

Standard Operating Procedure #7:

Data Entry and QA/QC Using the NPS Bats Acoustic Survey Database

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 to perform data entry for bat acoustic monitoring data using the NPS Bats Acoustic Survey Database (Version 1.X). This Microsoft Access database was developed by the NPS Biological Resources Division and Inventory and Monitoring Division. The database is used for multiple programs and parks across the nation, and thus was designed to accommodate varying protocols. Use of the NPS Bats Acoustic Survey Database to manage and store bat acoustic monitoring data is required for all projects funded by NPS WNS funds, which includes this GLKN project.

1.1 Preparation for Data Entry

Prior to beginning data entry, ensure raw data received from parks has been thoroughly reviewed and any obvious corrections made. Refer to SOP #6 for details of this process. Organize data into appropriately labeled folders by year, park, and sample site. For each deployment there should be a scanned copy of the completed field datasheet (.pdf format), one program file exported from the Song Meter by the technician (.pgm or .sm4s format), one or more summary files automatically generated by the Song Meter (.txt format), audio recordings (.wav format), and site photos (.jpg format). Occasionally the Song Meter will also generate “dump” files which occur when there is a recording error or battery failure (.sm3dump or .sm4dump format). Some deployments may have additional explanatory notes as well (.txt format).

Verify the necessary software has been installed on your computer. Required software includes Microsoft Access (2010 or later) to run the database itself, Microsoft Excel to open and edit the QA/QC tracking spreadsheet, Adobe Pro to make corrections to datasheets, and ArcGIS to perform spatial checks. In addition, you will need the Wildlife Acoustics Song Meter SM3 and SM4 Configurator utilities to review the audio settings and recording schedules embedded in the metadata of program files and WAV files.

1.2 Main Menu

When you first open the NPS Bats Acoustic Survey Database, you will see the Main Menu window (Figure 1). The areas you will be working with include the first three buttons under Data Entry, described below. The GLKN protocol does not include Mobile Deployments. There will typically be no need to access the options under Reports or Utilities (if you do, consult with GLKN Data Managers).

