



Acoustic Monitoring for Bats at Indiana Dunes National Park

Data Summary Report for 2016–2019

Natural Resource Report NPS/GLKN/NRDS—2022/1345



ON THE COVER

Technician checking bat acoustic monitoring equipment at Indiana Dunes National Park.
NPS photo.

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Contents

	Page
Figures.....	v
Tables.....	vii
Appendices.....	ix
Abstract.....	xi
Acknowledgments.....	xi
Introduction.....	1
Methods.....	3
Site Selection.....	3
Data Collection.....	3
Data Management and Analysis.....	4
Results.....	7
Survey Effort.....	7
Automated Classification.....	7
Spatial and Temporal Distribution.....	13
Manual Vetting.....	14
Summary and Conclusions.....	17
Big Brown Bat.....	19
Eastern Red Bat.....	19
Hoary Bat.....	19
Silver-haired Bat.....	20
Evening Bat.....	20
Little Brown Bat.....	20
Northern Long-eared Bat.....	20
Indiana Bat.....	21
Tricolored Bat.....	21
Literature Cited.....	23

Figures

	Page
Figure 1. Bat monitoring sites at Indiana Dunes National Park.....	4
Figure 2. Yearly survey effort at Indiana Dunes National Park, 2016–2019.....	7
Figure 3. Percent of audio files classified by Kaleidoscope Pro as bat species vs. unknown bats vs. noise, corrupt, and excluded files, Indiana Dunes National Park, 2016–2019.....	8
Figure 4. Proportion of files classified to each species each year, Indiana Dunes National Park, 2016–2019.	9
Figure 5. Proportion of files classified to each species each year relative to all other species, Indiana Dunes National Park, 2016–2019.....	10
Figure 6. Parkwide call files per recording night by species and year, Indiana Dunes National Park, 2016–2019.....	11
Figure 7. Call files per recording night for each species and for all species combined, by year, Indiana Dunes National Park, 2016–2019.....	12
Figure 8. Proportion of monitoring sites where each species was detected each year, Indiana Dunes National Park, 2016–2019.	13
Figure 9. Proportion of recording nights on which each species was detected each year, Indiana Dunes National Park, 2016–2019..	14
Figure E-1. Percent of audio files classified as noise for each detector model (mean ± 95% confidence interval).	37
Figure E2. Percent of audio files classified as noise for each sampling site at Indiana Dunes National Park, 2016–2019.	38
Figure H1. Percent of audio files classified as each bat species by Kaleidoscope Pro in the baseline analysis for each park and year.	62

Tables

	Page
Table 1. Bat species occurrences recorded at Indiana Dunes National Park prior to the initiation of the GLKN acoustic monitoring program in 2016 and method(s) by which the species were documented.....	2
Table 2. Summary of bat species documented at Indiana Dunes National Park through automated classification and manual vetting of acoustic files.	18
Table A1. Nine bat species are found in the Great Lakes region.	27
Table C1. Earliest and latest dates equipment was deployed, number of deployments in each category, and total number of files recorded for each survey year, Indiana Dunes National Park, 2016–2019.....	31
Table C2. Total number of sites, recording nights, files recorded, and mean recording nights per site, mean files per site, and mean files per recording night for each survey year’s valid deployments only, Indiana Dunes National Park, 2016–2019	31
Table D1. Total number of audio files recorded, and number and percent classified by Kaleidoscope Pro as bat species vs. unknown bats vs. noise for each survey year, Indiana Dunes National Park, 2016–2019.	33
Table D2. Total number of audio files classified as each bat species by Kaleidoscope Pro for each survey year, Indiana Dunes National Park, 2016–2019.....	33
Table D3. Percent of audio files classified as each bat species by Kaleidoscope Pro for each survey year, Indiana Dunes National Park, 2016–2019.....	34
Table D4. Total number of monitoring sites, and count of sites where each species was detected for each survey year, Indiana Dunes National Park, 2016–2019.....	34
Table D5. Total number of monitoring sites, and percent of sites where each species was detected for each survey year, Indiana Dunes National Park, 2016–2019.....	34
Table D6. Total number of recording nights, and count of recording nights on which each species was detected for each survey year, Indiana Dunes National Park, 2016–2019.....	35
Table D7. Total number of recording nights, and percent of recording nights on which each species was detected for each survey year, Indiana Dunes National Park, 2016–2019.....	35
Table E1. Mean percent of audio files classified as noise for each sampling site at Indiana Dunes National Park, 2016–2019.	38
Table F1. Total number of files manually vetted, and the results of manual vetting for each year and species, Indiana Dunes National Park, 2016–2019.....	41

Tables (continued)

	Page
Table G1. Total number of files manually vetted, and the results of manual vetting for each year, site, and species, Indiana Dunes National Park, 2016–2019.	43

Appendices

	Page
Appendix A. Bat Species of the Great Lakes Region	27
Appendix B. Analysis Settings for Kaleidoscope Pro	29
Appendix C. Yearly Deployment Data	31
Appendix D. Automated Classification Results	33
Appendix E. Noise Assessment	37
Appendix F. Manual Vetting Results for Entire Park.....	41
Appendix G. Manual Vetting Results by Site.....	43
Appendix H. Species Composition Across Parks	61

Abstract

The Great Lakes Inventory and Monitoring Network initiated an acoustic monitoring program for bats in 2015. At Indiana Dunes National Park, monitoring began in 2016. This report presents results for the 2016–2019 surveys. Acoustic recordings were analyzed using the software program Kaleidoscope Pro and a subset of files were manually reviewed to confirm species identifications. Seven of the eight bat species previously documented at the park were reconfirmed. These include big brown bat, eastern red bat, hoary bat, silver-haired bat, evening bat, little brown bat, and tricolored bat. In addition, the Kaleidoscope software classified some acoustic files to northern long-eared bat and Indiana bat, however none of these recordings were verified through manual vetting. Activity levels for six of the nine species (big brown bat, hoary bat, silver-haired bat, evening bat, northern long-eared bat, and Indiana bat) appeared to be stable or slightly increasing. For northern long-eared and Indiana bats, observed activity levels were very low in all four years, so we may not have adequate data to assess trends for those species. The remaining three species (eastern red bat, little brown bat, and tricolored bat) showed slightly decreasing trends.

Acknowledgments

This work would not have been possible without all the park employees, partners, and volunteers who completed field surveys and provided logistical support, including R. Knutson, A. Derkacz, J. Pullen, R. Bokota, K. Rushmore, K. Duh, and K. McGowan. We thank K. Gilland and others at Normandeau Associates for data processing and manual vetting, and R. Key for database development and assistance with data management. R. Knutson and T. Gostomski reviewed earlier drafts of this report. Funding for this monitoring effort was provided by the National Park Service's Natural Resource Stewardship and Science Directorate White-Nose Syndrome program.

Introduction

North American bat populations are threatened by a number of environmental pressures including the fungal disease white-nose syndrome (WNS), mortality from wind turbines, and changing land use and climatic conditions. Due to these conservation concerns, the National Park Service (NPS) and other federal agencies have begun implementing or expanding bat research and monitoring programs (Loeb et al. 2015, Rodhouse et al. 2016, Rodriguez et al. 2019). The NPS has funded over 150 bat-focused research, conservation, and education projects at 78 parks since 2013 (National Park Service 2016).

In 2015, the Great Lakes Inventory and Monitoring Network (GLKN) and the network parks established a bat acoustic monitoring program with a particular focus on documenting the impacts of WNS. When the project was initiated, the Great Lakes region was at the leading edge of the disease's spread, with WNS documented within 50 miles of most parks (U.S. Geological Survey 2019). GLKN's monitoring program is helping parks to document baseline data on their bat populations and assess changes over time. Indiana Dunes National Park (INDU) has participated in this monitoring program since 2016.

Nine species of bats are found in the Great Lakes region (Kurta 2017), detailed in Appendix A. All are insectivores belonging to the Family Vespertilionidae, the largest and most common group of bats in North America. Great Lakes bat species can be divided into two groups: tree-roosting, migratory bats and cavity-roosting, hibernating bats. The hibernating species are highly susceptible to WNS, except for big brown bats (*Eptesicus fuscus*), which show greater resistance to the disease and experience less severe infections (Frank et al. 2014, Moore et al. 2018).

The U.S. Fish and Wildlife Service lists the Indiana bat (*Myotis sodalis*) as federally endangered and the northern long-eared bat (*Myotis septentrionalis*) as federally threatened under the Endangered Species Act (U.S. Fish and Wildlife Service 1967, 2016). Furthermore, all nine Great Lakes bat species are listed by one or more states as endangered, threatened, or of special concern (Michigan Natural Features Inventory 2009, Minnesota Department of Natural Resources 2013, Wisconsin Department of Natural Resources 2016, Indiana Division of Fish & Wildlife 2020) (Appendix A).

Prior to the initiation of the GLKN bat acoustic monitoring program, a total of eight species had been documented at INDU (Table 1). Historical records include observations of the silver-haired bat (*Lasionycteris noctivagans*) (Hahn 1909), eastern red bat (*Lasiurus borealis*) (Lyon 1922), and big brown bat (Rand and Rand 1951) in the area now designated as the park. Mumford and Cope (1964) reported records of these same three species in Porter and LaPorte counties plus the evening bat (*Nycticeius humeralis*), though it is not specified where in the county these records were from.

Comprehensive mammal surveys were completed at INDU in 1987–1989 (Whitaker et al. 1994). They documented three species of bats (eastern red, silver-haired, and big brown) through mist-netting and roost observations but suggested that additional bat species are likely present. Whitaker et al. (1994) also noted an unverified record of the little brown bat (*Myotis lucifugus*) from a study in 1975–1980, and a single evening bat specimen collected in 1958.

Table 1. Bat species occurrences recorded at Indiana Dunes National Park prior to the initiation of the GLKN acoustic monitoring program in 2016 and method(s) by which the species were documented. Data sources include Hahn (1909), Lyon (1922), Rand and Rand (1951), Whitaker et al. (1994), Brookhart (2003), Kurta et al. (2007), Byrne (2014), and Shier et al. (2015). Ranges are as shown in Kurta (2017).

Species Name	Prior Records	Methods Used
Big Brown Bat <i>Eptesicus fuscus</i>	Yes	Acoustic, Capture, Direct Observation, Specimen Collected
Eastern Red Bat <i>Lasiurus borealis</i>	Yes	Acoustic, Capture, Direct Observation, Specimen Collected
Hoary Bat <i>Lasiurus cinereus</i>	Yes	Acoustic
Silver-haired Bat <i>Lasionycteris noctivagans</i>	Yes	Acoustic, Capture, Direct Observation, Specimen Collected
Little Brown Bat <i>Myotis lucifugus</i>	Yes	Acoustic*, Capture
Northern Long-eared Bat <i>Myotis septentrionalis</i>	Possible, within range	Acoustic*
Indiana Bat <i>Myotis sodalis</i>	Yes	Acoustic*, Capture
Evening Bat <i>Nycticeius humeralis</i>	Yes	Acoustic*, Specimen Collected
Tricolored Bat <i>Perimyotis subflavus</i>	Yes	Acoustic, Capture

* indicates acoustic files were identified only to the level of a species pair or group

More recent survey efforts have provided additional species verifications for the park. In 2003, mist-netting resulted in captures of four species, reconfirming earlier records for big brown and eastern red bats plus adding new records for little brown and Indiana bats (Brookhart 2003). In 2005, the tricolored bat (*Perimyotis subflavus*) was verified at INDU, with two individuals captured (Kurta et al. 2007). Acoustic surveys in 2014 recorded a total of five species plus call sequences that were identified to the *Myotis* group and to the species pair eastern red bat/evening bat (Byrne 2014, Shier et al. 2015).

Although the known range of the northern long-eared bat overlaps with INDU (Kurta 2017), this species has not been definitively confirmed in the park. However, a northern long-eared bat was captured in 2003 less than 25 miles away (Brookhart 2003). This species is very likely to be present in the park given its known range.

Methods

Bat acoustic monitoring at INDU was conducted according to the protocol and standard operating procedures developed by GLKN (Goodwin 2020). Initial protocol development was done in coordination with an outside consultant, Western EcoSystems Technology, Inc. (Gruver et al. 2016). Although methods were revised by GLKN after the 2015 season of monitoring, the majority of the sampling procedures were consistent across all years.

Site Selection

GLKN utilizes a probabilistic sample design based on the creation of a master sample, as described by Larsen et al. (2008). The sampling frame for each park consists of a finite grid of 1 km² cells. For some parks certain areas were excluded from the sampling frame *a priori* based on inaccessibility from roads, trails, or shorelines. Using the Generalized Random Tessellation Stratified (GRTS) algorithm, cells within the sampling frame were arranged into an ordered list, referred to as the “master sample”; this list is both randomized and spatially balanced (Stevens and Olsen 2004). Cells to be sampled were identified by working through the master sample list in numerical order, starting with Cell #001. Each cell was evaluated for accessibility and safety to determine if it should be included. Omitted cells were documented to justify the reason for exclusion.

At INDU, the GRTS design was used beginning in 2016. A total of 30 cells were selected for sampling, equivalent to approximately 21% of the park’s sampling frame. The selected cells have been used from 2016 onward.

The cell is defined as the 1 km² area that is selected for sampling. The site is defined as the exact location within the cell where the acoustic recording equipment is placed. Sites were chosen by identifying locations that were reasonably accessible and had suitable bat habitat such as travel corridors (e.g., cut line, road, trail, or forest edge) or foraging areas (e.g., wetland). As much as possible, sites were located away from dense vegetative clutter, buildings, or open water to optimize recording quality. Each site was assigned a Site ID based on the cell’s GRTS order number, in the format INDU001A. A map of INDU sample sites is provided in Figure 1.

Data Collection

Acoustic monitoring is conducted during the summer, from 1 June–15 August. The same sites are monitored each year in approximately the same order and at approximately the same time of year, to facilitate estimation of long-term trends. Each site is sampled once per year, for a period of 7–14 consecutive nights. Detectors are programmed to record every night from 6:00 p.m. to 8:00 a.m.

One acoustic detector with an external ultrasonic microphone is deployed at each survey site to passively record bat echolocation calls. Equipment used at INDU includes Wildlife Acoustics Song Meter SM3BAT and Song Meter SM4BAT-FS detectors and Wildlife Acoustics SMM-U1 microphones. Recordings are collected in full-spectrum format and stored as WAV files on SD cards mounted in the detector. Field technicians complete a datasheet for each deployment and collect site photographs and GPS coordinates. After retrieving equipment, the WAV files and detector program/status files are downloaded.

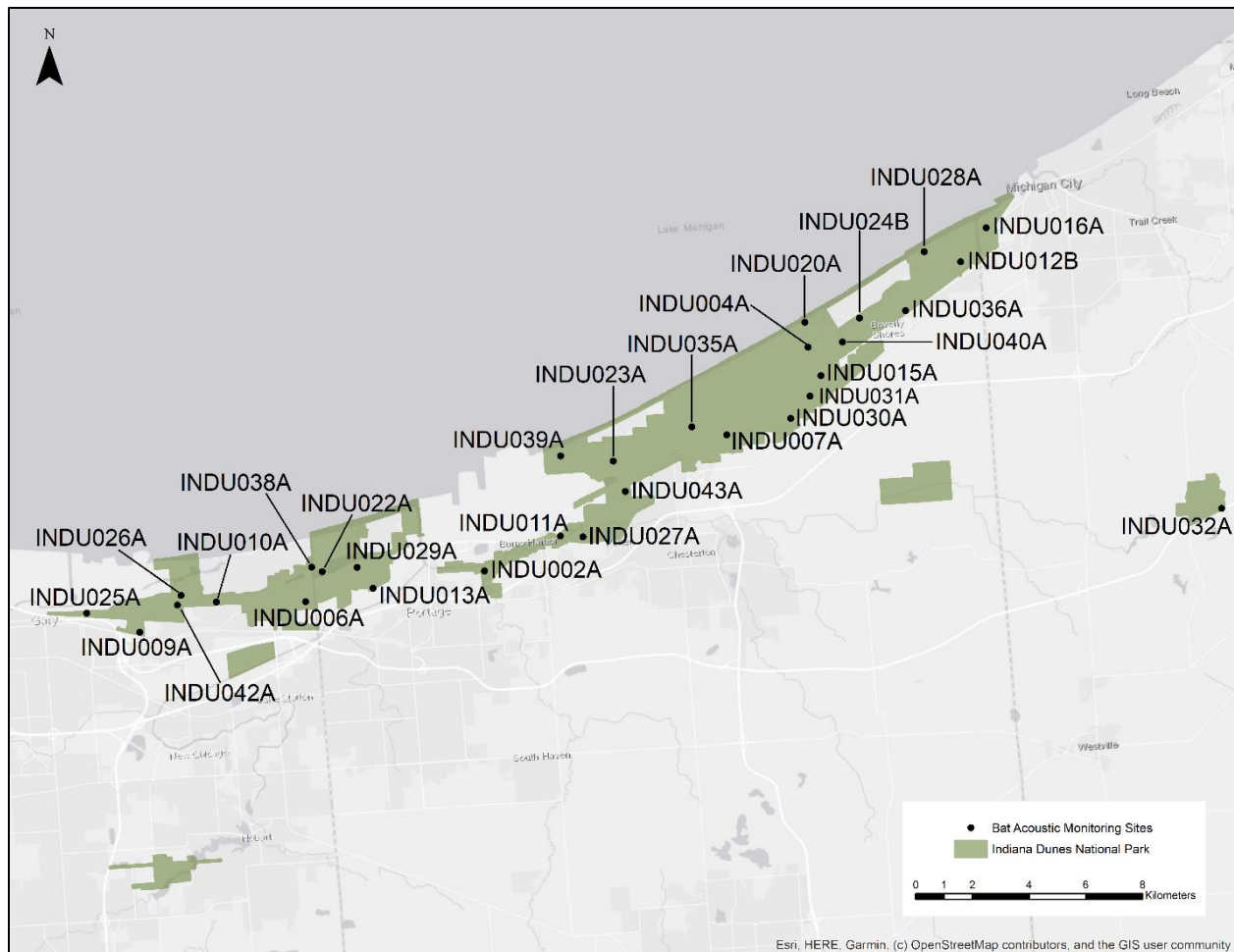


Figure 1. Bat monitoring sites at Indiana Dunes National Park. Sites shown were established in 2016 and used each year since, with the exception of INDU012, which was relocated from the “A” site to the “B” site in 2017, and INDU024, which was relocated from the “A” site to the “B” site in 2019. The westernmost outlying section of the park (Hoosier Prairie State Nature Preserve) is not included in this map because no monitoring sites were located there.

