

Cumberland Piedmont Network

National Park Service
Inventory and Monitoring Division



Standard Operating Procedure 7.0

Data Management—Version 1.2

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Summary

This SOP provides documentation for the Cumberland Piedmont Network (CUPN) Cave Bats Monitoring Protocol database, CUPN_CaveBat_v2.0.mdb. It also provides guidance for the processing, maintenance, and archival of the data contained within the aforementioned database. For procedures related to data entry, verification and validation, individuals are referred to the CUPN Cave Bats DB user manual (Lee 2015).

Archival procedures for data products produced as a result of this project are also discussed within this SOP. For additional details related to the processing of other data elements (i.e., photos/videos, cave maps, and data logger files), users are referred to SOP—6: Post-field Sampling.

Revision Log

Previous Version #	Revision Date	Author	Changes Made	Reason for Change	New Version #
1.0	Dec 2015	Bill Moore	V1.0 based on “conceptual” db design. This version based on CUPN_CaveBat_DB_v2.0. Completed by UNC 9/30/2015.		1.1
1.1	Oct 2016		Address IMD regional program manager review comments (April 2016), including sensitive data, update data dictionary for 9/30/2015 db.		1.2

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Database Model

Cumberland Piedmont Network's Cave Bat database (db) was developed in Microsoft Access, and will continue within that platform for the foreseeable future. Basic structure of this database conforms to the I&M-developed Natural Resource Database Template (NRDT), which includes an established set of core tables and fields (NPS 2007).

The core or primary tables within the NRDT, and ultimately the CUPN Cave Bat database, are tbl_Locations and tbl_Events. Within tbl_Locations all fixed location sampling units (i.e., caves) are stored. As its name implies, tbl_Events contains information about the sampling event such as date and time of sampling, protocol being implemented, etc. These tables are linked within the NRDT structure via a one to many relationship where each sampling location can accommodate multiple sampling events (Figure SOP7-1). Additional tables within the database are designed to store:

- Cave bat summer emergence counts at the entrance level (i.e., some caves have multiple entrances through which bats may exit). On occasion winter hibernacula counts are also tracked in the database at the entrance level.
- Cave bat winter hibernacula counts including temperature and relative humidity measures taken near roosting bats in the section (a within-cave subunit) where the counts took place.
- Location and servicing history of within-cave continuous monitoring environmental data loggers (i.e., HOBO data loggers).

