

Integrated Monitoring Protocol for Cave Entrance Communities and Cave Environments in the Klamath Network

Standard Operating Procedure #13: Data Entry

Version 2017Feb10

Citation:

Krejca, J. K., G. R. Myers III, A. Chung-MacCoubrey, E. C. Dinger, S. Mohren, D. Riggs, D. Sarr, K. Smith, A. Snyder, and S. Thomas. 2017. Standard Operating Procedure 13: Data Entry. Version 2017Feb10. Integrated monitoring protocol for cave entrance communities and cave environments in the Klamath Network. Unpublished National Park Service Report, Klamath Inventory and Monitoring Network, Ashland, Oregon.

To create a new version of this SOP, carefully follow the instructions in SOP #18: Revising the Protocol (<https://irma.nps.gov/DataStore/Reference/Profile/2238840>). Use the Revision History Log below to describe the revisions:

- Populate the top table of the revision history log, providing the previous version date, author of the change, a specific but concise description of the changes made, the footnote number associated with change details, and a new version date.
- In the bottom table, add a footnote and as much text as needed to describe in detail the reasons for and implications of the change.

Revision History Log

Previous Version Date	Author of Change	Changes Made	Footnote #	New Version Date

Footnote #	Detailed Reasons for and Implications of the Changes

1 Introduction

This Standard Operating Procedure (SOP) provides details on how to enter and verify data in the working database (SOP #12: Cave Database) as well as how data are validated and archived. Cave environment monitoring is unique when compared to other Klamath Network (KLMN) monitoring projects because data are collected at various times throughout each year, different data are collected depending on the year, and some of the data are collected using data loggers.

2 Field Work Preparations

Prior to starting field work, the Field Lead is responsible for printing datasheets and obtaining the cave monitoring working database. It is the Klamath Network Data Manager's responsibility to verify that the working database is ready for the upcoming field season (SOP #2: Scheduling, SOP #12: Cave Database). The Field Lead will work with the Data Manager to train personnel in the use of the databases (as described in SOP #1: Training). In addition, the Field Lead will work with the Data Manager to ensure the entry forms in the database meet all specifications needed to enter data.

3 Data Entry Overview

Data entry should occur as soon as possible after data collection is completed and before the next sets of observations occur. Data entry should be completed by the people who collected the data or by someone who is familiar with the project and data collection methods.

Each data entry form has built-in quality-assurance components, such as pick lists and validation rules, to test for missing data or illogical combinations. Users are strongly encouraged to use only the pre-built forms to provide the maximum level of quality assurance.

As data are being entered, the person entering the data should visually compare each data form to the datasheet values to make sure that they match. This should be done for each record prior to moving to the next form for data entry.

3.1 Parameters

Data should be entered into the database as soon as possible after collecting the data and all data for a calendar year should be entered following the timeline in SOP #15: Data Transfer, Storage, and Archiving to ensure it is available to meet reporting requirements. The following list describes when the data should be entered:

- HOBO data loggers will be downloaded according to SOP #2: Scheduling and the methods to enter those data into the database.
- Lava Beds National Monument (LBE) bat data will be collected once each year according to a schedule given in SOP #2: Scheduling and entered into the bat database. The Data Manager will upload these data to the working database in April of each year (SOP #12: Cave Database). Oregon Caves National Monument and Preserve (ORCA) bat data should be entered into the working database as soon as possible.
- Ice and subterranean pool water level data are collected multiple times each year and entered into the working database.

- Visitation data are recorded on paper visitation logs, by ticket sales, or downloaded from automated count loggers. Summarized visitation data that are collected using automated methods should be entered into the working database. Visitation data should be entered once a year, in early January.
- Scat, vegetation, and invertebrate survey data are collected once every other year from April through September (precise schedule given in SOP #2: Scheduling). Data should be entered into the working database as soon as possible.

3.2 Data Entry

The Cave Monitoring Database is documented in SOP #12. Once you are ready to enter data, navigate to the cave monitoring project folder. This folder may be in different locations at each park, so the Field Lead will show the crew where this folder is located. A well-thought-out folder structure is key to proper data management. While the structure can be flexible, it should be intuitive and logical. Each park should share their final folder structure with the KLMN Data Manager. An example structure follows:

- Data. Contains databases, scanned datasheets, metadata, data dictionary, HOBO data logger data, images, and GIS/GPS data.
- Documents. Contains the reports, implementation material, budgets, work plans, emails, protocols, contracts, and agreements associated with a specific project.

