

Standard Operating Procedure #9:

Yearly Summary Reports

Version 1.0

In Bat monitoring protocol for the Great Lakes Inventory and Monitoring Network: Version 1.0

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Revision History Log

The following table lists all edits and amendments to this document since the original publication date. Information entered in the log must be complete and concise. Users of this standard operating procedure will promptly notify the GLKN protocol lead and/or project coordinator about recommended and required changes. The protocol lead and/or project coordinator must review and incorporate all changes, complete the revision history log, and change the date and version number on the title page and in the header of the document file.

Previous Version #	Revision Date	Author (with title and affiliation)	Location in Document and Concise Description of Revision	Reason for Change	New Version #
Add rows as needed for each change or set of changes tied to an updated version number					

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1.0 Introduction

The Great Lakes Inventory and Monitoring Network (GLKN) is implementing a monitoring program to document changes in bat populations in national park units in the upper Midwest. We are using acoustic monitoring as an index for assessing long-term bat population trends in response to ecosystem changes including climate, habitat, and disease such as white-nose syndrome (WNS). The goals of this monitoring program are to assess probable presence and absence of bat species, and to determine relative activity levels of those species for each national park unit over time. This Standard Operating Procedure (SOP) describes how data will be summarized after each sampling season and what will be included in yearly summary reports.

1.1 Park-specific Summary Reports

To improve project record-keeping, each park is required to create a summary report at the end of each field season. These reports are crucial for conveying methods used, problems that arose, and suggestions for changes to the protocol. The report will be submitted to GLKN as well as kept at the park for park staff to reference. A report template is provided in Appendix A and will also be provided on the bat project's shared online drive. Park personnel tasked with report-writing are encouraged to use the template as a guide for both formatting and content. GLKN requires that each report contains at a minimum the following sections: Introduction, Methods, Results, Discussion, Recommendations, and Literature Cited. Expanded reports are welcome. See Appendix A for further detail.

1.2 Overall Summary Report

Data processing procedures are described in SOP #8, including when and how to exclude data from analysis if it does not meet protocol specifications. Once those steps have been completed, an overall summary report must be created. The report will describe results from all participating parks and should include both explanatory text and tables/figures displaying data visually. Normandeau Associates created a Microsoft Access module called *modCreateSumTables* to summarize data into tables and figures suitable for use in reports. The resulting tables will be located in the database table (created by Normandeau) called *tableDataSummaries*. These summary tables can be exported from the database into Microsoft Excel spreadsheets or CSV files, which can be used to create graphs and finalize formatting as desired.

The report should clearly distinguish between results of automated species classifications and results of manual vetting. If automated classification detects a species outside of its known range, this should be manually verified prior to publication, or the report should include a qualification that this detection is unverified. The report should also include a statement indicating that automated species classification software is not perfect and results may include misclassifications (false positives and/or false negatives). For more detail on automated vs. manual identifications, refer to SOP #8.

The overall summary report will include the following sections at a minimum:

I. Summary of survey effort

- Number and names of parks where sampling occurred
- Number of sample sites per park, and total number of sites for all parks combined
- Number of deployment nights per park and average number of deployment nights per site
- Total number of deployment nights for all parks combined
- Range of sampling dates for each park

II. Inventory of audio files by park

- Total number of audio files recorded
- Number and percent of audio files recorded during protocol sampling period (1 June–15 August)
- Number and percent of audio files recorded either before or after the protocol sampling period
- Number and percent of audio files recorded during deployments that were too short to meet protocol specifications (less than 4 days)
- Number and percent of audio files recorded during nights that were too short to meet protocol specifications (less than 6 hours of recording time)
- Number and percent of audio files recorded during extra nights when deployments extended beyond 16 nights
- Number and percent of audio files that were corrupt or unreadable

III. Results of automated species classification using Kaleidoscope Pro for each park, for both baseline and expanded species lists

- Kaleidoscope Pro settings used
- Total number of audio files run through Kaleidoscope Pro
- Number and percent of audio files that were classified as any bat species
- Number and percent of audio files that were classified as a bat, but of unknown species
- Number and percent of audio files that were classified as non-bat noise
- Number and percent of audio files that were corrupt or unreadable
- Total number and percent of audio files that were classified to each particular bat species
- Number of audio files per deployment night that were classified to each particular bat species

- Number and percent of deployments where each bat species was detected
- Number and percent of deployment nights where each bat species was detected
- Comparison of baseline vs. expanded analysis

IV. Nightly activity patterns for all parks combined, based on results of automated species classification using Kaleidoscope Pro, for both baseline and expanded species lists

- Total number of audio files that were classified to each particular bat species on each night
- Number of audio files per deployment night that were classified to each particular bat species on each night
- Total number of audio files for all species on each night
- Number of audio files per deployment night for all species on each night

V. Results of manual vetting

- Name and qualifications of biologist performing manual reviews
- Number of files manually reviewed per park/species combination, for baseline and expanded analysis
- Comparison of automated vs. manual identifications (number and percent of audio files with agreement between the two methods; list of common disagreements between the two methods)
- If additional files were manually vetted outside of the minimum 1%, documentation of how many files and how/why they were selected