Data Management and Analysis

Field technicians are responsible for data organization and securely storing data at the INDU office. At the conclusion of the field season, all data are submitted to GLKN for quality assurance/quality control, entry into the bat monitoring database, data analysis, and data archiving.

For 2016–2019 data, GLKN contracted with an outside consultant (Normandeau Associates) to process acoustic files and obtain species classifications. Each deployment was categorized as valid or not valid. Valid deployments were those that had at least four nights of successful recording during the protocol sampling period (1 June–15 August). In some cases, there was more than one valid deployment per year at a particular site. When this occurred, the first valid deployment was categorized as “valid” and the remaining were categorized as “valid (duplicate)”. A deployment categorized as “failed” indicates it was unsuccessful due to equipment malfunction, improper programming, and/or vandalism. “Failed (short)” indicates the deployment was unsuccessful only

because the minimum required four nights of recording were not completed. “Early” and “late” categories designate deployments that occurred either before 1 June or after 15 August, and thus were outside the protocol sampling period. Finally, “nonprotocol” indicates deployments that were completed for park-specific monitoring goals at locations that were selected intentionally, rather than following the GRTS sample design. Non-valid deployments (including those categorized as “valid (duplicate)”) were excluded from all further analyses.

Normandeau Associates used an automated acoustic analysis software program to filter out noise and assign species classifications to audio files. The specific program used was Wildlife Acoustics Kaleidoscope Pro Version 4.0.0 (2016–2018) or Version 5.0.3 (2019), with the Bats of North America Classifier Version 3.1.0 and the “–1 More Sensitive” setting. During Kaleidoscope processing, the software assigned each audio file a species-level classification where possible. Files not classified to a particular species were labeled “No ID” if they contained unknown bat calls, otherwise they were labeled “Noise”. The software did not process files that were corrupt or unreadable. Files from incomplete recording nights (less than six hours of recording) were also excluded from processing.

Kaleidoscope Pro allows the user to customize a list of possible bat species that will be considered during the classification process. This allows for the exclusion of any species not found in the study area, reducing the chance of obtaining false positive results. GLKN determined which species have known ranges within the boundaries of INDU based on published range maps (Harvey et al. 2011, Rodhouse et al. 2016, Kurta 2017). For INDU, the list of possible species included all nine Great Lakes species (Appendix A). No additional species were allowed as candidates for the software analysis. Complete analysis settings used in Kaleidoscope Pro are provided in Appendix B.

Kaleidoscope Pro and other similar acoustic analysis programs are not 100% accurate. Software classification results are expected to include some errors due to the similarity of echolocation calls among different species, variation of calls within the same species, poor quality or truncated calls, clutter effects, or multiple bats recorded simultaneously (Britzke et al. 2013, Reichert et al. 2018). Therefore, manual review (manual vetting) of call files by a qualified biologist is an important secondary step to verify the results produced by the software.

Due to the enormous quantity of data collected by the GLKN monitoring program, it is not feasible to manually review all files. From each year’s dataset, Normandeau Associates randomly selected approximately 1% of the files that Kaleidoscope Pro identified to the species level (i.e., excluding noise and unknown bats). To ensure all species were proportionally represented, this consisted of 1% of the files identified to each species, with a required minimum of 10 files per species unless there were fewer than 10 files available. Files selected for manual vetting were chosen and prepared by a different individual than the biologist doing the reviewing. Potentially identifying information such as site location and date were removed from the file name. Manual vetting was performed by a qualified biologist from Normandeau Associates, who was provided with a list of possible species to consider. However, to ensure an independent assessment, the manual reviewer did not know how the Kaleidoscope software had identified each file. Manual identifications were based on call characteristics such as shape, frequency, and duration, using published reference materials and call

libraries. The manual reviewer assigned a species or species group (e.g., unknown high frequency or unknown low frequency) to each audio file, assuming it contained bat calls of sufficient quality. The reviewer could also determine that a file did not contain bat echolocation calls and contained only noise. Following processing, results of both automated software classification and manual vetting were incorporated into GLKN's bat monitoring database.

Acoustic monitoring by the above-described methods does not allow estimation of population size or number of individual bats detected. Instead, data are presented in terms of species composition (percent of total files assigned to each species), activity levels (call files per recording night), and spatial and temporal distribution (percent of sites and percent of recording nights with positive detections), using the results of the Kaleidoscope Pro analysis. Manual vetting results are presented in terms of the number of vetted calls that were verified. For simplicity, results for vetted calls that were not verified are not broken down by species in this report, but those data are available if needed for future analyses. Misclassification rates, as derived from the manual vetting process, have not been applied to the Kaleidoscope Pro results; data presented reflect the original outputs from the software.

Results

Survey Effort

Acoustic monitoring took place at INDU during the years 2016 to 2019. There were 27 to 30 valid deployments per year. This report provides results only for the sites that had valid deployments.

Monitoring occurred over a total of 280 to 328 nights of recording. The number of audio files collected per year ranged from 84,713 to 111,416. Yearly survey effort and deployment information are summarized in Figure 2 and Appendix C.

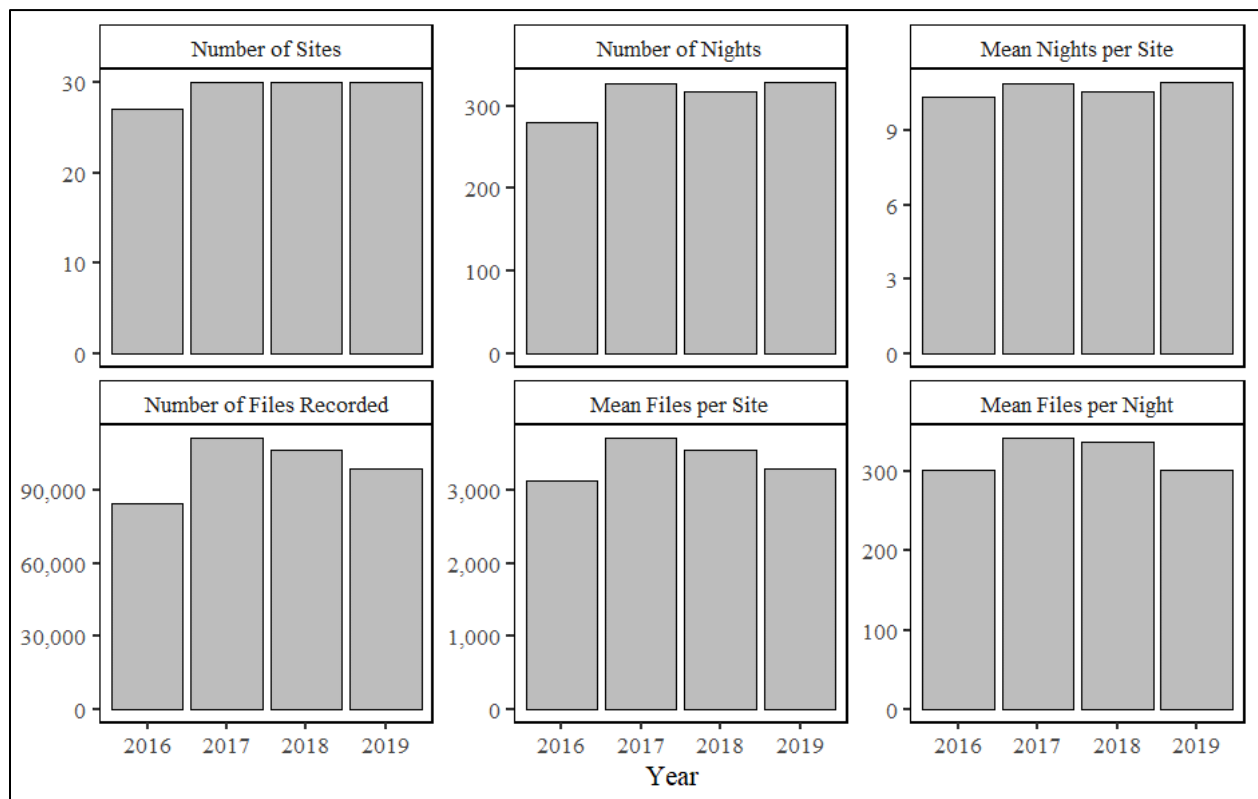


Figure 2. Yearly survey effort at Indiana Dunes National Park, 2016–2019. *Top, left to right:* Number of sites, number of nights, and mean nights per site; *bottom, left to right:* total number of audio files recorded, mean files per site, and mean files per night. Number of files is prior to classification (i.e., includes noise).

Automated Classification

A majority of files (72%–83% per year) were identified to the species level by Kaleidoscope Pro (Figure 3, Appendix D). Of the remainder, most were noise, corrupt, or excluded files and only a small percentage were classified as unknown bats. The two detector models (SM3BAT and SM4BAT-FS) were similar in terms of percent noise (data from all parks combined) but noise levels varied across the different INDU sampling sites (Appendix E).

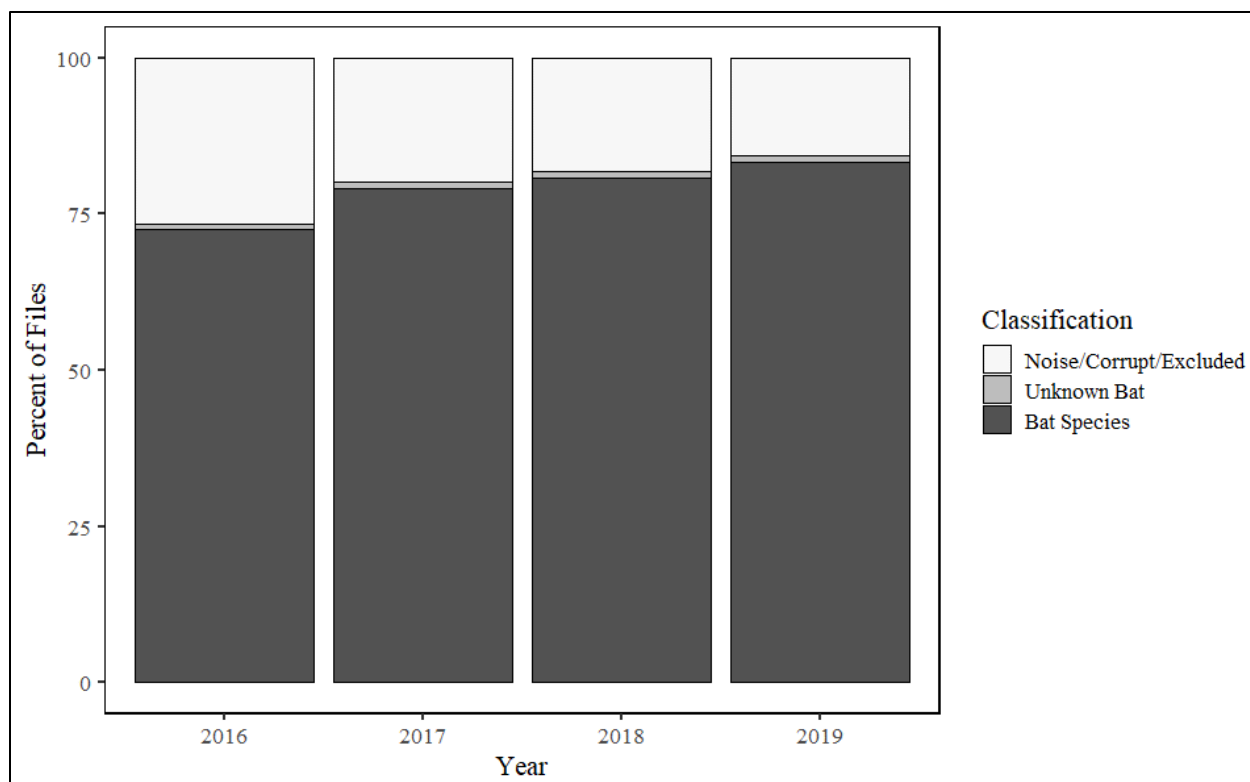


Figure 3. Percent of audio files classified by Kaleidoscope Pro as bat species vs. unknown bats vs. noise, corrupt, and excluded files, Indiana Dunes National Park, 2016–2019.

Kaleidoscope Pro automated classification resulted in audio files being assigned to a total of nine species. For the subset of files that were successfully assigned a species-level classification, the percent classified to each species in each year is shown in Figure 4. The most notable changes over the four-year survey period for individual species were a decrease in the percentage of eastern red bat files and an increase in the percentage of big brown bat files. Slight increases were also observed in the percentage of files attributed to hoary and silver-haired bats, and a slight decrease for evening bat.

Eastern red bat made up the largest proportion of files in 2016 (35%), while big brown bat made up the largest proportion of files in 2017–2019 (42%–50%) (Figure 5). Big brown and eastern red bat files were numerous every year, but four species were rarely recorded. Little brown, northern long-eared, Indiana, and tricolored bats never accounted for more than 3% of files per species, and often less than 1%. File counts and percentages are provided in Appendix D.

Call files per recording night were calculated on both the park level and individual site level, using the results of the automated classification by Kaleidoscope. Parkwide, total call files per recording night were highest in 2017 and 2018, and somewhat lower in 2016 and 2019 (Figure 6).

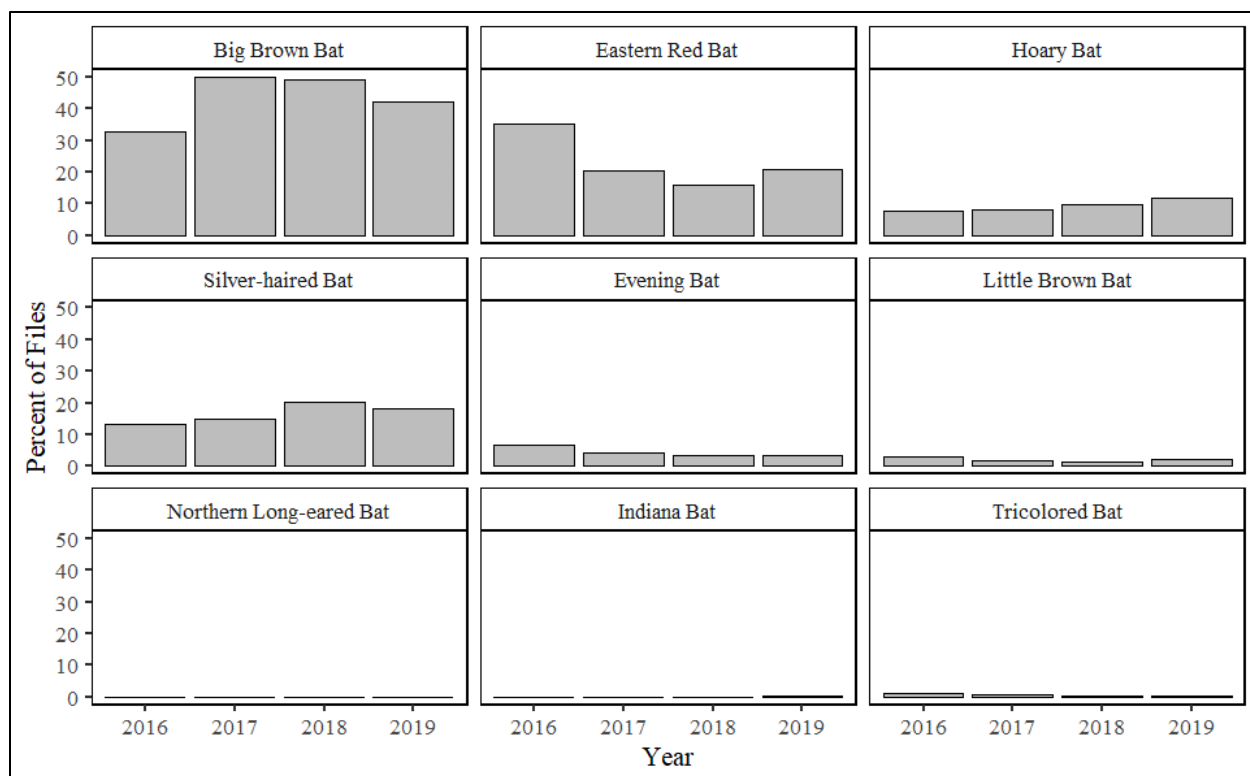


Figure 4. Proportion of files classified to each species each year, Indiana Dunes National Park, 2016–2019. Includes only the subset of files successfully assigned a species-level classification by Kaleidoscope Pro.