The working database consists of 2 parts: a front-end and a back-end. The front-end is the user interface, containing the data entry forms and queries. The back-end consists of the data tables and look-up tables. The working back-end database has “_BE_” as part of its name, and should be stored on the server in the project workspace so that all data enterers can enter data into the same back-end file. Section 3.2.2.3 below (Connect data tables) describes how to connect the front-end with the back-end. For best performance, users should copy the front-end database onto their workstation hard drives and open it there. This front-end copy does not contain any data, but rather acts as an interface with data residing in the back-end working database.

When new versions of the front-end application are released, there should be no need to move or alter the back-end file. Instead, the front-end file may be deleted and replaced with the new version, which will be named in a manner reflecting the update. When this occurs, the front-end application will prompt the user to update the links to the back-end database file. This update will only need to be done once for each new release of a database.

The *Switchboard* form (Figure 13-1) is the entry point for the application, and opens automatically when the application starts. At the top right of the form is an **Exit** button that can be used to close the application.

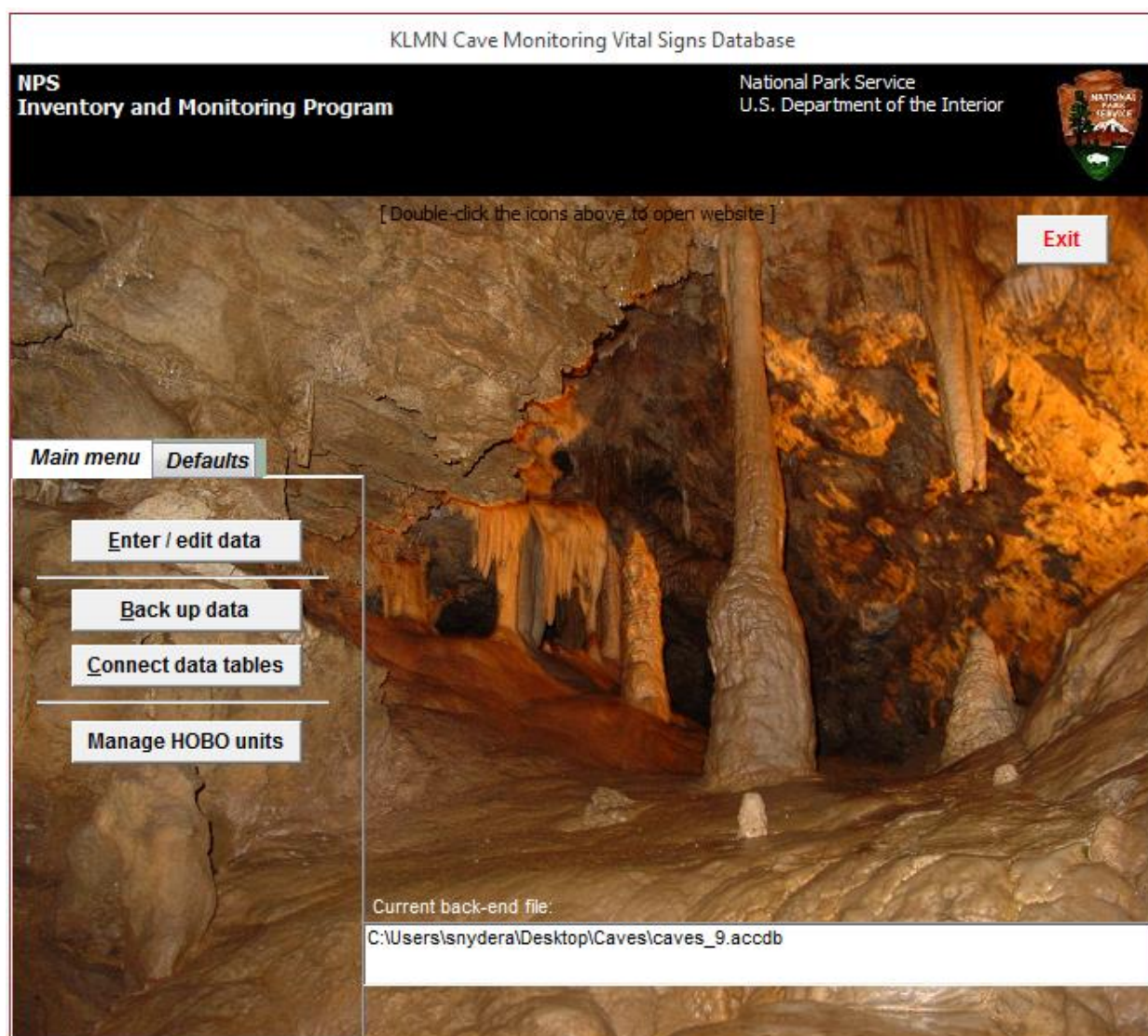


Figure 13-1. Cave Monitoring Database Switchboard.

This form contains 2 tabs: the *Main menu* tab and the *Defaults* tab. Each of the tabs will be examined in more detail in the sections that follow.

At the bottom of the form is a box that displays the full pathname of the back-end data file to which the application is linked.

3.2.1 Defaults tab

The *Defaults* tab (Figure 13-2) on the *Switchboard* displays current default values, and check box options for automatic backups on startup or exit, data file compaction on backup, and link verification on startup.



Figure 13-2. Default tab and form in the Cave Monitoring Database.

3.2.1.1 Current defaults

