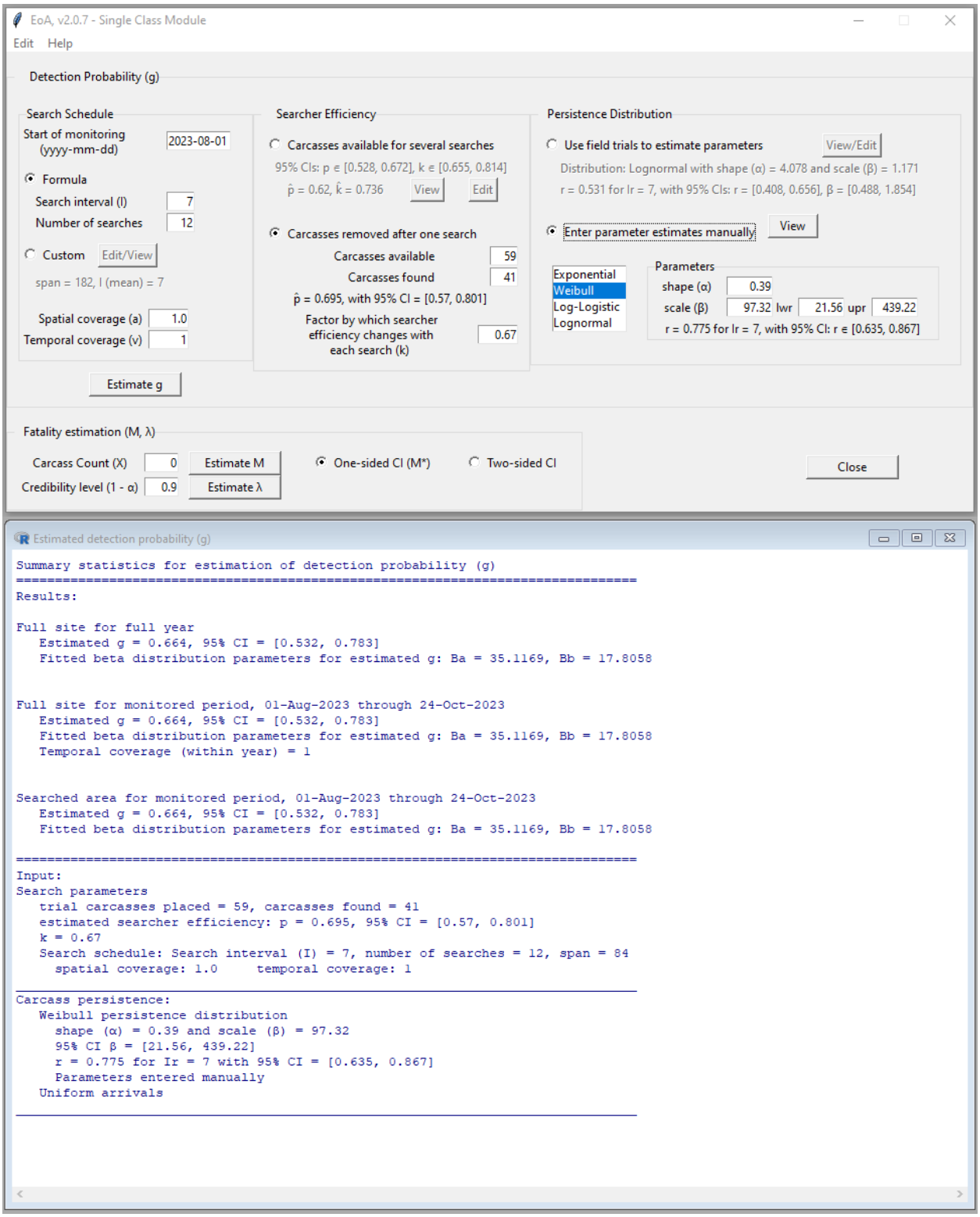


Appendix D16 Screen shot of Evidence of Absence (v2.0.7) graphical user interface, Single Class Module inputs for fall 2023, 100-meter road and pad searches at four Vestas V110 2.0-megawatt turbines, searched at a 7-day interval.