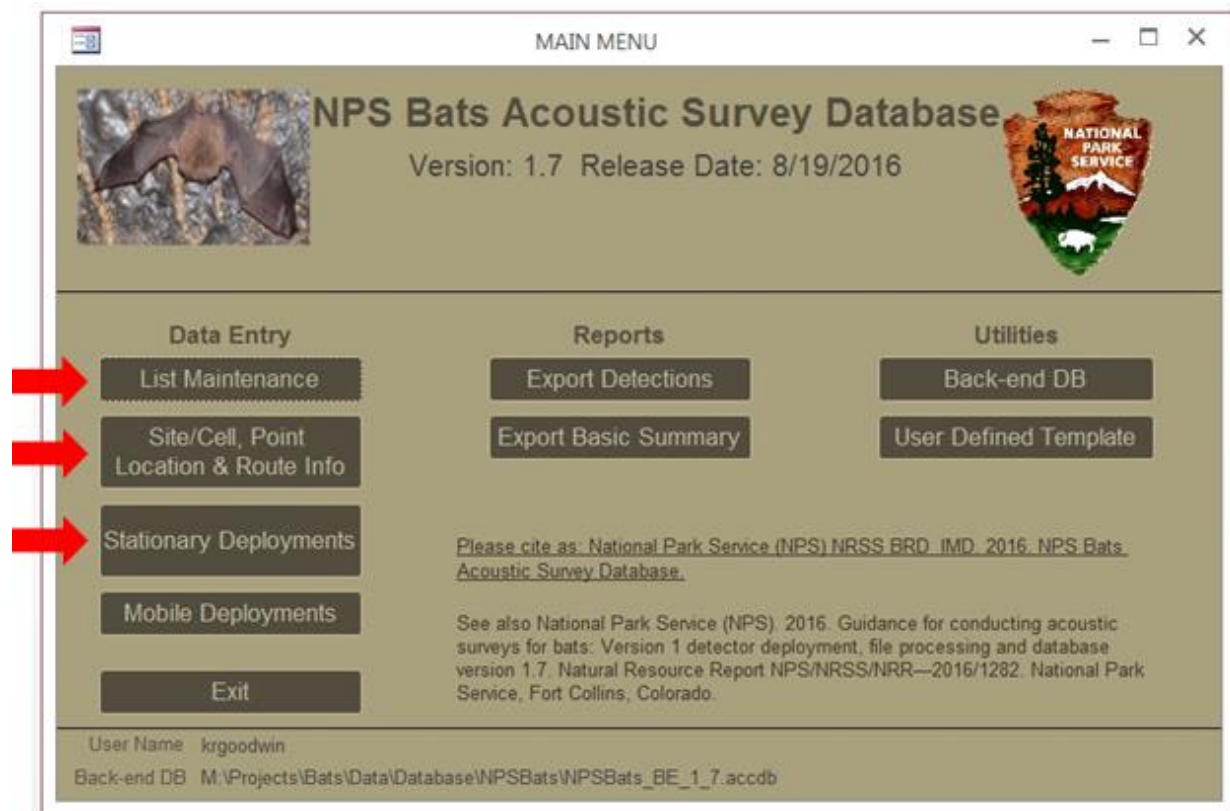


Figure 1. Main Menu screen of the NPS Bats Acoustic Survey Database.

List Maintenance allows you to edit the dropdown lists. For example, there is a list of all Song Meter units by serial number. If a park acquires a new unit, it must be added to the list before that unit can be entered on the deployment details page.

Site/Cell, Point Location & Route Info is where you will enter general information about each sampling cell and the sampling site(s) within that cell. You must complete this information prior to entering deployment data.

Stationary Deployments is where you will enter specific information about each deployment at each sampling site.

1.3 List Maintenance

This is the form where you will edit the dropdown lists. This information must be completed prior to entering deployment data.

When you click on the List Maintenance button in the Main Menu, you will see the following screen (Figure 2). The various lists are shown on the left side, and the contents of the selected list are shown on the right. For example, the “Audio Loggers” list shows each Song Meter unit by serial number, model, and manufacturer.

MAINTENANCE FORMS

Click on a list name

Audio Loggers

Battery Types
Broad Habitats
Clutter Types
Contacts
Datum
Distance Ranges
Local Habitats
Microphone Types
Sample Designs
Species
Species Group
Study Areas*
Waterbody Types

Audio Logger List

Logger Code*	Model	Manufacturer	Firmware	Serial Num
SM303669	SM3BAT	Wildlife Acoustics		SM303669
SM303670	SM3BAT	Wildlife Acoustics		SM303670
SM303671	SM3BAT	Wildlife Acoustics		SM303671
SM303676	SM3BAT	Wildlife Acoustics		SM303676
SM303982	SM3BAT	Wildlife Acoustics		SM303982
SM304358	SM3BAT	Wildlife Acoustics		SM304358
SM304538	SM3BAT	Wildlife Acoustics		SM304538
SM305042	SM3BAT	Wildlife Acoustics		SM305042
SM305050	SM3BAT	Wildlife Acoustics		SM305050
SM3055042	SM3BAT	Wildlife Acoustics		SM3055042
SM313620	SM3BAT	Wildlife Acoustics		SM313620
SM313625	SM3BAT	Wildlife Acoustics		SM313625
SM313636	SM3BAT	Wildlife Acoustics		SM313636
SM313639	SM3BAT	Wildlife Acoustics		SM313639
SM317240	SM3BAT	Wildlife Acoustics		SM317240
		Wildlife Acoustics		

*Required and must be unique

Record: 63 of 63

No Filter Search

Add the new list item here.

Figure 2. List Maintenance screen of the NPS Bats Acoustic Survey Database.

Select the list you need to edit from the options on the left side. In the table on the right side of the screen, scroll down to the bottom and add the new item in the last row. Some lists will require you to complete multiple fields.

Note that the majority of lists will not need updating. Those you should expect to update occasionally include Audio Loggers and Contacts, as new equipment and personnel are added to the project. Habitat types and clutter types should be restricted to the existing lists, using “Other” if needed rather than adding new list items.

1.4 Site/Cell, Point Location & Route Info

This is the form where you will enter general information about the sampling site/cell and the sampling location(s) within that cell. This information must be completed prior to entering deployment data.

It is important to understand the project sampling design and terminology used in order to correctly enter data in the database. Review SOP #1 for details of sample design and site naming. For our purposes, the term **cell** refers to a certain 1-km² area. Each park has a grid of 1-km² cells to serve as the sampling frame. Within each cell we establish one or more sampling sites, referred to in the database as **point locations**. Typically, only one sampling site is used per cell, however a second site is selected if the original site has to be omitted (due to flooding or blocked access). Sampling sites established using the GRTS sample design (referred to as “GRTS-protocol sites”) are assigned standardized Site IDs indicating the park, the cell’s GRTS order number, and the order of the site within the cell. For example, APIS003A refers to the first site within cell number 003 at Apostle Islands National Lakeshore. The first site in each cell is named with an “A”, the second site is named with a “B”, and so on.