The current defaults section of the *Defaults* tab displays values for **Project**, **User**, **Park**, **Sample Year**, and **Protocol**. To change values, click the **Change** button to bring up the *Set application default* form (Figure 13-3). If a **User** is not listed, click the **New user** button to open the *View and edit contact information* form (Figure 13-4). Populate the form as much as possible and then close it. The new entry should now appear in the **User** drop-down list. When you have finished entering default values, click the **OK** button.

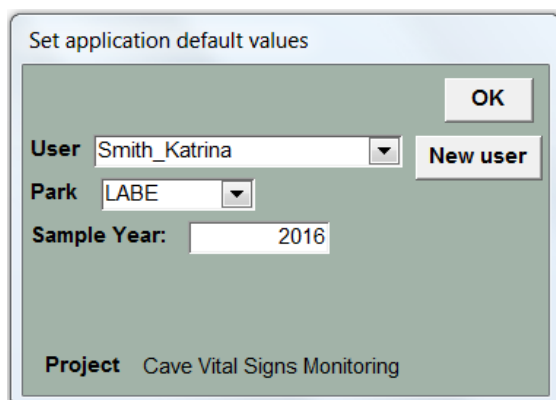


Figure 13-3. Set application default values form in the Cave Monitoring Database.

The screenshot shows a software window titled "View and edit contact information". At the top left, there is a "Filter:" section with two radio buttons: "View all contacts" (selected) and "Filter by search". To the right of the filter is a "Search:" text box with a dropdown arrow. A "Close" button is in the top right corner. Below the filter and search area, there are four buttons: "Edit record", "New record", "Undo", and "Done". The form contains several input fields: "First name", "Middle initial", "Last name", "Organization", "Position/title", "Work phone" (with an "ext" field), "Email", "Comments" (a large text area), "Address Type" (dropdown), "Address 1" (dropdown), "Address 2", "City", "State Code" (dropdown), "Zip Code", and "Country" (set to "USA"). At the bottom, a "Contact ID" field displays the value "20160909142157-533424019.813538". The status bar at the very bottom shows "Record: 4 of 4", navigation icons, "No Filter", and a "Search" button.

Figure 13-4. View and edit contact information data entry form in the Cave Monitoring Database.

3.2.1.2 Automatic backups at startup or exit.

The application can be set to automatically prompt for backups every time it is started and/or every time it is closed (using the Exit button on the main form). Making backups before and after data entry sessions is recommended, in case of database corruption or data entry mistakes. Backups can also be run manually by clicking the **Back up data** button on the *Main menu* tab.

3.2.1.3 Compact back-end on exit.

Compaction causes Microsoft Access to optimize the organization of the file, making it smaller and faster at accessing data. Check the option to **Compact back-end on exit** so that the application will compact the linked back-end when the application is closed using the **Exit** button on the main form.