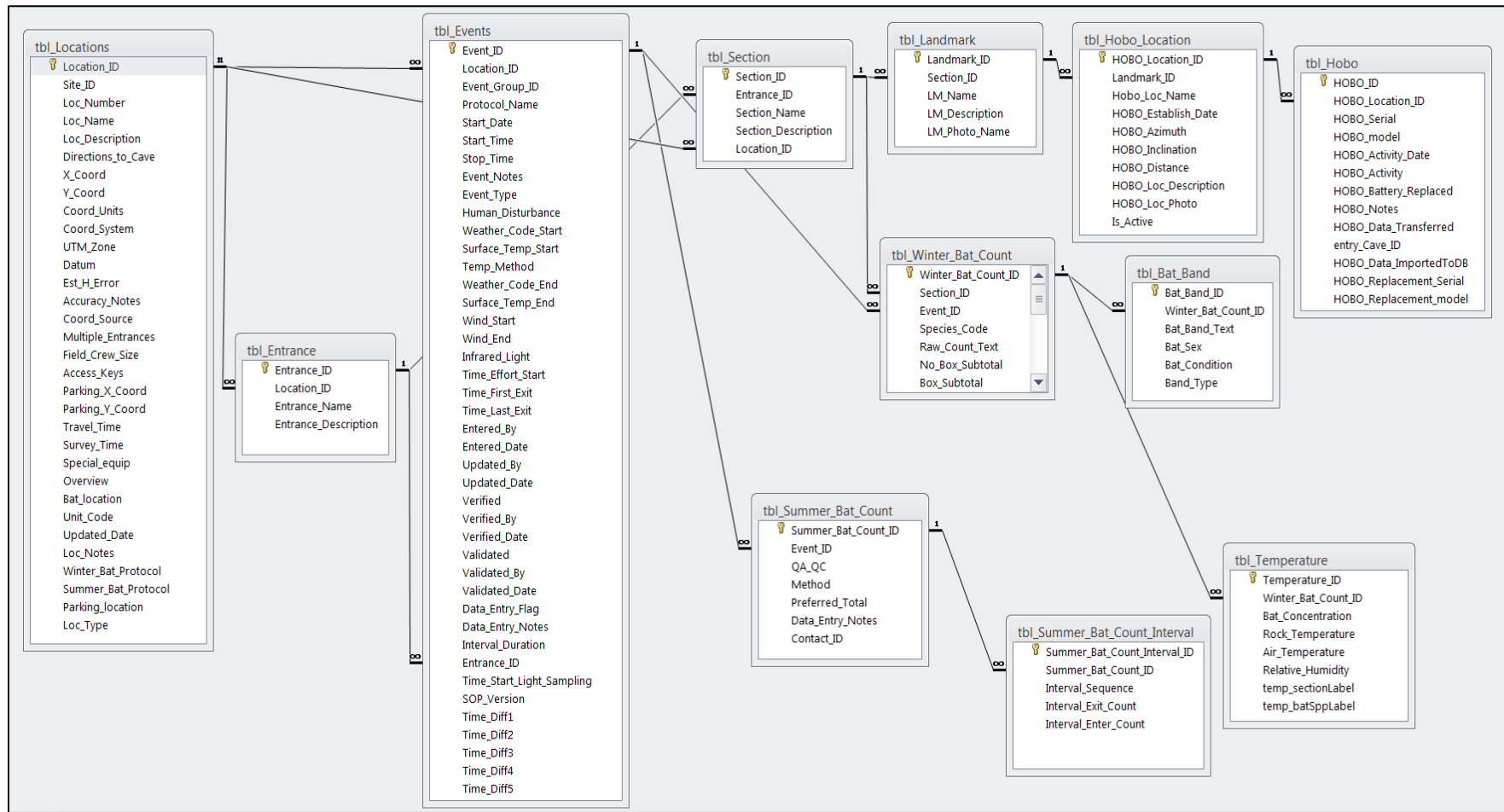


Figure SOP7-1. The Cumberland Piedmont Network (CUPN) Cave Bats Monitoring Protocol database model. Lookup tables and metadata tables such as `tbl_contacts` excluded for clarity.

Database Dictionary

With the exception of look up tables (i.e., tlu_ prefix), the following data dictionary contains names, type, size, and descriptions of fields within the CUPN Cave Bats database back-end file. Note, this information was excerpted from the most recent working draft of this database, CUPN_Cave_Bats_be_v1.0.

Table SOP7-1. Data dictionary for the CUPN Cave Bats database.

Table Name	Field Name	Field Type	Size	Field Description
Tbl_Bat_Band (Bat bands/PIT tags observed and recorded during winter bat counts)	Band_Type	Text	50	PIT or BAND
	Bat_Band_ID	Text	255	Primary key
	Bat_Band_Text	Text	255	Observed text on the bat band (or PIT tag)
	Bat_Condition	Text	50	Condition code for the bat (w=white-nose syndrome, d=dead, h=healthy, u=unknown)
	Bat_Sex	Text	20	Sex of the observed bat
	Winter_Bat_Count_ID	Text	255	Foreign key: Link to tbl_Winter_Bat_Count where the bat band was observed
	Entrance_Description	Memo	0	Description of cave entrance to aid surveyors in recognizing and locating it.
tbl_Entrance (Cave entrance information for caves with multiple entrances requiring survey [summer only])	Entrance_ID	Text	50	Primary Key unique record identifier
	Entrance_Name	Text	255	Entrance name used to identify a particular entrance of a cave (i.e., a cave with multiple surface exit/entry points)
	Location_ID	Text	50	Foreign Key: Link to tbl_Locations
	Data_Entry_Flag	Boolean	1	Provides data entry person with ability to flag records for later follow up during QA/QC process.
tbl_Events (summer and winter bat survey events)	Data_Entry_Notes	Memo	0	Provides data entry person with ability to comment on why a record was flagged.
	Entered_By	Text	50	Person who entered the data for this event
	Entered_Date	Date/Time	8	Date on which data entry occurred
	Entrance_ID	Text	50	Primary Key unique record identifier
	Event_Group_ID	Text	50	Link to tbl_Event_Group
	Event_ID	Text	50	Primary Key: Event identifier
	Event_Notes	Memo	0	General notes on the event
	Event_Type	Text	50	Is this a Summer, Winter, or Other type of monitoring event?
	Human_Disturbance	Boolean	1	Sum/Win—Human disturbance observed at cave entrance? (yes or no)

Table Name	Field Name	Field Type	Size	Field Description
	Infrared_Light	Boolean	1	Summer only—Infrared lights utilized to aid in bat count (yes or no)
	Interval_Duration	Double	8	Summer only—Duration of counting interval for this event, in minutes, default = 5
	Location_ID	Text	50	Foreign Key: Link to tbl_Locations
	Protocol_Name	Text	100	The name or code of the protocol governing the event
	SOP_Version	Text	255	Standard Operating Procedure Version used in this event (e.g., 1.2).
	Start_Date	Date/Time	8	Starting date for the event
	Start_Time	Date/Time	8	Sum/Win—Starting time for the event (i.e., time of arrival at cave entrance)
	Stop_Time	Date/Time	8	Sum/Win—Stopping time for the event (i.e., time crew finishes sampling within/at entrance...“Time Count Ended”)
	Surface_Temp_End	Double	8	Sum/Win—Ambient temperature in degrees Celsius outside cave at end of Event
	Surface_Temp_Start	Double	8	Sum/Win—Ambient temperature in degrees Celsius outside cave at start of Event
	Temp_Method	Text	50	Sum/Win—Method used to obtain temperature outside cave at start and end of Event
	Time_Diff1	Long Integer	4	Temporary field: difference between Start_Time and Time_Effort_Start
	Time_Diff2	Long Integer	4	Temporary field: difference between Time_Effort_Start and Time_Start_Light_Sampling
	Time_Diff3	Long Integer	4	Temporary field: difference between Time_Start_Light_Sampling and Time_First_Exit
	Time_Diff4	Long Integer	4	Temporary field: difference between Time_First_Exit and Time_Last_Exit
	Time_Diff5	Long Integer	4	Temporary field: difference between Time_Last_Exit and Stop_Time
	Time_Effort_Start	Date/Time	8	Sum/Win—Time first bat observed flying out of entrance, regardless if it re-entered (summer), Time crew begins sampling <u>within</u> entrance (winter)

