



Acoustic Monitoring for Bats at Saint Croix National Scenic Riverway

Data Summary Report for 2016–2018

Natural Resource Report NPS/GLKN/NRDS—2021/1331



ON THE COVER

Bat acoustic monitoring equipment at Saint Croix National Scenic Riverway.

NPS Photo

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Abstract

The Great Lakes Inventory and Monitoring Network initiated an acoustic monitoring program for bats in 2015. At Saint Croix National Scenic Riverway, monitoring began in 2016. This report presents results for the 2016–2018 surveys. Acoustic recordings were analyzed using the software program Kaleidoscope Pro and a subset of files were manually reviewed to confirm species identifications. The seven bat species previously documented at the park were reconfirmed: big brown bat, eastern red bat, hoary bat, silver-haired bat, little brown bat, northern long-eared bat, and tricolored bat. One additional species, the evening bat, was documented through both automated Kaleidoscope classification and manual vetting. Although the park is north of the typical evening bat range, this species was observed by other researchers in both Wisconsin and Minnesota in 2016, prompting us to include it in our expanded analysis. We obtained a total of 26 manually verified evening bat recordings, suggesting that this species is at least occasionally present in the park. Activity levels for big brown bat, eastern red bat, hoary bat, silver-haired bat, tricolored bat, and evening bat appear to be stable or slightly increasing. Activity levels for little brown bat and northern long-eared bat appear to be declining.

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 L. Yager, B. Karns, S. Weyenberg, M. Rhoades, B. Hines, M. Bell, S. House, P. Matzinger, J. Hill, K. Kafura, M. Prosser, M. Weiss, D. Leigh, S. Griffen, S. Koch, D. Langer, E. Weiler, E. Greger, C. Ross, S. Griffin, K. Hands, J. Bryzek, J. Medland, A. Wickenhauser, K. Moore, J. Rudquist, and O. Poelmann. 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. L. Yager, M. Rhoades, 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. Saint Croix National Scenic Riverway (SACN) 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 and Wildlife 2020) (Appendix A).

Prior to the initiation of the GLKN bat acoustic monitoring program, seven species had been documented at SACN (Table 1). Although bat acoustic surveys were conducted by SACN staff in 1999–2001 using Anabat detectors, the resulting data have not been analyzed and no report is available (M. Rhoades, personal communication). In 2009–2010, a graduate student researcher captured little brown bats (*Myotis lucifugus*) at maternity colonies in two Minnesota state parks, Saint Croix State Park, and William O'Brien State Park (Dixon 2011). Both parks are adjacent to the Saint Croix River. The Wisconsin Bat Monitoring citizen science program, managed by the Wisconsin DNR, included acoustic survey driving routes in or adjacent to SACN in 2010, 2013, and 2019. Their results included detections of seven species: big brown bat, eastern red bat (*Lasiurus borealis*), hoary bat (*Lasiurus cinereus*), silver-haired bat (*Lasionycteris noctivagans*), little brown bat, northern long-eared bat, and tricolored bat (*Perimyotis subflavus*) (White et al. 2010, Wisconsin DNR 2020).

Table 1. Bat species occurrences recorded at Saint Croix National Scenic Riverway prior to the initiation of the GLKN acoustic monitoring program in 2016 and methods by which the species were documented. Data sources include White et al. (2010), Dixon (2011), and Wisconsin DNR (2020). Ranges are as shown in Kurta (2017).

Species Name	Prior Records	Methods Used
Big Brown Bat <i>Eptesicus fuscus</i>	Yes	Acoustic
Eastern Red Bat <i>Lasiurus borealis</i>	Yes	Acoustic
Hoary Bat <i>Lasiurus cinereus</i>	Yes	Acoustic
Silver-haired Bat <i>Lasionycteris noctivagans</i>	Yes	Acoustic
Little Brown Bat <i>Myotis lucifugus</i>	Yes	Acoustic, Capture
Northern Long-eared Bat <i>Myotis septentrionalis</i>	Yes	Acoustic
Indiana Bat <i>Myotis sodalis</i>	No, well outside of range	n/a
Evening Bat <i>Nycticeius humeralis</i>	No, close to edge of range	n/a
Tricolored Bat <i>Perimyotis subflavus</i>	Yes	Acoustic

Evening bats (*Nycticeius humeralis*) were first documented as a resident species in Wisconsin in 2016, when a maternity colony was discovered in Rock County (Kaarakka 2018). An evening bat was also captured near the Twin Cities in Minnesota in 2016 (Swingen et al. 2018). Although previous surveys have not documented evening bats at SACN, this species may be expanding its range northward and could be present. The range of the Indiana bat lies further south and east, therefore this species is not expected to be present at SACN.

Methods

Bat acoustic monitoring at SACN 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 SACN, the GRTS design was used beginning in 2016, with 26 cells selected for sampling. Four additional cells were added in 2017–2018. The total of 30 cells is equivalent to approximately 4% of the park’s sampling frame.

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 SACN001A. A map of SACN sample sites is provided in Figure 1.



Figure 1. Bat monitoring sites at Saint Croix National Scenic Riverway. Sites shown were established in 2016 (n = 26), 2017 (n = 3), and 2018 (n = 1). Sites were used each year after their establishment, except for SACN011, SACN027, SACN034, and SACN042 which were relocated from the “A” site to the “B” site in 2017.

Data Collection

Acoustic monitoring is conducted during the summer, from 1 June to 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 SACN includes Wildlife Acoustics 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.

Data Management and Analysis

Field technicians are responsible for data organization and securely storing data at the SACN 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 2016–2018 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 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 SACN based on published range maps (Harvey et al. 2011, Rodhouse et al. 2016, Kurta 2017). These species were considered the “baseline” species list. We also created an “expanded” list, adding species that are documented relatively close to the park and may possibly be present. All audio files were run through Kaleidoscope Pro twice, once using the baseline list and once using the expanded list. The baseline and expanded species lists for SACN are provided in Appendix B. Analysis settings used in Kaleidoscope Pro are provided in Appendix C.

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. This procedure was used for the baseline analysis; for the expanded analysis, additional files were selected only for the new species not already represented by the baseline analysis. 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 SACN during the years 2016 to 2018. There were 22 to 28 valid deployments per year. This report provides results only for the sites that had valid deployments.

Monitoring occurred over a total of 172 to 224 nights of recording. The number of audio files collected per year ranged from 57,933 to 63,720. Yearly survey effort and deployment information are summarized in Figure 2 and Appendix D.

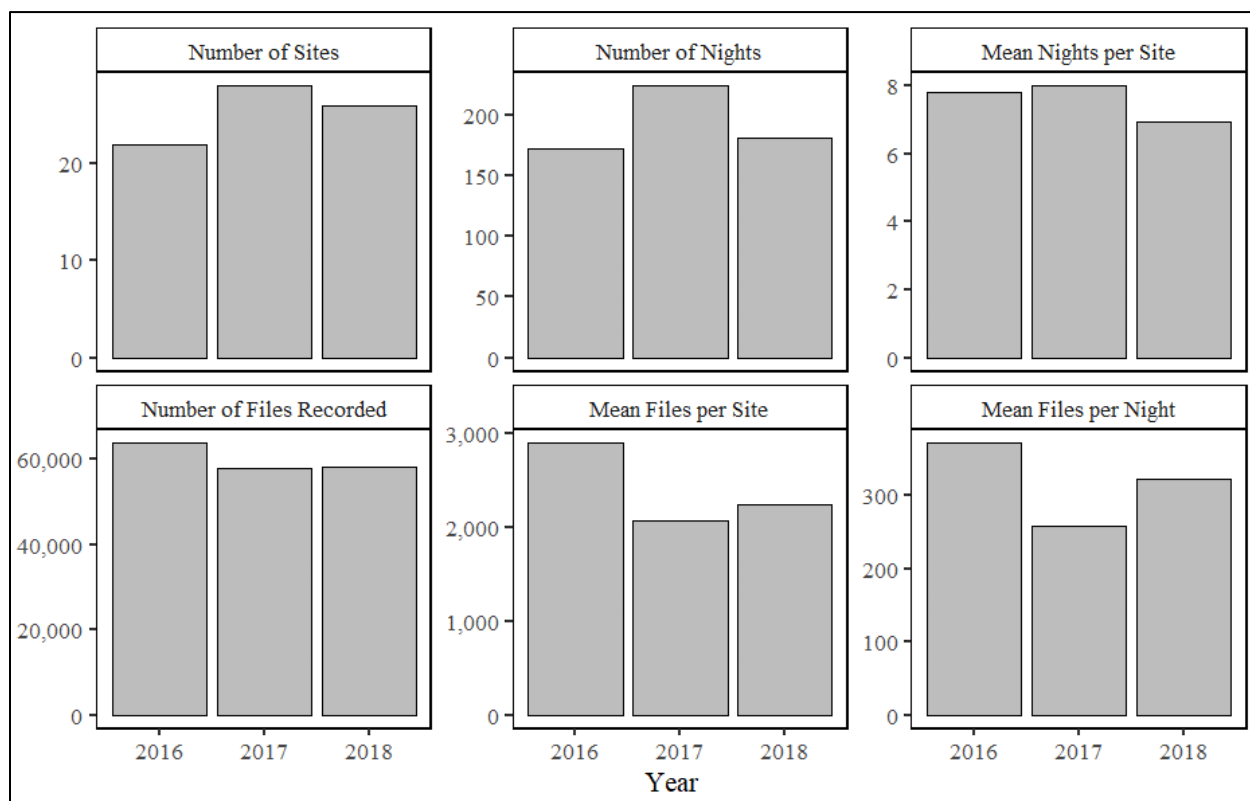


Figure 2. Yearly survey effort at Saint Croix National Scenic Riverway, 2016–2018. *Top, left to right:* Number of sites, number of nights, and mean nights per site; *bottom, left to right:* total number of audio files recorded, mean files per site, and mean files per night. Number of files is prior to classification (i.e., includes noise).

Automated Classification

Most files (69%–83% per year) were identified to the species level by Kaleidoscope Pro (Figure 3, Appendix E). The proportion of files assigned to a species versus noise or unknown was similar for the baseline and expanded analyses (Figure 3). The proportion of files categorized as noise was similar to the average across all parks using the same detector model (Appendix F). However, noise levels were highly variable among the different SACN sampling sites (Appendix F).

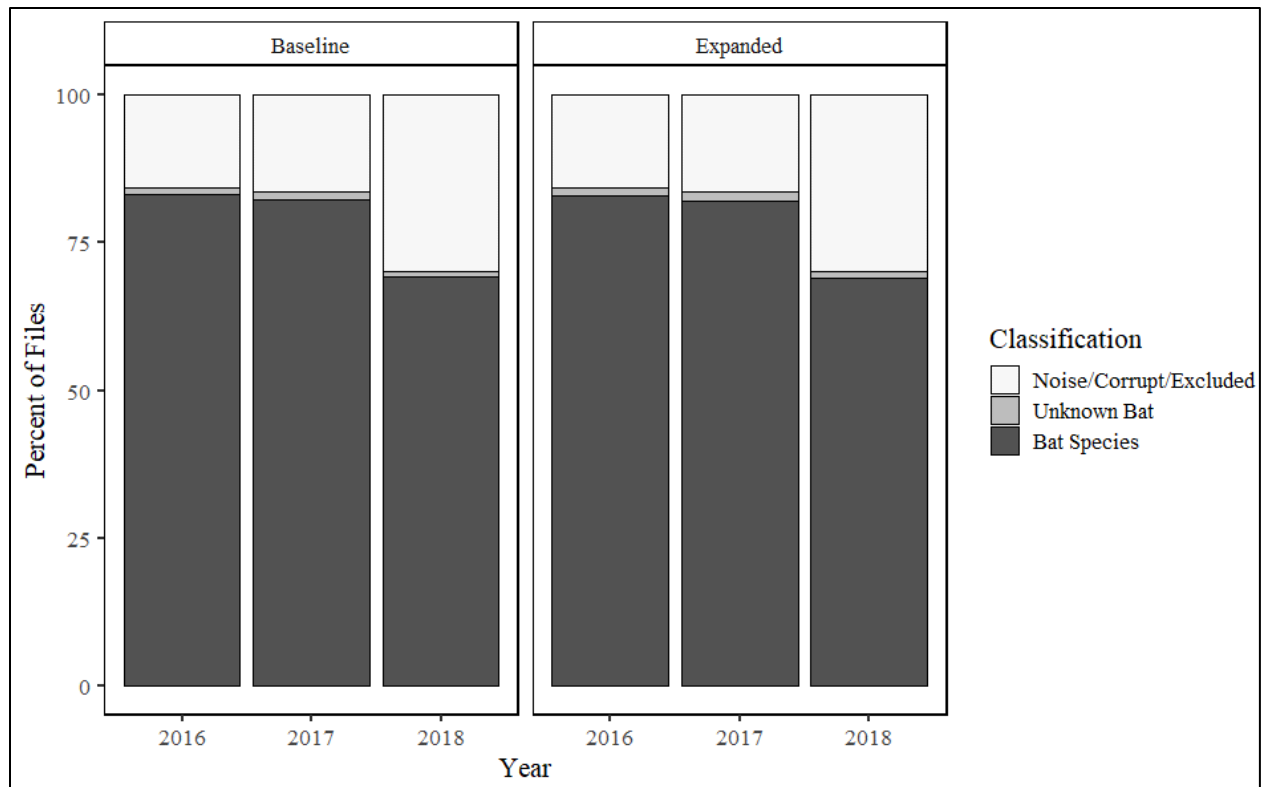


Figure 3. Percent of audio files classified by Kaleidoscope Pro as bat species vs. unknown bats vs. noise, corrupt, and excluded files, Saint Croix National Scenic Riverway, 2016–2018. Proportions are shown for the baseline (*left*) and expanded (*right*) analyses.