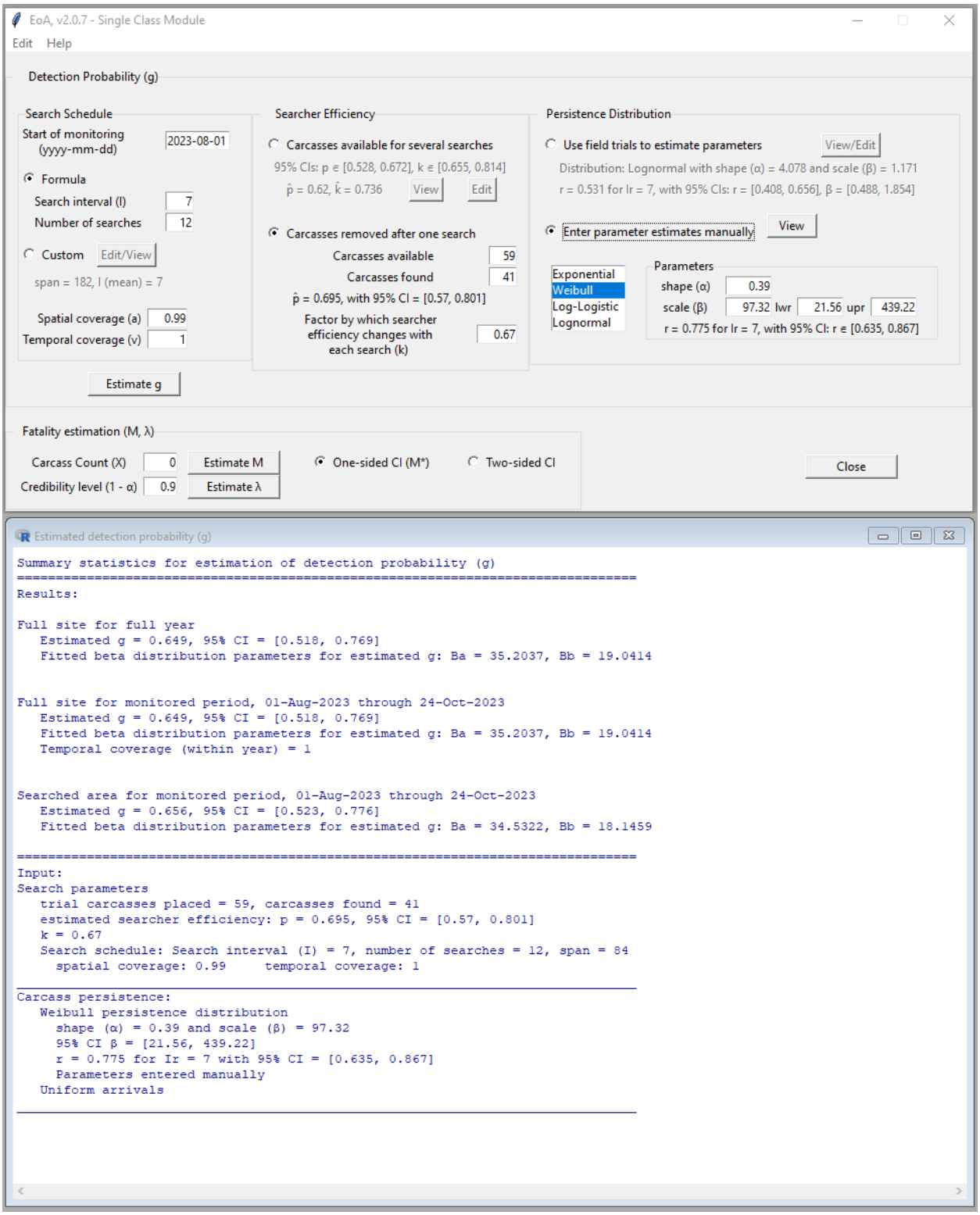




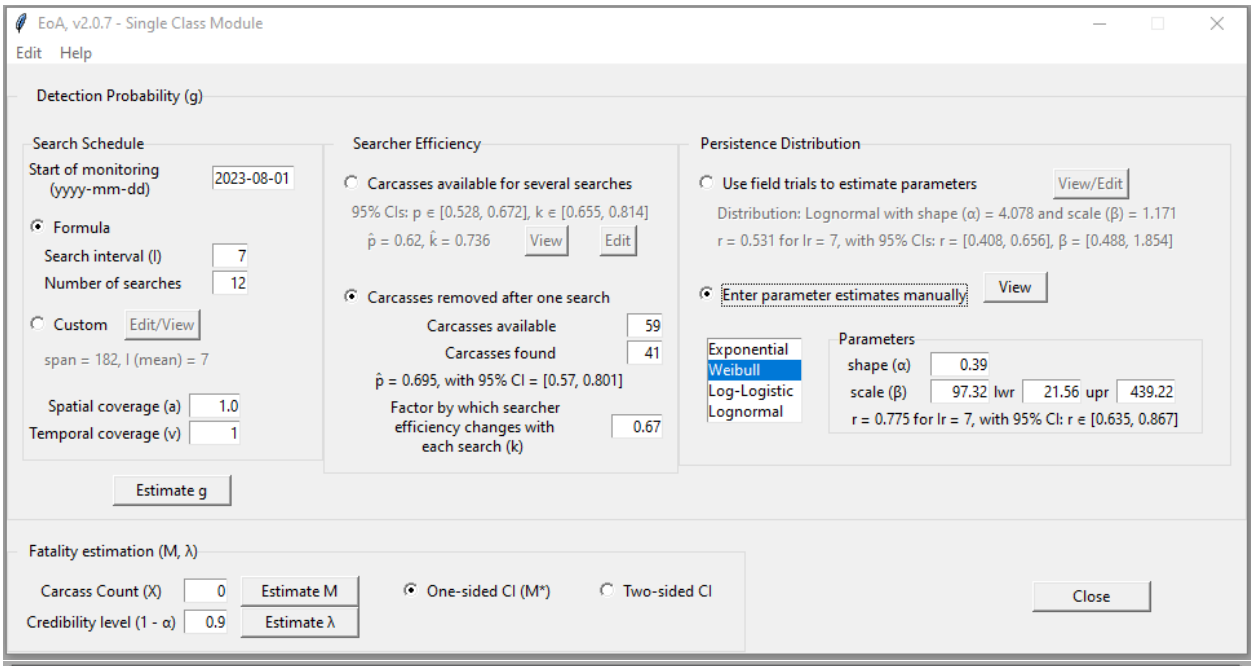
Appendix D17 Screen shot of Evidence of Absence (v2.0.7) graphical user interface, Single Class Module inputs for fall 2023, 100-meter road and pad searches at 10 Vestas V136 3.6-megawatt turbines, searched at a 7-day interval.

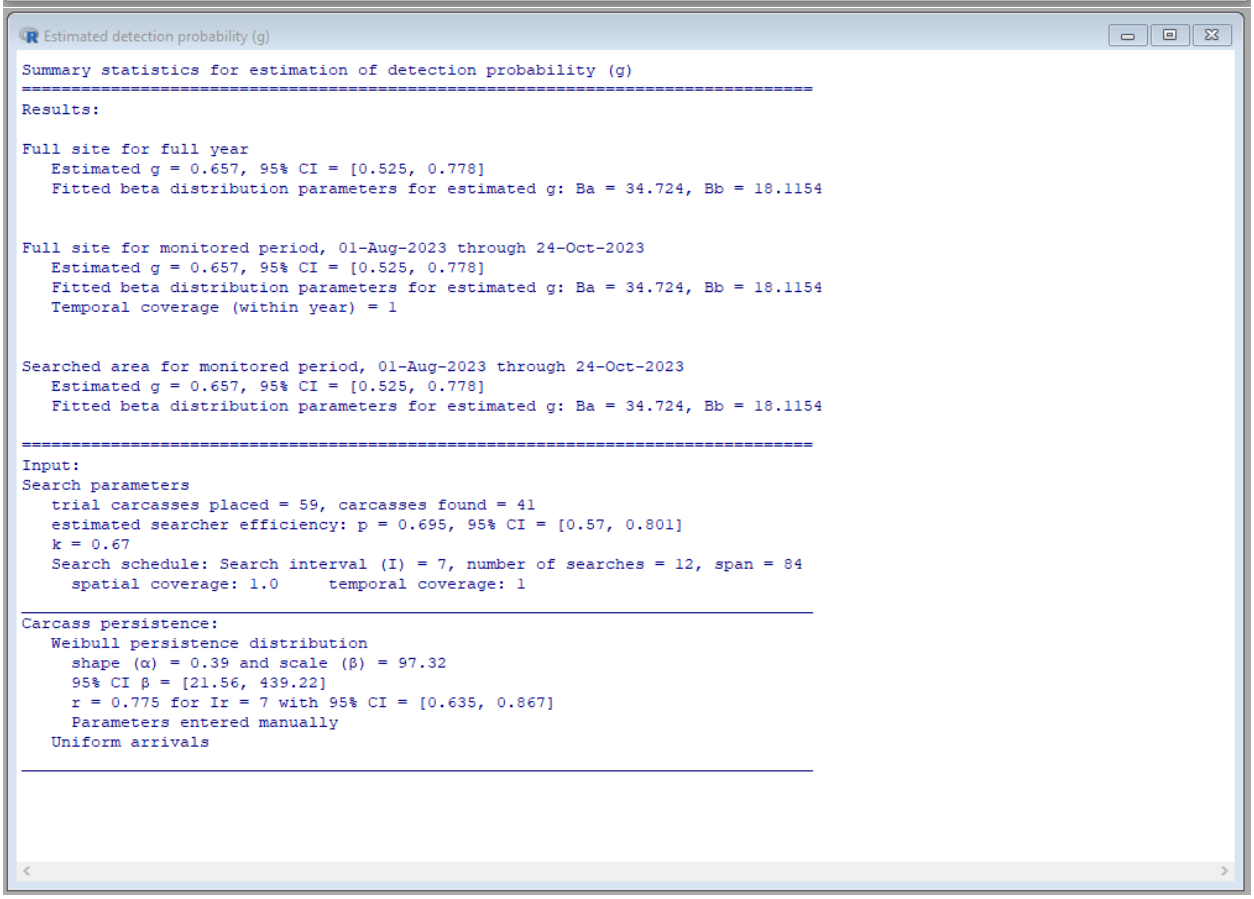


Appendix D18. Screen shot of Evidence of Absence (v2.0.7) graphical user interface, Single Class Module inputs for fall 2023, 70-meter full plot searches at nine GE 1.5 SLE 1.5-megawatt turbines, searched at a 7-day interval.