Table Name	Field Name	Field Type	Size	Field Description
Tbl_Hobo (HOBO data logger information unclear how/if this table will be utilized)	Time_First_Exit	Date/Time	8	Summer only—Time first bat observed flying out of entrance and did not re-enter cave
	Time_Last_Exit	Date/Time	8	Summer only—Time last bat observed flying out of entrance
	Time_Start_Light_Sampling	Date/Time	8	Summer only—Time the first bat emerged (regardless of re-entry), which is taken to be the beginning of light sampling.
	Updated_By	Text	50	Person who made the most recent updates
	Updated_Date	Date/Time	8	Date and time of the most recent edits
	Validated	Boolean	1	Whether the data has been validated
	Validated_By	Text	50	Person who validated data for accuracy and completeness
	Validated_Date	Date/Time	8	Date and time on which data were certified
	Verified	Boolean	1	Whether the data has been verified
	Verified_By	Text	50	Person who verified accurate data transcription
	Verified_Date	Date/Time	8	Date and time on which data were verified
	Weather_Code_End	Long Integer	4	Sum/Win—Sky/Weather Code at End of Event (0=clear or few clouds, 1=partly cloudy...)
	Weather_Code_Start	Long Integer	4	Sum/Win—Sky/Weather Code at Start of Event (0=clear or few clouds, 1=partly cloudy...)
	Wind_End	Long Integer	4	Summer only—Wind conditions at end of Event (0=smoke rises vertically, 2=wind direction shown by smoke drift...)
	Wind_Start	Long Integer	4	Summer only—Wind conditions at start of Event (0=smoke rises vertically, 2=wind direction shown by smoke drift...)
	entry_Cave_ID	Text	255	Used in data entry to capture the cave
	HOBO_Activity	Text	100	Type of HOBO Activity taking place (i.e., install, service, replace, remove)
	HOBO_Activity_Date	Date/Time	8	Date HOBO activity (e.g., install, service, replace) is taking place
	HOBO_Battery_Replaced	Boolean	1	Was the HOBO Battery replaced?
	HOBO_Data_ImportedToDB	Boolean	1	Raw file uploaded to server?
	HOBO_Data_Transferred	Boolean	1	Was data transfer from HOBO to shuttle successful? (yes or no)

Table Name	Field Name	Field Type	Size	Field Description
	HOBO_ID	Text	50	Primary Key: HOBO identifier
	HOBO_Location_ID	Text	255	Foreign Key: Link to tbl_Hobo_Location
	HOBO_model	Text	255	HOBO data logger model type (e.g., H8 Pro, or Pro v2)
	HOBO_Notes	Memo	0	Notes about the HOBO record
	HOBO_Replacement_model	Text	255	Model of replacement HOBO (if HOBO being replaced)
	HOBO_Replacement_Serial	Text	255	Serial # of replacement HOBO (if HOBO being replaced)
	HOBO_Serial	Text	255	Serial # printed on side of the data logger
	HOBO_Azimuth	Long Integer	4	Compass bearing in degrees from permanent landmark to HOBO data logger
Tbl_Hobo_Location (information on HOBO data logger locations in cave)	HOBO_Distance	Long Integer	4	Distance in meters from permanent landmark to HOBO
	HOBO_Establish_Date	Date/Time	8	Date Hobo Location was first established
	HOBO_Inclination	Long Integer	4	Inclination (% slope) from the permanent landmark to HOBO (positive or negative whole number)
	HOBO_Loc_Description	Text	255	HOBO Location Description, a detailed description of the location where the installed HOBO data logger is placed
	Hobo_Loc_Name	Text	255	Unique identifier within cave for the HOBO Location (e.g., H1, H2,...)
	HOBO_Loc_Photo	Text	50	Photo name (as stored on network server) of HOBO data logger <i>in situ</i>
	HOBO_Location_ID	Text	50	Primary Key: Location identifier
	Is_Active	Boolean	1	Is this particular HOBO location in use (i.e., a data logger is currently deployed in this location)? (yes or no)
	Landmark_ID	Text	50	Foreign Key: Link to tbl_Landmark
tbl_Landmark (in cave landmarks to aid in finding locations where HOBO data loggers are or have been deployed)	Landmark_ID	Text	255	Primary Key: Unique Location Identifier
	LM_Description	Text	255	Detailed physical description of landmark
	LM_Name	Text	4	Land mark name (e.g., L1, L2... or NONE)
	LM_Photo_Name	Text	50	Photo name of landmark (as stored on network server)
	Section_ID	Text	50	Foreign Key: Link to tbl_Section
	Access_Keys	Text	255	List keys needed for access to cave (road gate, cave gate, etc.)