Kaleidoscope Pro automated classification resulted in a total of seven species documented in the baseline analysis and eight species documented in the expanded analysis. For the subset of files that were successfully assigned a species-level classification, the percent classified to each species varied from year to year but was generally similar between the baseline and expanded analyses (Figure 4). However, for eastern red bat, a greater percentage of files were classified as this species in the baseline analysis than in the expanded analysis, likely due to the inclusion of evening bat in the expanded analysis. Eastern red bat and evening bat echolocate at similar frequencies. When evening bat was included as an option in the expanded analysis, Kaleidoscope Pro reassigned some files from eastern red bat to evening bat.

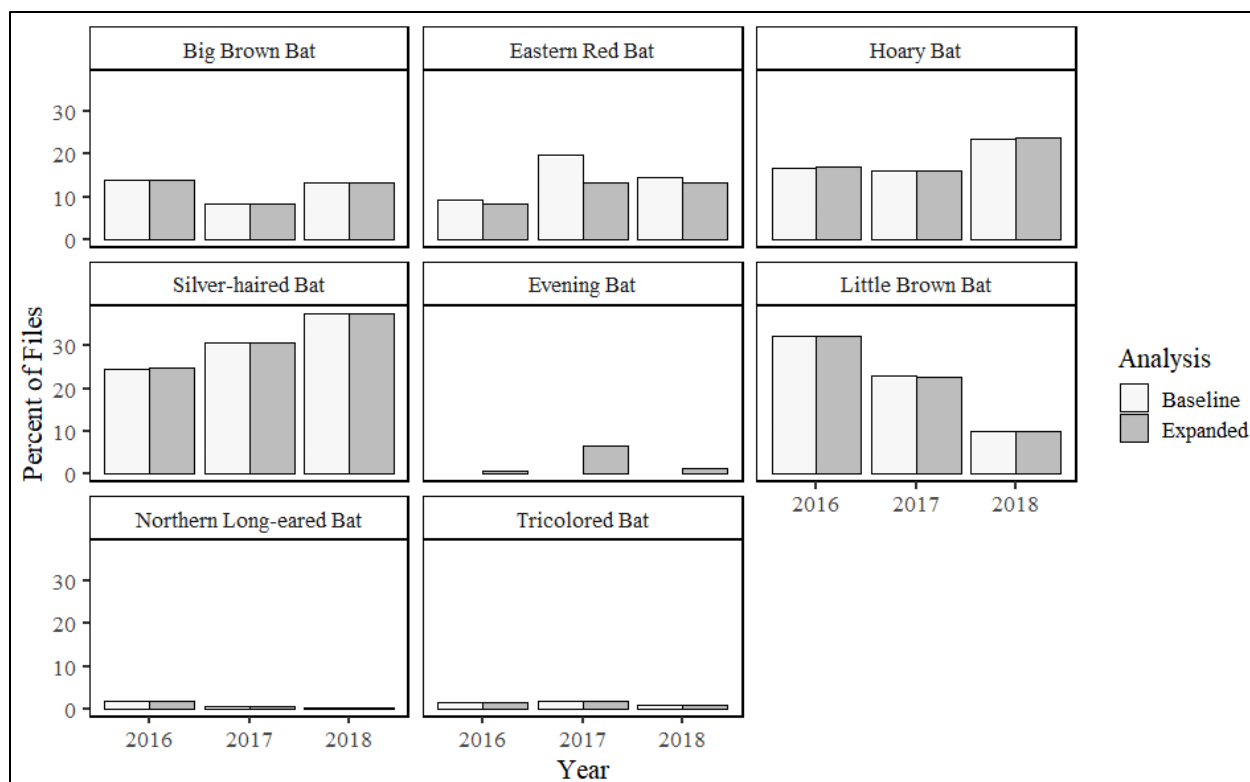


Figure 4. Proportion of files classified to each species each year in the baseline versus expanded analysis, Saint Croix National Scenic Riverway, 2016–2018. Evening bat was only allowed as a possible species in the expanded analysis. Includes only the subset of files successfully assigned a species-level classification by Kaleidoscope Pro.

In both the baseline and expanded analyses, the largest proportion of files was classified to little brown bat in 2016, and silver-haired bat in 2017–2018. After 2016, the proportion of files attributed to the three most WNS-susceptible species (little brown, northern long-eared, and tricolored bats) showed a strong decrease relative to the proportion attributed to the other species (Figure 5). The most notable changes for individual species were an increase in the percentage of silver-haired bat files and a decrease in the percentage of little brown bat files. File counts and percentages are provided in Appendix E.

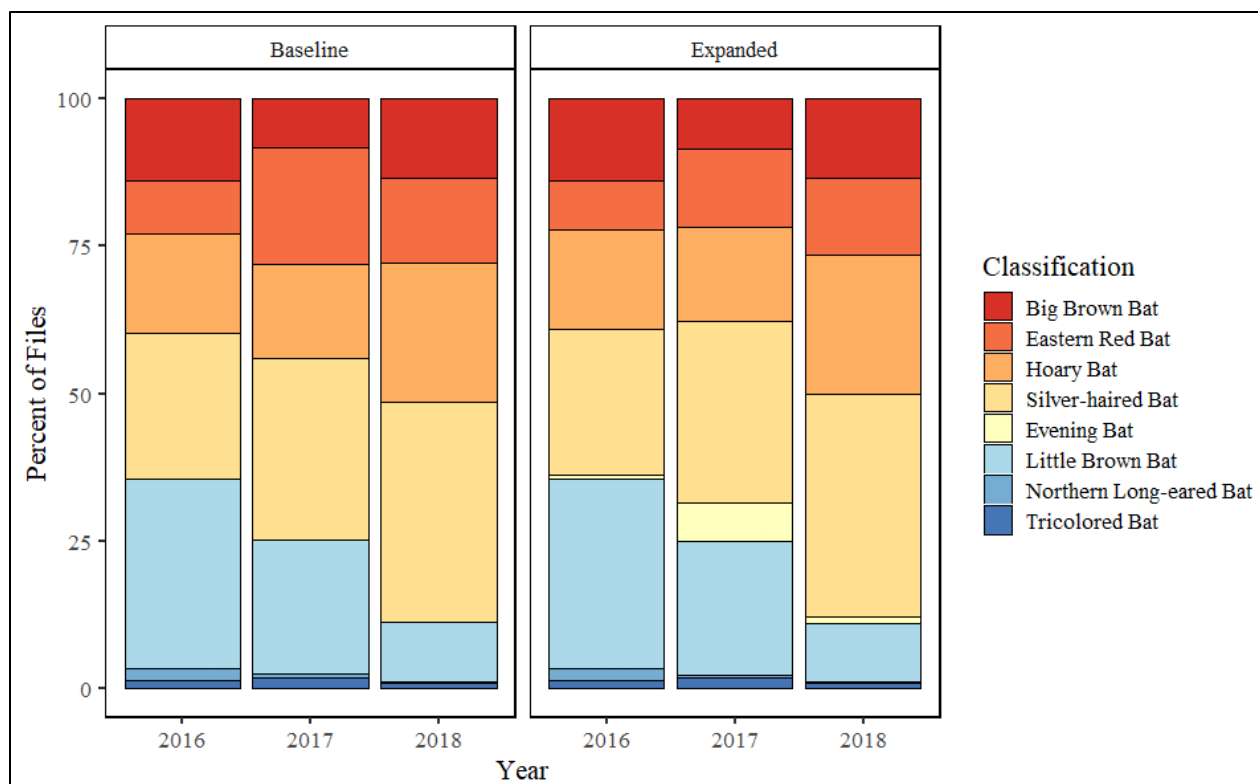


Figure 5. Proportion of files classified to each species each year relative to all other species, Saint Croix National Scenic Riverway, 2016–2018. The three most WNS-susceptible species (little brown, northern long-eared, and tricolored bats) are shown in shades of blue while less susceptible species are shown in red, orange, and yellow. Evening bat was only allowed as a possible species in the expanded analysis. Includes only the subset of files successfully assigned a species-level classification by Kaleidoscope Pro.

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 in 2016 were about 1.5 times higher than in 2017–2018, with little brown bat showing the largest difference (Figure 6).

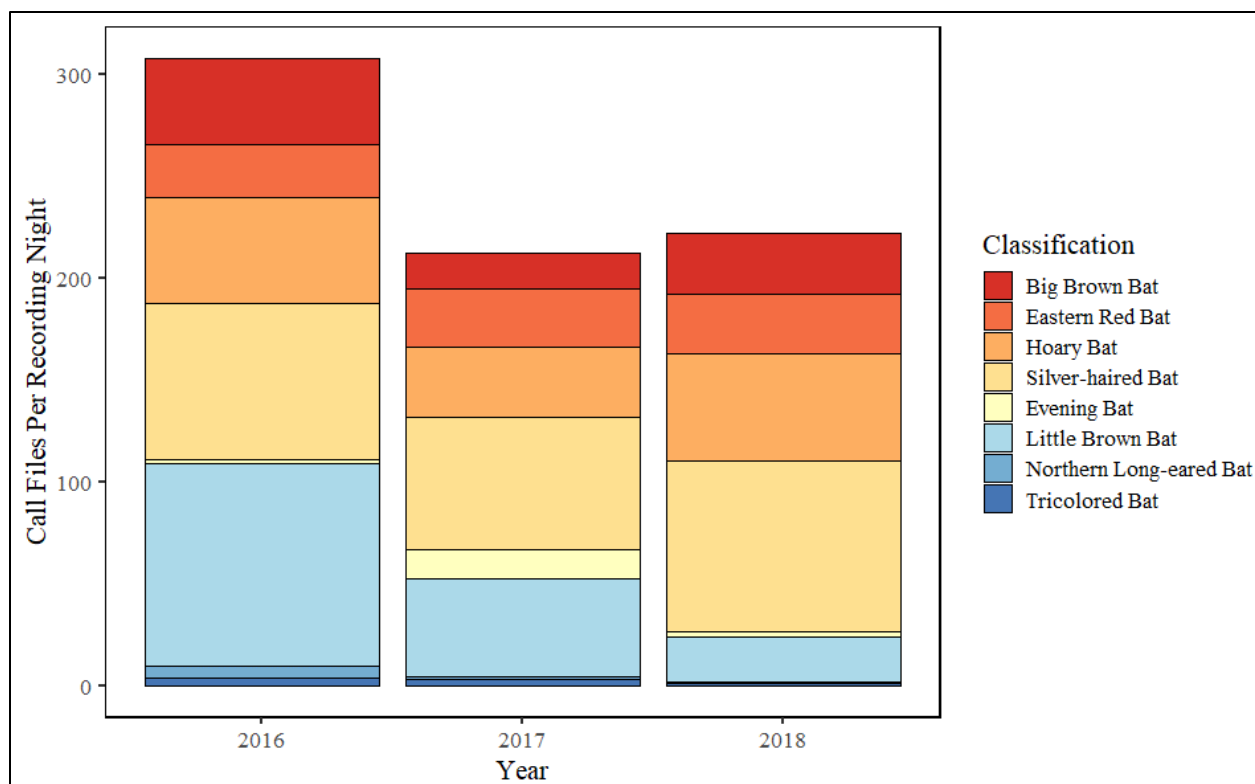


Figure 6. Parkwide call files per recording night by species and year for the expanded analysis, Saint Croix National Scenic Riverway, 2016–2018. The three most WNS-susceptible species (little brown, northern long-eared, and tricolored bats) are shown in shades of blue while less susceptible species are shown in red, orange, and yellow. Results were similar for baseline and expanded analysis so only the expanded analysis is shown.