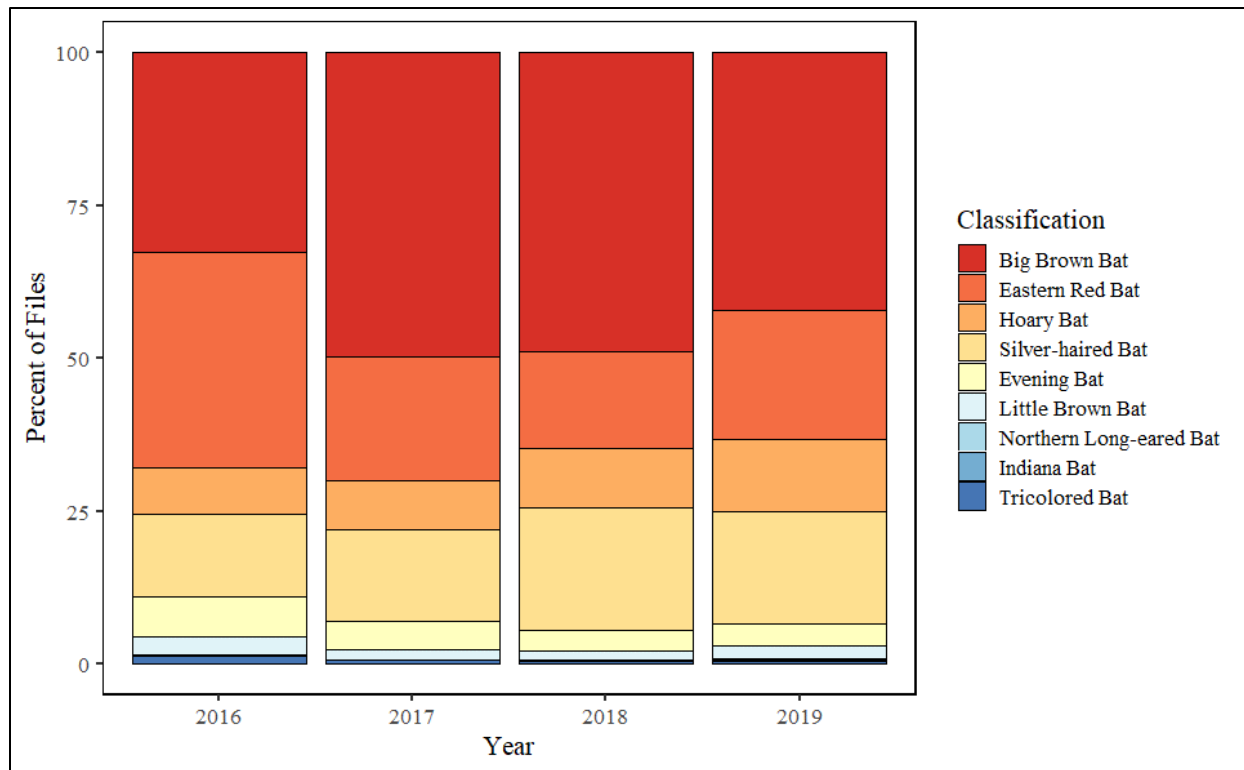


Figure 5. Proportion of files classified to each species each year relative to all other species, Indiana Dunes National Park, 2016–2019. The four most WNS-susceptible species (little brown, northern long-eared, Indiana, and tricolored bats) are shown in shades of blue while less susceptible species are shown in red, orange, and yellow. Includes only the subset of files successfully assigned a species-level classification by Kaleidoscope Pro.

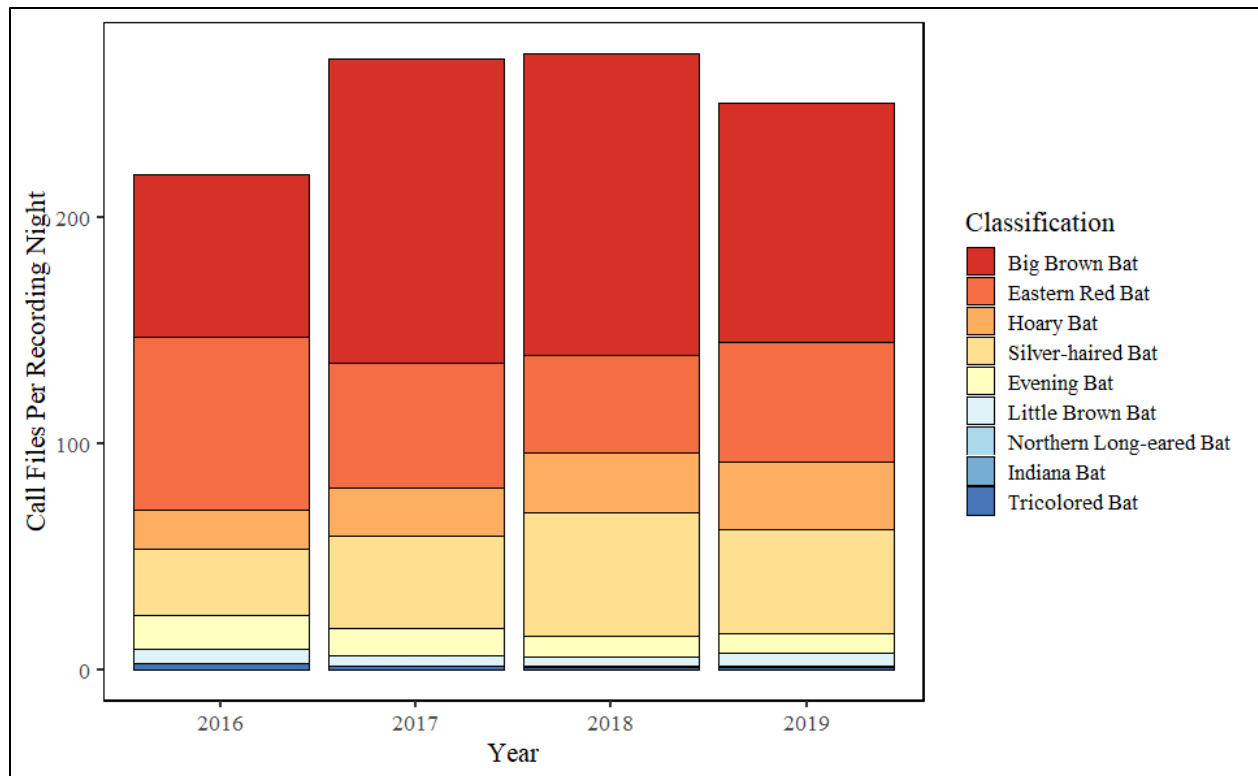


Figure 6. Parkwide call files per recording night by species and year, Indiana Dunes National Park, 2016–2019. The four most WNS-susceptible species (little brown, northern long-eared, Indiana, and tricolored bats) are shown in shades of blue while less susceptible species are shown in red, orange, and yellow.

At the site level, when looking at all species combined, the median call files per recording night was higher in 2017–2018 than in 2016 and 2019 (Figure 7, lower right panel). Looking at individual species, we observed an increase in median call files per recording night from 2016 through 2019 for the hoary bat, and from 2016 through 2018 for the silver-haired bat (Figure 7). Trends in call files per recording night were not as strong or as consistent for the other species.

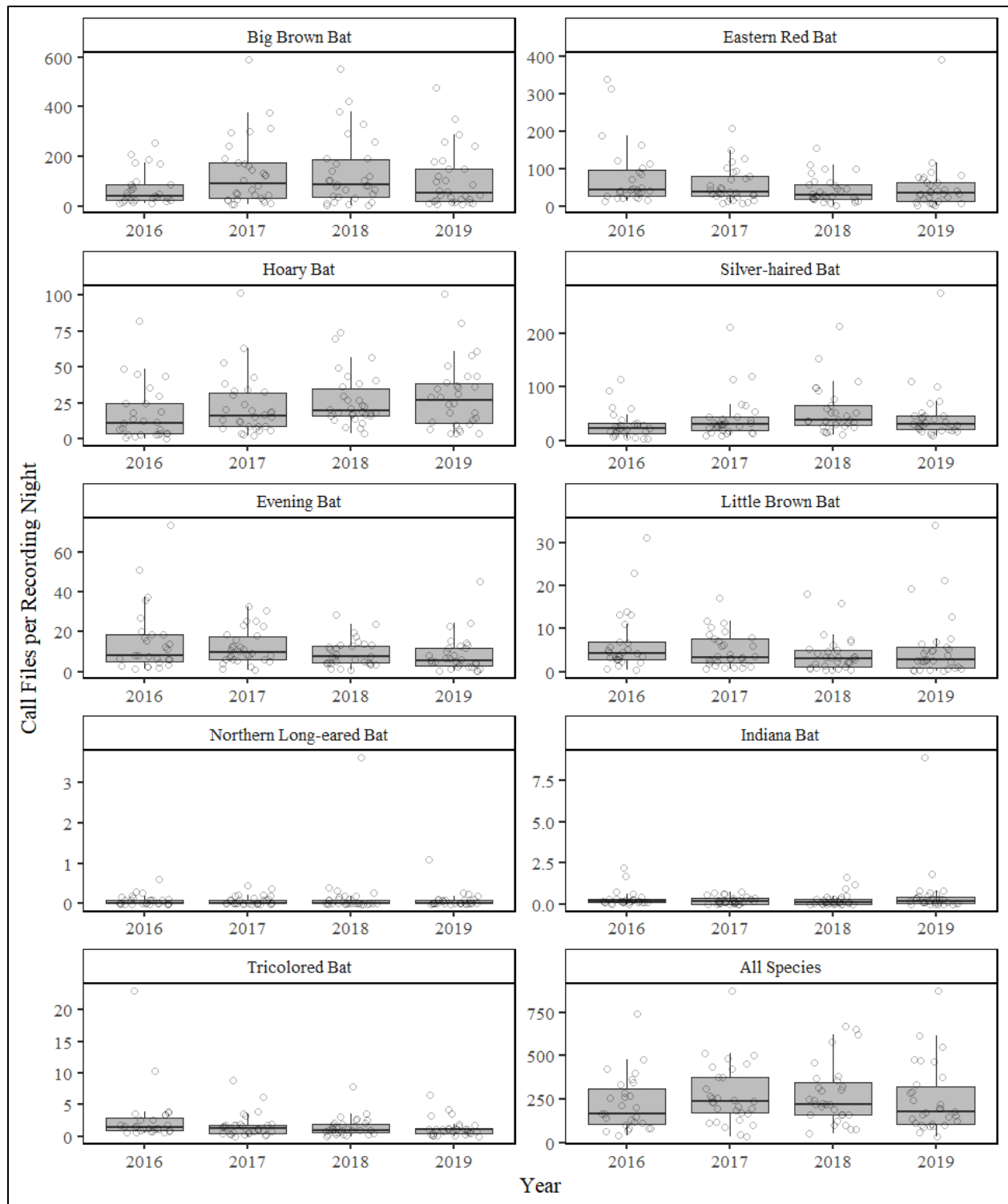


Figure 7. Call files per recording night for each species and for all species combined, by year, Indiana Dunes National Park, 2016–2019. Each point represents call files per recording night at a particular survey site. The dark line across the boxplot represents the median. Note that the y-axis scale is different for each species.

Spatial and Temporal Distribution

Spatial and temporal species distributions were assessed using the results of the automated classification. A species was considered to be detected at a site if at least one audio file was classified as that species by Kaleidoscope Pro. Seven out of nine species were widely distributed across the park, with detections at 100% or nearly 100% of monitoring sites in all four years (Figure 8, Appendix D). Northern long-eared and Indiana bats were detected at the fewest sites. Most species were detected on at least 75% of recording nights in all four years (Figure 9, Appendix D). However, tricolored bats were recorded on only about 50%–70% of nights each year, and northern long-eared and Indiana bats were recorded on less than 25% of nights.

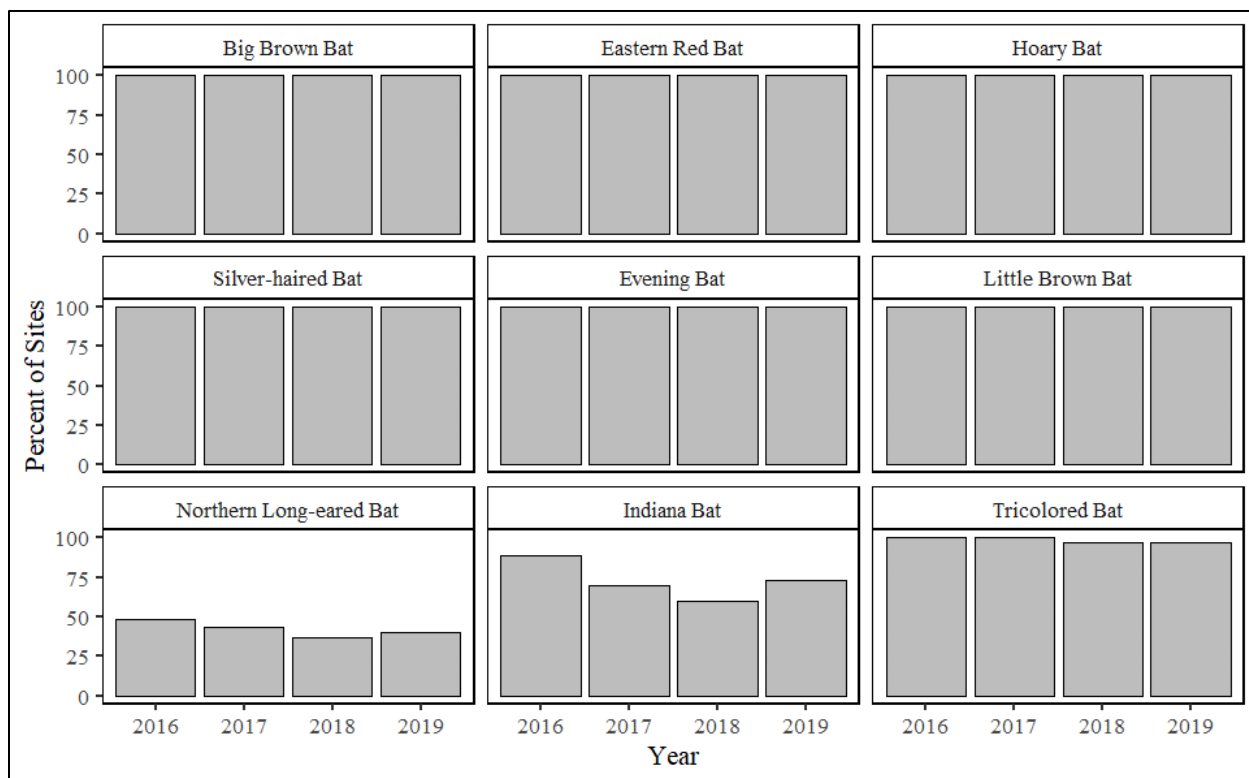


Figure 8. Proportion of monitoring sites where each species was detected each year, Indiana Dunes National Park, 2016–2019. A species was considered to be detected at a site if at least one audio file was classified as that species by Kaleidoscope Pro.