In cases where the park conducts a survey of a building or other location of management interest (referred to as “non-protocol sites”), the site was not selected following the GRTS sample design and is not tied to a specific GRTS cell. Therefore, the park assigns a name based on the geographical area, a landmark, or building name, with the naming format varying from park to park.

When you click on the **Site/Cell, Point Location & Route Info** button in the Main Menu, you will see the following screen (Figure 3). Data pertaining to the overall sampling site/cell are entered in the top third of the screen. For GRTS-protocol sites this refers to the GRTS cell. For non-GRTS sites this refers to the park-designated site and will not be an actual cell. Data pertaining to the specific sampling point location (within the cell) are entered in the middle third of the screen, under the heading “Point Locations at this Site”. Mobile Transect data would be entered in the bottom third of the screen, however our protocol does not include mobile surveys so we will not use this section.

To begin entering data for an existing site/cell, select it from the dropdown menu at the top, titled “Find a Site/Cell”. Or, if you are starting data entry for a new area, click the **New Site/Cell** button.

Sampling Site/Cell information is entered in the top third of the screen. The following guidelines will assist you in completing the data entry.

- Site/Cell Code = Name of site or cell. For GRTS-protocol sites this will be the 4-letter park code followed by the cell’s GRTS order number (e.g., APIS001; note this does not include the final letter such as “A” or “B”). For non-GRTS sites this will be the park-designated site name, formatting varies by park.
- Study Area = Standard 4-letter park code (e.g., APIS).
- Sample Unit ID = Leave blank.

Dropdown menu listing all of the existing sites/cells. Check here first. Most have already been entered into the database. If the area you are working on is not listed, click New Site/Cell.

Enter information about the SITE/CELL. This will only need to be entered once.

Enter information about the LOCATIONS within the site or cell. There will often be multiple entries.

No mobile routes. Do not use!

Figure 3. Site/Cell, Point Location & Route Info screen of the NPS Bats Acoustic Survey Database.

- Sample Design = Select “GLKN Bat: Park-based 1 Km GRTS” (most often) or “GLKN Bat: Additional Non-Protocol Sampling” (for park-selected targeted sites, e.g., buildings).
- State & County = State and county in which site or cell is located. Note that a cell may overlap multiple counties. This info is not provided on the datasheet and will need to be determined using GIS.
- Broad Habitat = Leave blank. Habitat info will be added at the sample location level rather than the overall site/cell level. The Broad Habitat indicated on the datasheet refers only to the 100 meters immediately surrounding the sample location and should be entered into the

Location Notes field (see below). For example, “The surrounding habitat is primarily coniferous forest.”

- Ownership/Agency = Leave blank. Ownership info will be added at the sample location level rather than the overall site/cell level because of the potential for multiple different owners.
- Site Description = Leave blank. Site info will be added at the sample location level rather than the overall site/cell level. Notes provided on the datasheet should be entered into the Location Notes field (see below).
- Image Count = Leave blank. This refers to the number of images attached to the database. We are not using this option.

Sampling Point Location information is entered in the middle third of the screen. This refers to specific sample locations *within* the cell. Note that even if equipment is deployed in the same place, each year’s data will be entered as a new sampling location. Use these guidelines to assist you in completing data entry.

- Location ID = Site ID followed by underscore and year. For GRTS-protocol sites the format will be APIS001A_2016. For non-protocol sites the naming format will vary by park but always add the underscore and year to the end of the site name.
- UTM Zone = Leave blank because we use latitude/longitude instead of UTM. However, if coordinates were originally recorded on the datasheet in UTM format, include them and the zone in addition to the converted latitude/longitude.
- Datum = From datasheet, typically NAD83.
- Easting & Northing = Leave blank because we use latitude/longitude instead of UTM. However, if coordinates were originally recorded on the datasheet in UTM format, include them and the zone in addition to the converted latitude/longitude.
- Latitude & Longitude = From datasheet or from summary file. Use decimal degrees format with five digits (if available), e.g., 41.60375, -87.22643. If coordinates provided on the field datasheet are in the incorrect format (UTM or degrees/minutes/seconds) convert using an online tool such as www.rcn.montana.edu/resources/converter.aspx.
- USGS Quad & Elevation = Leave blank.
- Ownership/Agency = Use one of the following terms: NPS, Federal, State, County, Municipal, Tribal, or Private. “Federal” will encompass any federal agency ownership other than NPS. Ownership info will be added at the sample location level rather than the overall site/cell level because of the potential for multiple different owners within the same cell. This field will be completed using GIS after coordinates have been verified as correct.
- Access Road & Parking = Leave blank unless noted on datasheet.