At the site level, when looking at all species combined, the median call files per recording night was slightly higher in 2016 than in 2017 and 2018 (Figure 7, lower left panel). Looking at individual species, we observed a sharp decrease in the median call files per recording night after 2016 for little brown bat and northern long-eared bat (Figure 7). The remaining species were generally consistent (eastern red, evening, tricolored) or slightly increasing (big brown, hoary, silver-haired) over the three years (Figure 7).

Adding the evening bat as a possible species in the expanded analysis did not substantially change the call files per recording night values for other species, except for the eastern red bat at a few sample sites, because only a small number of files were reassigned. Most files assigned to evening bat had been originally classified as eastern red bat.

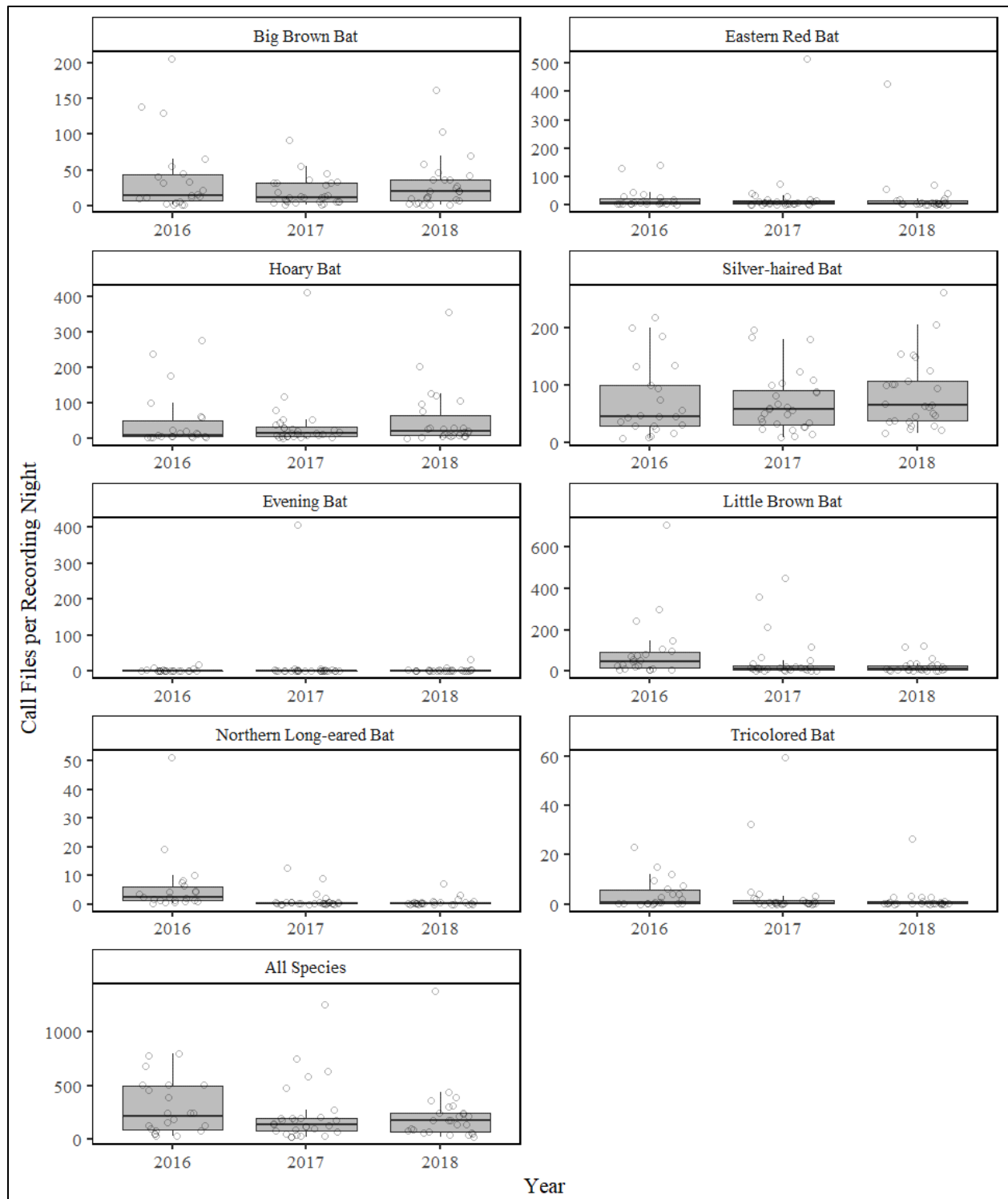


Figure 7. Call files per recording night for each species and for all species combined, by year, for the expanded analysis, Saint Croix National Scenic Riverway, 2016–2018. Each point represents call files per recording night at a particular survey site. The dark line across the boxplot represents the median. Note that the y-axis scale is different for each species. Results were similar for baseline and expanded analysis so only the expanded analysis is shown.

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. All species were widely distributed across the park, with detections at more than 70% of monitoring sites in every year (Figure 8, Appendix E). Five species were detected on at least 80% of recording nights each year (Figure 9, Appendix E). Northern long-eared, evening, and tricolored bats were detected on fewer nights. When included in the expanded analysis, the evening bat was detected at 92%–95% of sites and on 42%–55% of nights.

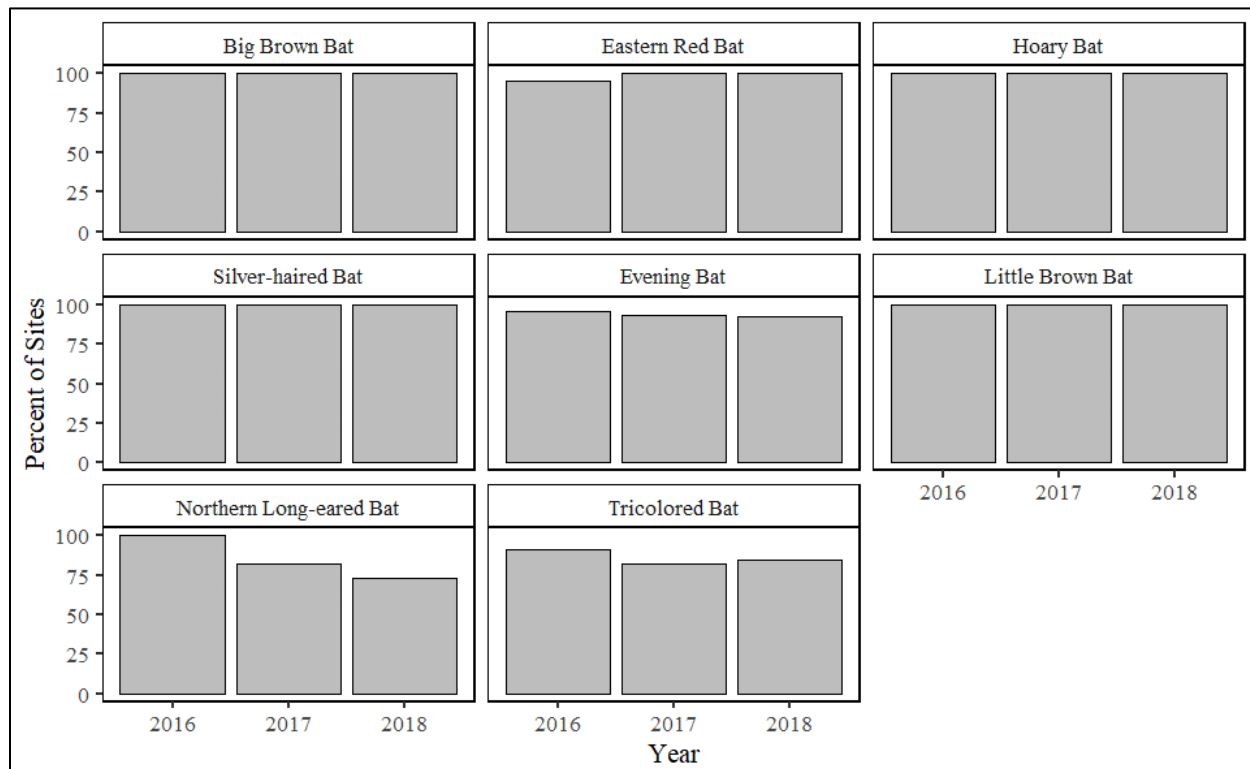


Figure 8. Proportion of monitoring sites where each species was detected each year, Saint Croix National Scenic Riverway, 2016–2018. A species was considered to be detected at a site if at least one audio file was classified as that species by Kaleidoscope Pro. Results were similar for baseline and expanded analysis so only the expanded analysis is shown.

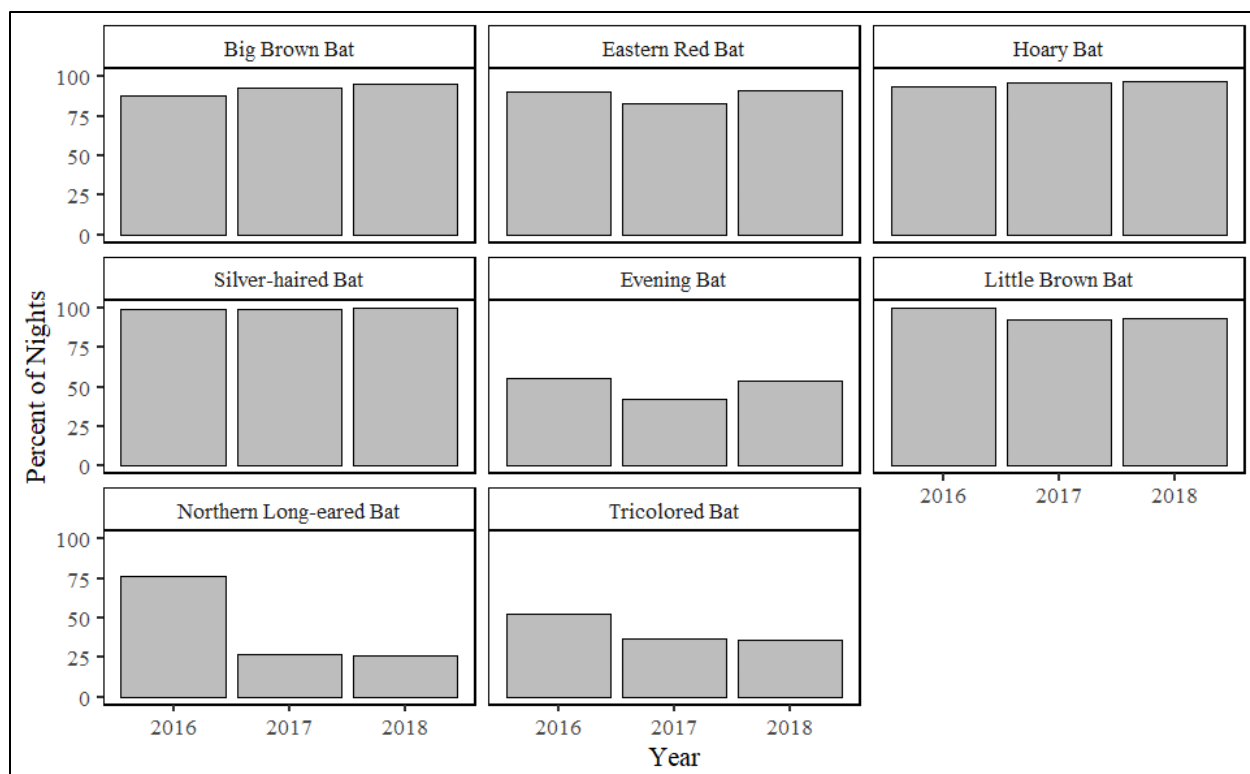


Figure 9. Proportion of recording nights on which each species was detected each year, Saint Croix National Scenic Riverway, 2016–2018. A species was considered to be detected on a night if at least one audio file was classified as that species by Kaleidoscope Pro. Results were similar for baseline and expanded analysis so only the expanded analysis is shown.