Table Name	Field Name	Field Type	Size	Field Description
Tbl_Locations (cave location information)	Accuracy_Notes	Memo	0	Positional accuracy notes
	Bat_location	Memo	0	Description of the locations where bats are commonly encountered and areas of high bat density
	Coord_Source	Text	255	The source of the GIS X and Y coordinates, i.e., shapefile, Lesser Cave Inventory database, field coordinates.
	Coord_System	Text	50	Coordinate system (e.g., UTM, SPCS)
	Coord_Units	Text	50	Coordinate distance units (i.e., m, ft)
	Datum	Text	50	Datum of mapping ellipsoid (e.g., NAD83)
	Directions_to_Cave	Memo	0	Directions to cave
	Est_H_Error	Double	8	Estimated horizontal accuracy
	Field_Crew_Size	Text	255	The ideal recommended number of personnel based on safety, efficiency, cave size, and disturbance considerations
	Loc_Description	Memo	0	In-cave description
	Loc_Name	Text	100	Cave Name
	Loc_Notes	Memo	0	General notes on the location
	Loc_Number	Single	4	Lesser Cave DB unique identifier (MACA and CUGA only)
	Loc_Type	Text	25	Primary cave type (e.g., sink, fissure, etc.)
	Location_ID	Text	50	Primary Key: Location identifier
	Multiple_Entrances	Boolean	1	Does this cave have multiple entrances requiring multiple, simultaneous survey efforts during summer? (yes or no)
	Overview	Memo	0	Cave description and recommended survey route, including obstacles such as crawls and climbs
	Parking_location	Memo	0	Directions to recommended parking location
	Parking_X_Coord	Double	8	X coordinate of the parking location
	Parking_Y_Coord	Double	8	Y coordinate of the parking location
	Site_ID	Text	50	Link to tbl_Sites
	Special_equip	Text	255	Non-standard equipment necessary for the survey
	Summer_Bat_Protocol	Boolean	1	Is this a summer survey cave? (yes or no)

Table Name	Field Name	Field Type	Size	Field Description
	Survey_Time	Text	255	The approximate time needed to complete survey (does not include travel time and set-up)
	Travel_Time	Text	255	The approximate time required to complete round-trip travel only
	Unit_Code	Text	12	Park, monument, or network code
	Updated_Date	Text	50	Date of entry or last change
	UTM_Zone	Text	50	UTM Zone
	Winter_Bat_Protocol	Boolean	1	Is this a winter survey cave? (yes or no)
	X_Coord	Double	8	X coordinate of the cave entrance
	Y_Coord	Double	8	Y coordinate of the cave entrance
	Entrance_ID	Text	50	Foreign Key: Link to tbl_Entrance
Tbl_Section (in cave subunits [i.e., sections] used to delineate hibernacula counts [winter only])	Location_ID	Text	50	Foreign Key: Link to the cave in which the section is located
	Section_Description	Memo	0	Description of cave sections to aid surveyors in recognizing section transitions
	Section_ID	Text	50	Primary Key: Unique record identifier
	Section_Name	Text	255	Section name used to identify a particular section or area within the cave (i.e., a subunit of the cave) (e.g., S1, S2....)
	Contact_ID	Text	50	ID of person who did the counting on the method (Contact_ID)
Tbl_Summer_BT_Count (Summer emergence bat survey count information)	Data_Entry_Notes	Text	255	Any comments related to this particular count identified during data entry process
	Event_ID	Text	255	Foreign Key: Link to tbl_Events
	Method	Text	50	Method used for counting (i.e., NV-goggles, NV video camera, thermal infrared camera)
	Preferred_Total	Boolean	1	Is this particular count the preferred value for reporting purposes? (Yes/No)
	QA_QC	Boolean	1	Is this particular count total for QA/QC purposes only (i.e, double count conducted)?
	Summer_Bat_Count_ID	Text	50	Primary Key: Unique row identifier
	Summer_Bat_Count_Interval_ID	Text	50	Primary Key unique record identifier
	Air_Temperature	Double	8	Temperature (°C) of air adjacent to bat concentration

Table Name	Field Name	Field Type	Size	Field Description
tbl_Temperature (Cave environmental data associated with winter bat hibernaculum counts [i.e., grab samples taken near aggregations of hibernating bats])	Bat_Concentration	Text	50	Relative concentration of bats by species where temp and RH grab sample taken
	Relative_Humidity	Double	8	Relative humidity (%) of air adjacent to bat concentration
	Rock_Temperature	Double	8	Temperature (°C) of rock (i.e., ceiling, wall) adjacent to bat concentration
	temp_batSppLabel	Text	255	Used for data entry only
	temp_sectionLabel	Text	255	Used for data entry only
	Temperature_ID	Text	50	Primary Key: Primary key of tbl_Temperature
	Winter_Bat_Count_ID	Text	255	Foreign Key: Link to tbl_Winter_Bat_Count
tbl_Winter_Bat_Count (Winter hibernacula bat survey information.)	Box_Subtotal	Long Integer	4	Subtotal # bats directly counted <u>and</u> photographed (i.e., with a box drawn around # on datasheet)
	Box_Subtotal_errCheck	Long Integer	4	Error check "box subtotal", used to verify entry
	Dead_Count	Double	8	Count of dead bats, which are NOT included in other counts
	Denorm_Bat_Band_Flag	Text	255	A denormalized field the database used to show the presence of one or more bands on a particular count
	Box_Subtotal	Long Integer	4	Subtotal # bats directly counted <u>and</u> photographed (i.e., with a box drawn around # on datasheet)
	Box_Subtotal_errCheck	Long Integer	4	Error check "box subtotal", used to verify entry
	Dead_Count	Double	8	Count of dead bats, which are NOT included in other counts
	Denorm_Bat_Band_Flag	Text	255	A denormalized field the database used to show the presence of one or more bands on a particular count
	No_Box_Subtotal_errCheck	Long Integer	4	Error check "no box subtotal", used to verify entry
	Other_Count_Total	Double	8	Total # bats as determined by some other type of counting, for example, Grid or LIDAR
	Other_Count_Type	Text	255	Type of other counting, for example, Grid or LIDAR
	Photo_Count_Total	Double	8	Total # bats, as determined by the direct count for non-photographed bats <u>plus</u> the count of bats that were photographed
	Preferred_Count_Total	Double	8	Preferred number for the total count of bats to be used in exports