- Waterbody Type = Leave blank unless noted on datasheet. Refers to any significant waterbodies near the sample location.
- Local Habitat Type = From datasheet. Refers to the specific habitat being targeted for sampling. If multiple types are circled, use the primary which may be indicated by a #1, or can be determined by looking at aerial imagery. Additional habitat types should be recorded in the Location Notes field.
- State/County = State and county in which site is located. A dropdown list is generated based on what was entered for cell-level data.
- Count & Images = Leave blank. This refers to the number of images attached to the database. We are not using this option.
- Location Notes = Click on the small button titled “Note” at the far right to open the Location Notes field. Location notes should describe the specific sampling location, not the cell as a whole. Enter relevant portions of notes from datasheet, including descriptions of the area being targeted for sampling and the surrounding habitat. Notes about how to access the site or how equipment is mounted will go under Deployment Notes.

1.5 Stationary Deployments

This is the set of forms where you will enter specific information about each deployment at each sampling site. Remember: Before you can enter any deployment information, you must complete the necessary sections under Site/Cell, Point Location & Route Info.

When you click on the **Stationary Deployments** button on the Main Menu, you will see the following screen, which contains a list of all existing deployments (Figure 4). If you need to edit an existing deployment, double-click the row to open the details. If you need to enter a new deployment, click the **New Deployment** button at the top.

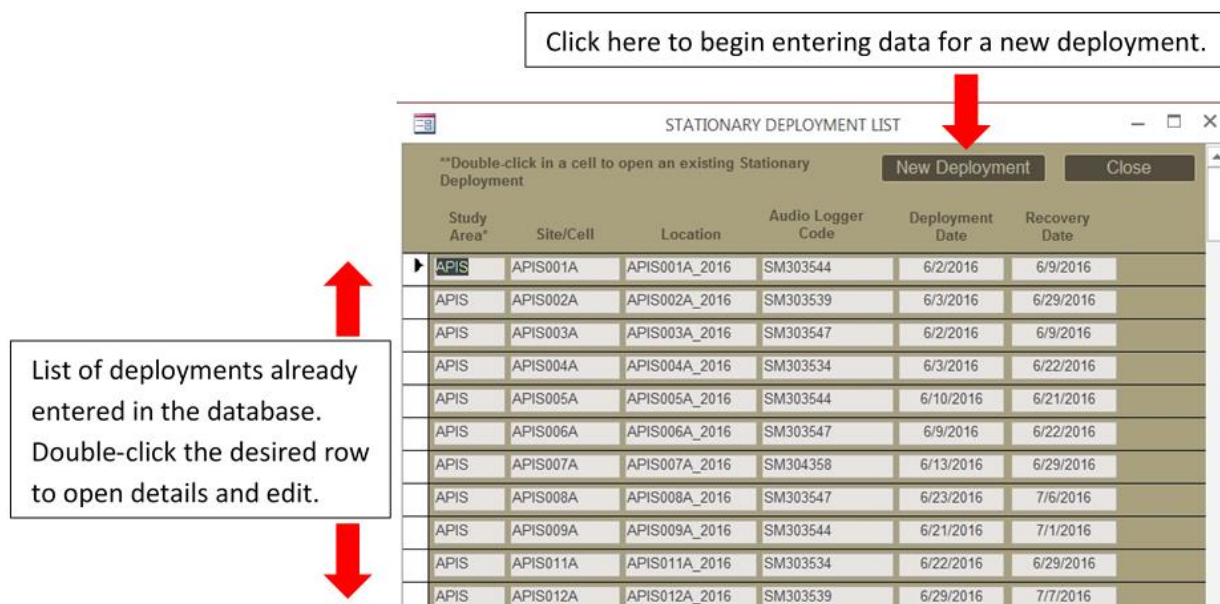


Figure 4. Stationary Deployment List screen of the NPS Bats Acoustic Survey Database.