3.2.1.4 Verify table links on startup.

In order for the application to work properly, the front-end must be linked to the tables in the back-end. When this option is check-marked (recommended), the link to the back-end file(s) will be verified when the application is started.

3.2.2 Main menu tab

The *Main menu* tab (Figure 13-1) has 4 buttons that provide the following functions:

Enter/edit data. Allows the user to enter or review data (see section 3.2.2.1).

Back up data. Creates a date-stamped copy of the back-end database file (see section 3.2.2.2).

Connect data tables. Allows the user to connect to a different back-end database file (see section 3.2.2.3).

Manage HOBO units. Opens a form that allows user to enter/edit data about HOBO units (see section 3.2.2.4)

Each of these buttons is described in detail below.

3.2.2.1 Enter/edit data button.

Clicking the **Enter/edit data** button on the *Main menu* tab of the *Switchboard* (Figure 13-1) opens the *Set application default values* form, which allows the user to verify or change the application defaults (Figure 13-3). Clicking the **OK** button closes this form and opens the *Data Gateway* form (Figure 13-5).

Sample Data Gateway - List of data that have been entered

* Double-click on the field label to change sort order. Double-click on a Location Name to open the Locations form for that record or a Visit Date to open the Data Entry form for that record.

Filters

Park: Location Name: Year: Visit Date:

Unit*	Location Name*	Visit Year*
LABE	DECA	2016
LABE	BEAC	2016
LABE	BIPA	2016
LABE	BLGR	2016
LABE	CAIC	2016
LABE	COIC	2016
LABE	CGCA	2016
LABE	ANGL	2016
LABE	CRIC	2016
LABE	INCA	2016
LABE	DRHE	2016
LABE	EMST	2016
LABE	FOCA	2016
LABE	HIMM	2016
LABE	ICEB	2016
LABE	IDWL	2016
LABE	CRCA	2016

Figure 13-5. Data Gateway form in the Cave Monitoring Database.

Data Gateway form. This form displays location and event information to help the user determine which record to edit/view.

- Editing existing records. Both filter and sort functions are available on the *Data Gateway* form to help a user find a needed record. Filters for **Park**, **Location Name**, and **Year** are set by selecting from the drop-down lists in the Filters box at the top of the form. Filters are turned on and off by clicking the **Filter** button, which will reflect the current status of the filters, either on or off. A specific filter can be removed by deleting the text that is currently displayed in one of the filter Controls. To open a record, double-click on the entry in the **Visit Year**.
- Sorting records. Double-clicking column headings with an asterisk will cause the records to be sorted in ascending order by that column value. The column heading will change to a bold italic format to indicate that it is the column being used to determine sort order. If the same column is double-clicked a second time, the records will be sorted in descending order by that column value. Double-clicking on the blue text in the **Visit Year** column will open the Data Entry form for that particular record, allowing the user to review or edit the data entered.
- Adding new records. To add a new data record, click the **Add a new record** button at the top of the form. This action will open the *Main Data Entry* form (Figure 13-6).