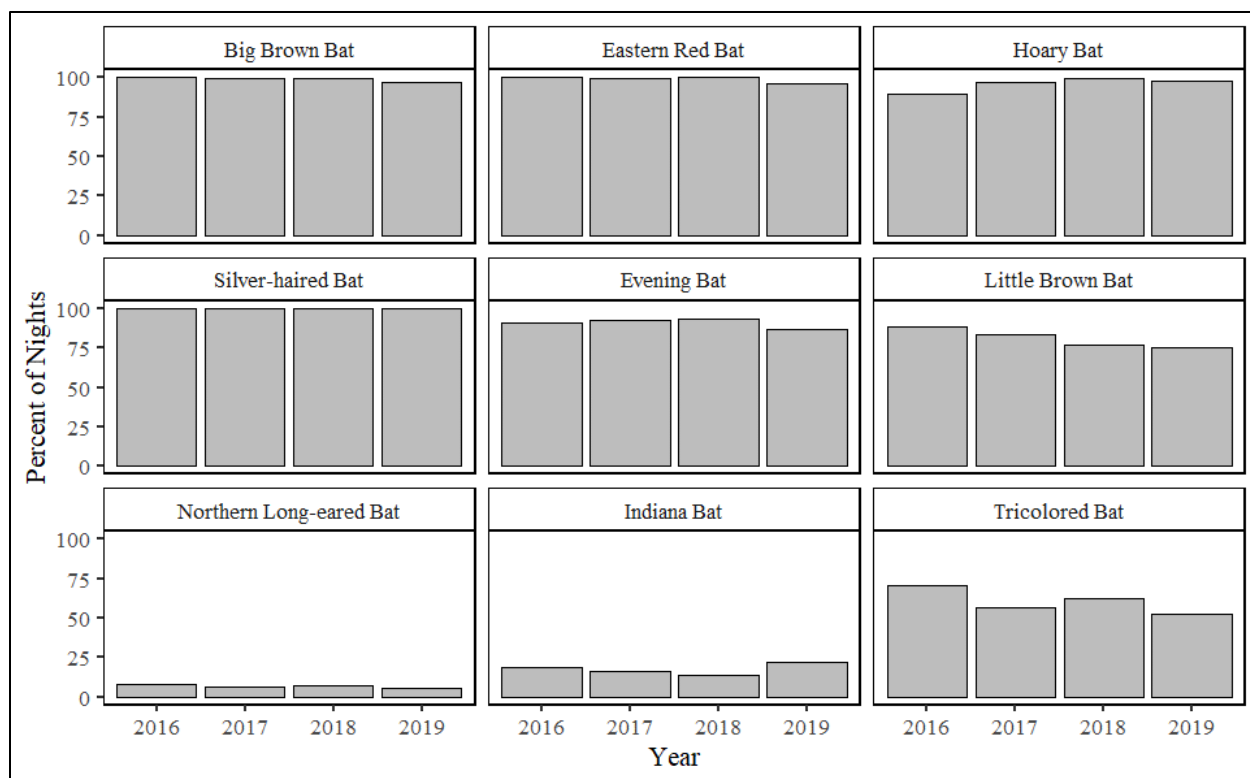


Figure 9. Proportion of recording nights on which each species was detected each year, Indiana Dunes National Park, 2016–2019. A species was considered to be detected on a night if at least one audio file was classified as that species by Kaleidoscope Pro.

Manual Vetting

A small subset of audio files—approximately 1% of files identified to each species—was manually vetted. Because the 1% sometimes equated to only a few files, we required a minimum of 10 files per species to be vetted unless there were fewer than 10 files available (see Methods). Manual vetting resulted in a total of seven species being verified between 2016 and 2019. The two species that were not verified through manual vetting were the northern long-eared bat and Indiana bat. Detailed manual vetting results for the park as a whole are provided in Appendix F, and for each monitoring site in Appendix G.

The percentage of files that were verified by manual vetting varied widely by species. The mean percentage verified (calculated parkwide, across all survey years) ranged from 0% each for the northern long-eared bat and Indiana bat, to 70% for the hoary bat (Appendix F). The variation in percentage verified is related to how difficult the calls are to identify. Ease of identification can depend on both call structure and recording environment. For example, the hoary bat consistently vocalizes at a much lower frequency than any other bat in the region, making its call signature unique and relatively easy to distinguish. On the other hand, the three *Myotis* species (little brown bat, northern long-eared bat, and Indiana bat) all produce very similar calls with highly overlapping call characteristics. Northern long-eared and little brown bat calls tend to be more distinctive from each

other in cluttered environments, such as under a closed forest canopy, than in open environments (Broders et al. 2004) and can therefore sometimes be identified.

Summary and Conclusions

Seven of the eight bat species previously documented at INDU (see Table 1) were reconfirmed through this monitoring effort: big brown bat, eastern red bat, hoary bat, silver-haired bat, evening bat, little brown bat, and tricolored bat. In addition, the Kaleidoscope software classified some acoustic files to northern long-eared bat and Indiana bat, but none of these recordings were verified through manual vetting. It is important to note that only about 30% of the call files identified by the software as northern long-eared bat and only about 10% of the call files identified as Indiana bat have so far been manually reviewed. Conducting additional manual review on the remaining files could increase the number of locations or years with positive records. The call characteristics of the three closely related *Myotis* species (little brown, Indiana, and northern long-eared bats) overlap with each other and calls can be difficult to identify. Therefore, capture and in-hand identification may be required to obtain further confirmation of their presence.

Activity levels for six of the nine species (big brown bat, hoary bat, silver-haired bat, evening bat, northern long-eared bat, and Indiana bat) appeared to be stable or slightly increasing. However, we observed very low activity levels for northern long-eared and Indiana bats (generally less than two calls per night at any individual site and often zero) so we may not have adequate data to assess trends for those species. The remaining three species (eastern red bat, little brown bat, and tricolored bat) showed slightly decreasing trends. Eastern red bats are frequently killed at wind energy facilities (Arnett et al. 2015). Although there are no wind energy facilities in close proximity to INDU, there are many located to the south in Indiana and Illinois. Migration routes of migratory bats are not well understood but red bats are thought to move south and east, concentrating on the Atlantic and Gulf coasts for the winter (Cryan 2003). Hoary and silver-haired bats also have high fatality rates at wind facilities, but do not seem to be declining at INDU. The slight decrease in red bat activity at INDU may be due to other unknown factors.

Little brown bats and tricolored bats are both highly susceptible to WNS, and the disease is most likely causing the slight declines we observed at INDU. Two other bat studies from Illinois and Indiana reported that WNS-related declines had occurred as early as 2012–2014 for the three *Myotis* species and the tricolored bat (Langwig et al. 2015, Petit and O’Keefe 2017). Although it is highly likely that these four WNS-susceptible species experienced significant declines at INDU after the arrival of WNS to the region, our monitoring has not captured these changes. Rather, it appears our data are reflective of the INDU bat community that has already felt the major impacts of WNS and is no longer experiencing such rapid change.

Results for each species are summarized in Table 2 and below. For comparison purposes, species composition over time across all GLKN parks is provided in Appendix H.

Table 2. Summary of bat species documented at Indiana Dunes National Park through automated classification and manual vetting of acoustic files. Situations where bats were not detected using manual methods are indicated with the word “No” and highlighted in red.

Species	Year	Detected	
		Automated	Manual
Big Brown Bat	2016	Yes	Yes
	2017	Yes	Yes
	2018	Yes	Yes
	2019	Yes	Yes
Eastern Red Bat	2016	Yes	Yes
	2017	Yes	Yes
	2018	Yes	Yes
	2019	Yes	Yes
Hoary Bat	2016	Yes	Yes
	2017	Yes	Yes
	2018	Yes	Yes
	2019	Yes	Yes
Silver-haired Bat	2016	Yes	Yes
	2017	Yes	Yes
	2018	Yes	Yes
	2019	Yes	Yes
Evening Bat	2016	Yes	Yes
	2017	Yes	Yes
	2018	Yes	Yes
	2019	Yes	Yes
Little Brown Bat	2016	Yes	Yes
	2017	Yes	Yes
	2018	Yes	Yes
	2019	Yes	No
Northern Long-eared Bat	2016	Yes	No
	2017	Yes	No
	2018	Yes	No
	2019	Yes	No
Indiana Bat	2016	Yes	No
	2017	Yes	No
	2018	Yes	No
	2019	Yes	No

Table 2 (continued). Summary of bat species documented at Indiana Dunes National Park through automated classification and manual vetting of acoustic files. Situations where bats were not detected using manual methods are indicated with the word “No” and highlighted in red.

Species	Year	Detected	
		Automated	Manual
Tricolored Bat	2016	Yes	No
	2017	Yes	Yes
	2018	Yes	Yes
	2019	Yes	Yes

Big Brown Bat

- Documented in every year of surveys (both automated and manual identification).
- Widely distributed: present at 100% of survey sites each year.
- Most commonly recorded species in 3 out of 4 years, with 33%–50% of total files.
- Recorded on greater than 95% of nights each year.
- Median call files per recording night lower 2016 and 2019, and higher in 2017 and 2018.

Eastern Red Bat

- Documented in every year of surveys (both automated and manual identification).
- Widely distributed: present at 100% of survey sites each year.
- Within the top three most commonly recorded species every year, with 16%–35% of total files.
- Recorded on greater than 95% of nights each year.
- Median call files per recording night decreased from 2016–2018, then increased again in 2019. Sites INDU028A (old home site west of Central Beach) and INDU035A (old home site north of Dune Park Station) both had consistently high numbers of eastern red bat calls per recording night. These sites offer good foraging opportunities due to the forest edges and small clearings.

Hoary Bat

- Documented in every year of surveys (both automated and manual identification).
- Widely distributed: present at 100% of survey sites each year.
- Percent of total files ranged from 8%–12%.
- Recorded on a high percentage of nights each year (89%–99%).
- Median call files per recording night increased each year. Sites INDU023A (Cowles Bog) and INDU004A (East State Park Road) had the top two highest numbers of hoary bat calls

per recording night of all sites in 3 out of 4 years. Both sites are located at extensive open wetlands that provide good foraging opportunities.

Silver-haired Bat

- Documented in every year of surveys (both automated and manual identification).
- Widely distributed: present at 100% of survey sites each year.
- Second or third most commonly recorded species every year, with 13%–20% of total files.
- Recorded on greater than 99% of nights each year.
- Median call files per recording night increased from 2016–2018, then decreased in 2019. Site INDU023A (Cowles Bog) had the highest number of silver-haired bat calls per recording night in 3 out of 4 years. Sites INDU004A (East State Park Road) and INDU031A (old home site east of Kemil Road) also had consistently high activity in most years. The habitat at these three locations includes open wetland and forest edge, both of which are good foraging areas.

Evening Bat

- Documented in every year of surveys (both automated and manual identification).
- Widely distributed: present at 100% of survey sites each year.
- Percent of total files ranged from 3%–7%.
- Recorded on a high percentage of nights each year (86%–93%).
- Median call files per recording night generally similar across all four years, with highest value observed in 2017 and lowest value observed in 2019.

Little Brown Bat

- Documented in every year of surveys via automated identification and verified manually in 2016–2018.
- Widely distributed: present at 100% of survey sites each year.
- Rarely recorded compared to other species: less than 3% of total files each year.
- Recorded on a high percentage of nights each year (75%–88%).
- Median call files per recording night generally similar across all four years, with a slightly decreasing trend.

Northern Long-eared Bat

- Documented in every year of surveys via automated identification, but not manually verified.
- The least widely distributed species: present at less than 50% of survey sites each year.
- Rarely recorded compared to other species: less than 1% of total files each year.
- Recorded on a very low percentage of nights each year (less than 8%).
- Median call files per recording night very low (close to zero) in all years.

Indiana Bat

- Documented in every year of surveys via automated identification, but not manually verified.
- Less widely distributed than other species: present at 60%–89% of survey sites each year.
- Rarely recorded compared to other species: less than 1% of total files each year.
- Recorded on a low percentage of nights each year (14%–22%).
- Median call files per recording night very low (less than 0.25) in all years.

Tricolored Bat

- Documented in every year of surveys via automated identification and verified manually in 2017–2019.
- Widely distributed: present at over 95% of survey sites each year.
- Rarely recorded compared to other species: less than 2% of total files each year.
- Recorded on 52%–71% of nights each year.
- Median call files per recording night generally similar across all four years, with a slightly decreasing trend. One site (INDU020A, old home site south of Kemil Beach) had much higher activity in 2016 than any other sites in any other years (>20 calls per night). The same site had the highest tricolored bat activity of all deployments in 2017.

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Appendix A. Bat Species of the Great Lakes Region

Table A1. Nine bat species are found in the Great Lakes region. Species affected by white-nose syndrome (WNS) are listed as “Confirmed” if they have been identified with diagnostic symptoms of the disease, or “Pd Positive” if the causative fungus *Pseudogymnoascus destructans* has been detected but without diagnostic symptoms of the disease. Federal/state status is indicated as E (Endangered), T (Threatened), or SC (Special Concern).

Species Name	Roosting/Wintering Behavior	WNS Affected? ^a	Federal Status ^b	State Status ^c
Big Brown Bat <i>Eptesicus fuscus</i>	Cavity-roosting/ Hibernating	Confirmed WNS	–	T (WI), SC (MN)
Eastern Red Bat <i>Lasiurus borealis</i>	Tree-roosting/ Migratory	Pd Positive	–	SC (IN)
Hoary Bat <i>Lasiurus cinereus</i>	Tree-roosting/ Migratory	–	–	SC (IN)
Silver-haired Bat <i>Lasionycteris noctivagans</i>	Tree-roosting/ Migratory	Pd Positive	–	SC (IN, WI)
Little Brown Bat <i>Myotis lucifugus</i>	Cavity-roosting/ Hibernating	Confirmed WNS	–	E (IN), T (WI), SC (MI, MN)
Northern Long-eared Bat <i>Myotis septentrionalis</i>	Cavity-roosting/ Hibernating	Confirmed WNS	T	E (IN), T (WI), SC (MI, MN)
Indiana Bat <i>Myotis sodalis</i>	Cavity-roosting/ Hibernating	Confirmed WNS	E	E (IN, MI)
Evening Bat <i>Nycticeius humeralis</i>	Tree-roosting/ Migratory	–	–	E (IN), T (MI)
Tricolored Bat <i>Perimyotis subflavus</i>	Cavity-roosting/ Hibernating	Confirmed WNS	–	E (IN), T (WI), SC (MI, MN)

^a White-nose Syndrome Response Team, www.whitenosesyndrome.org.

^b U. S. Fish and Wildlife Service (1967, 2016).

^c Indiana Division of Fish and Wildlife (2020), Michigan Natural Features Inventory (2009), Minnesota Department of Natural Resources (2013), Wisconsin Department of Natural Resources (2016).

Appendix B. Analysis Settings for Kaleidoscope Pro

The following software settings were used during Kaleidoscope Pro analysis for species classification. Although two different software versions were used, the classifier did not change, so results are still comparable.

Software Version: Kaleidoscope Pro 4.0.0 (2016–2018 data) and Kaleidoscope Pro 5.0.3 (2019 data)

Classifier: Bats of North America 3.1.0

Classifier Sensitivity: –1 More Sensitive/Liberal

Signal Parameters:

Frequency: 8–120 kHz

Duration: 2–500 ms

Maximum inter-syllable gap: 500 ms

Minimum Number of Pulses: 2

Full spectrum WAV files were converted to zero crossing format before analysis.

Zero crossing conversion/analysis was enhanced with advanced signal processing option.

Appendix C. Yearly Deployment Data

Table C1. Earliest and latest dates equipment was deployed, number of deployments in each category, and total number of files recorded for each survey year, Indiana Dunes National Park, 2016–2019.

Year	Earliest	Latest	Deployment Category ¹							Total Files
			Early	Failed	Failed (short)	Late	Non-protocol	Valid	Valid (dupl.)	
2016	10 June	29 August	0	0	3	3	0	27	0	92,233
2017	7 June	10 August	0	0	1	0	0	30	0	111,729
2018	31 May	7 August	0	0	0	0	0	30	0	106,913
2019	7 June	6 August	0	0	0	0	0	30	0	98,831

¹ “Early” = deployment occurred before 1 June, outside the protocol sampling period.

“Failed” = deployment was unsuccessful due to equipment malfunction, improper programming, and/or vandalism.

“Failed (short)” = deployment was unsuccessful because the minimum required four nights of recording were not completed.

“Late” = deployment occurred after 15 August, outside the protocol sampling period.

“Non-protocol” = deployment was completed for park-specific monitoring goals at a location selected intentionally, rather than following the GRTS sample design.

“Valid” = deployment with at least four nights of successful recording during the protocol sampling period (1 June–15 August).

“Valid (dupl.)” = valid deployment at a particular site in addition to the first valid deployment.

Table C2. Total number of sites, recording nights, files recorded, and mean recording nights per site, mean files per site, and mean files per recording night for each survey year’s valid deployments only, Indiana Dunes National Park, 2016–2019. This table corresponds to Figure 2 in the main text.

Year	Total Sites	Total Nights	Mean Nights Per Site	Total Files	Mean Files Per Site	Mean Files Per Night
2016	27	280	10.4	84,713	3,138	303
2017	30	326	10.9	111,416	3,714	342
2018	30	317	10.6	106,913	3,564	337
2019	30	328	10.9	98,831	3,294	301

Appendix D. Automated Classification Results

Table D1. Total number of audio files recorded, and number and percent classified by Kaleidoscope Pro as bat species vs. unknown bats vs. noise for each survey year, Indiana Dunes National Park, 2016–2019. Noise category includes files classified as noise and files that were corrupt, unreadable, or excluded because the recording night was less than six hours long. Only data from valid deployments are shown. This table corresponds to Figure 3 in the main text.