Once you open an individual deployment you will see a window with a few fields at the top and five tabs below (Figure 5). By default, it will open to the Deployment Detail tab. You will mainly be using this tab and the Recovery Detail tab.

General information about the deployment is found in the top section of the page (Figure 5). This section is visible no matter what tab you are on. Follow these guidelines to fill out the fields in this top section:

- Deployment Date & Recovery Date = From datasheet. Refers to the dates the equipment was actually set up and retrieved. If recording was scheduled for a delayed start or if recording stopped early due to battery failure, that will be reflected in additional fields on the Deployment Detail and Recovery Detail tabs.

Figure 5. Stationary Deployment screen of the NPS Bats Acoustic Survey Database, showing the Deployment Detail tab.

- Sample Location = Select location from dropdown list. The list will include all point locations that have already been entered using the Site/Cell, Point Location & Route Info forms (see Section 1.4 above). Alternatively, clicking on the brown plus sign next to the Sample Location dropdown will open the form to add a new location.
- Point Location = Once a location is selected, the location name and GPS coordinates will autofill. These are locked fields and cannot be edited.
- Site/Cell = Once a location is selected, the site/cell name and site description will autofill. These are locked fields and cannot be edited.
- Data Management (Has QA/QC been completed?) = Leave blank while doing initial data entry. This box will be checked only after all QA/QC is done and corrections have been made.

Deployment Detail Tab

Additional, more detailed information about the deployment is covered in the **Deployment Detail Tab** (see Figure 5). Guidance for how to complete each field is found below. Note that the audio settings and recording schedule information can be found either in the program file or in the metadata of the recorded WAV files. These files can be opened using the Song Meter SM3 or SM4 Configurator program, depending on which type of unit was used to record the file. For SM3, look at the “Program” section on the top right of the SM3 Configurator window. For SM4, look at the

“Settings” section in the middle and “Schedule” on the right of the SM4 Configurator window. Note that some settings visible in the Configurator utility (e.g., Min Duration, Max Duration) do not have corresponding fields in the database.

- Audio Logger = From datasheet, refers to detector serial number. If not recorded on datasheet, can be viewed by opening a WAV file in Kaleidoscope Pro. Select correct serial number from dropdown list. Clicking on the brown plus sign next to the Audio Logger dropdown will open the form to add a new audio logger. This is an alternative to using the List Maintenance page (see Section 1.3).
- Primary Contact & Other Contacts = From datasheet. Refer to observer(s) listed at top of datasheet and put first person listed as the primary contact. If the person is not on the dropdown list, you will need to add them using the List Maintenance page (see Section 1.3).
- Recording Start Date & Recording Start Time = Determined by comparing the summary file to the first recorded audio file. See section below on Summary File and Audio File Information. If start date/time were not taken from either the summary file or the programmed recording schedule, add a note in Other Comments explaining how it was determined. For example: “No summary file available; Recording Start Date & Time were determined from first audio file.”
- Description of Mounting System = From datasheet and photos. Use standardized terminology: Tripod, T-post with Pole, Pole attached to Tree, Tree Mounted, or Other. If Other, describe in Deployment Notes.
- SD Card Numbers = From datasheet. Numbering system varies by park.
- SD Card Sizes = From WAV file opened in Song Meter SM3 or SM4 Configurator, shown at top left.
- Expected End Date = Leave blank.
- Gain Settings = On SM3 this is found in Program section, Row 2. If it says Automatic, enter 12 dB. On SM4 this is called Gain.
- Division Ratio = Leave blank. This is only for zero-crossing recordings which we do not use.
- Frequency Filters = On SM3 this is found in Program section, Row 1, HPF. Enter kHz value or off. On SM4 this is called 16k High Filter. If “on” enter 16 kHz; if “off” enter off.
- Trigger Window Length = On SM3 this is found in Program section, Row 10, TRGWIN. On SM4 this is called Trigger Window.
- Recording Mode = Refers to file type (ZC, WAC, or WAV). This will typically be WAV for all sites. Check by looking at ending of audio file names (should be .wav).