Table Name	Field Name	Field Type	Size	Field Description
	Preferred_Count_Type	Text	255	Type of preferred count (average, direct, photo, Grid, LIDAR, etc.)
	Raw_Count_Text	Memo	0	Raw text recorded from field datasheet
	Section_ID	Text	255	Foreign Key: Link to xref_Section_Events
	SectionStatusFlag	Text	100	Status of the section, if abnormal: no bats present, survey incomplete, survey not attempted
	Species_Code	Text	4	Link to tlu_Bat_Species
	White_Nose_Count	Double	8	Total number bats with visible field signs of white-nose syndrome
	Winter_Bat_Count_ID	Text	50	Primary Key, unique row identifier
	Common_Name	Text	75	Name in general use within a community.
tlu_Bat_Species (Bat species look up table)	Genus	Text	75	Genus (plural: genera), low-level taxonomic rank.
	Scientific_Name	Text	75	The first part of the name identifies the genus to which the species belongs; the second part identifies the species within the genus.
	Species	Text	75	Species observed
	Species_Code	Text	4	Four-Letter (1st two letters of genus and 1st two letters of species) code for species observed.
	Taxon_Code	Text	255	ITIS taxonomic serial number (TSN)

Data Entry

Prior to initiating data entry for a season the project leader will contact the data manager to ensure database versions are up to date and the correct files are accessible for use on appropriate machines. Data entry will be accomplished via paper field data forms (Refer to SOPs 3, 4, and 5 for field forms and field data dictionaries). Data entry should be completed as soon as possible following field data collection and should be done by someone familiar with data collection efforts, preferably someone who participated in collection of the data to be entered. Data entry forms in the CUPN Cave Bat database are patterned as much as possible to mimic the paper field forms, and the database has quality components such as pick lists and validation rules to further limit the possibility of incorrect or incomplete data entries.

Prior to commencement of database use, a user (e.g., field crew leader, crew member, and data intern) will have reviewed this SOP and received hands-on training from the project leader or data manager in the use of this database and demonstrate a level of competency and understanding of the

data entry steps. In addition, it is expected that any individuals utilizing the database will have reviewed and be familiar with the database user manual (Lee 2015).

Correct data entry is an integral step in ensuring the overall success of this long-term monitoring effort. As such, when in doubt as to what is written on the form due to poor hand writing or any other reason, do not guess! Data forms should have been reviewed and initialed in the field. Thus, begin by checking with this individual in an effort to determine what is printed on the form. If confusion remains, flag the record in the database and make a note for the project leader to review during later data processing steps. After each field data form is entered, the person entering the data will print their initials and date in the reserved space on the field data forms.

In addition to paper forms, data will be collected in various media. These are listed below. Their mention within this SOP is not to provide step-by-step instruction (refer to the overview section of this SOP), but rather to simply make readers seeking an overview of data management aware of these ‘other’ data. Many of the steps for processing and cataloging these other forms of data can be found in SOP—6: Post-field Sampling.

Digital photos and video—bat photographs to aid in obtaining accurate hibernacula counts, bat photographs to document presence of disease, bat photographs to aid in species identification, photographs as image markers of field data forms, photographs to document miscellaneous incidental observations (e.g., unique cave formation or a rare species), or photographs to document field work. Another ‘category’ of photographs will be taken to aid in documenting the location of HOBO data loggers deployed in-cave. This will entail a photograph of the data logger in situ, as well as photographs of landmarks within caves.

In addition to photographs, this monitoring effort will also rely on digital video imagery to aid in obtaining accurate summer emergence counts.

Field paper—In addition to the field data forms found within the field methods SOPs for this protocol (i.e., SOPs 3, 4, and 5), other paper field forms include cave section maps and cave field information sheets. In addition to maintaining copies that are accessible for field crews, these items will also need occasional updating. Examples include adding new data logger locations on cave maps or updating the equipment list needed within a cave. These updated products will need to be properly versioned and made available to field crews.

GPS data—incidental observations (e.g., rare plants or animals), coordinates for cave locations or access points.

Data logger files—Digital files comprised of cave meteorological data. These are periodically offloaded from data loggers in the field and transported to the office via a data shuttle.