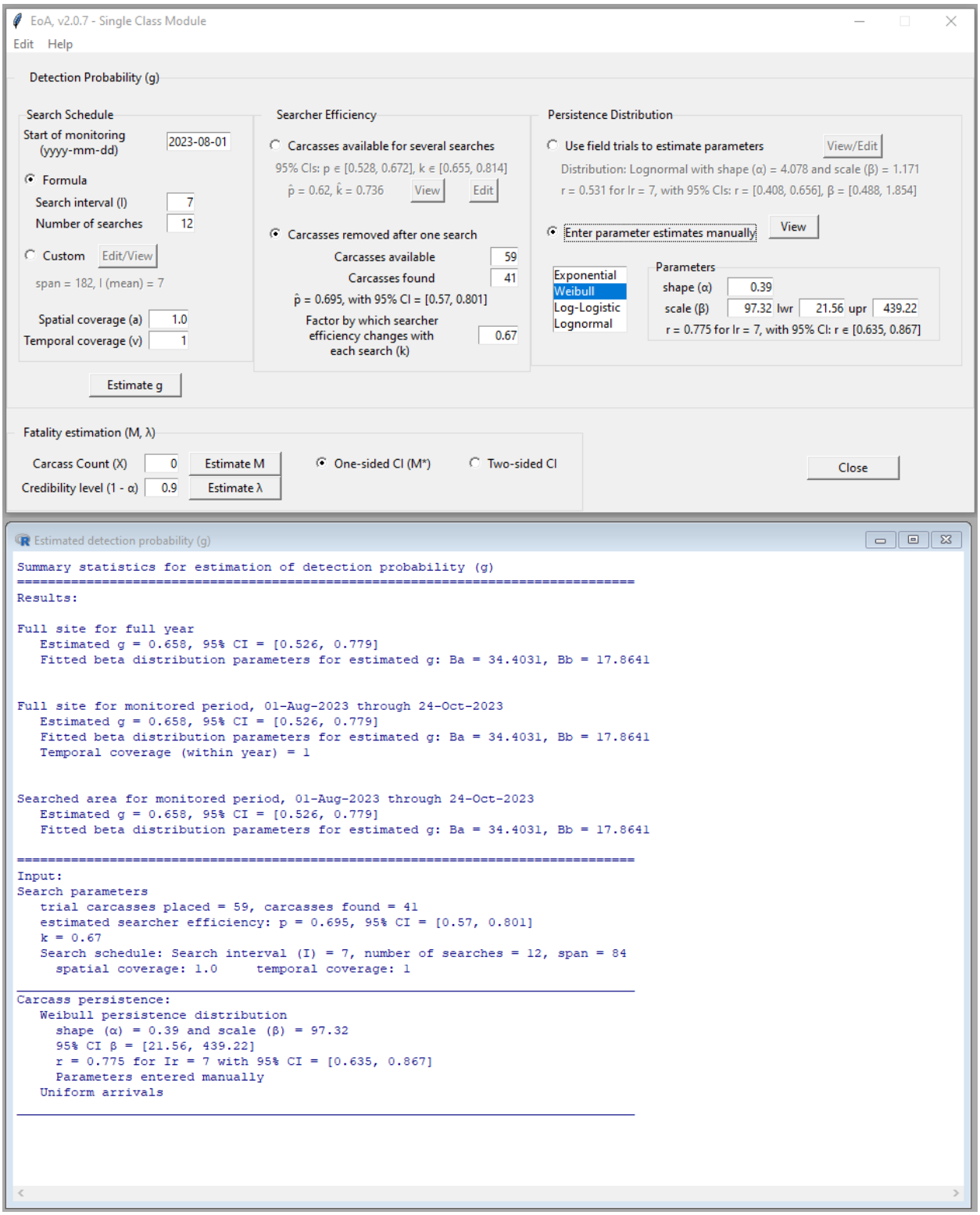


Appendix D19. Screen shot of Evidence of Absence (v2.0.7) graphical user interface, Single Class Module inputs for fall 2023, 70-meter full plot searches at nine Acciona AW-82 1.5-megawatt turbines, searched at a 7-day interval.