- Sample Rate = On SM3 this is found in the last box of Program section, Row 3 (e.g., 256 kHz). If it says “Auto” determine the kHz value as follows: If second box of Row 3 says WAV format, the value is 256 kHz. If that box says WAC format, the value is 192 kHz. Refer to SM3 User Guide pp 42–43 for details. On SM4 this is called Sample Rate.
- Low Filter Level = On SM3 this is found in Program section, Row 5, FRQMIN. On SM4 this is called Min Trig Freq.
- High Filter Level = SM3 this is found in Program section, Row 6, FRQMAX. On SM4 this is not an available setting so leave it blank.
- Max File Length = On SM3 this is found in Program section, Row 11, TRGMAX. On SM4 this is called Max Length.
- Decibel Level = On SM3 this is found in Program section, Row 9, TRGLVL. Enter the dB value, or if it says “Auto” enter 12 dB. On SM4 this is called Trigger Level.
- Recording Schedule = General description of schedule. For most deployments you will enter “GLKN Protocol 18:00 to 08:00” if the standard protocol schedule was used. If the schedule was sunset to sunrise, enter “Sunset / Sunrise”. If the schedule was relative to sunset/sunrise time, enter in the format “Sunset – 30 min / Sunrise + 15 min”.
- Activation Start & End Times = From WAV file, refers to recording schedule. Usually it will be Start at 18:00, End at 08:00. Enter all times in 24-hr format and include the leading zero (e.g., 08:00 not 8:00). Be sure to enter clock times, not durations.
 - On SM4 this is found under Schedule on the upper right, shown as a start *time* and end *time*, in 24-hr format.
 - On SM3 this is found in the Program section, starting in Row 12, shown as a start *time* in 24-hr format and *duration* of recording. Refer to Song Meter User Guide pp.47–48 and example below (Figure 6) to help interpret the SM3 schedule.
 - If the recording schedule was from sunset to sunrise, or relative to sunset and sunrise, determine the actual times of sunset and sunrise for that location on that date, and record those specific times under Activation Start and End. This information can be obtained from www.timeanddate.com/sun/ or similar websites.

AT TIME	18	:	00	:	00	← Means start recording at the time 18:00
RECORD	14	:	00	:	00	← Means continue recording for 14 hours after the start time

Figure 6. Recording schedule example, in the format you will see in the SM3 Song Meter Configurator Utility.

- File Prefix – Final = Check the upper left of the SM Configurator screen to see what the prefix was originally programmed as. If the prefix was programmed *correctly*, record the prefix here. If the prefix was programmed *incorrectly*, the WAV file names will have to be corrected by GLKN staff through a bulk renaming procedure (refer to SOP #6). This is the field to record the corrected, final prefix.
- File Prefix – Original = Check the upper left of the SM Configurator screen to see what the prefix was originally programmed as. If the prefix was programmed *correctly*, leave this field blank (only record it under File Prefix – Final). If the prefix was programmed *incorrectly*, this is the field to record the original, incorrect prefix.
- File Prefix Notes = Indicate if the prefix was edited after GLKN received the data from the park. Phrase should be “Initial config file had incorrect prefix (XXXXXXX). Changed by GLKN staff after field season to XXXXXXX based on file structure received from park.”
- File Suffix = Leave blank.
- File Folder = Leave blank.
- First Battery
 - Start Voltage = From first line of summary file (7th item, immediately after coordinates). Or, from datasheet if it was recorded. In this example the voltage would be 6.5. 2017-Jun-08, 18:00:59, 0.00000, N, 0.00000, W, 6.5, 28.75, 0, 0, U1
 - Location = From datasheet, type of power supply (internal or external).
- Second Battery = Leave blank.
- Microphone Type = From WAV file opened in Configurator, at top left. Or, from datasheet. Assume it is SMM-U1 if serial # starts with “MU”.
- Microphone Serial Number = From datasheet. If no serial number was recorded, enter “Not documented”. Do not leave blank.
- Microphone Height = From datasheet.
- Microphone Orientation = From datasheet. Datasheet will have orientation in degrees, you will need to convert this to the more general N, NE, NW, E, S, SE, SW, or W.
- Distance to Clutter = From datasheet.
- Housing Type = Leave blank.
- Calibration Method = Leave blank.