Quality Review

As part of data entry, database entries will be reviewed against the original data sheets to ensure data have been copied from the paper forms accurately (i.e., verification). In addition to manual checks some basic queries summarizing species counts, date ranges, max and min values, etc. are also

contained within the database to aid the data entry technician verifying data are accurate and complete.

If data verification reveals significant problems with the data entry for a particular method, cave, or park, this will trigger a full review of all data entered for that method, cave, or park. In addition, steps will be reviewed by the data manager or project leader to correct deficiencies and avoid a repeat of future errors. Once all routines are complete the data entry technician will mark the events as “verified” in the database. Once verification is complete field data forms will be returned to the location designated by the project leader. The project leader will also be informed that data verification is complete.

After data verification is finished, the data will be reviewed by the project leader, who will again check the data for completeness, as well as logical inconsistencies. The primary question throughout the validation process should be “Do these data make sense?” Although data may be correctly transcribed from the original field forms, they may not be accurate or logical. For example, a cave temperature of 60 °C may have been recorded on a datasheet and entered ‘correctly’ in the database. However, the value is obviously in error. Certain components of data validation are built into the data entry forms.

During the entry, verification, and validation phases, the project leader is responsible for the data. The project leader must assure consistency between field data forms and the database by noting how and why any changes were made to the data on the original field forms. In general, changes made to the field forms should not be made via erasure, but rather through marginal notes (preferred) or attached explanations.

Once the computerized data are verified as accurately reflecting the original field data and validation is complete, the project leader will submit original field forms to the curatorial specialist for archival. The electronic version of the data will be turned over to the data manager for archiving and storage. This version of the data is used for all subsequent data activities.

Database Administration

Data Updates

Data sets are rarely static. They often change through additions, corrections, and improvements made following the archival of a data set. There are three main caveats to this process:

- Only make changes that improve or update the data while maintaining data integrity.
- Be prepared to recover from mistakes made during editing.
- Document changes.

Any editing of archived data is accomplished jointly by the project leader and data manager. Every change must be documented and accompanied by an explanation that includes pre- and post-edit data descriptions.

Naming Convention and Version Control

Version control allows project staff to manage changes made to data sets or documents and provides an auditable trail of individual versions. As a general rule, to safeguard against loss or damage to data, changes or edits should not begin without having in place the ability to back up and start over. In its simplest form, version control is simply saving a copy of a file before beginning work on it and using an established naming convention to do so.

This project utilizes a front-end /back-end Microsoft Access application to manage data. The front-end contains the forms, queries, reports, etc. for interacting with the data which are stored in the back-end application or file.

The recommended naming convention for both files is to begin with the network acronym, followed by an underbar (“_”) followed by the protocol name (i.e., CUPN_CaveBats). For the front-end application (i.e., the user interface) this is followed by another underbar and the version number. The back-end file (i.e., the one containing data) should include the date of the latest changes made to the data using a YYYYMMDD format. Thus the recommended naming convention for this protocol would look like the following:

CUPN_CaveBats_v1.30

CUPN_CaveBats_20151124

Thus, based on the names of these files the user can discern that these are indeed the Cumberland Piedmont Network’s Cave Bats protocol applications. The front-end is version 1.30 and the data were last updated on November 24, 2015.

As noted above, any data editing/entry session should begin by making a backup of the current back-end data file. This is a simple task that is accomplished by doing a copy and paste routine and adding “_backup” to the end of the file name. For example, if entering data to the above file on 25 November 2015, the following data files should be in your folder:

CUPN_CaveBats_20151125

CUPN_CaveBats_20151124_backup

It is also good practice to maintain an edit log throughout the data processing efforts for an entire sampling season to keep track of what changes were made at each step (i.e., backup file) of the way. This simply makes it easier to know which backup file to select, if for some reason you have to “start over” at some point in the process. For suggestions of what information should go into this edit log, consult with the data manager.

Data entry or editing should NEVER be done in a file labeled backup (or in a file with “Archive” in its name). File naming and proper version control practices are extremely important to the long-term integrity of the data. It can also save both you and the data manager a significant amount of time and frustration. So if any questions arise regarding this process then ask the data manager.

It is also recommended that reports, presentations, etc. be appended with the date at the end of the file name. This will aid other users by making it clear which file is the last report or the most recent presentation given.

Data Backups

Tape backups of all project data stored on CUPN's server are regularly conducted. A full backup is conducted at the end of each work week (i.e., every Friday night) with incremental backups each night, Saturday through Thursday. With this approach data are backed up every night and the tape is changed on Friday, giving a full week's backup on each tape. Utilizing 12 tapes provides 12 weeks' worth of daily backups before tapes are recycled (i.e., put back in the rotation). In addition to these short-term backups, an historical backup is also made and retained by the data manager on an annual basis. All tape backups are conducted by MACA information technology (IT) staff.

One exception to the above is video. Annual video storage needs for this protocol are not precisely known at this time but are expected to be substantial over the long term. At the recommendation of MACA IT staff, the project leader is currently storing video files on an external expansion drive (USB). This aids in easy mobility from one computer to another for analysis needs. Raw files are copied to a second expansion drive to serve as backup.

Directory Structure

The various databases, images, reports, GIS coverages, etc. used and generated by the monitoring program create a large number of files and folders to manage. Poor file organization will lead to confusion and potentially to data corruption. Figure SOP7-2 depicts the file organization structure for a typical monitoring project.