Year	Total Files	# Bat Species	# Bat Unknown	# Noise	% Bat Species	% Bat Unknown	% Noise
2016	84,713	61,398	847	22,468	72.48	1.00	26.52
2017	111,416	88,100	1,169	22,147	79.07	1.05	19.88
2018	106,913	86,444	1,154	19,315	80.85	1.08	18.07
2019	98,831	82,254	1,039	15,538	83.23	1.05	15.72

Table D2. Total number of audio files classified as each bat species by Kaleidoscope Pro for each survey year, Indiana Dunes National Park, 2016–2019. Only data from valid deployments are shown.

Year	Big Brown Bat	Eastern Red Bat	Hoary Bat	Silver-haired Bat	Evening Bat	Little Brown Bat	Northern Long-eared Bat	Indiana Bat	Tricolored Bat
2016	20,089	21,542	4,723	8,235	4,113	1,799	24	89	784
2017	43,860	17,887	7,028	13,226	3,922	1,553	24	67	533
2018	42,372	13,642	8,359	17,320	2,897	1,242	57	74	481
2019	34,721	17,302	9,747	15,084	2,916	1,821	28	183	452

Table D3. Percent of audio files classified as each bat species by Kaleidoscope Pro for each survey year, Indiana Dunes National Park, 2016–2019. Only data from valid deployments are shown. This table corresponds to Figures 4 and 5 in the main text.

Year	Big Brown Bat	Eastern Red Bat	Hoary Bat	Silver-haired Bat	Evening Bat	Little Brown Bat	Northern Long-eared Bat	Indiana Bat	Tricolored Bat
2016	32.72	35.09	7.69	13.41	6.70	2.93	0.04	0.14	1.28
2017	49.78	20.30	7.98	15.01	4.45	1.76	0.03	0.08	0.60
2018	49.02	15.78	9.67	20.04	3.35	1.44	0.07	0.09	0.56
2019	42.21	21.03	11.85	18.34	3.55	2.21	0.03	0.22	0.55

Table D4. Total number of monitoring sites, and count of sites where each species was detected for each survey year, Indiana Dunes National Park, 2016–2019. A species was considered to be detected at a site if at least one audio file was classified by Kaleidoscope Pro to that species.

Year	Total Sites	Big Brown Bat	Eastern Red Bat	Hoary Bat	Silver-haired Bat	Evening Bat	Little Brown Bat	Northern Long-eared Bat	Indiana Bat	Tricolored Bat
2016	27	27	27	27	27	27	27	13	24	27
2017	30	30	30	30	30	30	30	13	21	30
2018	30	30	30	30	30	30	30	11	18	29
2019	30	30	30	30	30	30	30	12	22	29

Table D5. Total number of monitoring sites, and percent of sites where each species was detected for each survey year, Indiana Dunes National Park, 2016–2019. A species was considered to be detected at a site if at least one audio file was classified by Kaleidoscope Pro to that species. This table corresponds to Figure 8 in the main text.

Year	Total Sites	Big Brown Bat	Eastern Red Bat	Hoary Bat	Silver-haired Bat	Evening Bat	Little Brown Bat	Northern Long-eared Bat	Indiana Bat	Tricolored Bat
2016	27	100.00	100.00	100.00	100.00	100.00	100.00	48.15	88.89	100.00
2017	30	100.00	100.00	100.00	100.00	100.00	100.00	43.33	70.00	100.00
2018	30	100.00	100.00	100.00	100.00	100.00	100.00	36.67	60.00	96.67
2019	30	100.00	100.00	100.00	100.00	100.00	100.00	40.00	73.33	96.67

Table D6. Total number of recording nights, and count of recording nights on which each species was detected for each survey year, Indiana Dunes National Park, 2016–2019. A species was considered to be detected on a night if at least one audio file was classified by Kaleidoscope Pro to that species.

Year	Total Nights	Big Brown Bat	Eastern Red Bat	Hoary Bat	Silver-haired Bat	Evening Bat	Little Brown Bat	Northern Long-eared Bat	Indiana Bat	Tricolored Bat
2016	280	280	280	250	279	255	246	22	53	198
2017	326	323	325	317	324	300	273	20	53	185
2018	317	315	317	315	317	295	243	23	43	198
2019	328	318	314	320	326	283	246	18	72	171

Table D7. Total number of recording nights, and percent of recording nights on which each species was detected for each survey year, Indiana Dunes National Park, 2016–2019. A species was considered to be detected on a night if at least one audio file was classified by Kaleidoscope Pro to that species. This table corresponds to Figure 9 in the main text.

Year	Total Nights	Big Brown Bat	Eastern Red Bat	Hoary Bat	Silver-haired Bat	Evening Bat	Little Brown Bat	Northern Long-eared Bat	Indiana Bat	Tricolored Bat
2016	280	100.00	100.00	89.29	99.64	91.07	87.86	7.86	18.93	70.71
2017	326	99.08	99.69	97.24	99.39	92.02	83.74	6.13	16.26	56.75
2018	317	99.37	100.00	99.37	100.00	93.06	76.66	7.26	13.56	62.46
2019	328	96.95	95.73	97.56	99.39	86.28	75.00	5.49	21.95	52.13

Appendix E. Noise Assessment

Figure E1, Figure E2, and Table E1 show the assessment of noise levels relative to detector model and survey site.

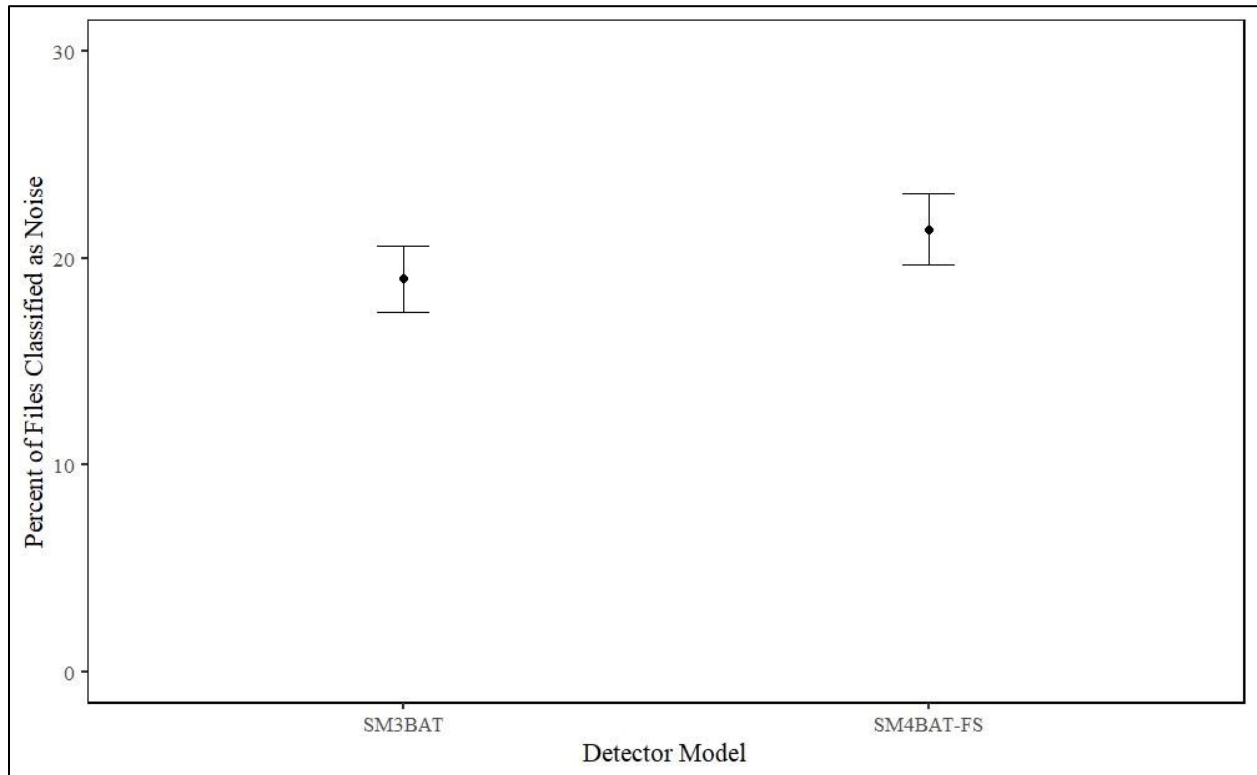


Figure E1. Percent of audio files classified as noise for each detector model (mean $\pm$ 95% confidence interval). Includes all Great Lakes Network parks in which bat monitoring occurred. Includes all deployments from 2015–2019 except failed deployments. Sample size: $n = 442$ for SM3BAT; $n = 452$ for SM4BAT-FS.

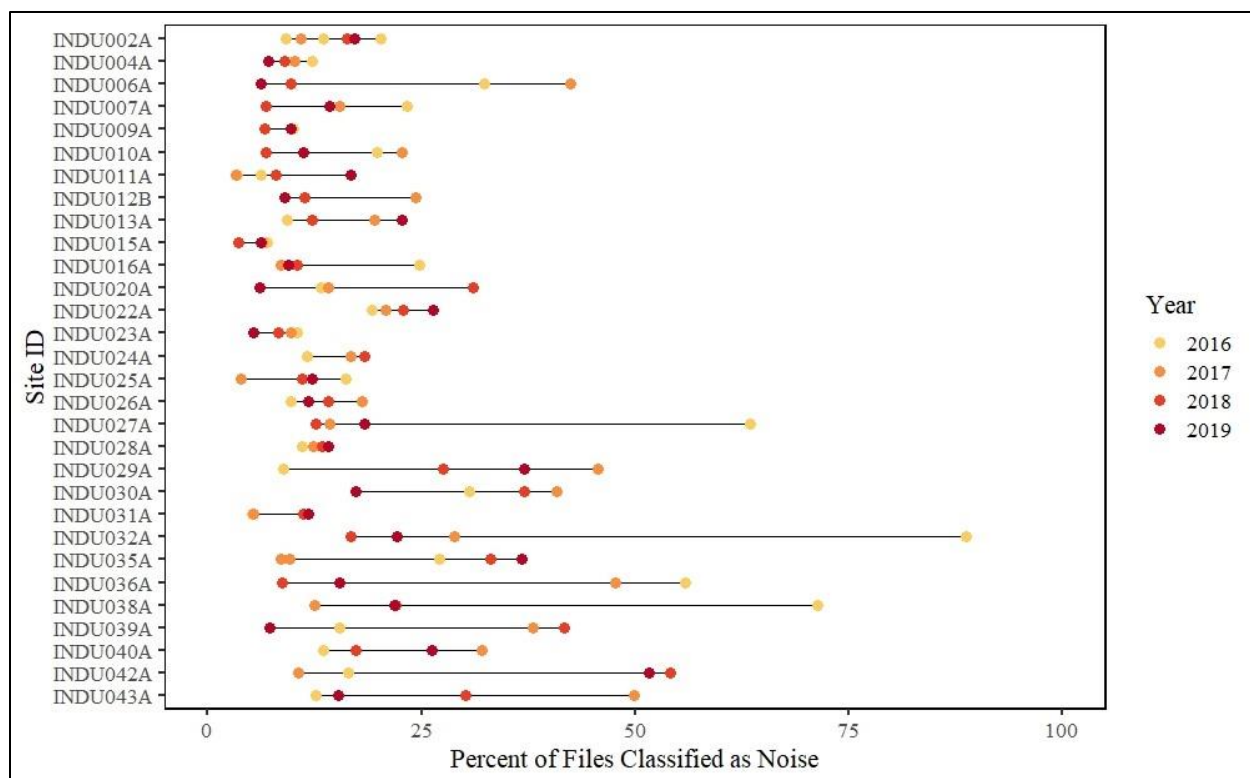


Figure E2. Percent of audio files classified as noise for each sampling site at Indiana Dunes National Park, 2016–2019. Each point represents the percent noise for one year’s deployment at that sampling site. Excludes failed deployments and sites that were sampled for only one year.

Table E1. Mean percent of audio files classified as noise for each sampling site at Indiana Dunes National Park, 2016–2019. Excludes failed deployments and sites that were sampled for only one year. Standard deviation, minimum percent noise, and maximum percent noise are given for each site. The last column indicates whether the site’s mean percent noise exceeded the parkwide mean percent noise, with asterisks indicating the top five sites with the highest mean percent noise.

Site ID	Mean % Noise	St. Dev.	Min. % Noise	Max. % Noise	Exceeds Parkwide Mean
INDU002A	14.6	4.2	9.1	20.3	No
INDU004A	9.6	2.1	7.1	12.2	No
INDU006A	22.7	17.5	6.2	42.4	Yes
INDU007A	15.0	6.8	6.8	23.3	No
INDU009A	9.1	1.6	6.7	10.1	No
INDU010A	15.2	7.4	6.8	22.8	No
INDU011A	7.5	5.5	3.3	16.7	No
INDU012B	14.9	8.3	9.0	24.3	No
INDU013A	15.9	6.3	9.3	22.8	No
INDU015A	5.8	1.5	3.6	6.9	No

Table E1 (continued). Mean percent of audio files classified as noise for each sampling site at Indiana Dunes National Park, 2016–2019. Excludes failed deployments and sites that were sampled for only one year. Standard deviation, minimum percent noise, and maximum percent noise are given for each site. The last column indicates whether the site’s mean percent noise exceeded the parkwide mean percent noise, with asterisks indicating the top five sites with the highest mean percent noise.

Site ID	Mean % Noise	St. Dev.	Min. % Noise	Max. % Noise	Exceeds Parkwide Mean
INDU016A	13.3	7.7	8.5	24.7	No
INDU020A	16.1	10.5	6.1	31.0	No
INDU022A	22.3	3.1	19.2	26.4	Yes
INDU023A	8.4	2.3	5.3	10.4	No
INDU024A	15.6	3.4	11.7	18.3	No
INDU025A	10.8	5.1	3.9	16.1	No
INDU026A	13.4	3.6	9.7	18.0	No
INDU027A	27.2	24.3	12.7	63.5	Yes
INDU028A	12.7	1.3	11.1	14.1	No
INDU029A	29.8	15.8	8.9	45.7	Yes
INDU030A	31.4	10.3	17.3	40.8	Yes*
INDU031A	8.4	3.6	5.2	11.8	No
INDU032A	39.1	33.4	16.8	88.7	Yes*
INDU035A	23.0	13.2	8.6	36.8	Yes
INDU036A	31.9	23.4	8.7	55.9	Yes*
INDU038A	31.9	26.6	12.5	71.3	Yes*
INDU039A	25.7	16.9	7.3	41.7	Yes
INDU040A	22.3	8.4	13.5	32.1	Yes
INDU042A	33.2	22.9	10.6	54.1	Yes*
INDU043A	27.0	17.1	12.7	49.9	Yes

Appendix F. Manual Vetting Results for Entire Park

Manual vetting was performed on approximately 1% of call files classified to each species by Kaleidoscope Pro (or minimum of 10 files).

Table F1. Total number of files manually vetted, and the results of manual vetting for each year and species, Indiana Dunes National Park, 2016–2019. “Verified” indicates that the manual identification matched, and thus verified, the automated identification.

Year	Kaleidoscope Classification	Total Files Vetted	Number Files Verified	Percent Files Verified
2016	Big Brown Bat	210	32	15.24
	Eastern Red Bat	216	69	31.94
	Hoary Bat	47	30	63.83
	Silver-haired Bat	84	43	51.19
	Little Brown Bat	18	1	5.56
	Northern Long-eared Bat	10	0	0.00
	Indiana Bat	10	0	0.00
	Evening Bat	42	19	45.24
	Tricolored Bat	10	0	0.00
2017	Big Brown Bat	439	214	48.75
	Eastern Red Bat	179	120	67.04
	Hoary Bat	70	56	80.00
	Silver-haired Bat	132	44	33.33
	Little Brown Bat	16	1	6.25
	Northern Long-eared Bat	10	0	0.00
	Indiana Bat	10	0	0.00
	Evening Bat	39	13	33.33
	Tricolored Bat	10	3	30.00
2018	Big Brown Bat	424	93	21.93
	Eastern Red Bat	136	87	63.97
	Hoary Bat	84	59	70.24
	Silver-haired Bat	173	61	35.26
	Little Brown Bat	12	2	16.67
	Northern Long-eared Bat	10	0	0.00
	Indiana Bat	10	0	0.00
	Evening Bat	29	18	62.07
	Tricolored Bat	10	2	20.00
2019	Big Brown Bat	347	175	50.43
	Eastern Red Bat	173	117	67.63

Table F1 (continued). Total number of files manually vetted, and the results of manual vetting for each year and species, Indiana Dunes National Park, 2016–2019. “Verified” indicates that the manual identification matched, and thus verified, the automated identification.