VI. Conclusions and recommendations for future work

1.3 Supplementary Tables for Summary Report

In addition to the report itself, supplementary tables or spreadsheets will be created containing more detailed information at the park-, site-, and night-level. These are provided outside the main body of the report due to the large amount of data. Supplementary data will include the following at a minimum:

- 1. Number of deployments occurring on each night at each park during the protocol sampling period (1 June–15 August)**
- 2. Inventory of audio files for each sample site**
 - Total number of audio files recorded
 - Number and percent of audio files recorded during protocol sampling period
 - Number and percent of audio files recorded either before or after the protocol sampling period
 - Number and percent of audio files recorded during deployments that were too short to meet protocol specifications (less than 4 days)
 - Number and percent of audio files recorded during nights that were too short to meet protocol specifications (less than 6 hours of recording time)
 - Number and percent of audio files recorded during extra nights when deployments extended beyond 16 nights
 - Number and percent of audio files that were corrupt or unreadable
- 3. General audio file classifications for each park based on automated species classification using Kaleidoscope Pro, for both baseline and expanded species lists**
 - Total number of audio files classified to any species, on each night of sampling (all species combined)
 - Number of audio files per deployment night classified to any species, on each night of sampling (all species combined)
- 4. General audio file classifications for each sample site based on automated species classification using Kaleidoscope Pro, for both baseline and expanded species lists**
 - Total number of audio files run through Kaleidoscope Pro
 - Number and percent of audio files that were classified as a specific bat species
 - Number and percent of audio files that were classified as a bat, but of unknown species
 - Number and percent of audio files that were classified as non-bat noise
 - Number and percent of audio files that were corrupt or unreadable

5. **Species-level audio file classifications for each night based on automated species classification using Kaleidoscope Pro, for both baseline and expanded species lists**
 - Total number of audio files classified to each species, on each night of sampling (all parks/sites combined)
 - Number of audio files per deployment night classified to each species, on each night of sampling (all parks/sites combined)
6. **Species-level audio file classifications for each sample site based on automated species classification using Kaleidoscope Pro, for both baseline and expanded species lists**
 - Number of audio files classified to each species on each night of sampling at each site
 - Total number of audio files for all species combined on each night of sampling at each site
 - Number of audio files classified to each species at each site (all sampling nights combined)
 - Total number of audio files for all species combined at each site (all sampling nights combined)
 - Number of audio files per deployment night classified to each species at each site
 - Number of audio files per deployment night classified to any species at each site (all species combined)

Appendix A. Template for Park-specific Summary Reports

National Park Service
U.S. Department of the Interior

Insert National Park Name
Bat Monitoring Report Insert Year



Insert Title

Date Published

Author(s) name

Park Name

Street Address

City, State Zip Code



Include description of photo.

Introduction

Discuss a brief history of the project including when your park entered the program, objectives, previous bat surveys conducted within your park, and known species present. Sections about white-nose syndrome (WNS) and other regional threats or an overview of the park habitats and other information could also be included. Looking at standard operating procedures (SOPs) and previous park reports will provide ideas and information for your introduction.

Methods

This section should cite the version of the protocol and SOPs that were in use when the work was conducted. Include a very brief overview of those documents. This should only take a few sentences. For example, “We used Song Meter 3 detectors attached to t-posts with microphones mounted 2 to 4 meters high, according to methods presented in Route and Matzinger (2016).” Rather than regurgitate what was already presented in the protocol and SOPs, put particular emphasis on park-specific techniques such as whether you used t-posts or tripods. This section should also include the full names of all the individuals from the park who participated in the project. Other important information includes the overall range of nights deployed (e.g., July 1st through August 15th), the number of cells planned for sampling, and the criteria used for omitting cells that were planned for sampling. Finally include a brief description of how sites were selected, accuracy of GPS locations, and the orientation of microphones. A photo of a typical set up should be included.

Results and Discussion

The results section can be brief since data analysis will not be available at the time of report writing. This section will contain an overview of the data (and if applicable, comparisons between years). Helpful summary data includes number of sites surveyed, number of acoustic detectors that did not record properly during surveys (and any known causes of failure), number of sites omitted, total number of nights surveyed, average number of nights surveyed per site, and total number of gigabytes of data collected. Also describe any sites that were moved (with justification for the move) and any sites that were newly established this year. Include figures or tables to compliment your results, such as maps, recording schedule, dates of deployments, and site data tables. If your park has conducted any in-house analysis of acoustic data also include that within the report.

Recommendations

This is the most important section in the report because it will allow project coordinators to be more aware of the issues and recommended changes suggested by each park. It is important to discuss things that you thought worked well, problems that were encountered within the field season, and any suggestions for improvements that can be corrected for future years. This can be structured in whatever way the park sees fit (ex. paragraph or bullet points). It is important to include any information that the next field technician will need. For example, anything that is park-specific such as required equipment and where it is

stored at the park, information for navigating to and locating sites, logistical issues, safety considerations, useful contacts, and anything else that was not found in the GLKN protocol or SOPs.

Literature Cited

Cite all of the sources that were referenced in your report including project documents such as SOPs or prior reports.

Appendix

Appendices can be included if desired but are not necessary. Examples of possible information to include in appendices would be previous research documents, equipment specifications, data sheets, description of sites, additional photos or maps, or protocols and SOPs utilized.