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 eight species being verified between 2016 and 2018. Detailed manual vetting results for the park as a whole are provided in Appendix G, and for each monitoring site in Appendix H.

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 7% for the northern long-eared bat to 80% for the hoary bat (Appendix G). 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

The seven bat species previously documented at SACN (see Table 1) were reconfirmed through this monitoring effort: big brown bat, eastern red bat, hoary bat, silver-haired bat, little brown bat, northern long-eared bat, and tricolored bat. One additional species, the evening bat, was documented during our expanded analysis, through both automated Kaleidoscope classification and manual vetting.

The northern edge of the evening bat's range is generally thought to be in northern Iowa and northern Illinois (Kurta 2017). However, this species was observed for the first time in Wisconsin in 2015 (Kaarakka 2018) and in Minnesota in 2016 (Swingen et al. 2018), prompting us to include it as a possible species in our expanded analysis. Our monitoring effort yielded 26 manually verified evening bat recordings from nine different sites at SACN. In most cases, each site had only one or two recordings from a single year. However, two sites had more activity: SACN017A (St John's Road) had five files in 2016 and SACN028A (upriver of West River Landing) had eleven files in 2017. Our results suggest that the evening bat is at least occasionally present within the park. It is important to note that only about 1% of the call files (51 files) identified by the software as evening 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.

Activity levels for six of the eight species (big brown bat, eastern red bat, hoary bat, silver-haired bat, tricolored bat, and evening bat) appeared to be stable or slightly increasing. Activity levels for the other two species (little brown bat and northern long-eared bat) showed decreasing trends. These two species are highly susceptible to WNS and the disease is mostly likely causing the observed declines. The tricolored bat is also susceptible to WNS, but our results do not indicate a strong decline at SACN during the period surveyed.

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

Table 2. Summary of bat species documented at Saint Croix National Scenic Riverway through automated classification and manual vetting of acoustic files.

Species	Year	Detected	
		Automated	Manual
Big Brown Bat	2016	Yes	Yes
	2017	Yes	Yes
	2018	Yes	Yes
Eastern Red Bat	2016	Yes	Yes
	2017	Yes	Yes
	2018	Yes	Yes

Table 2 (continued). Summary of bat species documented at Saint Croix National Scenic Riverway through automated classification and manual vetting of acoustic files.

Species	Year	Detected	
		Automated	Manual
Hoary Bat	2016	Yes	Yes
	2017	Yes	Yes
	2018	Yes	Yes
Silver-haired Bat	2016	Yes	Yes
	2017	Yes	Yes
	2018	Yes	Yes
Evening Bat	2016	Yes	Yes
	2017	Yes	Yes
	2018	Yes	Yes
Little Brown Bat	2016	Yes	Yes
	2017	Yes	Yes
	2018	Yes	Yes
Northern Long-eared Bat	2016	Yes	Yes
	2017	Yes	No
	2018	Yes	No
Tricolored Bat	2016	Yes	Yes
	2017	Yes	Yes
	2018	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.
- Percent of total files ranged from 8%–14%, with little change from year to year.
- Recorded on more than 85% of nights each year.
- Median call files per recording night highest in 2018 and lowest in 2017. Site SACN030A (prairie northwest of Sunrise Landing Campground) had the highest call files per recording night in two out of three years.

Eastern Red Bat

- Documented in every year of surveys (both automated and manual identification).

- Widely distributed: Present at over 95% of survey sites each year.
- Percent of total files ranged from 8%–20%, increased after 2016.
- Recorded on more than 80% of nights each year.
- Median call files per recording night similar across all three years. Certain sites had extremely high call files per recording night in 2017 (SACN028A, upriver from West River Landing) and 2018 (SACN030A, prairie northwest of Sunrise Landing Campground).

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 16%–24%. Second-most commonly recorded species in 2018.
- Recorded on more than 90% of nights each year.
- Median call files per recording night increased from 2016 to 2017 and increased again from 2017 to 2018. Sites SACN026A (Sandrock Cliffs) and SACN030A (prairie northwest of Sunrise Landing Campground) had the highest call files per recording night in two out of three years.

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-most commonly recorded species in 2016, and most commonly recorded species in 2017–2018. Represented 25%–38% of total files, with an increasing trend.
- Recorded on nearly 100% of nights each year.
- Median call files per recording night increased from 2016 to 2017 and increased again from 2017 to 2018. Site SACN030A (prairie northwest of Sunrise Landing Campground) had the highest call files per recording night in two out of three years.

Evening Bat

- Documented in every year of surveys (both automated and manual identification).
- Widely distributed: Present at over 90% of survey sites each year.
- Rarely recorded compared to other species. Represented about 6% of total files in 2017 and less than 2% in the other two years.
- Recorded on 42%–55% of nights each year.
- Median call files per recording night very low (approximately 1) and similar across all three years. Site SACN028A (upriver from West River Landing) had extremely high call files per recording night in 2017.

Little 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 2016, with 32% of files. The percent of files attributed to this species decreased sharply in 2017 and 2018 to only 23% and 10%, respectively.
- Recorded on more than 90% of nights each year.
- Median call files per recording night more than three times as high in 2016 as in 2017–2018. In 2016, one site (SACN018A, Twin Springs Road) had much higher call files per recording night than any other site in any other year. This is a quiet wetland/backwater area that likely hosts aquatic insects and provides good bat foraging habitat. Tricolored and northern long-eared bats also had high activity at this site.

Northern Long-eared Bat

- Documented in every year of surveys via automated identification and manually verified in 2016.
- Less widely distributed than other species, but still present at over 70% of survey sites each year.
- Rarely recorded compared to other species. Represented 2% or less of total files each year, with a decreasing trend.
- Recorded on 26%–77% of nights each year, with a sharp decrease after 2016.
- Median call files per recording night more than four times as high in 2016 as in 2017–2018, and very low (<1) in 2017–2018. In 2016, one site (SACN018A, Twin Springs Road) had much higher call files per recording night than any other site in any other year. This is a quiet wetland/backwater area that likely hosts aquatic insects and provides good bat foraging habitat. Little brown and tricolored bats also had high activity at this site.

Tricolored Bat

- Documented in every year of surveys (both automated and manual identification).
- Less widely distributed than other species, but still present at over 75% of survey sites each year.
- Rarely recorded compared to other species. Represented 2% or less of total files each year.
- Recorded on 36%–53% of nights each year, with a decrease after 2016.
- Median call files per recording night very low (<1) in all three years. In 2017, one site (SACN018A, Twin Springs Road) had much higher call files per recording night than any other site in any other year. This is a quiet wetland/backwater area that likely hosts aquatic insects and provides good bat foraging habitat. Little brown and northern long-eared bats also had high activity at this site.

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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. Baseline and Expanded Species Lists

Table B1. Bat species included as possible candidates during Kaleidoscope Pro species classification, where an “X” means yes and an en-dash (–) means no. The first column shows the “baseline” species group (known ranges within the boundaries of the park). The second column shows the “expanded” species group (documented near the park, possibly present).

Species Name	Baseline Analysis	Expanded Analysis
Big Brown Bat <i>Eptesicus fuscus</i>	X	X
Eastern Red Bat <i>Lasiurus borealis</i>	X	X
Hoary Bat <i>Lasiurus cinereus</i>	X	X
Silver-haired Bat <i>Lasionycteris noctivagans</i>	X	X
Little Brown Bat <i>Myotis lucifugus</i>	X	X
Northern Long-eared Bat <i>Myotis septentrionalis</i>	X	X
Tricolored Bat <i>Perimyotis subflavus</i>	X	X
Evening Bat <i>Nycticeius humeralis</i>	–	X

Appendix C. Analysis Settings for Kaleidoscope Pro

The following software settings were used during Kaleidoscope Pro analysis for species classification.

Software Version: Kaleidoscope Pro 4.0.0

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 D. Yearly Deployment Data

Tables D1 and D2 show the yearly deployment data from 2016 through 2018.

Table D1. Earliest and latest dates equipment was deployed, number of deployments in each category, and total number of files recorded for each survey year, Saint Croix National Scenic Riverway, 2016–2018.

Year	Earliest	Latest	Deployment Category*							Total Files
			Early	Failed	Failed (short)	Late	Non-protocol	Valid	Valid (dupl.)	
2016	24 May	5 October	1	0	0	3	8	22	0	81,037
2017	19 May	24 August	1	0	0	1	0	28	0	59,788
2018	5 June	22 August	0	0	1	3	0	26	0	76,594

* “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 D2. 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, Saint Croix National Scenic Riverway, 2016–2018. 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	22	172	7.8	63,720	2,896	370
2017	28	224	8.0	57,933	2,069	259
2018	26	181	7.0	58,254	2,241	322

Appendix E. Automated Classification Results

Tables E1 through E7 show the automated classification results for years 2016 through 2018.

Table E1. Total number of audio files recorded, and number and percent classified by Kaleidoscope Pro as bat species vs. unknown bats vs. noise for each year and analysis type, Saint Croix National Scenic Riverway, 2016–2018. Noise category includes files classified as noise and files that were corrupt or 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	Analysis	Total Files	# Bat Species	# Bat Unknown	# Noise	% Bat Species	% Bat Unknown	% Noise
2016	baseline	63,720	53,009	687	10,024	83.19	1.08	15.73
2016	expanded	63,720	52,946	750	10,024	83.09	1.18	15.73
2017	baseline	57,933	47,750	708	9,475	82.42	1.22	16.36
2017	expanded	57,933	47,602	856	9,475	82.17	1.48	16.36
2018	baseline	58,254	40,303	620	17,331	69.18	1.06	29.75
2018	expanded	58,254	40,171	752	17,331	68.96	1.29	29.75

Table E2. Total number of audio files classified as each bat species by Kaleidoscope Pro for each year and analysis type, Saint Croix National Scenic Riverway, 2016–2018. Evening bat was allowed as a possible species only in the expanded analysis. Only data from valid deployments are shown.

Year	Analysis	Big Brown Bat	Eastern Red Bat	Hoary Bat	Silver-haired Bat	Little Brown Bat	Northern Long-eared Bat	Evening Bat	Tricolored Bat
2016	baseline	7,312	4,860	8,909	13,068	17,138	986	n/a	736
2016	expanded	7,320	4,460	8,925	13,081	17,062	980	375	743
2017	baseline	3,978	9,394	7,691	14,628	10,949	238	n/a	872
2017	expanded	3,990	6,312	7,692	14,633	10,782	236	3,139	818
2018	baseline	5,374	5,865	9,474	15,102	4,068	119	n/a	301
2018	expanded	5,376	5,277	9,502	15,115	3,970	119	503	309

Table E3. Percent of audio files classified as each bat species by Kaleidoscope Pro for each year and analysis type, Saint Croix National Scenic Riverway, 2016–2018. Evening bat was allowed as a possible species only in the expanded analysis. Only data from valid deployments are shown. This table corresponds to Figures 4 and 5 in the main text.

Year	Analysis	Big Brown Bat	Eastern Red Bat	Hoary Bat	Silver-haired Bat	Little Brown Bat	Northern Long-eared Bat	Evening Bat	Tricolored Bat
2016	baseline	13.79	9.17	16.81	24.65	32.33	1.86	n/a	1.39
2016	expanded	13.83	8.42	16.86	24.71	32.23	1.85	0.71	1.40
2017	baseline	8.33	19.67	16.11	30.63	22.93	0.50	n/a	1.83
2017	expanded	8.38	13.26	16.16	30.74	22.65	0.50	6.59	1.72
2018	baseline	13.33	14.55	23.51	37.47	10.09	0.30	n/a	0.75
2018	expanded	13.38	13.14	23.65	37.63	9.88	0.30	1.25	0.77

Table E4. Total number of monitoring sites, and count of sites where each species was detected for each year and analysis type, Saint Croix National Scenic Riverway, 2016–2018. A species was considered to be detected at a site if at least one audio file was classified by Kaleidoscope Pro to that species. Evening bat was allowed as a possible species only during the expanded analysis.