Year	Kaleidoscope Classification	Total Files Vetted	Number Files Verified	Percent Files Verified
2019 (cont.)	Hoary Bat	97	62	63.92
	Silver-haired Bat	151	38	25.17
	Little Brown Bat	18	0	0.00
	Northern Long-eared Bat	10	0	0.00
	Indiana Bat	10	0	0.00
	Evening Bat	29	10	34.48
	Tricolored Bat	10	3	30.00

Appendix G. Manual Vetting Results by Site.

Manual vetting was performed on approximately 1% of call files classified to each species by Kaleidoscope Pro (or minimum of 10 files). This was 1% parkwide, so not every combination of monitoring site/species had files vetted.

Table G1. Total number of files manually vetted, and the results of manual vetting for each year, site, and species, Indiana Dunes National Park, 2016–2019. “Verified” indicates that the manual identification matched, and thus verified, the automated identification.

Year	Site ID	Kaleidoscope Classification	Total Files Vetted	Number Files Verified	Percent Files Verified
2016	INDU002A_2016	Big Brown Bat	2	1	50.00
	INDU002A_2016	Eastern Red Bat	6	2	33.33
	INDU002A_2016	Hoary Bat	7	4	57.14
	INDU002A_2016	Silver-haired Bat	2	0	0.00
	INDU002A_2016	Evening Bat	3	2	66.67
	INDU002A_2016	Tricolored Bat	1	0	0.00
	INDU004A_2016	Big Brown Bat	2	0	0.00
	INDU004A_2016	Eastern Red Bat	1	0	0.00
	INDU004A_2016	Hoary Bat	5	3	60.00
	INDU004A_2016	Silver-haired Bat	11	8	72.73
	INDU004A_2016	Evening Bat	1	1	100.00
	INDU006A_2016	Big Brown Bat	2	0	0.00
	INDU006A_2016	Eastern Red Bat	2	1	50.00
	INDU006A_2016	Hoary Bat	1	0	0.00
	INDU006A_2016	Silver-haired Bat	3	3	100.00
	INDU007A_2016	Big Brown Bat	4	0	0.00
	INDU007A_2016	Eastern Red Bat	12	5	41.67
	INDU007A_2016	Hoary Bat	1	1	100.00
	INDU007A_2016	Silver-haired Bat	2	1	50.00
	INDU007A_2016	Little Brown Bat	1	0	0.00
	INDU007A_2016	Evening Bat	2	1	50.00
	INDU009A_2016	Big Brown Bat	2	0	0.00
	INDU009A_2016	Eastern Red Bat	3	1	33.33
	INDU009A_2016	Silver-haired Bat	6	1	16.67
	INDU010A_2016	Big Brown Bat	5	0	0.00
	INDU010A_2016	Eastern Red Bat	11	2	18.18
	INDU010A_2016	Hoary Bat	2	1	50.00
	INDU010A_2016	Little Brown Bat	1	0	0.00

Table G1 (continued). Total number of files manually vetted, and the results of manual vetting for each year, site, and species, Indiana Dunes National Park, 2016–2019. “Verified” indicates that the manual identification matched, and thus verified, the automated identification.

Year	Site ID	Kaleidoscope Classification	Total Files Vetted	Number Files Verified	Percent Files Verified
2016 (cont.)	INDU010A_2016	Evening Bat	1	0	0.00
	INDU010A_2016	Tricolored Bat	1	0	0.00
	INDU011A_2016	Big Brown Bat	21	3	14.29
	INDU011A_2016	Eastern Red Bat	4	1	25.00
	INDU011A_2016	Hoary Bat	2	1	50.00
	INDU011A_2016	Silver-haired Bat	5	2	40.00
	INDU011A_2016	Little Brown Bat	1	1	100.00
	INDU011A_2016	Northern Long-eared Bat	1	0	0.00
	INDU011A_2016	Indiana Bat	1	0	0.00
	INDU011A_2016	Evening Bat	2	1	50.00
	INDU011A_2016	Tricolored Bat	2	0	0.00
	INDU012A_2016	Big Brown Bat	3	1	33.33
	INDU012A_2016	Eastern Red Bat	1	0	0.00
	INDU012A_2016	Silver-haired Bat	2	0	0.00
	INDU013A_2016	Big Brown Bat	9	1	11.11
	INDU013A_2016	Eastern Red Bat	1	0	0.00
	INDU013A_2016	Hoary Bat	1	1	100.00
	INDU013A_2016	Silver-haired Bat	1	0	0.00
	INDU013A_2016	Northern Long-eared Bat	1	0	0.00
	INDU013A_2016	Indiana Bat	2	0	0.00
	INDU015A_2016	Big Brown Bat	10	3	30.00
	INDU015A_2016	Eastern Red Bat	13	3	23.08
	INDU015A_2016	Hoary Bat	1	0	0.00
	INDU015A_2016	Silver-haired Bat	1	1	100.00
	INDU015A_2016	Little Brown Bat	2	0	0.00
	INDU015A_2016	Northern Long-eared Bat	1	0	0.00
	INDU015A_2016	Indiana Bat	1	0	0.00
	INDU016A_2016	Big Brown Bat	20	0	0.00
	INDU016A_2016	Eastern Red Bat	5	2	40.00
	INDU016A_2016	Hoary Bat	1	1	100.00
	INDU016A_2016	Silver-haired Bat	5	2	40.00
	INDU016A_2016	Little Brown Bat	1	0	0.00
	INDU016A_2016	Northern Long-eared Bat	1	0	0.00
	INDU020A_2016	Big Brown Bat	4	2	50.00

Table G1 (continued). Total number of files manually vetted, and the results of manual vetting for each year, site, and species, Indiana Dunes National Park, 2016–2019. “Verified” indicates that the manual identification matched, and thus verified, the automated identification.

Year	Site ID	Kaleidoscope Classification	Total Files Vetted	Number Files Verified	Percent Files Verified
2016 (cont.)	INDU020A_2016	Eastern Red Bat	38	15	39.47
	INDU020A_2016	Hoary Bat	3	2	66.67
	INDU020A_2016	Silver-haired Bat	6	4	66.67
	INDU020A_2016	Little Brown Bat	4	0	0.00
	INDU020A_2016	Northern Long-eared Bat	2	0	0.00
	INDU020A_2016	Indiana Bat	2	0	0.00
	INDU020A_2016	Evening Bat	5	0	0.00
	INDU020A_2016	Tricolored Bat	1	0	0.00
	INDU022A_2016	Big Brown Bat	6	1	16.67
	INDU022A_2016	Eastern Red Bat	5	1	20.00
	INDU022A_2016	Hoary Bat	5	4	80.00
	INDU022A_2016	Silver-haired Bat	3	1	33.33
	INDU023A_2016	Big Brown Bat	6	2	33.33
	INDU023A_2016	Eastern Red Bat	3	1	33.33
	INDU023A_2016	Hoary Bat	6	4	66.67
	INDU023A_2016	Silver-haired Bat	6	6	100.00
	INDU023A_2016	Evening Bat	3	2	66.67
	INDU023A_2016	Tricolored Bat	1	0	0.00
	INDU024A_2016	Big Brown Bat	1	0	0.00
	INDU024A_2016	Eastern Red Bat	6	4	66.67
	INDU024A_2016	Hoary Bat	3	2	66.67
	INDU024A_2016	Silver-haired Bat	2	1	50.00
	INDU024A_2016	Indiana Bat	2	0	0.00
	INDU025A_2016	Big Brown Bat	26	7	26.92
	INDU025A_2016	Eastern Red Bat	14	5	35.71
	INDU025A_2016	Silver-haired Bat	2	0	0.00
	INDU025A_2016	Indiana Bat	1	0	0.00
	INDU025A_2016	Tricolored Bat	1	0	0.00
	INDU026A_2016	Big Brown Bat	16	0	0.00
	INDU026A_2016	Eastern Red Bat	6	3	50.00
	INDU026A_2016	Silver-haired Bat	1	0	0.00
	INDU026A_2016	Little Brown Bat	2	0	0.00
	INDU026A_2016	Evening Bat	2	1	50.00
	INDU027A_2016	Big Brown Bat	5	0	0.00

Table G1 (continued). Total number of files manually vetted, and the results of manual vetting for each year, site, and species, Indiana Dunes National Park, 2016–2019. “Verified” indicates that the manual identification matched, and thus verified, the automated identification.

Year	Site ID	Kaleidoscope Classification	Total Files Vetted	Number Files Verified	Percent Files Verified
2016 (cont.)	INDU027A_2016	Silver-haired Bat	1	1	100.00
	INDU027A_2016	Evening Bat	1	1	100.00
	INDU028A_2016	Big Brown Bat	20	3	15.00
	INDU028A_2016	Eastern Red Bat	35	2	5.71
	INDU028A_2016	Hoary Bat	7	5	71.43
	INDU028A_2016	Silver-haired Bat	7	4	57.14
	INDU028A_2016	Northern Long-eared Bat	2	0	0.00
	INDU028A_2016	Evening Bat	10	4	40.00
	INDU028A_2016	Tricolored Bat	1	0	0.00
	INDU029A_2016	Big Brown Bat	6	2	33.33
	INDU029A_2016	Eastern Red Bat	7	1	14.29
	INDU029A_2016	Hoary Bat	2	1	50.00
	INDU029A_2016	Silver-haired Bat	3	2	66.67
	INDU029A_2016	Northern Long-eared Bat	1	0	0.00
	INDU030A_2016	Big Brown Bat	12	2	16.67
	INDU030A_2016	Eastern Red Bat	15	8	53.33
	INDU030A_2016	Silver-haired Bat	3	1	33.33
	INDU030A_2016	Little Brown Bat	3	0	0.00
	INDU030A_2016	Evening Bat	3	2	66.67
	INDU031A_2016	Big Brown Bat	20	3	15.00
	INDU031A_2016	Eastern Red Bat	4	2	50.00
	INDU031A_2016	Silver-haired Bat	8	3	37.50
	INDU031A_2016	Little Brown Bat	1	0	0.00
	INDU031A_2016	Evening Bat	8	3	37.50
	INDU031A_2016	Tricolored Bat	1	0	0.00
	INDU032A_2016	Big Brown Bat	2	0	0.00
	INDU032A_2016	Eastern Red Bat	4	1	25.00
	INDU032A_2016	Silver-haired Bat	2	2	100.00
	INDU032A_2016	Northern Long-eared Bat	1	0	0.00
	INDU032A_2016	Indiana Bat	1	0	0.00
	INDU032A_2016	Tricolored Bat	1	0	0.00
	INDU035A_2016	Big Brown Bat	4	0	0.00
	INDU035A_2016	Eastern Red Bat	14	6	42.86
	INDU035A_2016	Little Brown Bat	1	0	0.00

Table G1 (continued). Total number of files manually vetted, and the results of manual vetting for each year, site, and species, Indiana Dunes National Park, 2016–2019. “Verified” indicates that the manual identification matched, and thus verified, the automated identification.

Year	Site ID	Kaleidoscope Classification	Total Files Vetted	Number Files Verified	Percent Files Verified
2016 (cont.)	INDU035A_2016	Evening Bat	1	1	100.00
	INDU036A_2016	Big Brown Bat	2	1	50.00
	INDU036A_2016	Eastern Red Bat	6	3	50.00
	INDU036A_2016	Silver-haired Bat	2	0	0.00
	INDU036A_2016	Little Brown Bat	1	0	0.00
2017	INDU002A_2017	Big Brown Bat	1	1	100.00
	INDU002A_2017	Eastern Red Bat	3	2	66.67
	INDU002A_2017	Hoary Bat	2	2	100.00
	INDU002A_2017	Silver-haired Bat	5	1	20.00
	INDU002A_2017	Indiana Bat	1	0	0.00
	INDU004A_2017	Eastern Red Bat	2	0	0.00
	INDU004A_2017	Hoary Bat	3	3	100.00
	INDU004A_2017	Silver-haired Bat	11	8	72.73
	INDU006A_2017	Big Brown Bat	2	0	0.00
	INDU006A_2017	Hoary Bat	1	0	0.00
	INDU006A_2017	Northern Long-eared Bat	1	0	0.00
	INDU006A_2017	Indiana Bat	1	0	0.00
	INDU007A_2017	Big Brown Bat	9	4	44.44
	INDU007A_2017	Eastern Red Bat	6	3	50.00
	INDU007A_2017	Hoary Bat	3	2	66.67
	INDU007A_2017	Silver-haired Bat	6	3	50.00
	INDU007A_2017	Little Brown Bat	1	0	0.00
	INDU007A_2017	Evening Bat	2	1	50.00
	INDU009A_2017	Big Brown Bat	10	3	30.00
	INDU009A_2017	Eastern Red Bat	2	2	100.00
	INDU009A_2017	Hoary Bat	1	1	100.00
	INDU009A_2017	Silver-haired Bat	4	1	25.00
	INDU010A_2017	Big Brown Bat	4	1	25.00
	INDU010A_2017	Eastern Red Bat	5	3	60.00
	INDU010A_2017	Hoary Bat	1	1	100.00
	INDU010A_2017	Silver-haired Bat	7	1	14.29
	INDU010A_2017	Northern Long-eared Bat	1	0	0.00
	INDU010A_2017	Evening Bat	1	1	100.00
	INDU010A_2017	Tricolored Bat	1	0	0.00

Table G1 (continued). Total number of files manually vetted, and the results of manual vetting for each year, site, and species, Indiana Dunes National Park, 2016–2019. “Verified” indicates that the manual identification matched, and thus verified, the automated identification.

Year	Site ID	Kaleidoscope Classification	Total Files Vetted	Number Files Verified	Percent Files Verified
2017 (cont.)	INDU011A_2017	Big Brown Bat	52	40	76.92
	INDU011A_2017	Eastern Red Bat	6	3	50.00
	INDU011A_2017	Hoary Bat	3	1	33.33
	INDU011A_2017	Silver-haired Bat	9	3	33.33
	INDU011A_2017	Little Brown Bat	2	0	0.00
	INDU011A_2017	Indiana Bat	1	0	0.00
	INDU011A_2017	Evening Bat	1	0	0.00
	INDU011A_2017	Tricolored Bat	1	1	100.00
	INDU012B_2017	Eastern Red Bat	2	2	100.00
	INDU012B_2017	Silver-haired Bat	2	0	0.00
	INDU012B_2017	Little Brown Bat	3	0	0.00
	INDU012B_2017	Northern Long-eared Bat	3	0	0.00
	INDU012B_2017	Evening Bat	1	0	0.00
	INDU013A_2017	Big Brown Bat	3	0	0.00
	INDU013A_2017	Indiana Bat	1	0	0.00
	INDU015A_2017	Big Brown Bat	24	8	33.33
	INDU015A_2017	Eastern Red Bat	6	5	83.33
	INDU015A_2017	Silver-haired Bat	5	2	40.00
	INDU015A_2017	Little Brown Bat	1	0	0.00
	INDU016A_2017	Big Brown Bat	11	1	9.09
	INDU016A_2017	Silver-haired Bat	5	1	20.00
	INDU016A_2017	Indiana Bat	1	0	0.00
	INDU016A_2017	Evening Bat	1	0	0.00
	INDU020A_2017	Big Brown Bat	30	20	66.67
	INDU020A_2017	Eastern Red Bat	11	7	63.64
	INDU020A_2017	Silver-haired Bat	4	0	0.00
	INDU020A_2017	Little Brown Bat	1	0	0.00
	INDU020A_2017	Evening Bat	1	0	0.00
	INDU020A_2017	Tricolored Bat	2	0	0.00
	INDU022A_2017	Eastern Red Bat	1	1	100.00
	INDU022A_2017	Hoary Bat	8	4	50.00
	INDU022A_2017	Silver-haired Bat	2	1	50.00
	INDU022A_2017	Indiana Bat	1	0	0.00
	INDU023A_2017	Big Brown Bat	7	2	28.57

Table G1 (continued). Total number of files manually vetted, and the results of manual vetting for each year, site, and species, Indiana Dunes National Park, 2016–2019. “Verified” indicates that the manual identification matched, and thus verified, the automated identification.