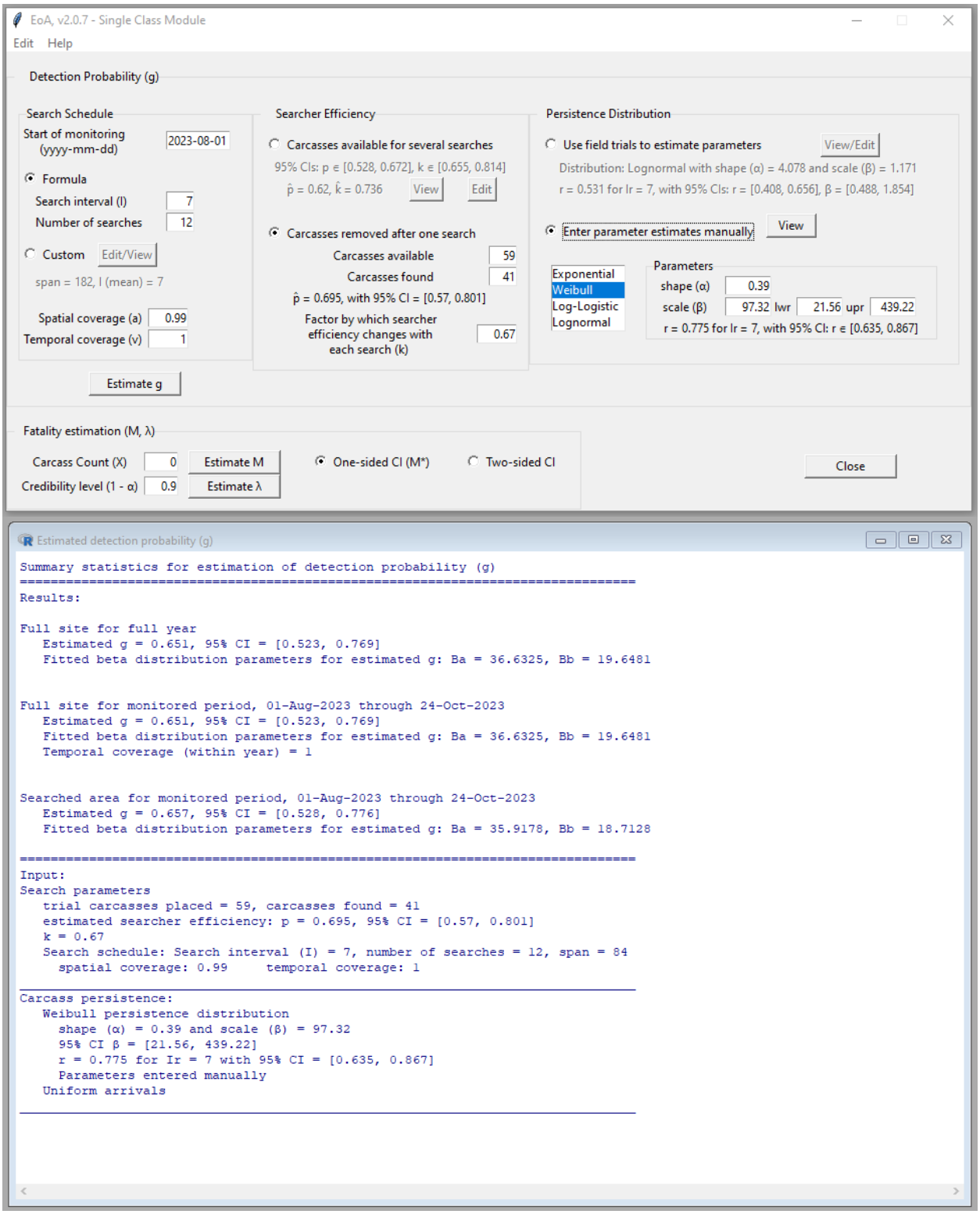




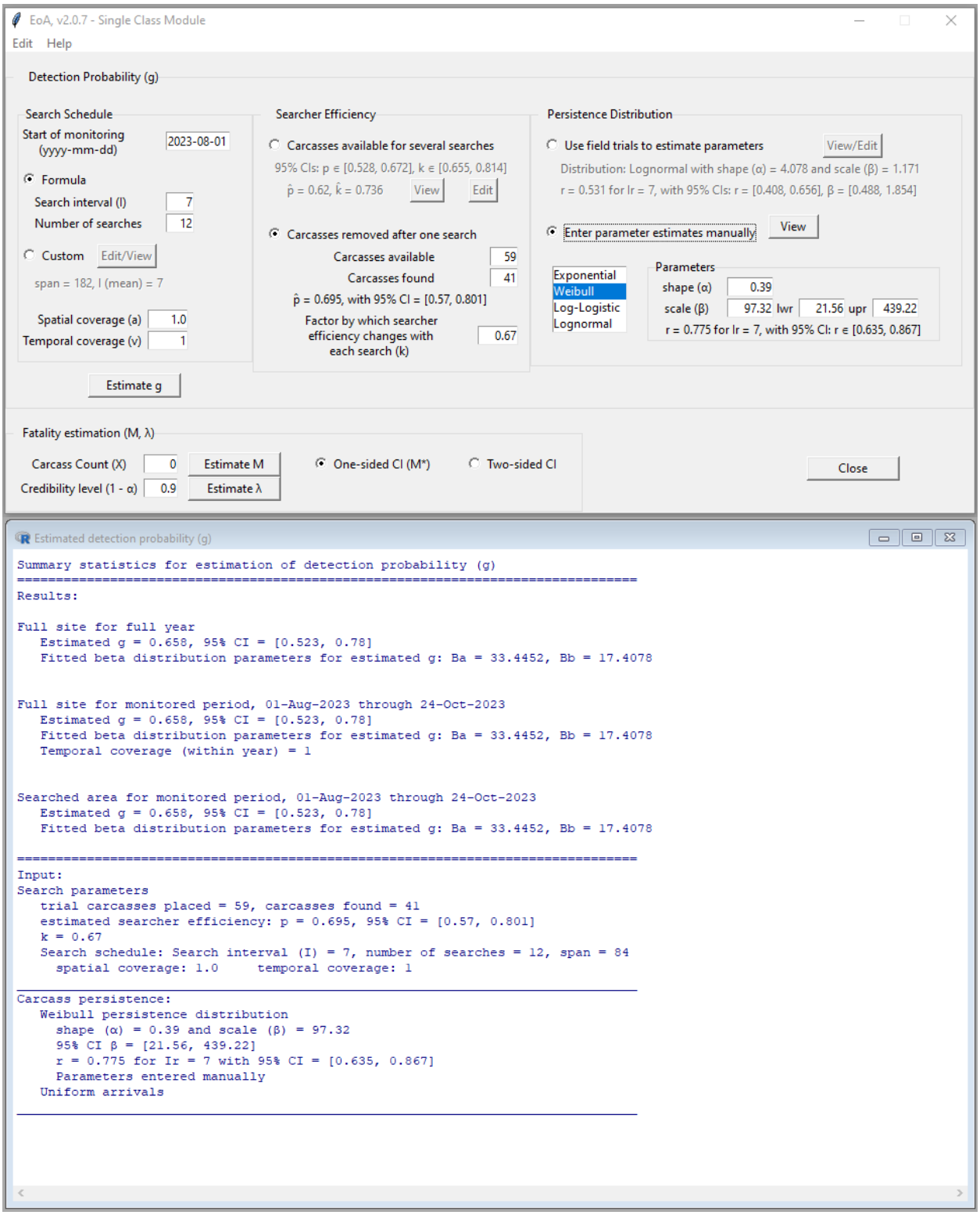
Appendix D20. Screen shot of Evidence of Absence (v2.0.7) graphical user interface, Single Class Module inputs for fall 2023, 70-meter full plot searches at 16 Vestas V82 1.65-megwatt turbines, searched at a 7-day interval.



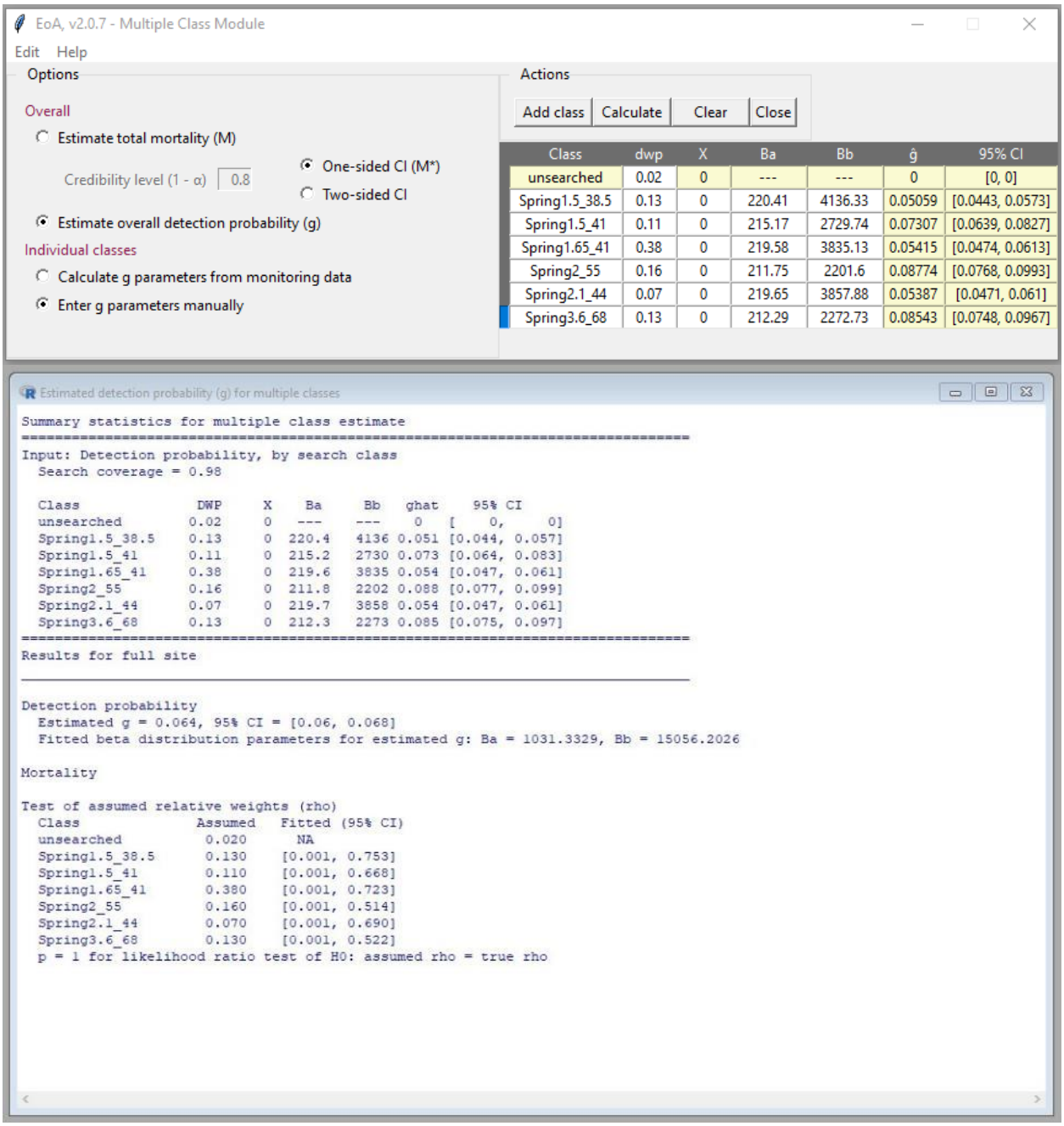
Appendix D21 Screen shot of Evidence of Absence (v2.0.7) graphical user interface, Single Class Module inputs for fall 2023, 70-meter full plot searches at six Suzlon S88 2.1-megawatt turbines, searched at a 7-day interval.



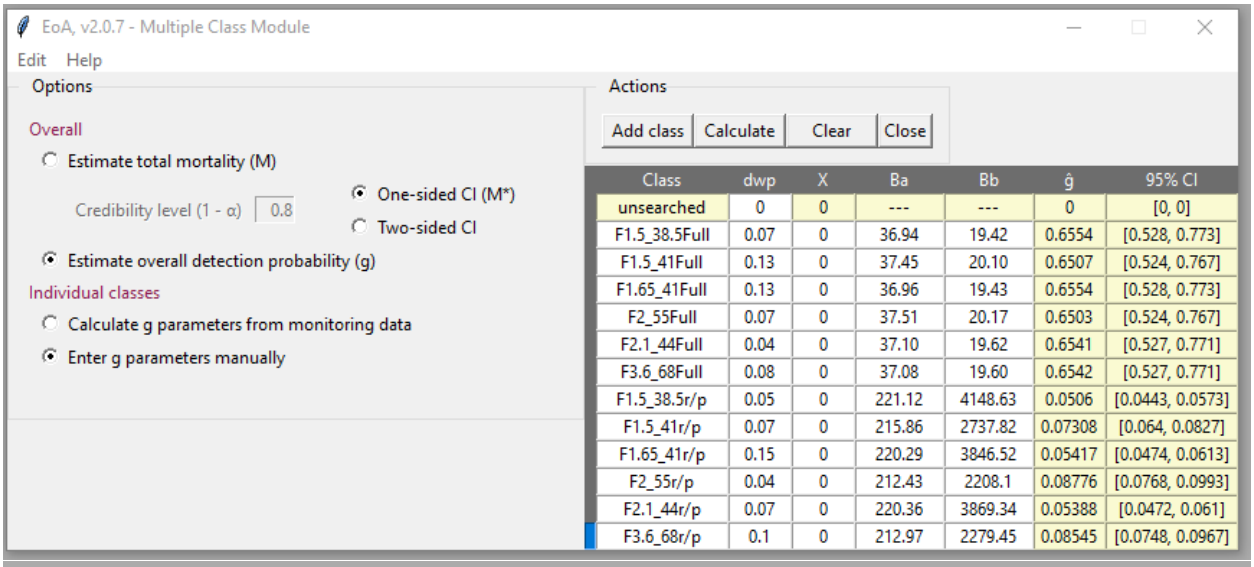
Appendix D22 Screen shot of Evidence of Absence (v2.0.7) graphical user interface, Single Class Module inputs for fall 2023, 70-meter full plot searches at eight Vestas V110 2.0-megawatt turbines, searched at a 7-day interval.