Data Entry Form - Filter by sampling event

Location: Skull Ice Cave Add New
 Unit Code: LABE
 Year: 2016

Data Verified By: Close

Climate
Ice
Water
Visitation
Soat
Vegetation
Invertebrate
Bats

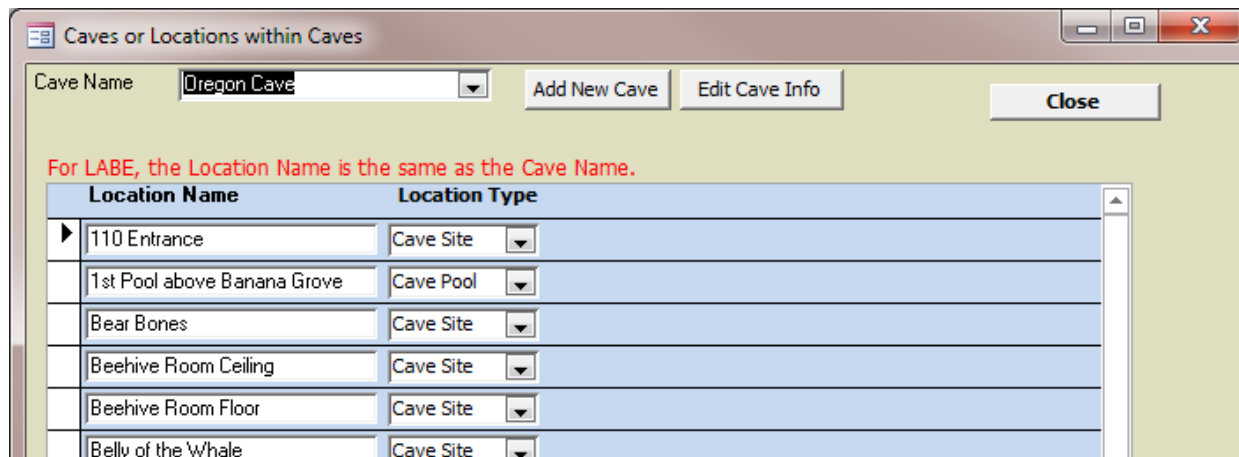
Zone:	Sampling Date:	Download Time:	Hobo removed:	Hobo installed:	Comments:
out	2/2/2016		10170150	10170115	
entrance	2/2/2016		10173889	9950013	
middle	2/2/2016		10173914	10170181	
deep	2/2/2016		10170143		
*					

Figure 13-6. Main Data Entry form in the Cave Monitoring Database.

Main Data Entry form. This form is used to enter all the field data for a sampling location.

If this is a new record, users can select a previously entered **Location** from a dropdown list at the top of the form, or click **Add New** to enter a new cave. For all caves at LABE and for Blind Leads Cave at ORCA, the location is the cave name. At ORCA, for Oregon Caves (“The Cave”), the location name is based on the sampling location in the cave. **Year** will be automatically populated based on the year entered in the *Defaults* form.

If the Location drop-down list does not include the desired value, click on the **Add New** button. This will open the *Caves or Locations within Caves* form (Figure 13-7). Values entered here include **Cave Name**, **Location Name**, and **Location Type**. At LABE, the **Location Name** and **Cave Name** will be the same.



Location Name	Location Type
110 Entrance	Cave Site
1st Pool above Banana Grove	Cave Pool
Bear Bones	Cave Site
Beehive Room Ceiling	Cave Site
Beehive Room Floor	Cave Site
Belly of the Whale	Cave Site

Figure 13-7. *Caves or Locations within Caves* data entry form in the Cave Monitoring Database.

If the **Cave Name** drop down does not include the desired value, click on the **Add New Cave** button. This opens the *Cave Entrances* form and allows users to add a new cave. Values entered here include **NPS Unit** (automatically entered based on default value), **Cave Name**, **X Coordinate**, **Y Coordinate**, **Cave Code**, **Do Not Use Code** checkbox, **Site Notes**, and **Directions**. Clicking on the **Edit Cave Info** button (from the *Caves or Locations Within Caves* form) opens the *Cave Entrances* form (Figure 13-8) and allows the user to update information.