Year	Site ID	Kaleidoscope Classification	Total Files Vetted	Number Files Verified	Percent Files Verified
2017 (cont.)	INDU023A_2017	Eastern Red Bat	6	5	83.33
	INDU023A_2017	Hoary Bat	11	10	90.91
	INDU023A_2017	Silver-haired Bat	22	15	68.18
	INDU023A_2017	Little Brown Bat	1	0	0.00
	INDU023A_2017	Northern Long-eared Bat	1	0	0.00
	INDU023A_2017	Evening Bat	2	0	0.00
	INDU023A_2017	Tricolored Bat	1	0	0.00
	INDU024A_2017	Big Brown Bat	2	1	50.00
	INDU024A_2017	Eastern Red Bat	3	2	66.67
	INDU024A_2017	Hoary Bat	3	3	100.00
	INDU024A_2017	Silver-haired Bat	1	0	0.00
	INDU024A_2017	Evening Bat	3	1	33.33
	INDU025A_2017	Big Brown Bat	33	14	42.42
	INDU025A_2017	Eastern Red Bat	15	8	53.33
	INDU025A_2017	Hoary Bat	4	4	100.00
	INDU025A_2017	Silver-haired Bat	5	0	0.00
	INDU025A_2017	Little Brown Bat	1	0	0.00
	INDU025A_2017	Northern Long-eared Bat	1	0	0.00
	INDU025A_2017	Evening Bat	2	0	0.00
	INDU026A_2017	Big Brown Bat	28	6	21.43
	INDU026A_2017	Eastern Red Bat	12	9	75.00
	INDU026A_2017	Hoary Bat	1	1	100.00
	INDU026A_2017	Silver-haired Bat	3	0	0.00
	INDU026A_2017	Northern Long-eared Bat	1	0	0.00
	INDU026A_2017	Indiana Bat	1	0	0.00
	INDU027A_2017	Big Brown Bat	12	4	33.33
	INDU027A_2017	Eastern Red Bat	5	3	60.00
	INDU027A_2017	Hoary Bat	6	6	100.00
	INDU027A_2017	Silver-haired Bat	4	0	0.00
	INDU027A_2017	Little Brown Bat	1	0	0.00
	INDU027A_2017	Evening Bat	4	2	50.00
	INDU028A_2017	Big Brown Bat	22	6	27.27
	INDU028A_2017	Eastern Red Bat	20	14	70.00
	INDU028A_2017	Hoary Bat	6	5	83.33

Table G1 (continued). Total number of files manually vetted, and the results of manual vetting for each year, site, and species, Indiana Dunes National Park, 2016–2019. “Verified” indicates that the manual identification matched, and thus verified, the automated identification.

Year	Site ID	Kaleidoscope Classification	Total Files Vetted	Number Files Verified	Percent Files Verified
2017 (cont.)	INDU028A_2017	Little Brown Bat	1	1	100.00
	INDU028A_2017	Evening Bat	4	0	0.00
	INDU029A_2017	Big Brown Bat	6	2	33.33
	INDU029A_2017	Eastern Red Bat	7	7	100.00
	INDU029A_2017	Hoary Bat	3	2	66.67
	INDU029A_2017	Silver-haired Bat	1	1	100.00
	INDU029A_2017	Indiana Bat	1	0	0.00
	INDU029A_2017	Evening Bat	3	1	33.33
	INDU030A_2017	Big Brown Bat	13	5	38.46
	INDU030A_2017	Eastern Red Bat	4	3	75.00
	INDU030A_2017	Silver-haired Bat	2	1	50.00
	INDU030A_2017	Little Brown Bat	1	0	0.00
	INDU031A_2017	Big Brown Bat	57	27	47.37
	INDU031A_2017	Eastern Red Bat	11	4	36.36
	INDU031A_2017	Hoary Bat	3	3	100.00
	INDU031A_2017	Silver-haired Bat	13	2	15.38
	INDU031A_2017	Evening Bat	4	0	0.00
	INDU032A_2017	Big Brown Bat	7	1	14.29
	INDU032A_2017	Eastern Red Bat	7	6	85.71
	INDU032A_2017	Hoary Bat	4	3	75.00
	INDU032A_2017	Silver-haired Bat	2	0	0.00
	INDU032A_2017	Little Brown Bat	1	0	0.00
	INDU032A_2017	Evening Bat	1	0	0.00
	INDU032A_2017	Tricolored Bat	1	1	100.00
	INDU035A_2017	Big Brown Bat	3	2	66.67
	INDU035A_2017	Eastern Red Bat	17	11	64.71
	INDU035A_2017	Silver-haired Bat	5	3	60.00
	INDU035A_2017	Evening Bat	6	4	66.67
	INDU035A_2017	Tricolored Bat	2	0	0.00
	INDU036A_2017	Big Brown Bat	25	18	72.00
	INDU036A_2017	Eastern Red Bat	7	4	57.14
	INDU036A_2017	Little Brown Bat	2	0	0.00
	INDU036A_2017	Northern Long-eared Bat	2	0	0.00
	INDU036A_2017	Indiana Bat	2	0	0.00

Table G1 (continued). Total number of files manually vetted, and the results of manual vetting for each year, site, and species, Indiana Dunes National Park, 2016–2019. “Verified” indicates that the manual identification matched, and thus verified, the automated identification.

Year	Site ID	Kaleidoscope Classification	Total Files Vetted	Number Files Verified	Percent Files Verified
2017 (cont.)	INDU036A_2017	Evening Bat	2	2	100.00
	INDU036A_2017	Tricolored Bat	1	0	0.00
	INDU038A_2017	Big Brown Bat	21	11	52.38
	INDU038A_2017	Eastern Red Bat	2	2	100.00
	INDU038A_2017	Silver-haired Bat	3	1	33.33
	INDU039A_2017	Big Brown Bat	38	25	65.79
	INDU039A_2017	Eastern Red Bat	9	5	55.56
	INDU039A_2017	Hoary Bat	1	1	100.00
	INDU039A_2017	Silver-haired Bat	2	0	0.00
	INDU040A_2017	Big Brown Bat	15	9	60.00
	INDU040A_2017	Eastern Red Bat	4	3	75.00
	INDU040A_2017	Hoary Bat	2	1	50.00
	INDU040A_2017	Silver-haired Bat	3	0	0.00
	INDU042A_2017	Big Brown Bat	4	3	75.00
	INDU042A_2017	Eastern Red Bat	4	4	100.00
	INDU042A_2017	Hoary Bat	2	1	50.00
	INDU042A_2017	Silver-haired Bat	2	0	0.00
	INDU042A_2017	Evening Bat	1	1	100.00
	INDU043A_2017	Eastern Red Bat	2	2	100.00
	INDU043A_2017	Hoary Bat	2	2	100.00
	INDU043A_2017	Silver-haired Bat	4	0	0.00
	INDU043A_2017	Tricolored Bat	1	1	100.00
2018	INDU002A_2018	Eastern Red Bat	2	0	0.00
	INDU002A_2018	Hoary Bat	1	0	0.00
	INDU002A_2018	Silver-haired Bat	3	2	66.67
	INDU004A_2018	Big Brown Bat	2	1	50.00
	INDU004A_2018	Eastern Red Bat	1	1	100.00
	INDU004A_2018	Hoary Bat	5	4	80.00
	INDU004A_2018	Silver-haired Bat	9	6	66.67
	INDU004A_2018	Evening Bat	2	2	100.00
	INDU006A_2018	Big Brown Bat	6	0	0.00
	INDU006A_2018	Eastern Red Bat	1	0	0.00
	INDU006A_2018	Hoary Bat	2	1	50.00
	INDU006A_2018	Silver-haired Bat	5	2	40.00

Table G1 (continued). Total number of files manually vetted, and the results of manual vetting for each year, site, and species, Indiana Dunes National Park, 2016–2019. “Verified” indicates that the manual identification matched, and thus verified, the automated identification.

Year	Site ID	Kaleidoscope Classification	Total Files Vetted	Number Files Verified	Percent Files Verified
2018 (cont.)	INDU007A_2018	Big Brown Bat	16	0	0.00
	INDU007A_2018	Eastern Red Bat	3	2	66.67
	INDU007A_2018	Hoary Bat	2	1	50.00
	INDU007A_2018	Silver-haired Bat	20	4	20.00
	INDU007A_2018	Tricolored Bat	1	0	0.00
	INDU009A_2018	Big Brown Bat	5	0	0.00
	INDU009A_2018	Eastern Red Bat	1	0	0.00
	INDU009A_2018	Silver-haired Bat	4	2	50.00
	INDU010A_2018	Big Brown Bat	9	2	22.22
	INDU010A_2018	Eastern Red Bat	3	1	33.33
	INDU010A_2018	Hoary Bat	8	4	50.00
	INDU010A_2018	Silver-haired Bat	9	5	55.56
	INDU010A_2018	Indiana Bat	1	0	0.00
	INDU010A_2018	Evening Bat	1	1	100.00
	INDU011A_2018	Big Brown Bat	14	6	42.86
	INDU011A_2018	Eastern Red Bat	5	3	60.00
	INDU011A_2018	Hoary Bat	2	1	50.00
	INDU011A_2018	Silver-haired Bat	13	5	38.46
	INDU011A_2018	Little Brown Bat	1	0	0.00
	INDU011A_2018	Indiana Bat	2	0	0.00
	INDU011A_2018	Evening Bat	1	0	0.00
	INDU012B_2018	Big Brown Bat	14	7	50.00
	INDU012B_2018	Eastern Red Bat	2	1	50.00
	INDU012B_2018	Hoary Bat	2	1	50.00
	INDU012B_2018	Silver-haired Bat	3	2	66.67
	INDU012B_2018	Little Brown Bat	2	1	50.00
	INDU013A_2018	Big Brown Bat	2	0	0.00
	INDU013A_2018	Silver-haired Bat	2	1	50.00
	INDU013A_2018	Indiana Bat	3	0	0.00
	INDU015A_2018	Big Brown Bat	65	19	29.23
	INDU015A_2018	Eastern Red Bat	3	2	66.67
	INDU015A_2018	Hoary Bat	1	1	100.00
	INDU015A_2018	Silver-haired Bat	4	0	0.00
	INDU015A_2018	Indiana Bat	1	0	0.00

Table G1 (continued). Total number of files manually vetted, and the results of manual vetting for each year, site, and species, Indiana Dunes National Park, 2016–2019. “Verified” indicates that the manual identification matched, and thus verified, the automated identification.

Year	Site ID	Kaleidoscope Classification	Total Files Vetted	Number Files Verified	Percent Files Verified
2018 (cont.)	INDU016A_2018	Big Brown Bat	10	0	0.00
	INDU016A_2018	Eastern Red Bat	5	1	20.00
	INDU016A_2018	Hoary Bat	4	2	50.00
	INDU016A_2018	Silver-haired Bat	7	1	14.29
	INDU016A_2018	Evening Bat	1	0	0.00
	INDU016A_2018	Tricolored Bat	1	1	100.00
	INDU020A_2018	Big Brown Bat	24	14	58.33
	INDU020A_2018	Eastern Red Bat	1	1	100.00
	INDU020A_2018	Hoary Bat	5	4	80.00
	INDU020A_2018	Silver-haired Bat	9	3	33.33
	INDU020A_2018	Little Brown Bat	2	0	0.00
	INDU020A_2018	Indiana Bat	1	0	0.00
	INDU020A_2018	Tricolored Bat	1	0	0.00
	INDU022A_2018	Hoary Bat	2	2	100.00
	INDU022A_2018	Silver-haired Bat	1	1	100.00
	INDU023A_2018	Big Brown Bat	2	0	0.00
	INDU023A_2018	Eastern Red Bat	1	1	100.00
	INDU023A_2018	Hoary Bat	5	3	60.00
	INDU023A_2018	Silver-haired Bat	23	19	82.61
	INDU023A_2018	Evening Bat	3	2	66.67
	INDU023A_2018	Tricolored Bat	1	0	0.00
	INDU024A_2018	Big Brown Bat	1	0	0.00
	INDU024A_2018	Eastern Red Bat	1	1	100.00
	INDU024A_2018	Hoary Bat	5	5	100.00
	INDU024A_2018	Silver-haired Bat	4	1	25.00
	INDU025A_2018	Big Brown Bat	22	6	27.27
	INDU025A_2018	Eastern Red Bat	2	2	100.00
	INDU025A_2018	Silver-haired Bat	1	0	0.00
	INDU025A_2018	Tricolored Bat	1	0	0.00
	INDU026A_2018	Big Brown Bat	40	5	12.50
	INDU026A_2018	Eastern Red Bat	12	8	66.67
	INDU026A_2018	Hoary Bat	6	5	83.33
	INDU026A_2018	Silver-haired Bat	3	1	33.33
	INDU026A_2018	Little Brown Bat	2	0	0.00

Table G1 (continued). Total number of files manually vetted, and the results of manual vetting for each year, site, and species, Indiana Dunes National Park, 2016–2019. “Verified” indicates that the manual identification matched, and thus verified, the automated identification.

Year	Site ID	Kaleidoscope Classification	Total Files Vetted	Number Files Verified	Percent Files Verified
2018 (cont.)	INDU026A_2018	Northern Long-eared Bat	6	0	0.00
	INDU026A_2018	Indiana Bat	1	0	0.00
	INDU026A_2018	Evening Bat	3	2	66.67
	INDU027A_2018	Big Brown Bat	12	1	8.33
	INDU027A_2018	Eastern Red Bat	3	1	33.33
	INDU027A_2018	Hoary Bat	3	1	33.33
	INDU027A_2018	Silver-haired Bat	4	1	25.00
	INDU027A_2018	Evening Bat	1	1	100.00
	INDU028A_2018	Big Brown Bat	40	4	10.00
	INDU028A_2018	Eastern Red Bat	8	3	37.50
	INDU028A_2018	Hoary Bat	3	3	100.00
	INDU028A_2018	Silver-haired Bat	9	3	33.33
	INDU028A_2018	Little Brown Bat	1	0	0.00
	INDU028A_2018	Northern Long-eared Bat	1	0	0.00
	INDU029A_2018	Big Brown Bat	2	0	0.00
	INDU029A_2018	Eastern Red Bat	5	4	80.00
	INDU029A_2018	Hoary Bat	5	4	80.00
	INDU029A_2018	Silver-haired Bat	2	0	0.00
	INDU029A_2018	Little Brown Bat	1	0	0.00
	INDU029A_2018	Northern Long-eared Bat	1	0	0.00
	INDU029A_2018	Indiana Bat	1	0	0.00
	INDU029A_2018	Tricolored Bat	1	0	0.00
	INDU030A_2018	Big Brown Bat	9	2	22.22
	INDU030A_2018	Eastern Red Bat	9	4	44.44
	INDU030A_2018	Silver-haired Bat	2	0	0.00
	INDU030A_2018	Little Brown Bat	1	1	100.00
	INDU030A_2018	Tricolored Bat	1	0	0.00
	INDU031A_2018	Big Brown Bat	37	8	21.62
	INDU031A_2018	Eastern Red Bat	1	1	100.00
	INDU031A_2018	Hoary Bat	3	2	66.67
	INDU031A_2018	Silver-haired Bat	16	1	6.25
	INDU031A_2018	Evening Bat	3	2	66.67
	INDU032A_2018	Big Brown Bat	4	2	50.00
	INDU032A_2018	Eastern Red Bat	10	5	50.00

Table G1 (continued). Total number of files manually vetted, and the results of manual vetting for each year, site, and species, Indiana Dunes National Park, 2016–2019. “Verified” indicates that the manual identification matched, and thus verified, the automated identification.

Year	Site ID	Kaleidoscope Classification	Total Files Vetted	Number Files Verified	Percent Files Verified
2018 (cont.)	INDU032A_2018	Hoary Bat	3	2	66.67
	INDU032A_2018	Silver-haired Bat	6	1	16.67
	INDU032A_2018	Evening Bat	5	2	40.00
	INDU035A_2018	Big Brown Bat	13	0	0.00
	INDU035A_2018	Eastern Red Bat	13	11	84.62
	INDU035A_2018	Silver-haired Bat	3	0	0.00
	INDU035A_2018	Evening Bat	2	0	0.00
	INDU035A_2018	Tricolored Bat	2	1	50.00
	INDU036A_2018	Big Brown Bat	21	2	9.52
	INDU036A_2018	Eastern Red Bat	7	7	100.00
	INDU036A_2018	Silver-haired Bat	5	0	0.00
	INDU036A_2018	Evening Bat	1	1	100.00
	INDU038A_2018	Big Brown Bat	18	3	16.67
	INDU038A_2018	Eastern Red Bat	5	2	40.00
	INDU038A_2018	Hoary Bat	5	4	80.00
	INDU038A_2018	Silver-haired Bat	1	0	0.00
	INDU038A_2018	Evening Bat	1	1	100.00
	INDU039A_2018	Big Brown Bat	13	5	38.46
	INDU039A_2018	Eastern Red Bat	18	13	72.22
	INDU039A_2018	Hoary Bat	2	1	50.00
	INDU039A_2018	Silver-haired Bat	3	0	0.00
	INDU039A_2018	Northern Long-eared Bat	1	0	0.00
	INDU039A_2018	Evening Bat	1	1	100.00
	INDU039A_2018	Tricolored Bat	1	0	0.00
	INDU040A_2018	Big Brown Bat	14	3	21.43
	INDU040A_2018	Eastern Red Bat	7	5	71.43
	INDU040A_2018	Hoary Bat	3	3	100.00
	INDU040A_2018	Silver-haired Bat	1	0	0.00
	INDU040A_2018	Little Brown Bat	1	0	0.00
	INDU040A_2018	Northern Long-eared Bat	1	0	0.00
	INDU040A_2018	Evening Bat	2	1	50.00
	INDU042A_2018	Big Brown Bat	7	3	42.86
	INDU042A_2018	Eastern Red Bat	6	6	100.00
	INDU042A_2018	Hoary Bat	5	4	80.00

Table G1 (continued). Total number of files manually vetted, and the results of manual vetting for each year, site, and species, Indiana Dunes National Park, 2016–2019. “Verified” indicates that the manual identification matched, and thus verified, the automated identification.