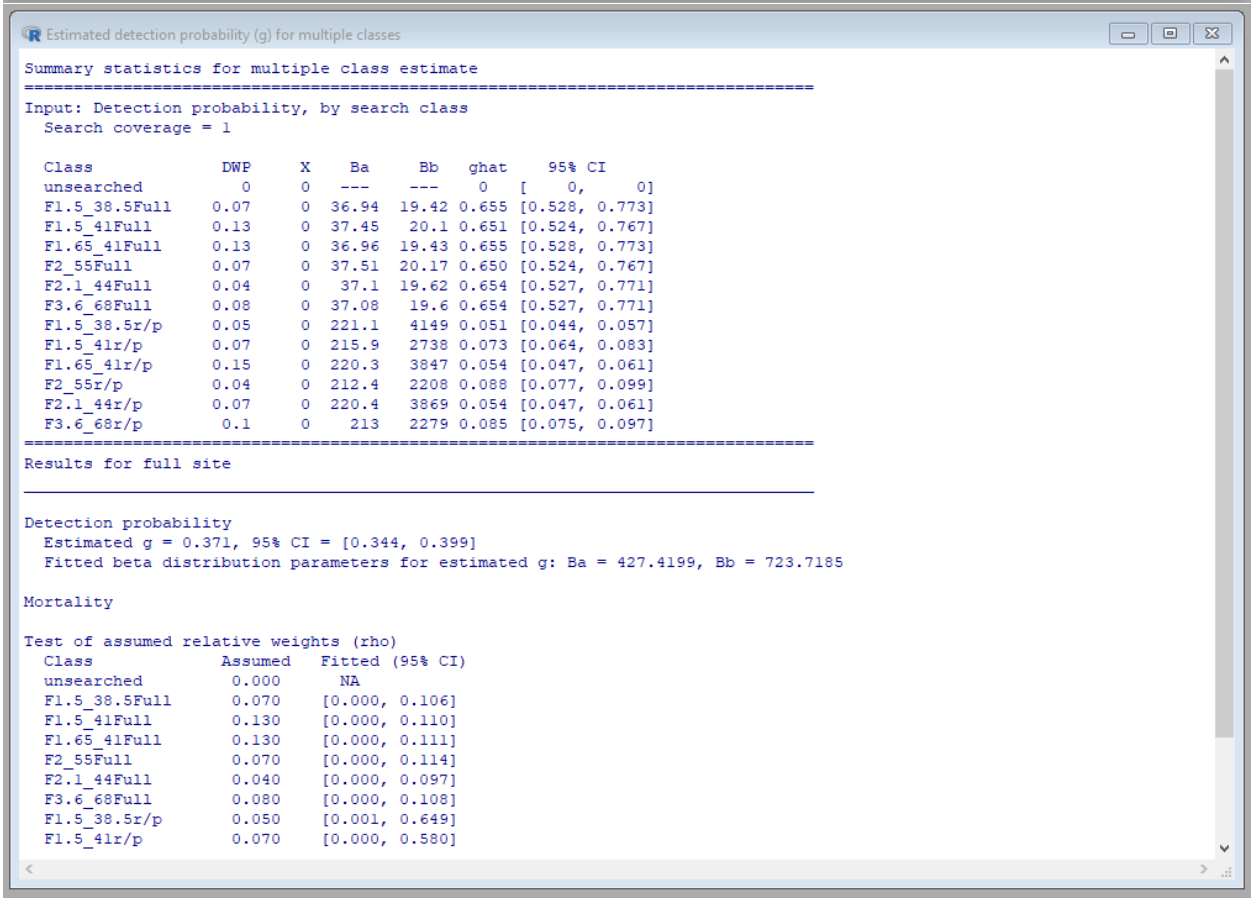
Appendix D23 Screen shot of Evidence of Absence (v2.0.7) graphical user interface, Single Class Module inputs for fall 2023, 70-meter full plot searches at eight Vestas V136 3.6-megawatt turbines, searched at a 7-day interval.



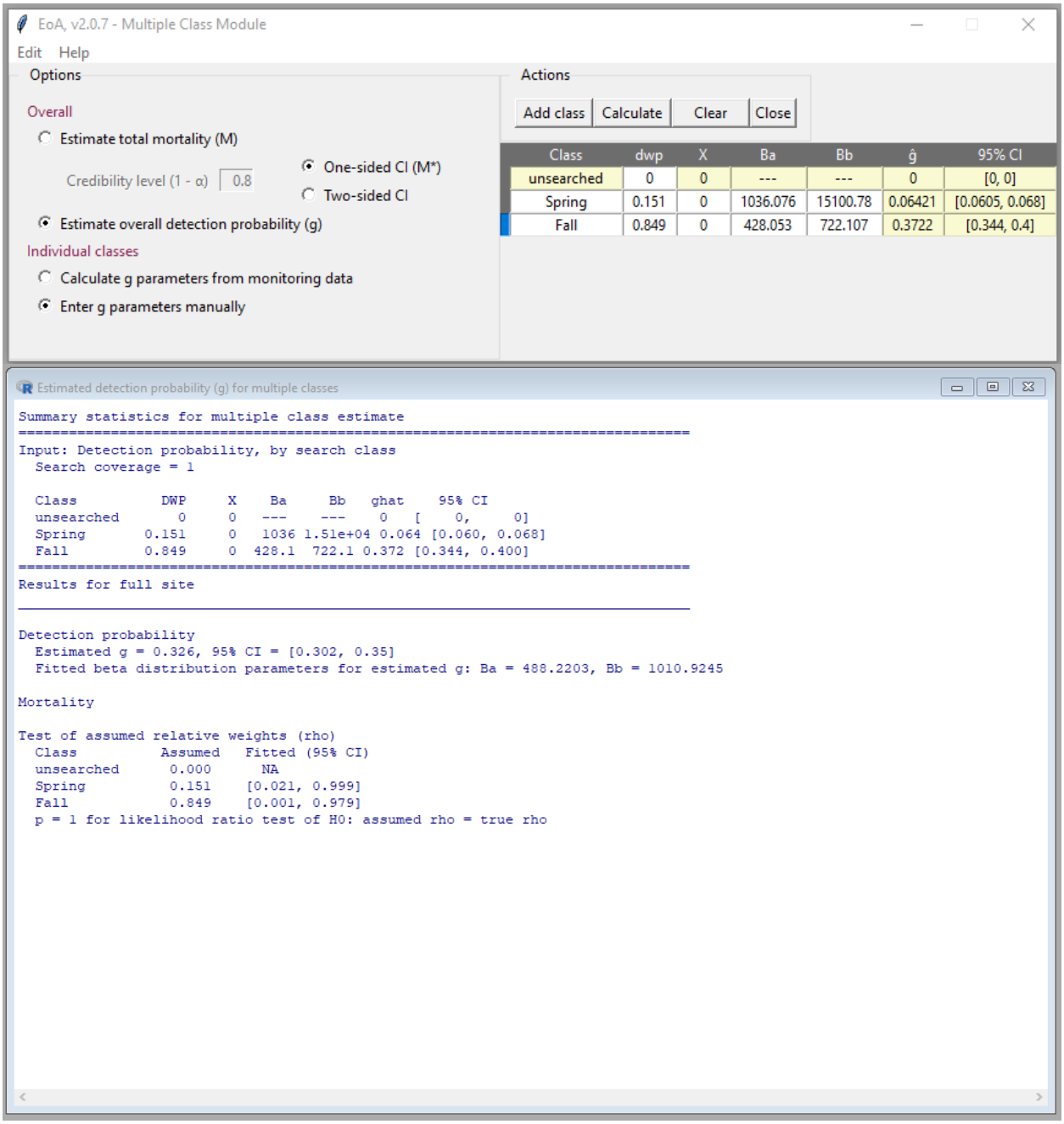
Appendix D24. Screen shot of Evidence of Absence (v2.0.7) graphical user interface, Multiple Class Module inputs for Spring 2023, searches at 109 turbines, searched at a 7-day interval.