Year	Analysis	Total Sites	Big Brown Bat	Eastern Red Bat	Hoary Bat	Silver-haired Bat	Little Brown Bat	Northern Long-eared Bat	Evening Bat	Tricolored Bat
2016	baseline	22	22	21	22	22	22	22	n/a	20
2016	expanded	22	22	21	22	22	22	22	21	20
2017	baseline	28	28	28	28	28	28	24	n/a	22
2017	expanded	28	28	28	28	28	28	23	26	23
2018	baseline	26	26	26	26	26	26	19	n/a	22
2018	expanded	26	26	26	26	26	26	19	24	22

Table E5. Total number of monitoring sites, and percent of sites where each species was detected for each year and analysis type, Saint Croix National Scenic Riverway, 2016–2018. A species was considered to be detected at a site if at least one audio file was classified by Kaleidoscope Pro to that species. Evening bat was allowed as a possible species only during the expanded analysis. This table corresponds to Figure 8 in the main text.

Year	Analysis	Total Sites	Big Brown Bat	Eastern Red Bat	Hoary Bat	Silver-haired Bat	Little Brown Bat	Northern Long-eared Bat	Evening Bat	Tricolored Bat
2016	baseline	22	100.00	95.45	100.00	100.00	100.00	100.00	n/a	90.91
2016	expanded	22	100.00	95.45	100.00	100.00	100.00	100.00	95.45	90.91
2017	baseline	28	100.00	100.00	100.00	100.00	100.00	85.71	n/a	78.57
2017	expanded	28	100.00	100.00	100.00	100.00	100.00	82.14	92.86	82.14
2018	baseline	26	100.00	100.00	100.00	100.00	100.00	73.08	n/a	84.62
2018	expanded	26	100.00	100.00	100.00	100.00	100.00	73.08	92.31	84.62

Table E6. Total number of recording nights, and count of recording nights on which each species was detected for each year and analysis type, Saint Croix National Scenic Riverway, 2016–2018. A species was considered to be detected on a night if at least one audio file was classified by Kaleidoscope Pro to that species. Evening bat was allowed as a possible species only during the expanded analysis.

Year	Analysis	Total Nights	Big Brown Bat	Eastern Red Bat	Hoary Bat	Silver-haired Bat	Little Brown Bat	Northern Long-eared Bat	Evening Bat	Tricolored Bat
2016	baseline	172	150	158	161	170	171	133	n/a	91
2016	expanded	172	151	156	161	170	171	132	95	91
2017	baseline	224	207	189	215	221	210	63	n/a	84
2017	expanded	224	207	185	215	221	207	61	95	83
2018	baseline	181	173	166	176	181	168	48	n/a	66
2018	expanded	181	173	165	176	181	168	47	98	66

Table E7. Total number of recording nights, and percent of recording nights on which each species was detected for each year and analysis type, Saint Croix National Scenic Riverway, 2016–2018. A species was considered to be detected on a night if at least one audio file was classified by Kaleidoscope Pro to that species. Evening bat was allowed as a possible species only during the expanded analysis. This table corresponds to Figure 9 in the main text.

Year	Analysis	Total Nights	Big Brown Bat	Eastern Red Bat	Hoary Bat	Silver-haired Bat	Little Brown Bat	Northern Long-eared Bat	Evening Bat	Tricolored Bat
2016	baseline	172	87.21	91.86	93.60	98.84	99.42	77.33	n/a	52.91
2016	expanded	172	87.79	90.70	93.60	98.84	99.42	76.74	55.23	52.91
2017	baseline	224	92.41	84.38	95.98	98.66	93.75	28.12	n/a	37.50
2017	expanded	224	92.41	82.59	95.98	98.66	92.41	27.23	42.41	37.05
2018	baseline	181	95.58	91.71	97.24	100.00	92.82	26.52	n/a	36.46
2018	expanded	181	95.58	91.16	97.24	100.00	92.82	25.97	54.14	36.46

Appendix F. Noise Assessment

Figures F1 and F2 and Table F1 show the assessment of noise levels relative to detector model and survey site.

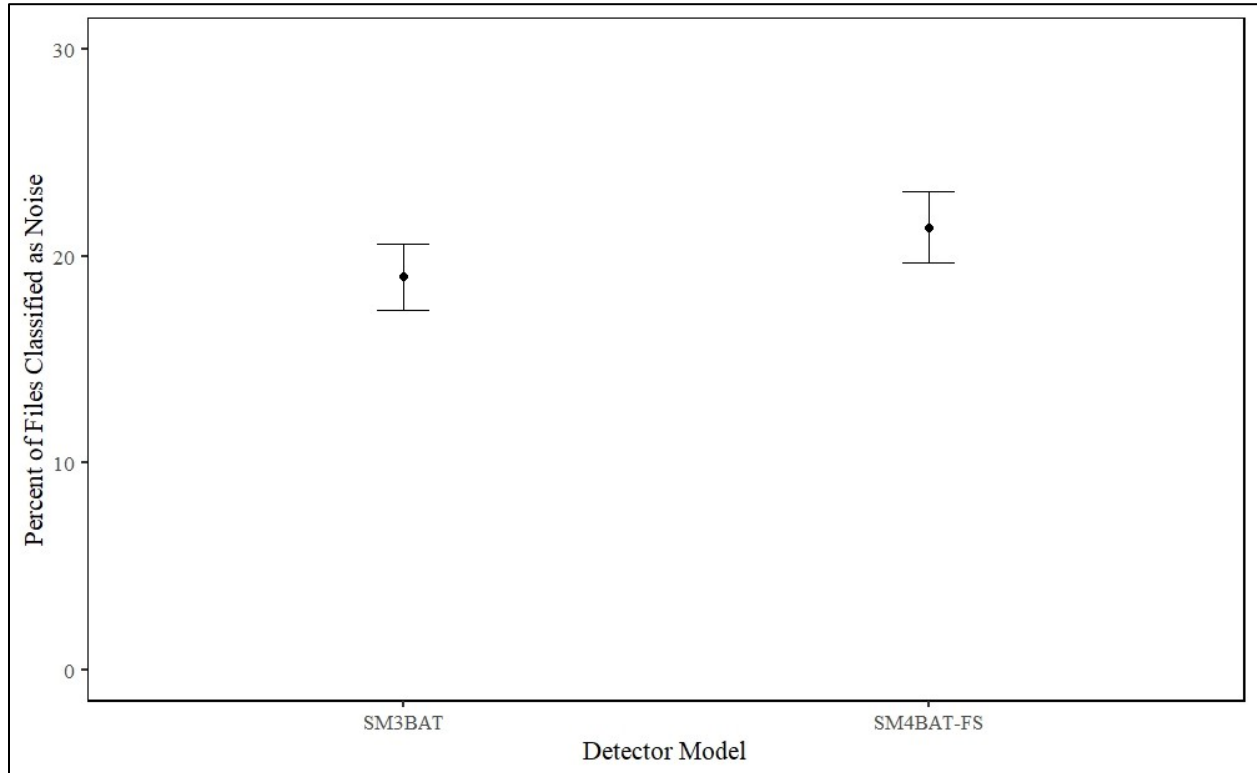


Figure F1. Percent of audio files classified as noise for each detector model (mean $\pm$ 95% confidence interval). Includes all Great Lakes Network parks in which bat monitoring occurred. Includes all deployments from 2015–2019 except failed deployments. Sample size: $n = 442$ for SM3BAT; $n = 452$ for SM4BAT-FS.

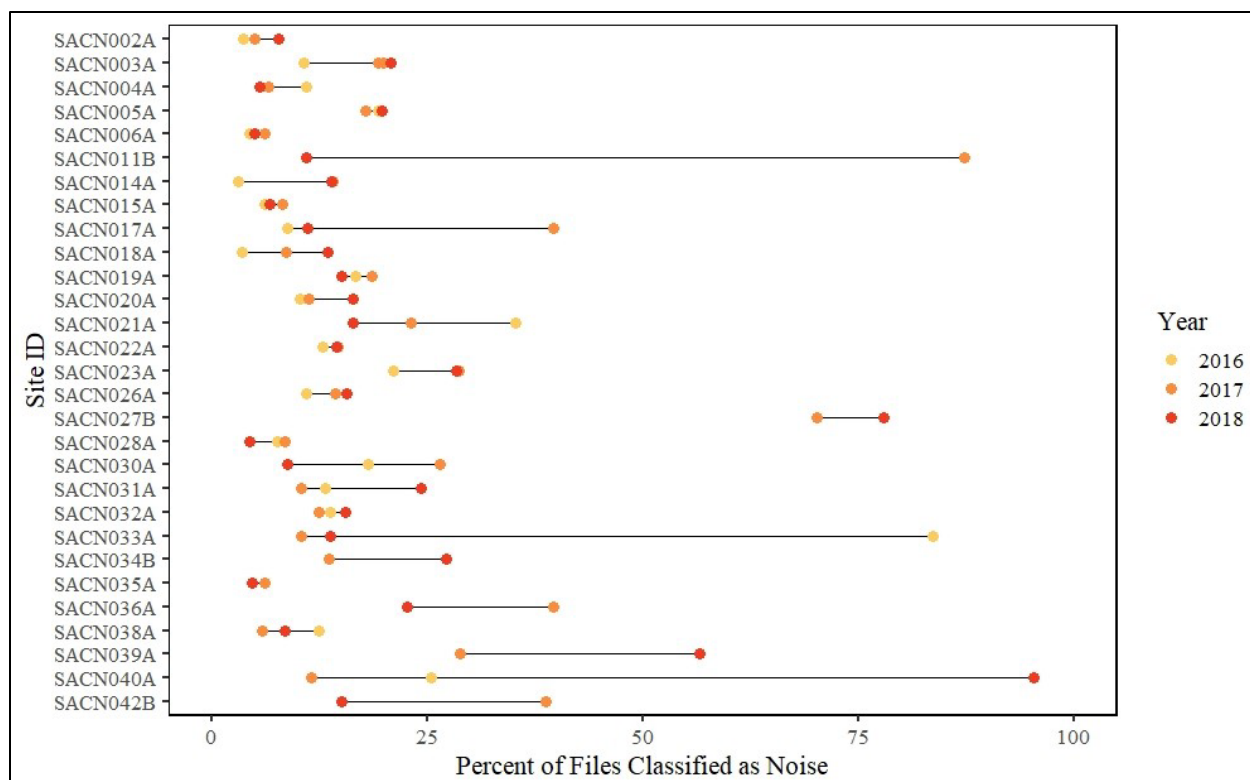


Figure F2. Percent of audio files classified as noise for each sampling site at Saint Croix National Scenic Riverway, 2016–2018. Each point represents the percent noise for one year’s deployment at that sampling site. Excludes failed deployments and sites that were sampled for only one year.

Table F1. Mean percent of audio files classified as noise for each sampling site at Saint Croix National Scenic Riverway, 2016–2018. 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
SACN002A	5.4	2.2	3.6	7.8	–
SACN003A	17.6	4.7	10.7	20.7	–
SACN004A	7.6	2.9	5.5	10.9	–
SACN005A	19.0	0.9	17.9	19.7	–
SACN006A	5.2	0.9	4.4	6.1	–
SACN011B	49.2	54.1	10.9	87.4	Yes*
SACN014A	10.3	6.3	3.0	14.0	–
SACN015A	7.0	1.0	6.1	8.1	–

Table F1 (continued). Mean percent of audio files classified as noise for each sampling site at Saint Croix National Scenic Riverway, 2016–2018. 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
SACN017A	19.8	17.2	8.7	39.6	Yes
SACN018A	8.5	5.0	3.5	13.5	–
SACN019A	16.8	1.8	15.1	18.6	–
SACN020A	12.6	3.3	10.2	16.3	–
SACN021A	24.9	9.6	16.3	35.2	Yes
SACN022A	14.0	0.9	12.9	14.6	–
SACN023A	26.0	4.3	21.0	28.7	Yes
SACN026A	13.7	2.4	11.0	15.7	–
SACN027B	74.1	5.4	70.2	77.9	Yes*
SACN028A	6.8	2.1	4.4	8.4	–
SACN030A	17.8	8.8	8.8	26.4	–
SACN031A	15.9	7.3	10.4	24.2	–
SACN032A	13.9	1.6	12.4	15.5	–
SACN033A	35.9	41.4	10.3	83.7	Yes*
SACN034B	20.4	9.6	13.6	27.2	Yes
SACN035A	5.3	1.1	4.6	6.1	–
SACN036A	31.2	12.0	22.7	39.7	Yes
SACN038A	8.9	3.3	5.8	12.4	–
SACN039A	42.7	19.7	28.8	56.6	Yes*
SACN040A	44.1	45.0	11.5	95.4	Yes*
SACN042B	26.9	16.8	15.0	38.7	Yes

Appendix G. 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 G1).