Year	Site ID	Kaleidoscope Classification	Total Files Vetted	Number Files Verified	Percent Files Verified
2018 (cont.)	INDU042A_2018	Little Brown Bat	1	0	0.00
	INDU042A_2018	Evening Bat	1	1	100.00
	INDU043A_2018	Big Brown Bat	2	0	0.00
	INDU043A_2018	Eastern Red Bat	1	1	100.00
	INDU043A_2018	Hoary Bat	2	1	50.00
	INDU043A_2018	Silver-haired Bat	1	0	0.00
	INDU043A_2018	Evening Bat	1	1	100.00
2019	INDU002A_2019	Big Brown Bat	1	0	0.00
	INDU002A_2019	Hoary Bat	1	1	100.00
	INDU002A_2019	Silver-haired Bat	2	2	100.00
	INDU004A_2019	Hoary Bat	9	8	88.89
	INDU004A_2019	Silver-haired Bat	9	3	33.33
	INDU004A_2019	Evening Bat	2	2	100.00
	INDU006A_2019	Big Brown Bat	8	1	12.50
	INDU006A_2019	Hoary Bat	2	2	100.00
	INDU006A_2019	Silver-haired Bat	1	0	0.00
	INDU007A_2019	Big Brown Bat	4	1	25.00
	INDU007A_2019	Hoary Bat	1	0	0.00
	INDU007A_2019	Silver-haired Bat	6	1	16.67
	INDU007A_2019	Evening Bat	1	0	0.00
	INDU009A_2019	Big Brown Bat	3	2	66.67
	INDU009A_2019	Silver-haired Bat	4	3	75.00
	INDU010A_2019	Big Brown Bat	2	0	0.00
	INDU010A_2019	Hoary Bat	1	1	100.00
	INDU010A_2019	Silver-haired Bat	1	0	0.00
	INDU010A_2019	Tricolored Bat	1	0	0.00
	INDU011A_2019	Big Brown Bat	2	2	100.00
	INDU011A_2019	Eastern Red Bat	2	1	50.00
	INDU011A_2019	Hoary Bat	2	0	0.00
	INDU011A_2019	Silver-haired Bat	5	3	60.00
	INDU011A_2019	Northern Long-eared Bat	1	0	0.00
	INDU011A_2019	Evening Bat	2	0	0.00
	INDU011A_2019	Tricolored Bat	2	2	100.00
	INDU012B_2019	Big Brown Bat	1	1	100.00

Table G1 (continued). Total number of files manually vetted, and the results of manual vetting for each year, site, and species, Indiana Dunes National Park, 2016–2019. “Verified” indicates that the manual identification matched, and thus verified, the automated identification.

Year	Site ID	Kaleidoscope Classification	Total Files Vetted	Number Files Verified	Percent Files Verified
2019 (cont.)	INDU012B_2019	Eastern Red Bat	5	5	100.00
	INDU012B_2019	Silver-haired Bat	3	2	66.67
	INDU012B_2019	Little Brown Bat	2	0	0.00
	INDU013A_2019	Little Brown Bat	1	0	0.00
	INDU013A_2019	Indiana Bat	1	0	0.00
	INDU015A_2019	Big Brown Bat	48	19	39.58
	INDU015A_2019	Eastern Red Bat	8	5	62.50
	INDU015A_2019	Hoary Bat	1	0	0.00
	INDU015A_2019	Silver-haired Bat	11	0	0.00
	INDU015A_2019	Little Brown Bat	1	0	0.00
	INDU015A_2019	Indiana Bat	4	0	0.00
	INDU016A_2019	Big Brown Bat	8	2	25.00
	INDU016A_2019	Eastern Red Bat	1	0	0.00
	INDU016A_2019	Silver-haired Bat	9	1	11.11
	INDU016A_2019	Evening Bat	1	0	0.00
	INDU016A_2019	Tricolored Bat	1	0	0.00
	INDU020A_2019	Big Brown Bat	45	42	93.33
	INDU020A_2019	Eastern Red Bat	10	6	60.00
	INDU020A_2019	Northern Long-eared Bat	1	0	0.00
	INDU020A_2019	Evening Bat	1	1	100.00
	INDU022A_2019	Big Brown Bat	4	2	50.00
	INDU022A_2019	Eastern Red Bat	1	1	100.00
	INDU022A_2019	Hoary Bat	4	1	25.00
	INDU022A_2019	Silver-haired Bat	3	0	0.00
	INDU022A_2019	Indiana Bat	1	0	0.00
	INDU023A_2019	Big Brown Bat	5	0	0.00
	INDU023A_2019	Eastern Red Bat	8	3	37.50
	INDU023A_2019	Hoary Bat	11	5	45.45
	INDU023A_2019	Silver-haired Bat	30	15	50.00
	INDU023A_2019	Evening Bat	1	0	0.00
	INDU023A_2019	Tricolored Bat	1	1	100.00
	INDU024B_2019	Eastern Red Bat	1	1	100.00
	INDU024B_2019	Hoary Bat	8	6	75.00
	INDU024B_2019	Silver-haired Bat	6	2	33.33

Table G1 (continued). Total number of files manually vetted, and the results of manual vetting for each year, site, and species, Indiana Dunes National Park, 2016–2019. “Verified” indicates that the manual identification matched, and thus verified, the automated identification.

Year	Site ID	Kaleidoscope Classification	Total Files Vetted	Number Files Verified	Percent Files Verified
2019 (cont.)	INDU024B_2019	Tricolored Bat	1	0	0.00
	INDU025A_2019	Big Brown Bat	10	5	50.00
	INDU025A_2019	Eastern Red Bat	4	3	75.00
	INDU025A_2019	Silver-haired Bat	5	0	0.00
	INDU025A_2019	Northern Long-eared Bat	1	0	0.00
	INDU025A_2019	Indiana Bat	1	0	0.00
	INDU026A_2019	Big Brown Bat	28	15	53.57
	INDU026A_2019	Eastern Red Bat	7	5	71.43
	INDU026A_2019	Hoary Bat	4	0	0.00
	INDU026A_2019	Silver-haired Bat	4	2	50.00
	INDU026A_2019	Little Brown Bat	2	0	0.00
	INDU026A_2019	Northern Long-eared Bat	4	0	0.00
	INDU027A_2019	Big Brown Bat	3	0	0.00
	INDU027A_2019	Eastern Red Bat	2	1	50.00
	INDU027A_2019	Hoary Bat	2	2	100.00
	INDU027A_2019	Silver-haired Bat	3	0	0.00
	INDU027A_2019	Little Brown Bat	1	0	0.00
	INDU027A_2019	Evening Bat	1	1	100.00
	INDU028A_2019	Big Brown Bat	15	7	46.67
	INDU028A_2019	Eastern Red Bat	12	9	75.00
	INDU028A_2019	Hoary Bat	2	2	100.00
	INDU028A_2019	Silver-haired Bat	7	0	0.00
	INDU028A_2019	Evening Bat	1	0	0.00
	INDU029A_2019	Big Brown Bat	3	1	33.33
	INDU029A_2019	Eastern Red Bat	2	0	0.00
	INDU029A_2019	Hoary Bat	1	1	100.00
	INDU029A_2019	Silver-haired Bat	2	0	0.00
	INDU030A_2019	Big Brown Bat	19	7	36.84
	INDU030A_2019	Eastern Red Bat	9	9	100.00
	INDU030A_2019	Hoary Bat	9	7	77.78
	INDU030A_2019	Silver-haired Bat	6	0	0.00
	INDU030A_2019	Little Brown Bat	2	0	0.00
	INDU030A_2019	Northern Long-eared Bat	1	0	0.00
	INDU030A_2019	Indiana Bat	1	0	0.00

Table G1 (continued). Total number of files manually vetted, and the results of manual vetting for each year, site, and species, Indiana Dunes National Park, 2016–2019. “Verified” indicates that the manual identification matched, and thus verified, the automated identification.

Year	Site ID	Kaleidoscope Classification	Total Files Vetted	Number Files Verified	Percent Files Verified
2019 (cont.)	INDU031A_2019	Big Brown Bat	29	14	48.28
	INDU031A_2019	Eastern Red Bat	3	2	66.67
	INDU031A_2019	Hoary Bat	8	4	50.00
	INDU031A_2019	Silver-haired Bat	8	1	12.50
	INDU031A_2019	Evening Bat	6	2	33.33
	INDU032A_2019	Big Brown Bat	3	0	0.00
	INDU032A_2019	Eastern Red Bat	8	4	50.00
	INDU032A_2019	Hoary Bat	4	3	75.00
	INDU032A_2019	Little Brown Bat	1	0	0.00
	INDU032A_2019	Evening Bat	1	0	0.00
	INDU035A_2019	Big Brown Bat	1	0	0.00
	INDU035A_2019	Eastern Red Bat	13	11	84.62
	INDU035A_2019	Hoary Bat	3	3	100.00
	INDU036A_2019	Big Brown Bat	23	11	47.83
	INDU036A_2019	Eastern Red Bat	4	3	75.00
	INDU036A_2019	Hoary Bat	1	0	0.00
	INDU036A_2019	Silver-haired Bat	3	1	33.33
	INDU036A_2019	Little Brown Bat	1	0	0.00
	INDU036A_2019	Indiana Bat	1	0	0.00
	INDU038A_2019	Big Brown Bat	15	7	46.67
	INDU038A_2019	Eastern Red Bat	10	8	80.00
	INDU038A_2019	Hoary Bat	5	5	100.00
	INDU038A_2019	Silver-haired Bat	2	1	50.00
	INDU038A_2019	Evening Bat	2	0	0.00
	INDU039A_2019	Big Brown Bat	31	16	51.61
	INDU039A_2019	Eastern Red Bat	44	28	63.64
	INDU039A_2019	Hoary Bat	5	1	20.00
	INDU039A_2019	Silver-haired Bat	15	1	6.67
	INDU039A_2019	Little Brown Bat	4	0	0.00
	INDU039A_2019	Indiana Bat	1	0	0.00
	INDU039A_2019	Evening Bat	7	2	28.57
	INDU039A_2019	Tricolored Bat	4	0	0.00
	INDU040A_2019	Big Brown Bat	11	5	45.45
	INDU040A_2019	Eastern Red Bat	6	4	66.67

Table G1 (continued). Total number of files manually vetted, and the results of manual vetting for each year, site, and species, Indiana Dunes National Park, 2016–2019. “Verified” indicates that the manual identification matched, and thus verified, the automated identification.

Year	Site ID	Kaleidoscope Classification	Total Files Vetted	Number Files Verified	Percent Files Verified
2019 (cont.)	INDU040A_2019	Hoary Bat	4	3	75.00
	INDU040A_2019	Silver-haired Bat	4	0	0.00
	INDU040A_2019	Little Brown Bat	2	0	0.00
	INDU040A_2019	Northern Long-eared Bat	1	0	0.00
	INDU040A_2019	Evening Bat	1	1	100.00
	INDU042A_2019	Big Brown Bat	22	15	68.18
	INDU042A_2019	Eastern Red Bat	11	6	54.55
	INDU042A_2019	Hoary Bat	3	1	33.33
	INDU042A_2019	Silver-haired Bat	1	0	0.00
	INDU042A_2019	Little Brown Bat	1	0	0.00
	INDU042A_2019	Northern Long-eared Bat	1	0	0.00
	INDU042A_2019	Evening Bat	1	1	100.00
	INDU043A_2019	Big Brown Bat	3	0	0.00
	INDU043A_2019	Eastern Red Bat	2	2	100.00
	INDU043A_2019	Hoary Bat	6	6	100.00
	INDU043A_2019	Silver-haired Bat	1	0	0.00
	INDU043A_2019	Evening Bat	1	0	0.00

Appendix H. Species Composition Across Parks

Figure H1 includes all Great Lakes Network parks in which bat monitoring occurred. For parks that had both baseline and expanded species lists, data shown are from the baseline analysis.

APIS:	Apostle Islands National Lakeshore (Wisconsin)
GRPO:	Grand Portage National Monument (Minnesota)
INDU:	Indiana Dunes National Park (Indiana)
ISRO:	Isle Royale National Park (Michigan)
MISS:	Mississippi National River and Recreation Area (Minnesota)
PIRO:	Pictured Rocks National Lakeshore (Michigan)
SACN:	St. Croix National Scenic Riverway (Wisconsin/Minnesota)
SLBE:	Sleeping Bear Dunes National Lakeshore (Michigan)
VOYA:	Voyageurs National Park (Minnesota)

The baseline analysis had Indiana bat and evening bat allowed as possible species only for INDU, and tricolored bat allowed as a possible species only for INDU, MISS, and SACN (Figure H1).

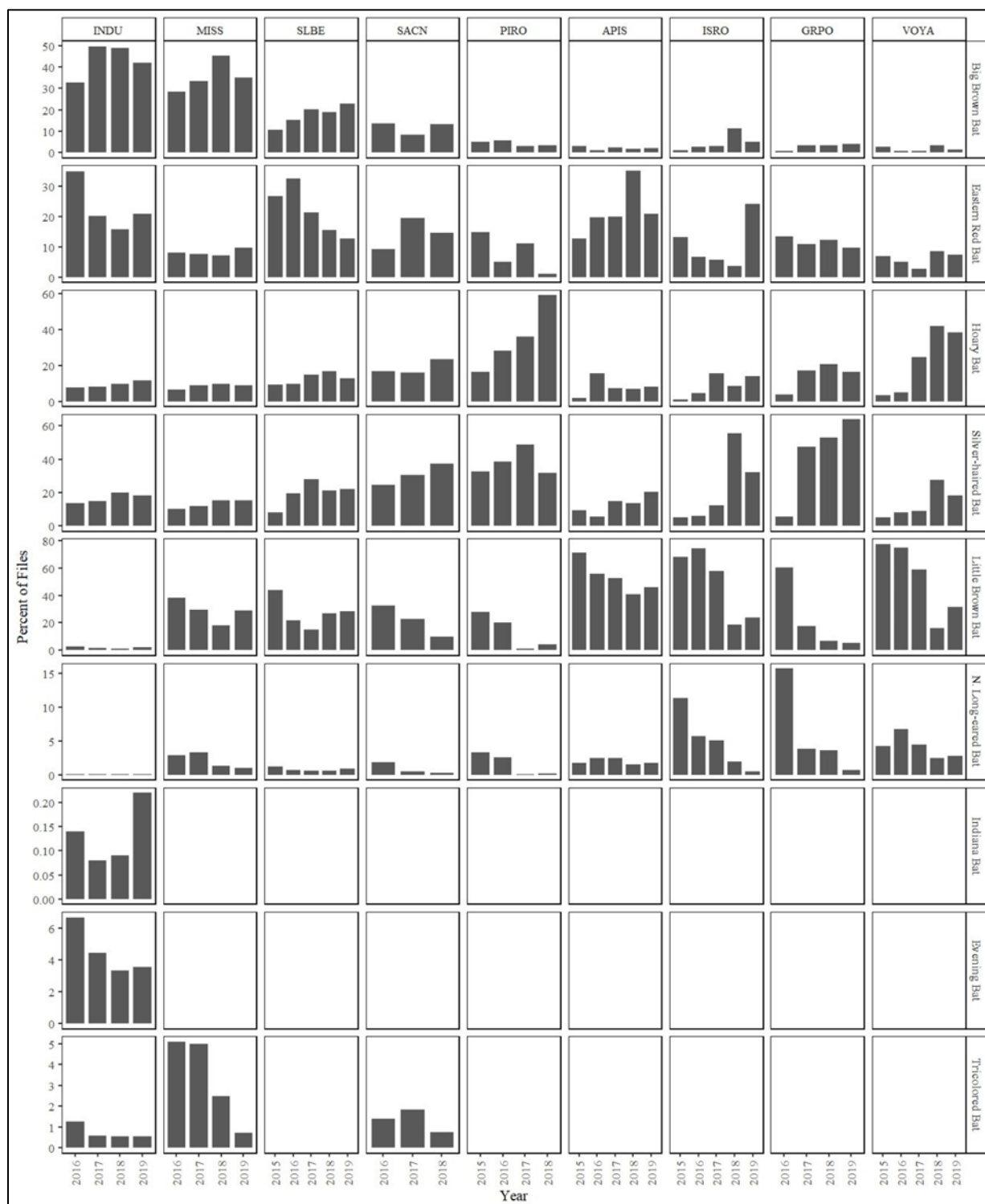


Figure H1. Percent of audio files classified as each bat species by Kaleidoscope Pro in the baseline analysis for each park and year. Note that the y-axis scale is different for each species and not all parks conducted surveys in all years. Only data from valid deployments are shown. Parks are ordered approximately by latitude, from INDU (southernmost) to VOYA (northernmost).

The Department of the Interior protects and manages the nation's natural resources and cultural heritage; provides scientific and other information about those resources; and honors its special responsibilities to American Indians, Alaska Natives, and affiliated Island Communities.

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