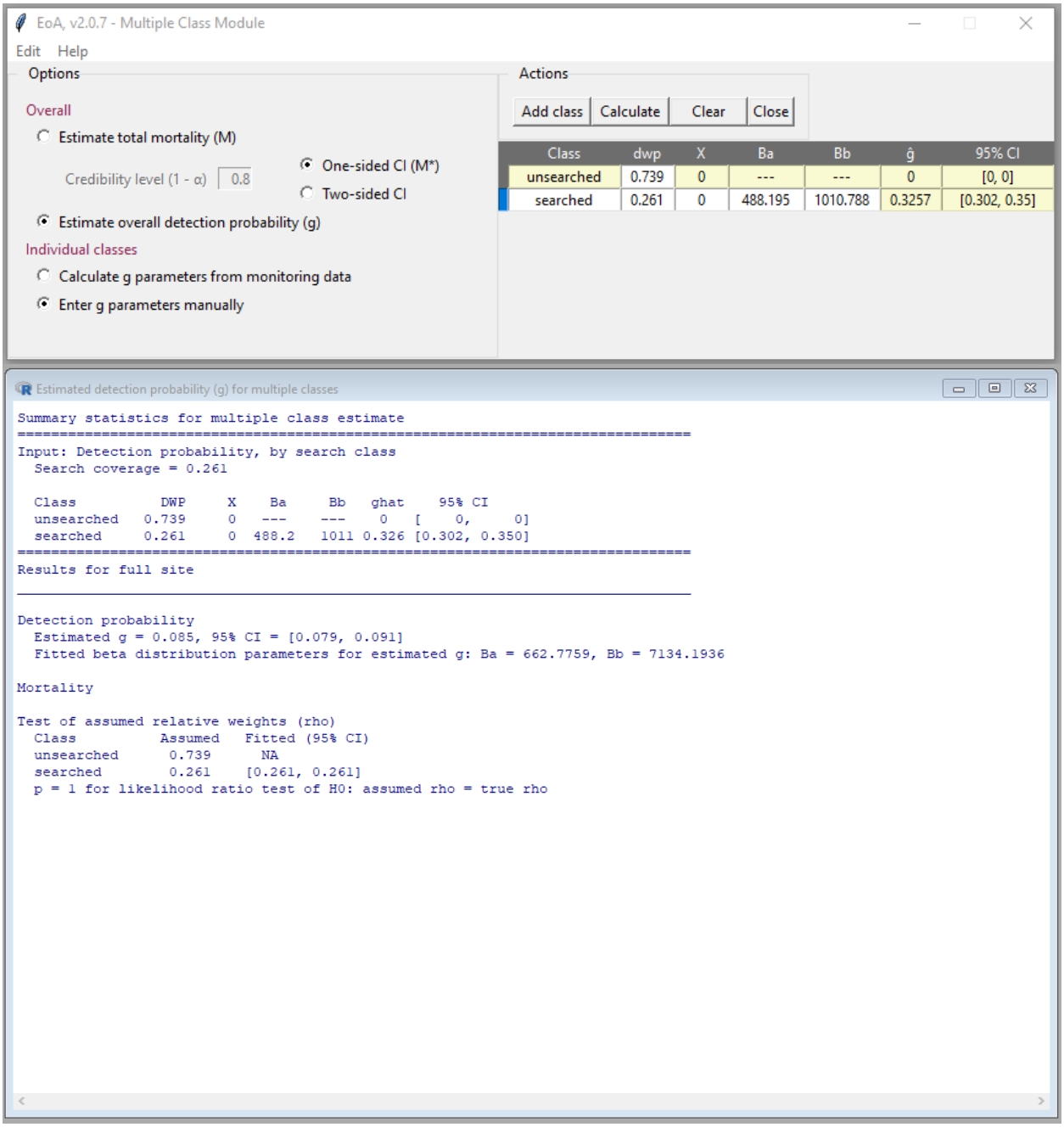
Class	dwp	X	Ba	Bb	ĝ	95% CI
unsearched	0	0	---	---	0	[0, 0]
F1.5_38.5Full	0.07	0	36.94	19.42	0.6554	[0.528, 0.773]
F1.5_41Full	0.13	0	37.45	20.10	0.6507	[0.524, 0.767]
F1.65_41Full	0.13	0	36.96	19.43	0.6554	[0.528, 0.773]
F2_55Full	0.07	0	37.51	20.17	0.6503	[0.524, 0.767]
F2.1_44Full	0.04	0	37.10	19.62	0.6541	[0.527, 0.771]
F3.6_68Full	0.08	0	37.08	19.60	0.6542	[0.527, 0.771]
F1.5_38.5r/p	0.05	0	221.12	4148.63	0.0506	[0.0443, 0.0573]
F1.5_41r/p	0.07	0	215.86	2737.82	0.07308	[0.064, 0.0827]
F1.65_41r/p	0.15	0	220.29	3846.52	0.05417	[0.0474, 0.0613]
F2_55r/p	0.04	0	212.43	2208.1	0.08776	[0.0768, 0.0993]
F2.1_44r/p	0.07	0	220.36	3869.34	0.05388	[0.0472, 0.061]
F3.6_68r/p	0.1	0	212.97	2279.45	0.08545	[0.0748, 0.0967]



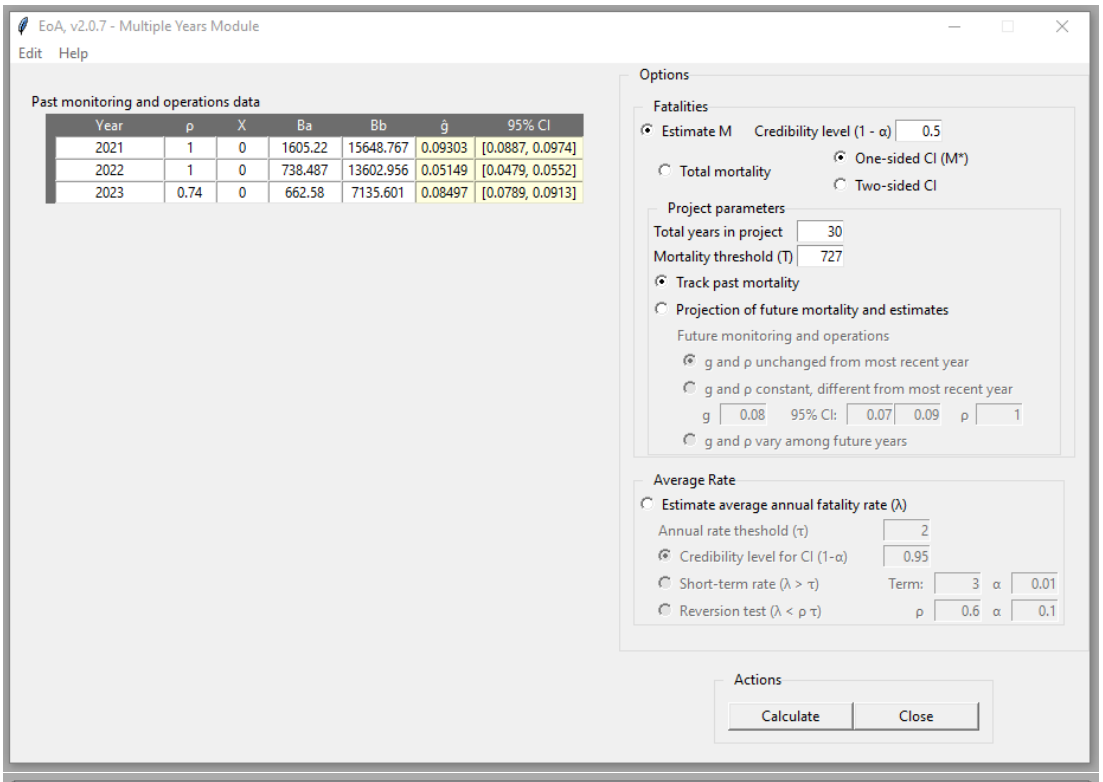
Appendix D25. Screen shot of Evidence of Absence (v2.0.7) graphical user interface, Multiple Class Module inputs for fall 2023, searches at 111 turbines, searched at a 7-day interval.