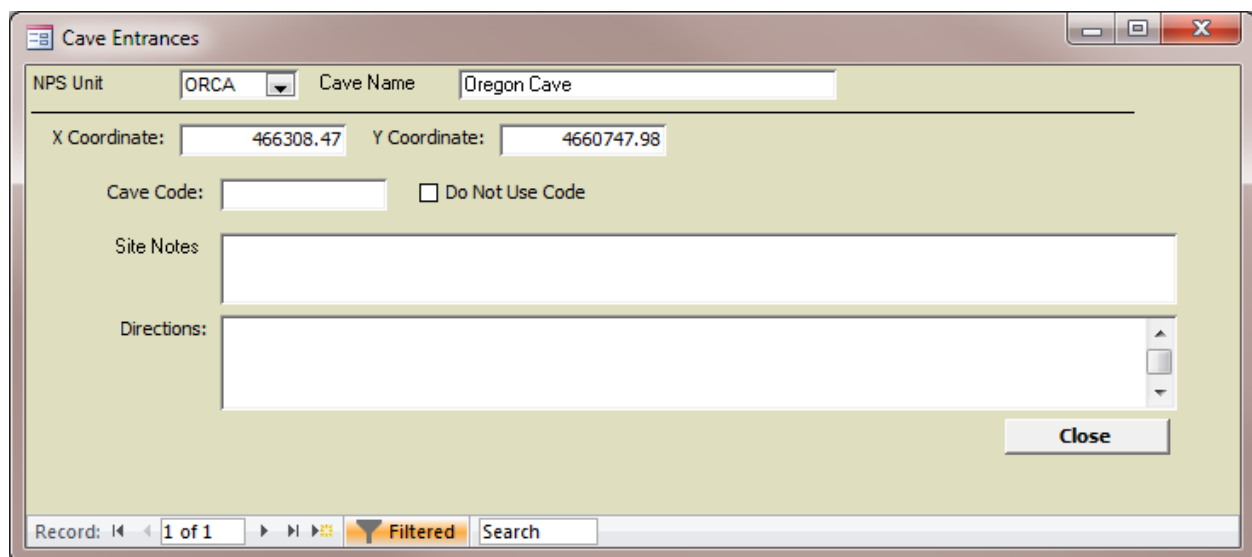


Figure 13-8. *Cave Entrances* data entry form in the Cave Monitoring Database.

The *Main Data Entry* form has 8 tabs: Climate, Ice, Water, Visitation, Scat, Vegetation, Invertebrate, and Bats.

a. *Climate* tab (Figure 13-9).

Data from the climate datasheet are entered in the *Climate* tab. Enter data for **Zone**, **Sampling Date**, **Download Time**, **Hobo removed**, **Hobo installed**, and any **Comments** about this climate record.

Zone:	Sampling Date:	Download Time:	Hobo removed:	Hobo installed:	Comments:
out	2/2/2016		10170150	10170115	
entrance	2/2/2016		10173889	9950013	
middle	2/2/2016		10173914	10170181	
deep	2/2/2016		10170143		

Figure 13-9. *Climate* data entry form in the Cave Monitoring Database.

b. *Ice* tab (Figure 13-10).

If data files are provided, the Data Manager can import data directly into the database back-end. If entering data manually, data from the Ice datasheet are entered in the *Ice* tab. Enter **Observers**, **Sampling Date**, **Time Start**, **Time End**, **Photos Taken**, **Photos Missed**, and add any **Comments**. There are 2 tabs to enter data info: *Ice Measurements* and *Ice Photos*. On the *Ice Measurements* tab, enter an **Ice Area Name**. If there is only 1 ice area to measure, enter “A”. Below this in the *Ice Level* form (Figure 13-10), enter **From Station**, **Distance to water**, and **Distance to Ice**. To add data for additional ice areas, click the **Add Ice Area** button.

From Station:	Distance to water:	Distance to Ice:

Figure 13-10. *Ice* tab and *Ice Level* data entry form in the Cave Monitoring Database.

Next enter **Transect Azimuth** at the top of the *Ice Transects* form (Figure 13-11). For each transect, enter the **Distance (m)**, **Inclination**, **Distance (m) down to ice edge**, **Distance (m) back to ice edge**, and **Comments**. To add data for additional transects, click the **Add Transect** button.

Ice Transects:

Transect Azimuth

	Distance (m)	Inclination	Distance (m) down to ice edge:	Distance (m) back to ice edge:	Comments:
▶	7.23	-9.2			
	6.18	-10.8			
	5.26	-12.8			
	4.3	-15.8			
	3.35	-20.6			
	2.44	-29.1			
	1.64	-46.5			
*					

Figure 13-11. *Ice Transects* data entry form in the Cave Monitoring Database.

In the *Tie-Ins* form (Figure 13-12), check **Start Point** if appropriate, and enter **To Station**, **Distance (m)**, **Azimuth**, **Inclination**, and any **Comments**.

Tie-Ins

	Start Point	To Station:	Distance (m):	Azimuth:	Inclination:	Comments:
▶	☒	SKIC008	1.89	339	-28.5	lava scroll nearest end of room
	☐	SKIC006	11.35	66.5	-3.8	
*	☐					

Figure 13-12. *Tie-Ins* data entry form in the Cave Monitoring Database.

On the *Ice Area Points* form (Figure 13-13), enter **Start Time**, **End Time** and **Starting Azimuth** at the top. Below this, list point records by entering **Point**, **Azimuth**, **Distance (m)**, **Inclination**, **Distance (m) down to ice edge**, **Distance (m) back to ice edge**, and any **Comments**.