Table G1. Total number of files manually vetted, and the results of manual vetting for each year, analysis type, and species, Saint Croix National Scenic Riverway, 2016–2018. “Verified” indicates that the manual identification matched, and thus verified, the automated identification.

Year	Analysis	Kaleidoscope Classification	Total Files Vetted	Number Files Verified	Percent Files Verified
2016	baseline	Big Brown Bat	74	11	14.86
2016	baseline	Eastern Red Bat	49	29	59.18
2016	baseline	Hoary Bat	89	58	65.17
2016	baseline	Silver-haired Bat	131	66	50.38
2016	baseline	Little Brown Bat	171	143	83.63
2016	baseline	Northern Long-eared Bat	10	2	20.00
2016	baseline	Tricolored Bat	10	4	40.00
2016	expanded	Evening Bat	10	6	60.00
2017	baseline	Big Brown Bat	40	14	35.00
2017	baseline	Eastern Red Bat	94	76	80.85
2017	baseline	Hoary Bat	77	69	89.61
2017	baseline	Silver-haired Bat	146	82	56.16
2017	baseline	Little Brown Bat	109	94	86.24
2017	baseline	Northern Long-eared Bat	10	0	0.00
2017	baseline	Tricolored Bat	10	1	10.00
2017	expanded	Evening Bat	31	14	45.16
2018	baseline	Big Brown Bat	54	9	16.67
2018	baseline	Eastern Red Bat	59	53	89.83
2018	baseline	Hoary Bat	95	81	85.26
2018	baseline	Silver-haired Bat	151	84	55.63
2018	baseline	Little Brown Bat	41	21	51.22
2018	baseline	Northern Long-eared Bat	10	0	0.00
2018	baseline	Tricolored Bat	10	1	10.00
2018	expanded	Evening Bat	10	6	60.00

Appendix H. 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) (Table H1). This was 1% parkwide, so not every combination of monitoring site/species had files vetted.

Table H1. Total number of files manually vetted, and the results of manual vetting for each year, site, analysis type, and species, Saint Croix National Scenic Riverway, 2016–2018. “Verified” indicates that the manual identification matched, and thus verified, the automated identification.

Year	Site ID	Analysis	Kaleidoscope Classification	Total Files Vetted	Number Files Verified	Percent Files Verified
2016	SACN002A_2016	baseline	Big Brown Bat	3	1	33.33
2016	SACN002A_2016	baseline	Hoary Bat	1	1	100.00
2016	SACN002A_2016	baseline	Silver-haired Bat	4	1	25.00
2016	SACN002A_2016	baseline	Little Brown Bat	2	2	100.00
2016	SACN002A_2016	baseline	Tricolored Bat	1	1	100.00
2016	SACN004A_2016	baseline	Eastern Red Bat	3	1	33.33
2016	SACN004A_2016	baseline	Silver-haired Bat	1	1	100.00
2016	SACN004A_2016	baseline	Little Brown Bat	5	4	80.00
2016	SACN004A_2016	baseline	Northern Long-eared Bat	1	1	100.00
2016	SACN005A_2016	baseline	Big Brown Bat	2	0	0.00
2016	SACN005A_2016	baseline	Hoary Bat	14	12	85.71
2016	SACN005A_2016	baseline	Silver-haired Bat	13	12	92.31
2016	SACN005A_2016	baseline	Little Brown Bat	8	6	75.00
2016	SACN006A_2016	baseline	Big Brown Bat	5	0	0.00
2016	SACN006A_2016	baseline	Hoary Bat	1	1	100.00
2016	SACN006A_2016	baseline	Silver-haired Bat	4	3	75.00
2016	SACN006A_2016	baseline	Little Brown Bat	6	6	100.00
2016	SACN006A_2016	baseline	Northern Long-eared Bat	2	0	0.00
2016	SACN006A_2016	baseline	Tricolored Bat	3	3	100.00
2016	SACN006A_2016	expanded	Evening Bat	1	0	0.00

Table H1 (continued). Total number of files manually vetted, and the results of manual vetting for each year, site, analysis type, and species, Saint Croix National Scenic Riverway, 2016–2018. “Verified” indicates that the manual identification matched, and thus verified, the automated identification.

Year	Site ID	Analysis	Kaleidoscope Classification	Total Files Vetted	Number Files Verified	Percent Files Verified
2016	SACN011A_2016	baseline	Eastern Red Bat	1	0	0.00
2016	SACN011A_2016	baseline	Little Brown Bat	1	0	0.00
2016	SACN014A_2016	baseline	Big Brown Bat	16	1	6.25
2016	SACN014A_2016	baseline	Eastern Red Bat	2	0	0.00
2016	SACN014A_2016	baseline	Hoary Bat	2	2	100.00
2016	SACN014A_2016	baseline	Silver-haired Bat	11	3	27.27
2016	SACN014A_2016	baseline	Little Brown Bat	23	18	78.26
2016	SACN015A_2016	baseline	Eastern Red Bat	1	0	0.00
2016	SACN015A_2016	baseline	Silver-haired Bat	1	1	100.00
2016	SACN015A_2016	baseline	Little Brown Bat	4	4	100.00
2016	SACN017A_2016	baseline	Big Brown Bat	1	0	0.00
2016	SACN017A_2016	baseline	Eastern Red Bat	6	6	100.00
2016	SACN017A_2016	baseline	Silver-haired Bat	6	3	50.00
2016	SACN017A_2016	baseline	Little Brown Bat	2	2	100.00
2016	SACN017A_2016	baseline	Northern Long-eared Bat	1	0	0.00
2016	SACN017A_2016	expanded	Evening Bat	6	5	83.33
2016	SACN018A_2016	baseline	Big Brown Bat	1	0	0.00
2016	SACN018A_2016	baseline	Hoary Bat	1	1	100.00
2016	SACN018A_2016	baseline	Silver-haired Bat	2	0	0.00
2016	SACN018A_2016	baseline	Little Brown Bat	46	41	89.13
2016	SACN018A_2016	baseline	Northern Long-eared Bat	2	0	0.00
2016	SACN018A_2016	baseline	Tricolored Bat	3	0	0.00
2016	SACN019A_2016	baseline	Big Brown Bat	8	0	0.00
2016	SACN019A_2016	baseline	Eastern Red Bat	2	0	0.00
2016	SACN019A_2016	baseline	Hoary Bat	10	8	80.00
2016	SACN019A_2016	baseline	Silver-haired Bat	15	8	53.33

Table H1 (continued). Total number of files manually vetted, and the results of manual vetting for each year, site, analysis type, and species, Saint Croix National Scenic Riverway, 2016–2018. “Verified” indicates that the manual identification matched, and thus verified, the automated identification.

Year	Site ID	Analysis	Kaleidoscope Classification	Total Files Vetted	Number Files Verified	Percent Files Verified
2016	SACN019A_2016	baseline	Little Brown Bat	19	15	78.95
2016	SACN019A_2016	baseline	Tricolored Bat	1	0	0.00
2016	SACN020A_2016	baseline	Big Brown Bat	3	1	33.33
2016	SACN020A_2016	baseline	Hoary Bat	1	1	100.00
2016	SACN021A_2016	baseline	Silver-haired Bat	1	1	100.00
2016	SACN021A_2016	baseline	Little Brown Bat	1	1	100.00
2016	SACN022A_2016	baseline	Silver-haired Bat	3	1	33.33
2016	SACN022A_2016	baseline	Little Brown Bat	4	3	75.00
2016	SACN026A_2016	baseline	Hoary Bat	19	14	73.68
2016	SACN026A_2016	baseline	Silver-haired Bat	9	7	77.78
2016	SACN026A_2016	baseline	Little Brown Bat	6	5	83.33
2016	SACN027A_2016	baseline	Big Brown Bat	1	0	0.00
2016	SACN027A_2016	baseline	Silver-haired Bat	4	3	75.00
2016	SACN027A_2016	baseline	Little Brown Bat	2	2	100.00
2016	SACN027A_2016	baseline	Tricolored Bat	1	0	0.00
2016	SACN030A_2016	baseline	Big Brown Bat	17	4	23.53
2016	SACN030A_2016	baseline	Eastern Red Bat	18	11	61.11
2016	SACN030A_2016	baseline	Hoary Bat	27	11	40.74
2016	SACN030A_2016	baseline	Silver-haired Bat	25	6	24.00
2016	SACN030A_2016	baseline	Little Brown Bat	7	4	57.14
2016	SACN030A_2016	baseline	Northern Long-eared Bat	1	0	0.00
2016	SACN031A_2016	baseline	Eastern Red Bat	9	8	88.89
2016	SACN031A_2016	baseline	Hoary Bat	2	0	0.00
2016	SACN031A_2016	baseline	Silver-haired Bat	1	1	100.00
2016	SACN031A_2016	baseline	Little Brown Bat	2	2	100.00
2016	SACN031A_2016	baseline	Northern Long-eared Bat	1	1	100.00

Table H1 (continued). Total number of files manually vetted, and the results of manual vetting for each year, site, analysis type, and species, Saint Croix National Scenic Riverway, 2016–2018. “Verified” indicates that the manual identification matched, and thus verified, the automated identification.

Year	Site ID	Analysis	Kaleidoscope Classification	Total Files Vetted	Number Files Verified	Percent Files Verified
2016	SACN031A_2016	baseline	Tricolored Bat	1	0	0.00
2016	SACN031A_2016	expanded	Evening Bat	1	1	100.00
2016	SACN032A_2016	baseline	Hoary Bat	5	5	100.00
2016	SACN032A_2016	baseline	Silver-haired Bat	5	4	80.00
2016	SACN032A_2016	expanded	Evening Bat	1	0	0.00
2016	SACN033A_2016	baseline	Big Brown Bat	2	0	0.00
2016	SACN033A_2016	baseline	Silver-haired Bat	3	1	33.33
2016	SACN033A_2016	baseline	Little Brown Bat	2	1	50.00
2016	SACN034A_2016	baseline	Big Brown Bat	2	1	50.00
2016	SACN034A_2016	baseline	Eastern Red Bat	2	1	50.00
2016	SACN034A_2016	baseline	Silver-haired Bat	3	1	33.33
2016	SACN034A_2016	baseline	Little Brown Bat	8	6	75.00
2016	SACN034A_2016	baseline	Northern Long-eared Bat	1	0	0.00
2016	SACN034A_2016	expanded	Evening Bat	1	0	0.00
2016	SACN038A_2016	baseline	Big Brown Bat	2	1	50.00
2016	SACN038A_2016	baseline	Eastern Red Bat	3	1	33.33
2016	SACN038A_2016	baseline	Hoary Bat	2	0	0.00
2016	SACN038A_2016	baseline	Silver-haired Bat	8	3	37.50
2016	SACN038A_2016	baseline	Little Brown Bat	9	8	88.89
2016	SACN038A_2016	baseline	Northern Long-eared Bat	1	0	0.00
2016	SACN042A_2016	baseline	Big Brown Bat	11	2	18.18
2016	SACN042A_2016	baseline	Eastern Red Bat	2	1	50.00
2016	SACN042A_2016	baseline	Hoary Bat	4	2	50.00
2016	SACN042A_2016	baseline	Silver-haired Bat	12	6	50.00
2016	SACN042A_2016	baseline	Little Brown Bat	14	13	92.86

Table H1 (continued). Total number of files manually vetted, and the results of manual vetting for each year, site, analysis type, and species, Saint Croix National Scenic Riverway, 2016–2018. “Verified” indicates that the manual identification matched, and thus verified, the automated identification.