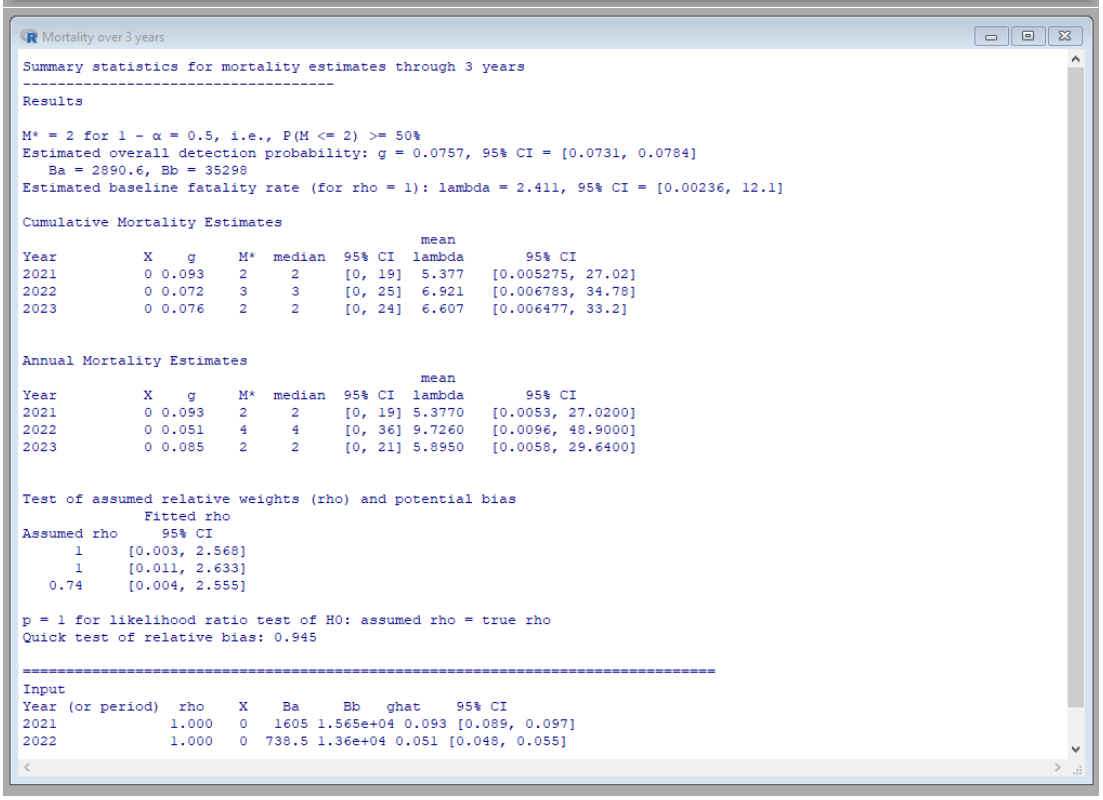


Appendix D26. Screen shot of Evidence of Absence (v2.0.7) graphical user interface, Multiple Class Module inputs and output for Spring and Fall 2023, (n= 109 in spring, 111 in fall), searched at a 7-day interval.

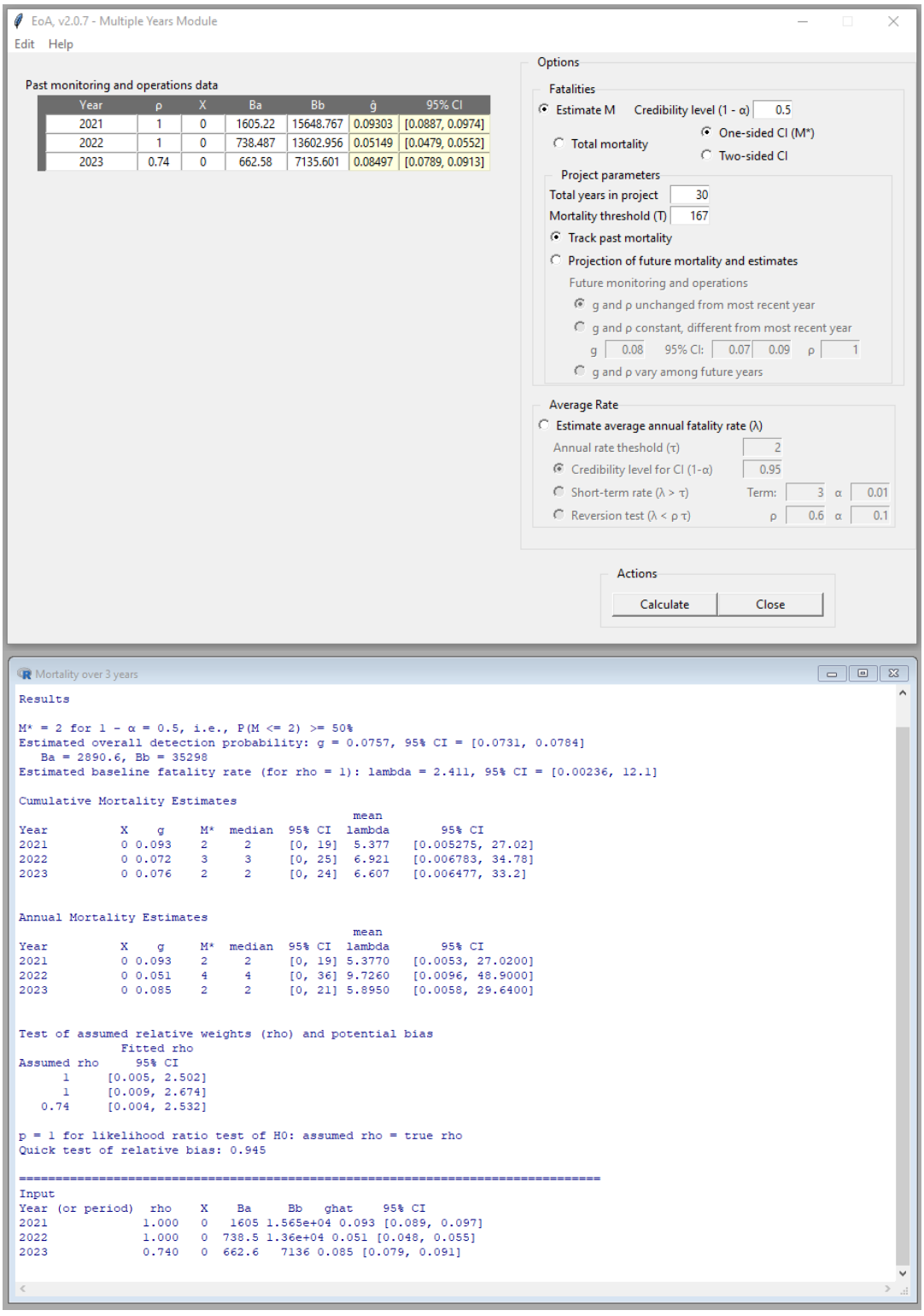


Appendix D27. Screen shot of Evidence of Absence (v2.0.7) graphical user interface, Multiple Class Module inputs and output for searched and unsearched turbines (n= 111 searched, 303 unsearched), searched at a 7-day interval.