Ice Area Points:

Start Time End Time Starting Azimuth

	Point	Azimuth	Distance (m)	Inclination	Distance (m) down to ice edge	Distance (m) back to ice edge	Comments
▶	1	339	2.01	-35.7			
	2	349	2.02	-35			
	3	359	2.06	-34.7			
	4	9	2.17	-32.7			
	5	19	2.38	-29.1			
	6	29	2.69	-25.5			

Figure 13-13. *Ice Area Points* data entry form in the Cave Monitoring Database.

If another section of ice exists, click the **Add Ice Area** button (Figure 13-10).

Click on the *Ice Photos* tab to get to the *Ice Photos* form (Figure 13-14). Enter each **Photo Name**. The Data Manager will enter the **Storage Location**.

Ice Measurements		Ice Photos
Photo Name	Storage Location	
Front Room Left	S:\Archive\Monitoring\Caves\LABE\2016\Data\Images	
Front Room Center	S:\Archive\Monitoring\Caves\LABE\2016\Data\Images	
Front Room Right	S:\Archive\Monitoring\Caves\LABE\2016\Data\Images	
Front Room Back	S:\Archive\Monitoring\Caves\LABE\2016\Data\Images	
Striated Wall	S:\Archive\Monitoring\Caves\LABE\2016\Data\Images	

Figure 13-14. *Ice Photos* data entry form in the Cave Monitoring Database.

c. *Water* tab (Figure 13-15).

Water measurements occur only at ORCA. Enter **Sampling Date**, **Personnel**, and water depths for pools in the following fields: **Icebox Pool Depth**, **Imagination Room Pool Depth**, **First Pool above Banana Grove Depth**, **Second Pool above Banana Grove Depth**, **King-Queen's Throne Room Pool Depth**, **Lake Michigan Depth**, and **Miller's Chapel Right Passage Pool Depth**. Enter the initials of the person who checked the data in **Reviewed by** and add any **Notes** about water sampling.

Climate Ice Water Visitation Scat Vegetation Invertebrate Bats											
Sampling Date:		Personnel:	Icebox Pool Depth:	Imagination Room Pool Depth:	First Pool above Banana Grove Depth:	Second Pool above Banana Grove Depth:	King-Queen's Throne Room Pool Depth:	Lake Michigan Depth:	Miller's Chapel Right Passage Pool Depth:	Reviewed by:	Notes:
6/20/2016	Ivan Y	4.1	0	0	13.5	0	14.5	<1			
*											

Figure 13-15. *Water* depth data entry form in the Cave Monitoring Database.

d. *Visitation* tab (Figures 13-16 and 13-17).

There are 2 forms on this tab: *Cave Registers* and *TRAFx Infrared Trail Counters*. On the *Cave Register* form, enter the **Month**, **Number of Public Visitors**, and **Number of Staff**. **Total Visitation** will be automatically calculated based on other fields. On the *TRAFx Infrared Trail Counters* form, enter **Month**, **Number of People**, and any **Notes**.

Cave Registers			
Month:	Number of Public Visitors:	Number of Staff:	Total Visitation
January	2	2	4
February	4	4	8
June	2	2	4
July	7	2	7
*			

Figure 13-16. *Cave Registers* data entry form on *Visitation* tab in the Cave Monitoring Database.

TRAFx Infrared Trail Counters		
Month:	Number of People:	Notes:
January	78	
February	71	
March	160	
April	212	

Figure 13-17. *TRAFx Infrared Trail Counters* data entry form on *Visitation* tab in the Cave Monitoring Database.

e. *Scat* tab (Figure 13-18).

At the top, enter the **Scat Date** and the **Surveyors**. Then enter in which cave **Zone** monitoring occurred. Enter **Search Start Time**, **Search End Time**, **Number of Surveyors**, **New Rodent Scat Abundance Tally**, and any **Notes**. If no scat was found, check **No Scat Present**. If scat was found, enter it in **Scat Type(s)**. To enter data for another zone, click the **Add Zone** button. Use the arrows to scroll between cave zones.