Year	Site ID	Analysis	Kaleidoscope Classification	Total Files Vetted	Number Files Verified	Percent Files Verified
2017	SACN002A_2017	baseline	Big Brown Bat	5	1	20.00
2017	SACN002A_2017	baseline	Eastern Red Bat	2	0	0.00
2017	SACN002A_2017	baseline	Hoary Bat	3	1	33.33
2017	SACN002A_2017	baseline	Silver-haired Bat	4	3	75.00
2017	SACN003A_2017	baseline	Big Brown Bat	3	1	33.33
2017	SACN003A_2017	baseline	Hoary Bat	3	3	100.00
2017	SACN003A_2017	baseline	Little Brown Bat	1	0	0.00
2017	SACN004A_2017	baseline	Eastern Red Bat	1	1	100.00
2017	SACN004A_2017	baseline	Hoary Bat	1	1	100.00
2017	SACN004A_2017	baseline	Silver-haired Bat	4	3	75.00
2017	SACN004A_2017	baseline	Little Brown Bat	1	0	0.00
2017	SACN005A_2017	baseline	Eastern Red Bat	1	1	100.00
2017	SACN005A_2017	baseline	Hoary Bat	3	2	66.67
2017	SACN005A_2017	baseline	Silver-haired Bat	11	8	72.73
2017	SACN006A_2017	baseline	Big Brown Bat	2	1	50.00
2017	SACN006A_2017	baseline	Hoary Bat	3	3	100.00
2017	SACN006A_2017	baseline	Silver-haired Bat	8	6	75.00
2017	SACN006A_2017	baseline	Little Brown Bat	7	6	85.71
2017	SACN014A_2017	baseline	Big Brown Bat	2	1	50.00
2017	SACN014A_2017	baseline	Silver-haired Bat	2	0	0.00
2017	SACN015A_2017	baseline	Big Brown Bat	1	1	100.00
2017	SACN015A_2017	baseline	Eastern Red Bat	2	2	100.00
2017	SACN015A_2017	baseline	Silver-haired Bat	3	1	33.33
2017	SACN017A_2017	baseline	Big Brown Bat	1	0	0.00
2017	SACN017A_2017	baseline	Little Brown Bat	1	1	100.00
2017	SACN018A_2017	baseline	Eastern Red Bat	1	0	0.00
2017	SACN018A_2017	baseline	Hoary Bat	1	1	100.00

Table H1 (continued). Total number of files manually vetted, and the results of manual vetting for each year, site, analysis type, and species, Saint Croix National Scenic Riverway, 2016–2018. “Verified” indicates that the manual identification matched, and thus verified, the automated identification.

Year	Site ID	Analysis	Kaleidoscope Classification	Total Files Vetted	Number Files Verified	Percent Files Verified
2017	SACN018A_2017	baseline	Silver-haired Bat	8	2	25.00
2017	SACN018A_2017	baseline	Little Brown Bat	27	25	92.59
2017	SACN018A_2017	baseline	Northern Long-eared Bat	1	0	0.00
2017	SACN018A_2017	baseline	Tricolored Bat	5	1	20.00
2017	SACN019A_2017	baseline	Big Brown Bat	2	0	0.00
2017	SACN019A_2017	baseline	Eastern Red Bat	4	3	75.00
2017	SACN019A_2017	baseline	Hoary Bat	4	3	75.00
2017	SACN019A_2017	baseline	Silver-haired Bat	3	3	100.00
2017	SACN019A_2017	baseline	Little Brown Bat	1	0	0.00
2017	SACN019A_2017	baseline	Northern Long-eared Bat	1	0	0.00
2017	SACN020A_2017	baseline	Eastern Red Bat	1	1	100.00
2017	SACN020A_2017	baseline	Hoary Bat	2	2	100.00
2017	SACN020A_2017	baseline	Silver-haired Bat	6	5	83.33
2017	SACN020A_2017	baseline	Little Brown Bat	1	1	100.00
2017	SACN021A_2017	baseline	Silver-haired Bat	2	2	100.00
2017	SACN022A_2017	baseline	Big Brown Bat	1	1	100.00
2017	SACN022A_2017	baseline	Eastern Red Bat	1	0	0.00
2017	SACN022A_2017	baseline	Hoary Bat	2	2	100.00
2017	SACN022A_2017	baseline	Silver-haired Bat	5	2	40.00
2017	SACN023A_2017	baseline	Big Brown Bat	2	0	0.00
2017	SACN023A_2017	baseline	Hoary Bat	1	1	100.00
2017	SACN023A_2017	baseline	Silver-haired Bat	5	2	40.00
2017	SACN026A_2017	baseline	Big Brown Bat	1	1	100.00
2017	SACN026A_2017	baseline	Hoary Bat	23	22	95.65
2017	SACN026A_2017	baseline	Silver-haired Bat	17	14	82.35
2017	SACN026A_2017	baseline	Little Brown Bat	13	11	84.62

Table H1 (continued). Total number of files manually vetted, and the results of manual vetting for each year, site, analysis type, and species, Saint Croix National Scenic Riverway, 2016–2018. “Verified” indicates that the manual identification matched, and thus verified, the automated identification.

Year	Site ID	Analysis	Kaleidoscope Classification	Total Files Vetted	Number Files Verified	Percent Files Verified
2017	SACN027B_2017	baseline	Silver-haired Bat	3	0	0.00
2017	SACN028A_2017	baseline	Big Brown Bat	3	2	66.67
2017	SACN028A_2017	baseline	Eastern Red Bat	64	59	92.19
2017	SACN028A_2017	baseline	Hoary Bat	5	5	100.00
2017	SACN028A_2017	baseline	Silver-haired Bat	10	6	60.00
2017	SACN028A_2017	baseline	Little Brown Bat	4	0	0.00
2017	SACN028A_2017	baseline	Tricolored Bat	4	0	0.00
2017	SACN028A_2017	expanded	Evening Bat	27	11	40.74
2017	SACN030A_2017	baseline	Big Brown Bat	6	2	33.33
2017	SACN030A_2017	baseline	Eastern Red Bat	7	6	85.71
2017	SACN030A_2017	baseline	Hoary Bat	11	9	81.82
2017	SACN030A_2017	baseline	Silver-haired Bat	13	1	7.69
2017	SACN030A_2017	baseline	Northern Long-eared Bat	1	0	0.00
2017	SACN030A_2017	baseline	Tricolored Bat	1	0	0.00
2017	SACN031A_2017	baseline	Big Brown Bat	2	2	100.00
2017	SACN031A_2017	baseline	Eastern Red Bat	3	2	66.67
2017	SACN031A_2017	baseline	Hoary Bat	4	4	100.00
2017	SACN031A_2017	baseline	Silver-haired Bat	7	4	57.14
2017	SACN031A_2017	baseline	Little Brown Bat	1	1	100.00
2017	SACN031A_2017	baseline	Northern Long-eared Bat	1	0	0.00
2017	SACN031A_2017	expanded	Evening Bat	1	1	100.00
2017	SACN032A_2017	baseline	Silver-haired Bat	2	2	100.00
2017	SACN033A_2017	baseline	Big Brown Bat	4	0	0.00
2017	SACN033A_2017	baseline	Eastern Red Bat	2	1	50.00
2017	SACN033A_2017	baseline	Hoary Bat	1	1	100.00

Table H1 (continued). Total number of files manually vetted, and the results of manual vetting for each year, site, analysis type, and species, Saint Croix National Scenic Riverway, 2016–2018. “Verified” indicates that the manual identification matched, and thus verified, the automated identification.

Year	Site ID	Analysis	Kaleidoscope Classification	Total Files Vetted	Number Files Verified	Percent Files Verified
2017	SACN033A_2017	baseline	Silver-haired Bat	7	3	42.86
2017	SACN033A_2017	baseline	Little Brown Bat	2	2	100.00
2017	SACN034B_2017	baseline	Eastern Red Bat	2	0	0.00
2017	SACN034B_2017	baseline	Hoary Bat	1	1	100.00
2017	SACN034B_2017	baseline	Silver-haired Bat	2	1	50.00
2017	SACN034B_2017	baseline	Little Brown Bat	19	19	100.00
2017	SACN034B_2017	baseline	Northern Long-eared Bat	4	0	0.00
2017	SACN035A_2017	baseline	Silver-haired Bat	2	1	50.00
2017	SACN038A_2017	baseline	Big Brown Bat	1	1	100.00
2017	SACN038A_2017	baseline	Eastern Red Bat	1	0	0.00
2017	SACN038A_2017	baseline	Silver-haired Bat	2	0	0.00
2017	SACN038A_2017	baseline	Little Brown Bat	28	26	92.86
2017	SACN038A_2017	expanded	Evening Bat	1	1	100.00
2017	SACN039A_2017	baseline	Big Brown Bat	2	0	0.00
2017	SACN039A_2017	baseline	Eastern Red Bat	2	0	0.00
2017	SACN039A_2017	baseline	Hoary Bat	4	3	75.00
2017	SACN039A_2017	baseline	Silver-haired Bat	3	2	66.67
2017	SACN039A_2017	baseline	Little Brown Bat	2	1	50.00
2017	SACN040A_2017	baseline	Big Brown Bat	1	0	0.00
2017	SACN040A_2017	baseline	Hoary Bat	1	1	100.00
2017	SACN040A_2017	baseline	Silver-haired Bat	8	5	62.50
2017	SACN040A_2017	baseline	Little Brown Bat	1	1	100.00
2017	SACN040A_2017	baseline	Northern Long-eared Bat	2	0	0.00
2017	SACN040A_2017	expanded	Evening Bat	2	1	50.00

Table H1 (continued). Total number of files manually vetted, and the results of manual vetting for each year, site, analysis type, and species, Saint Croix National Scenic Riverway, 2016–2018. “Verified” indicates that the manual identification matched, and thus verified, the automated identification.

Year	Site ID	Analysis	Kaleidoscope Classification	Total Files Vetted	Number Files Verified	Percent Files Verified
2017	SACN042B_2017	baseline	Big Brown Bat	1	0	0.00
2017	SACN042B_2017	baseline	Hoary Bat	4	4	100.00
2017	SACN042B_2017	baseline	Silver-haired Bat	9	6	66.67
2018	SACN002A_2018	baseline	Big Brown Bat	2	0	0.00
2018	SACN002A_2018	baseline	Silver-haired Bat	3	3	100.00
2018	SACN003A_2018	baseline	Big Brown Bat	3	1	33.33
2018	SACN003A_2018	baseline	Eastern Red Bat	1	0	0.00
2018	SACN003A_2018	baseline	Hoary Bat	5	5	100.00
2018	SACN003A_2018	baseline	Silver-haired Bat	10	6	60.00
2018	SACN003A_2018	baseline	Little Brown Bat	1	0	0.00
2018	SACN003A_2018	baseline	Tricolored Bat	1	0	0.00
2018	SACN004A_2018	baseline	Hoary Bat	1	1	100.00
2018	SACN004A_2018	baseline	Silver-haired Bat	1	1	100.00
2018	SACN005A_2018	baseline	Big Brown Bat	1	0	0.00
2018	SACN005A_2018	baseline	Eastern Red Bat	2	2	100.00
2018	SACN005A_2018	baseline	Hoary Bat	18	18	100.00
2018	SACN005A_2018	baseline	Silver-haired Bat	8	6	75.00
2018	SACN005A_2018	baseline	Little Brown Bat	1	1	100.00
2018	SACN005A_2018	expanded	Evening Bat	1	0	0.00
2018	SACN006A_2018	baseline	Big Brown Bat	2	2	100.00
2018	SACN006A_2018	baseline	Eastern Red Bat	1	1	100.00
2018	SACN006A_2018	baseline	Hoary Bat	7	6	85.71
2018	SACN006A_2018	baseline	Silver-haired Bat	9	7	77.78
2018	SACN006A_2018	baseline	Northern Long-eared Bat	1	0	0.00
2018	SACN011B_2018	baseline	Big Brown Bat	1	0	0.00
2018	SACN011B_2018	baseline	Silver-haired Bat	1	1	100.00
2018	SACN011B_2018	expanded	Evening Bat	2	2	100.00

Table H1 (continued). Total number of files manually vetted, and the results of manual vetting for each year, site, analysis type, and species, Saint Croix National Scenic Riverway, 2016–2018. “Verified” indicates that the manual identification matched, and thus verified, the automated identification.