- Clutter Type = From datasheet. If more than one clutter type, enter primary and put secondary clutter types in Other Comments.
- Clutter Percentage = Leave blank unless noted on datasheet (for sites with clutter <5 m from the microphone).
- Photo of Site? = Check box if any photos were taken.
- Photo Equipment = Leave blank unless noted on datasheet.
- Environmental Conditions = Leave blank.
- Significant Weather Notes = Leave blank unless noted on datasheet that significant weather impacted the initial deployment, e.g., if staff decided to delay scheduled recording until following day due to incoming storm. All notes on significant weather events that occurred *during* the deployment period should be recorded on the Recovery Detail tab.
- Deployment Notes = Enter relevant portions of notes from datasheet specifically pertaining to how the deployment occurred, such as how to access the site or how equipment is mounted. Descriptions of the area being targeted for sampling and the surrounding habitat belong under Location Notes.
- Other Comments = Enter notes pertaining to data issues and any other notes relevant to the sampling that are not specifically related to deployment or retrieval. For example: prefix was programmed incorrectly and files were renamed, coordinates were converted from UTM, coordinates were corrected based on data from Trimble, or summary file is missing. Also enter the Station Name in this field, from the very top of the datasheet (e.g., “Station name is Dunes Trail.”).
- Temperature Logger = Leave all temperature logger fields blank.
- Summary File and Audio File Information = This group of fields is used to determine when the detector actually started and stopped recording. Complete all four fields first, then compare the dates and times.
 - Summary File Start Date & Time = Enter date and time on the first line of the summary file. Do not include lines that were generated during equipment setup (indicated by time being middle of the day and/or no microphone being connected).
 - Summary File End Date & Time = Enter date and time on the last line of the summary file. Do not include lines that were generated after equipment retrieval (indicated by no microphone being connected).
 - Audio File Start Date & Time (First File) = Enter date and time when first audio file was recorded. Date and time can be derived from the file name. Do not include audio

files generated during equipment setup (indicated by time being in the middle of the day and/or unreadable bad header files).

- Audio File End Date & Time (Last File) = Enter date and time when last audio file was recorded. Date and time can be derived from the file name. Do not include audio files generated during equipment take-down (indicated by time being in the middle of the day and/or unreadable bad header files).
- Compare the summary file start date/time to the date/time of the first audio file. Pick the one that starts earliest and use this date/time to go back and fill in the Recording Start Date & Time at top of Deployment Detail tab. Typically it will be the start date/time from the summary file.
- Then compare the summary file end date/time to the date/time of the last audio file. Pick the one that ends the latest and use this date/time to fill in the Recording Stop Date & Time at top of screen on Recovery Detail tab. Typically it will be the ending date/time from the summary file, but sometimes additional valid audio files are recorded after the summary file ends.
- If there were zero audio files recorded, use only the summary file dates/times.
- If the summary file for the deployment is missing, compare the dates/times of the first and last audio files to the programmed recording schedule. For example, if the first audio file occurred at 18:37 but the detector was scheduled to start recording at 18:00, it is safe to assume that 18:00 is the Recording Start Time.

Recovery Detail Tab

After completing the Deployment Detail tab, continue to the Recovery Detail tab (Figure 7).

Guidance for how to complete each field is found below.

- Recording Stop Date & Recording Stop Time = Determined by comparing the summary file to the last recorded audio file. See section above on Summary File and Audio File Information. If stop date/time were not taken from either the summary file or the programmed recording schedule, add a note in Other Comments explaining how it was determined. For example: “No summary file available; Recording Stop Date & Time were determined from last audio file.”
- Number of Files Downloaded = Count of total number of WAV files produced during the deployment. This refers to the total number of raw files, even though some may turn out to be noise/non-bats.
- Recovery Contacts = From datasheet, refer to observer(s) initials listed at bottom of page.
- Nightly High/Low Temperatures = Leave blank.
- Environmental Conditions = Leave blank unless noted on datasheet.

Figure 7. Stationary Deployment screen of the NPS Bats Acoustic Survey Database, showing the Recovery Detail tab.

- Significant Weather Notes = Leave blank unless noted on datasheet. All notes on significant weather events that occurred *during* the deployment period should be recorded here, rather than on the Deployment Detail tab.
- Recovery Notes = Enter relevant portions of notes from datasheet specifically pertaining to what was observed at the time of recovery. For example: batteries at 4.3 V, batteries dead, 5/64 G data on Card A, microphone windscreen chewed on by animals, or tripod tipped over.
- Species Group to be Analyzed = Select appropriate park.
- First Battery
 - End Voltage = From last line of summary file, or from datasheet if recorded.
- Second Battery = Leave blank.

Detection Inputs Tab

This section includes details about how analysis was performed on the audio files and allows importation of bat species classification/detection data from batch-processed call files. GLKN staff will typically not need to enter data on this tab. This information will be entered by the person conducting the species classification analysis, and/or by the GLKN Data Managers.