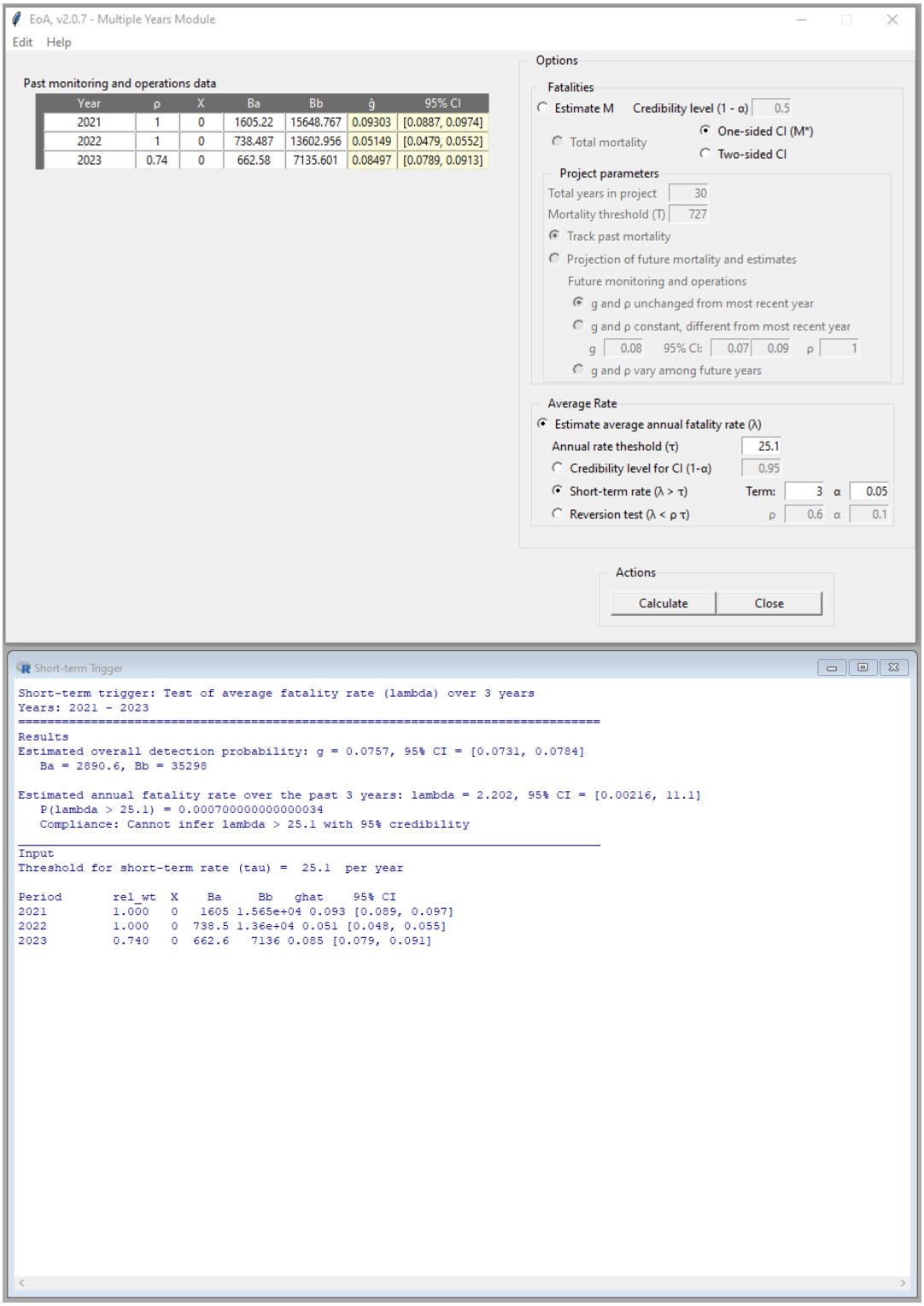




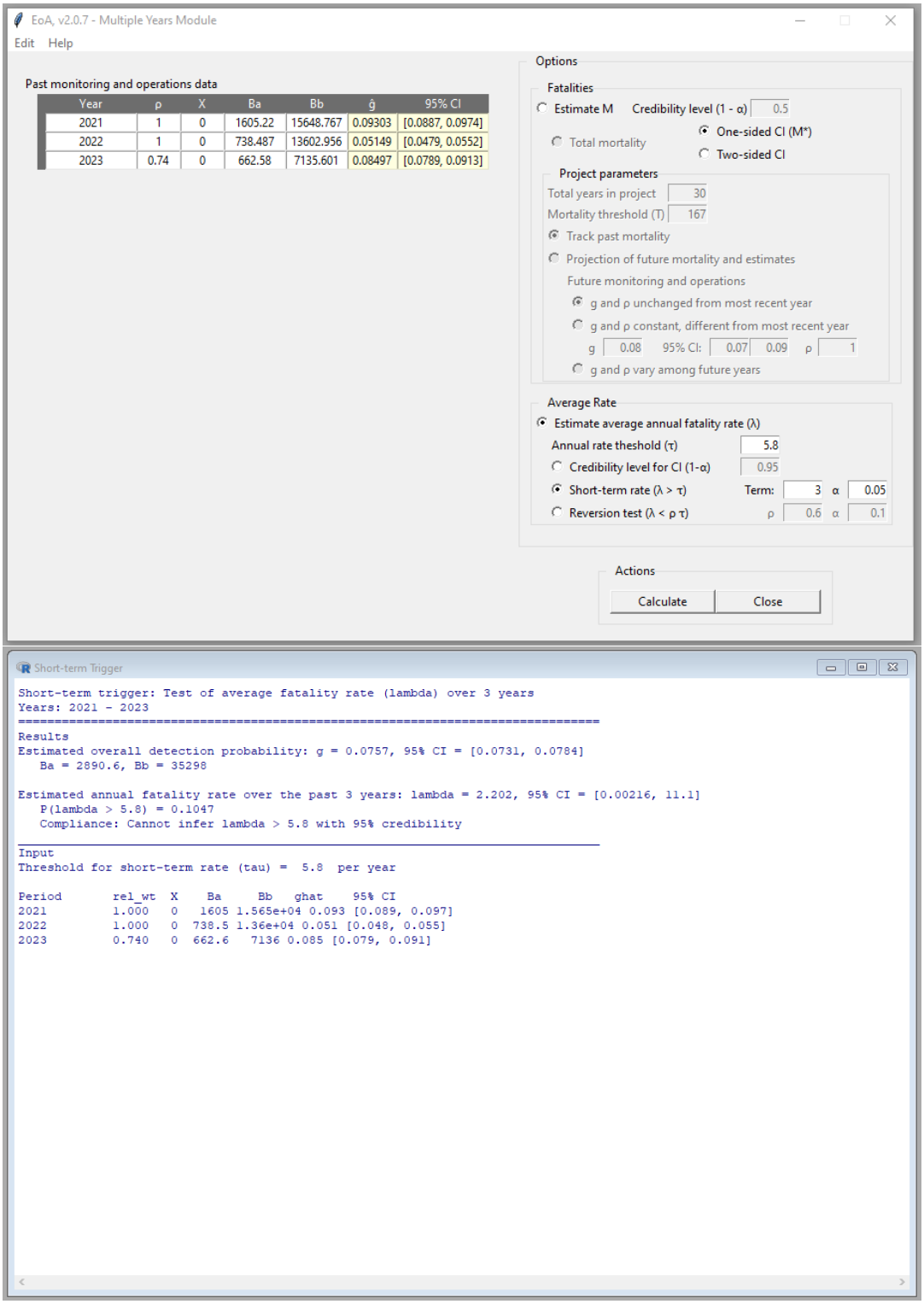
Appendix D28. Inputs and outputs from the Evidence of Absence (v2.0.7) graphical user interface Multiple Year Module for Indiana bat ITP term-to-date detection probability and cumulative take estimate (*M). Inputs are based on values reported in the main text.**



Appendix D29. Inputs and outputs from the Evidence of Absence (v2.0.7) graphical user interface Multiple Year Module for northern long-eared bat ITP term-to-date detection probability and cumulative take estimate (*M). Inputs are based on values reported in the main text.



Appendix D30. Inputs and outputs from the Evidence of Absence (v2.0.7) graphical user interface 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.



Appendix D31. Inputs and outputs from the Evidence of Absence (v2.0.7) graphical user interface Multiple Year Module for northern long-eared bat ITP term-to-date detection probability and cumulative take estimate (*M). Inputs are based on values reported in the main text.**