In all cases it is recommended that folder naming conventions adhere to the following:

- No spaces or special characters in the folder name.
- Use the underbar (" _ ") character to separate words in folder names.
- Try to limit folder names to 20 characters or fewer.
- Dates should be formatted as YYYYMMDD (this leads to better sorting than other date naming conventions).

CUPN has established this template directory structure for each vital sign monitoring project to serve as a basic starting point and provide consistency across projects. A similar directory structure contains archived files (\CUPN_Archive\). Both the working and archive directories are accessible via the MACA Local Area Network (LAN) with access permissions maintained by the data manager and MACA IT staff.

Because this project includes multiple field methods within multiple caves in several parks, attention to organization becomes much more important. The basic foundation or folder tree utilized to maintain organization within parks is presented below and in Figure SOP 7-2.

\Park\Cave

\Winter

\Summer

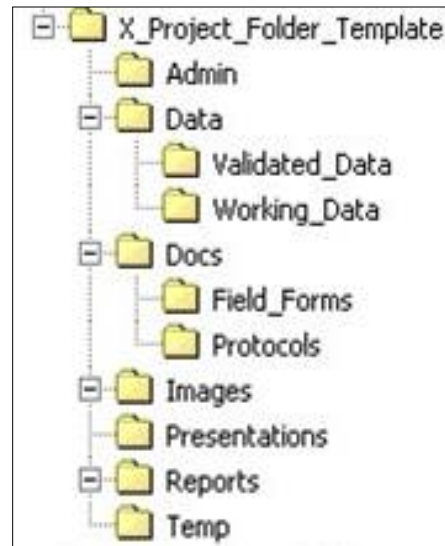


Figure SOP7-2. Project folder structure for the Cumberland Piedmont Network.

While there are schema that could be utilized (e.g., park-season-cave), it was agreed by the project leader and data manager that this basic structure is intuitive and will aid staff in maintaining park specific data, such as completed field forms (scanned) and images, in a logical, retrievable fashion. One type of data briefly noted earlier in this SOP that will not be stored within the Cave Bats Vital Sign folder structure is the cave meteorology data logger files. This is because cave meteorology data is collected in support of multiple vital signs. As such, “Cave Met” data are stored within a folder structure established specifically for that project on the MACA LAN.

Without due diligence file folders will become bloated over time with draft documents, multiple copies of the same files, etc; a review of archive and temporary files, backups etc., will be undertaken by the project leader and data manager on an annual basis. A good time for this review to take place is at the end of each season once annual reporting requirements have been completed and disseminated.

Metadata

Metadata has been defined as structured information about the content, quality, and condition of data. It can provide information about the ‘core data’ such as when and where they were collected or provide end users some level of confidence in the quality of the data, if for example they were collected via documented field methodologies. All CUPN projects are required to conform to Federal Geographic Data Committee (FGDC) guidelines. NPS also has its own guidance within the confines of FGDC guidelines. The ultimate goal of metadata is to make data available and inform users of its usability. With this in mind, CUPN staff will make every reasonable effort to fully document and make data available.

Protected Data

NPS does not define “sensitive” data per se, but does distinguish “protected” (from the Freedom of Information Act) data. Generally, data can be protected when releasing the information will “result in harm, theft, or destruction of the resource” (Draft RM 66B, 2010). Such information must not be shared outside the National Park Service, unless a signed confidentiality agreement is in place.

This project will involve the collection and management of hibernacula and summer cave roost locations of federally listed species, as well as cave locations. Per Executive Order and/or resource confidentiality laws these data could potentially be classified as protected. Final determination of which data are considered protected is made by the park, never by I&M staff.

CUPN staff have recently consulted (September 2016) with resource management staff in each of the parks where this protocol is planned for implementation (CHCH, CUGA, MACA, and RUCA). Given that the vast majority of locational information collected and/or maintained for this protocol could be classified as protected, the decision was made by the parks to redact the following data fields from tbl_Locations before release. General details of each of these fields can be found in the database dictionary in this SOP.

- Loc_Description
- Directions_to_Cave
- X_Coord
- Y_Coord
- Access_Keys
- Parking_X_Coord
- Parking_Y_Coord
- Overview
- Loc_Notes
- Parking_location

Essentially this removes all information from the database that could conceivably be used to locate any of the caves where monitoring occurs as part of this protocol. As such, prior to posting a dataset to IRMA the data manager will delete information stored in the 10 fields listed above.

Metadata development (i.e., FGDC guidelines Section 1, Constraints on Access) provides one way of documenting or labeling protected data to aid in their protection. Additionally procedures are in place to remove protected information from datasets made available outside of NPS. This includes but is not limited to the removal of location information from externally available datasets and reports. CUPN staff will continue to work with park resource contacts to ensure protected data are identified, labeled, and protected from inadvertent release.

Natural History Collections

Natural history collections consist of specimens taken from the living and non-living components of the natural world. Often these items are collected as part of a scientific research project in order to: (1) serve as vouchers documenting research; (2) document an area's natural features; (3) provide a better understanding of a natural process; and (4) document changes in the environment over time.