Audio Logger Details & Maintenance Tab

This section includes details on the acoustic detector (audio logger) that was used for this deployment. These are the same details that are found in the Audio Loggers list on the List Maintenance page. You may wish to refer to this tab during data entry, but should not need to edit anything. If editing is needed, go to the List Maintenance page and use the process described in Section 1.3 above.

Site/Cell & Point Location Detail Tab

This section includes details on the site/cell and point location for this deployment. This information is populated from the details previously entered using the Site/Cell, Point Location & Route Info page. Again, you may wish to refer to this tab while entering deployment/recovery details but should not need to edit anything. If editing is needed, go to the Site/Cell, Point Location & Route Info page and use the process described in Section 1.4 above.

1.6 Database Quality Assurance

Once data have been entered in the database, we must complete multiple quality assurance checks to verify data are as complete and correct as possible. Quality assurance will include manual checks, database queries, and spatial reference checks.

Manual Check

The manual check will be performed by a two-person team. One person will review the database entries, using a printed out copy. The other person will help compare these data to the data from the original datasheet, program file, summary text file, and settings in the WAV file. Any discrepancies will be noted on the printed out copy and corrections will be made in the database as necessary. The printed out copy includes a space to record the names of the two reviewers, the date of review, and the date corrections were made.

Database Queries

The GLKN Data Managers created QA/QC queries within the database to assist in finding errors that might not be easily caught by manual checks. These queries include: searching for overlap in recording dates for a given detector serial number, incorrect sampling design designation, differences in detector settings, spelling/typo checks, incorrect species group designation, and disagreement between recording dates and deployment/retrieval dates. Run each query to discover and correct errors.

Following the addition of species classifications to the Detection Inputs table, an additional query should be run to identify deployments with zero detections, and notes added to those records indicating the reason for zero detections (e.g., no files were recorded or all were noise).

Spatial Checks

Spatial reference checks will be performed using GIS. Site name, site coordinates, county, state, and property ownership information will be extracted from the database as a spreadsheet and imported into the GIS as X-Y data. This site data will then be overlaid on a spatial file showing state/county boundaries to confirm that the state/county information entered in the database is correct. A similar procedure will be used to check property ownership information, overlaying the location data on a parcel or park ownership file to determine if the correct designation was given (NPS, Federal, State, County, Private). This is especially important for those parks where private ownership is interspersed with federal ownership (e.g., MISS, SACN). If shapefiles showing parcel boundaries and ownership are not available, the county tax parcel GIS website may be utilized.

An additional check will be done to determine if GRTS-protocol sites fell within the proper GRTS cell by overlaying sample locations on the park's GRTS grid in GIS. Points located outside the correct cell will not necessarily need to be moved. However, to avoid future confusion it is important to make note of this issue both on the corrected datasheet PDF and in the database because the site name will not agree with the cell in which it is found. In the database, add a note to the Other Comments section such as "Point fell outside intended GRTS cell #004 and is located in cell #076 to the north."

Finally, any blatant location errors (for example, if points occurred well outside of park boundaries or outside the USA) must be investigated and resolved. These would most likely be due to a simple transcription error when recording coordinates on the datasheet. Make revisions both in the database and on the datasheet.

If desired, as part of this spatial analysis process sites could be assigned general habitat classifications (at the cell level) using existing NPS vegetation or land cover maps.

Quality Assurance Tracking

As you are going through the various quality assurance checks, it is critical to keep track of what has been reviewed, when, and by whom, as well as any corrections that were made. All of this information should be recorded in an Excel spreadsheet (*QAQC_GLKN_BatDatabase.xlsx*). The spreadsheet is located at M: Projects > Bats > Data > Database > NPS Bats > QAQC Documents.

After quality assurance has been performed and all corrections have been made, the database version can be officially certified by the GLKN Data Managers. Data must be completely checked and certified prior to archiving or sharing with outside partners, contractors, or the public. If during the QA/QC process corrections were made to datasheets or explanatory notes were added to site data on the M: Drive, remember to also duplicate all of these corrections and changes on the backup copies of the data.

1.7 Additional Resources

For additional information about the database and data entry procedures, please refer to the various documents provided by the NPS. These may all be found at M: Projects > Bats > Data > Database > NPS Database Documents. These include the following:

- NPS Bats Acoustic Survey Guidance
- FAQs for NPS Bat Acoustic Database
- WNS Bat Acoustical Monitoring Data Requirements
- How to Upload Data to NPS Data Store
- Webinar on NPS Bat Acoustic Database (Version 1.7)