Year	Site ID	Analysis	Kaleidoscope Classification	Total Files Vetted	Number Files Verified	Percent Files Verified
2018	SACN014A_2018	baseline	Big Brown Bat	7	0	0.00
2018	SACN014A_2018	baseline	Eastern Red Bat	3	3	100.00
2018	SACN014A_2018	baseline	Hoary Bat	4	3	75.00
2018	SACN014A_2018	baseline	Silver-haired Bat	9	4	44.44
2018	SACN015A_2018	baseline	Silver-haired Bat	4	2	50.00
2018	SACN015A_2018	baseline	Little Brown Bat	1	1	100.00
2018	SACN017A_2018	baseline	Big Brown Bat	3	0	0.00
2018	SACN017A_2018	baseline	Hoary Bat	1	0	0.00
2018	SACN017A_2018	baseline	Silver-haired Bat	4	4	100.00
2018	SACN018A_2018	baseline	Big Brown Bat	5	0	0.00
2018	SACN018A_2018	baseline	Silver-haired Bat	8	3	37.50
2018	SACN018A_2018	baseline	Little Brown Bat	2	0	0.00
2018	SACN018A_2018	baseline	Tricolored Bat	1	0	0.00
2018	SACN019A_2018	baseline	Big Brown Bat	6	0	0.00
2018	SACN019A_2018	baseline	Eastern Red Bat	2	1	50.00
2018	SACN019A_2018	baseline	Hoary Bat	6	5	83.33
2018	SACN019A_2018	baseline	Silver-haired Bat	11	3	27.27
2018	SACN019A_2018	baseline	Little Brown Bat	1	1	100.00
2018	SACN021A_2018	baseline	Big Brown Bat	1	0	0.00
2018	SACN021A_2018	baseline	Hoary Bat	1	1	100.00
2018	SACN021A_2018	baseline	Silver-haired Bat	8	5	62.50
2018	SACN022A_2018	baseline	Big Brown Bat	1	0	0.00
2018	SACN022A_2018	baseline	Hoary Bat	2	1	50.00
2018	SACN022A_2018	baseline	Silver-haired Bat	8	3	37.50
2018	SACN026A_2018	baseline	Big Brown Bat	1	0	0.00
2018	SACN026A_2018	baseline	Hoary Bat	12	12	100.00
2018	SACN026A_2018	baseline	Silver-haired Bat	15	10	66.67

Table H1 (continued). Total number of files manually vetted, and the results of manual vetting for each year, site, analysis type, and species, Saint Croix National Scenic Riverway, 2016–2018. “Verified” indicates that the manual identification matched, and thus verified, the automated identification.

Year	Site ID	Analysis	Kaleidoscope Classification	Total Files Vetted	Number Files Verified	Percent Files Verified
2018	SACN026A_2018	baseline	Little Brown Bat	3	2	66.67
2018	SACN026A_2018	baseline	Northern Long-eared Bat	1	0	0.00
2018	SACN026A_2018	expanded	Evening Bat	1	1	100.00
2018	SACN027B_2018	baseline	Silver-haired Bat	1	0	0.00
2018	SACN030A_2018	baseline	Big Brown Bat	12	5	41.67
2018	SACN030A_2018	baseline	Eastern Red Bat	33	31	93.94
2018	SACN030A_2018	baseline	Hoary Bat	23	17	73.91
2018	SACN030A_2018	baseline	Silver-haired Bat	11	2	18.18
2018	SACN030A_2018	baseline	Little Brown Bat	10	0	0.00
2018	SACN030A_2018	baseline	Tricolored Bat	6	0	0.00
2018	SACN030A_2018	expanded	Evening Bat	4	1	25.00
2018	SACN031A_2018	baseline	Eastern Red Bat	6	6	100.00
2018	SACN031A_2018	baseline	Silver-haired Bat	1	1	100.00
2018	SACN031A_2018	baseline	Little Brown Bat	1	0	0.00
2018	SACN032A_2018	baseline	Hoary Bat	1	1	100.00
2018	SACN032A_2018	baseline	Silver-haired Bat	6	4	66.67
2018	SACN033A_2018	baseline	Hoary Bat	1	1	100.00
2018	SACN033A_2018	baseline	Silver-haired Bat	5	2	40.00
2018	SACN033A_2018	baseline	Little Brown Bat	2	1	50.00
2018	SACN033A_2018	baseline	Tricolored Bat	1	0	0.00
2018	SACN034B_2018	baseline	Big Brown Bat	1	0	0.00
2018	SACN034B_2018	baseline	Eastern Red Bat	1	0	0.00
2018	SACN034B_2018	baseline	Hoary Bat	1	0	0.00
2018	SACN034B_2018	baseline	Silver-haired Bat	8	3	37.50
2018	SACN034B_2018	baseline	Little Brown Bat	9	9	100.00
2018	SACN034B_2018	baseline	Northern Long-eared Bat	2	0	0.00

Table H1 (continued). Total number of files manually vetted, and the results of manual vetting for each year, site, analysis type, and species, Saint Croix National Scenic Riverway, 2016–2018. “Verified” indicates that the manual identification matched, and thus verified, the automated identification.

Year	Site ID	Analysis	Kaleidoscope Classification	Total Files Vetted	Number Files Verified	Percent Files Verified
2018	SACN035A_2018	baseline	Big Brown Bat	4	1	25.00
2018	SACN035A_2018	baseline	Eastern Red Bat	1	1	100.00
2018	SACN035A_2018	baseline	Hoary Bat	1	0	0.00
2018	SACN035A_2018	baseline	Silver-haired Bat	5	4	80.00
2018	SACN035A_2018	baseline	Little Brown Bat	2	2	100.00
2018	SACN036A_2018	baseline	Big Brown Bat	2	0	0.00
2018	SACN036A_2018	baseline	Eastern Red Bat	2	2	100.00
2018	SACN036A_2018	baseline	Hoary Bat	6	6	100.00
2018	SACN036A_2018	baseline	Silver-haired Bat	5	2	40.00
2018	SACN036A_2018	baseline	Little Brown Bat	2	0	0.00
2018	SACN036A_2018	baseline	Northern Long-eared Bat	1	0	0.00
2018	SACN036A_2018	expanded	Evening Bat	2	2	100.00
2018	SACN038A_2018	baseline	Eastern Red Bat	1	0	0.00
2018	SACN038A_2018	baseline	Hoary Bat	2	2	100.00
2018	SACN038A_2018	baseline	Silver-haired Bat	4	2	50.00
2018	SACN038A_2018	baseline	Little Brown Bat	2	2	100.00
2018	SACN038A_2018	baseline	Northern Long-eared Bat	4	0	0.00
2018	SACN040A_2018	baseline	Eastern Red Bat	1	1	100.00
2018	SACN040A_2018	baseline	Hoary Bat	1	0	0.00
2018	SACN040A_2018	baseline	Silver-haired Bat	1	1	100.00
2018	SACN040A_2018	baseline	Little Brown Bat	1	1	100.00
2018	SACN042B_2018	baseline	Big Brown Bat	1	0	0.00
2018	SACN042B_2018	baseline	Eastern Red Bat	5	5	100.00
2018	SACN042B_2018	baseline	Hoary Bat	2	2	100.00
2018	SACN042B_2018	baseline	Silver-haired Bat	3	3	100.00
2018	SACN042B_2018	baseline	Little Brown Bat	3	1	33.33

Table H1 (continued). Total number of files manually vetted, and the results of manual vetting for each year, site, analysis type, and species, Saint Croix National Scenic Riverway, 2016–2018. “Verified” indicates that the manual identification matched, and thus verified, the automated identification.

Year	Site ID	Analysis	Kaleidoscope Classification	Total Files Vetted	Number Files Verified	Percent Files Verified
2018	SACN042B_2018	baseline	Northern Long-eared Bat	1	0	0.00
2018	SACN042B_2018	baseline	Tricolored Bat	1	1	100.00
2018	SACN043A_2018	baseline	Big Brown Bat	1	0	0.00
2018	SACN043A_2018	baseline	Silver-haired Bat	2	2	100.00

Appendix I. Species Composition Across Parks.

Figure I1 is for the baseline analysis only, and it includes all Great Lakes Network parks in which bat monitoring occurred.

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.

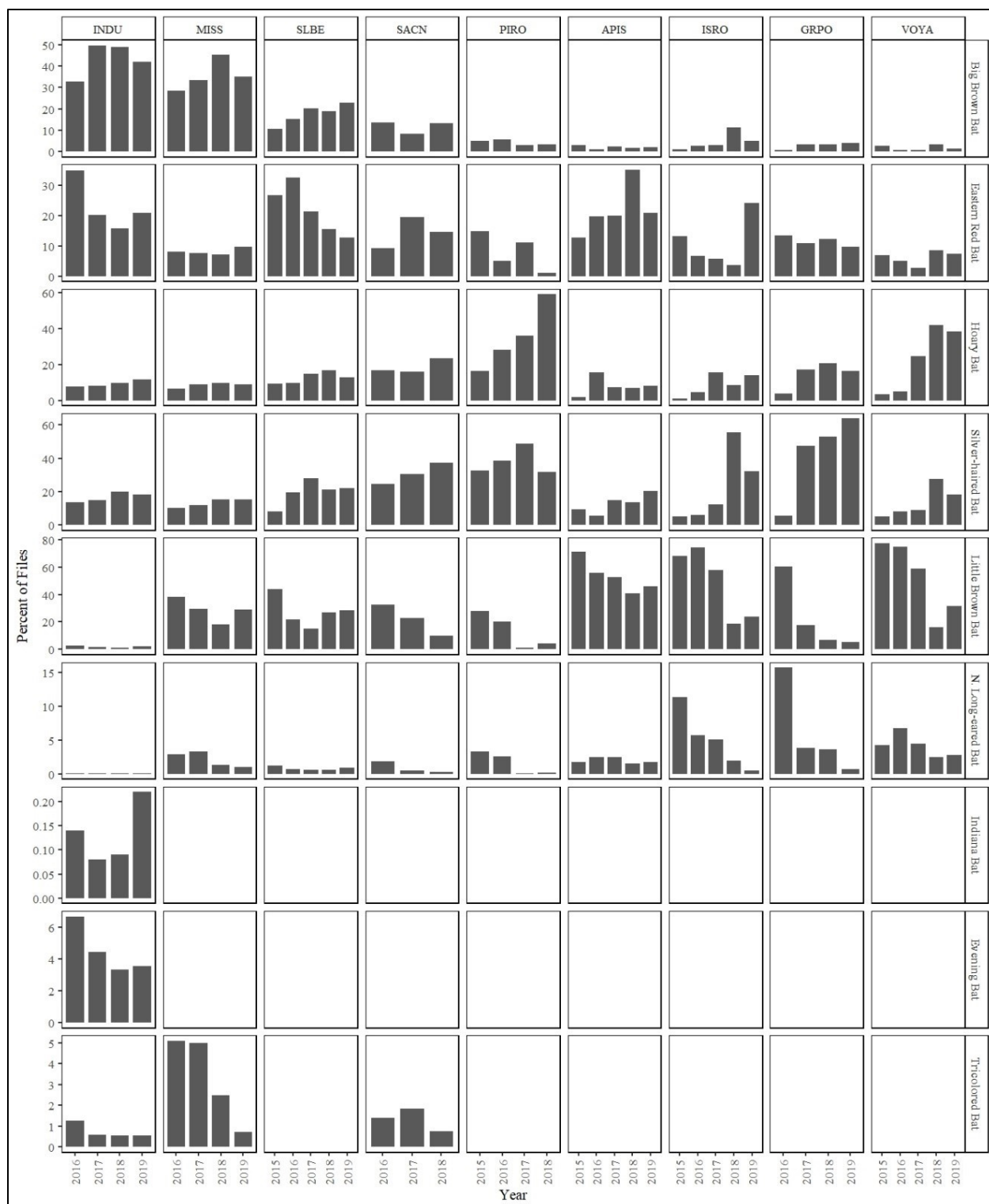


Figure 11. Percent of audio files classified as each bat species by Kaleidoscope Pro in the baseline analysis for each park and year. Note that the y-axis scale is different for each species and not all parks conducted surveys in all years. Only data from valid deployments are shown. Parks are ordered 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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National Park Service
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