The NPS maintains natural history collections primarily to voucher, or document, the presence of plants, animals, fossils, rocks, minerals, and other resources in a park at a particular place and time. Researchers and resource managers use this information for science and resource management decisions. Parks use research results and specimens in exhibits and as the basis for education and interpretive programs. Natural history collections and their associated records, which are managed as archival collections document the park's natural environment, geological history, current conditions, and changes over time.

ICMS

Field data, objects, specimens, and features obtained for preservation during inventory, monitoring, research, and study projects, together with associated records and reports, will be managed over the long term within the museum collection and catalogued into the Interior Collection Management System (ICMS).

ICMS is a collection management system for museum collections in all bureaus and 150 units of the U.S. Department of the Interior. It is used to catalog objects, specimens, and archival materials. This is the NPS museum standard and will be followed according to guidelines established by that program. Specimens, digital photographs, and archival material will be handled according to procedures established in the NPS museum handbook (Polk 2011). Final storage location will be in designated repositories decided by the collection park using loan agreements where needed.

Archives

Administrative histories, collections documentation, exhibits, publications, interpretation, cultural and natural resource management studies, and scholarly research are all dependent upon having well organized and accessible archives and manuscript collections. Without these documents, park interpretation, administrative histories, structural and vegetative preservation, scientific research, and resource management would be greatly diminished, and staff, visitors, and scholars could only speculate upon the history of the parks as well as their management.

The preservation of archival and manuscript collections is dependent upon providing appropriate resources, including suitably trained staff, a proper environment, and appropriate storage equipment and supplies. Once a document is damaged, it can never be fully repaired, even through the most costly restorative procedures. Under appropriate conditions, most agents of deterioration that affect collections can be greatly reduced. The design and long-term maintenance of archival conditions is, therefore, a crucial part of a park's collections management program. Further, it is essential to develop basic procedures on access, usage, duplication, and conservation, as well as to complete the archival processing work of arrangement and description.

Any material (preferably originals, but can be copies) associated with the project (photos, maps, field notes, recordings, etc.) will be archived and entered into ICMS. After these materials are archived and entered into ICMS they will be returned to the park or a repository requested by the park along with their corresponding ICMS records. All final electronic data sets and material associated with monitoring bats at cave roosts in the CUPN will be archived and curated according to NPS policy and procedures.

Curatorial Procedures

The project leader (PL) is responsible for turning over any and all material related to the project to the CUPN curatorial specialist every eighth year after completing the Trend Analysis Report. A list of steps in the CUPN curatorial process is provided in Figure SOP7-3. Projects have two main components: Archives and Specimens.

Step 1: Project leader turns over all project materials and specimens to the CUPN curatorial specialist.

Step 2a: All archival materials are transferred to archival housing by the CUPN curatorial specialist or a designated student intern.

Step 2: Specimens are counted by the CUPN curatorial specialist.

Step 3: The CUPN curatorial specialist contacts the park curator to request an accession number and catalog number(s) for the project.

Step 4: For specimens only: the CUPN curatorial specialist either curates specimens or arranges for professional curation.

Step 5: The CUPN curatorial specialist enters all information connected with each specimen or archival material(s) into ICMS.

Step 6: For specimens only: labels are printed and placed with specimen.

Step 7: If applicable, photos are taken of specimens.

Step 8a: If park is final repository, archives or specimens will be sent to park with associated ICMS records and DI-105 (receipt for property form) by CUPN curatorial specialist.

Step 8b: If park is unable to store items, the park will choose a repository that abides by NPS standards. The CUPN curatorial specialist will create a loan agreement between park and repository and will deliver final archives and specimens to repository.

Archives

Every project will have materials to be archived. Once the PL has turned over the all materials related to the project, not including actual specimens, they are placed in archival housing (stable acid-free papers, folders, boxes, etc.) for conservation by the CUPN curatorial specialist or an appointed student intern. The CUPN curatorial specialist will then notify the park curator to

request one accession number and catalog number(s) for that project. The information is then entered into ICMS by the CUPN curatorial specialist. If the park will be final repository, the archives will be sent to the park with the associated ICMS records and a DI-105 (receipt for property form). If the park is unable to store the archives, the park will choose a repository that abides by NPS standards. The CUPN curatorial specialist will then be responsible for creating a loan agreement between the park and the repository, as well as the final delivery of the archives.

Specimens

In addition to archives, if there are specimens, they will need to be curated (prepared for long-term storage). For inventory projects, the amount of specimens will be tallied to obtain the same number of catalog numbers and one accession number from the park. For ongoing monitoring projects, the new specimens are tallied every time they are turned in to the PL to receive the same number of catalog numbers, keeping the same accession number for the duration of the project. The CUPN curatorial specialist will be responsible for either curating the specimens or finding a professional to do so. Once the specimens have been curated, all information connected with each specimen will be entered into ICMS by the curatorial specialist. A standard NPS label will be created from this information through ICMS and then attached to the specimen. If applicable, photos will be taken of the labeled specimen and digitally attached to the respective ICMS record. If the park is final repository, the specimens will be sent to the park with the associated ICMS records and a DI-105 (receipt for property form). If the park is unable to store the specimens, the park will choose a repository that abides by NPS standards. The CUPN curatorial specialist will then be responsible for creating a loan agreement between the park and the repository as well as the final delivery of the specimens.

Literature Cited

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