The screenshot shows the 'Scat' tab selected in the Cave Monitoring Database. The form contains the following elements:

- Tabs:** Climate, Ice, Water, Visitation, **Scat**, Vegetation, Invertebrate, Bats.
- Scat Date:** 9/17/2014
- Surveyors:** D. Wood, K. Smith
- Zone:** entrance (with 'Add Zone' and navigation arrows)
- Search Start Time:** 9:32
- Search End Time:** 9:40
- Number of Surveyors:** 2
- No Scat Present:** ☐ (unchecked)
- New Rodent Scat Abundance Tally:** 765
- Scat Type(s):** A list of dropdown menus including Bat Guano, Rabbit Scat, Pika Scat, Bones, Dead Invertebrates, Moth Wings/Cricket Legs, Rodent Nest, Midden, or Amberrat, and Plant Material.
- Notes:** A large text area for additional information.

Figure 13-18. *Scat* data entry form in the Cave Monitoring Database.

f. *Vegetation* tab (Figure 13-19).

At the top, enter **Vegetation Sampling Date** and list **Crew** members. In the upper form, enter whether it is the **Inner or Outer** transect. Enter **Transect Length (m)**, sampling **Start Time** and **Stop Time**, **Interval Distance (cm)**, **Trail Start (m)**, and **Trail End (m)**. To enter data about another transect, click the **Add Transect** button. Use the arrows to scroll between transects.

Climate Ice Water Visitation Scat **Vegetation** Invertebrate Bats

Vegetation Sampling Date: 7/10/2014 Crew: K. Smith

Inner or Outer: Inner Add Transect

Transect Length (m): 22.14 Start Time: 9:25 Stop Time: 9:40

Interval Distance (cm): 105.4 Trail Start (m): 1.5 Trail End (m): 2

Point:	Distance:	Species Name/ Comments:
1	105.4	
2	210.8	
3	316.2	
4	421.6	
5	527	
6	632.4	
7	737.8	
8	843.2	
9	948.6	
10	1054	
11	1159.4	
12	1264.8	

Record: 1 of 12 No Filter Search

☒ Photo-monitoring completed

Transect Notes:

Vegetation Detail

Veg Type: R Order encountered: 1

Figure 13-19. *Vegetation* data entry form in the Cave Monitoring Database.

In the lower *Vegetation photos* form (Figure 13-20), enter **Photo Name**. **Storage Location** will be entered by the Data Manager once all photos have been archived on the KLMN server.

Photo Name:	Storage Location:
Carbide_Entrance_Inner_Left.JPG	S:\Archive\Monitoring\Caves\ORCA\2016\Data\Images
Carbide_Entrance_Inner_Right.JPG	S:\Archive\Monitoring\Caves\ORCA\2016\Data\Images
Carbide_Entrance_Outer_Left.JPG	S:\Archive\Monitoring\Caves\ORCA\2016\Data\Images
Carbide_Entrance_Outer_Right.JPG	S:\Archive\Monitoring\Caves\ORCA\2016\Data\Images
*	

Figure 13-20. *Vegetation* photo data entry form in the Cave Monitoring Database.

g. *Invertebrate* tab (Figure 13-21).

At the top, enter **Bait Type and Amount**, **Date bait set**, **Person(s) setting bait**, **Date bait retrieved**, **Person(s) retrieving and surveying**, and any **Comments**. Then enter **Zone**, **Station** (for LABE only), sampling **Start Time** and **End Time**, **Substrate Type**, **Substrate Moisture**, **Bait?**, **Mold/Fungus?**, and **Comments**. If no invertebrates are found, check **No Invertebrates Present**. If invertebrates are found, they can be listed below and entries include species **Type**, **Number**, and any **Comments**. To enter data about another zone, click the **Add Zone** button. Use the arrows to scroll between zones.

Bait Type and Amount 0.5 cm³ Adam's Natural Peanut Butter

Date bait set: 7/28/2016 Person(s) setting bait: Justin P

Date bait retrieved: 8/11/2016 Person(s) retrieving and surveying: Justin P

Comments

Zone: middle Add Zone

Station: 1 (LABE only) Start Time: 11:15 End Time: 11:21

Substrate Type: BD Substrate Moisture: D Bait?: Yes Mold/Fungus?: No

☐ No Invertebrates Present Comments:

Species

Type:	Number:
Dipluran	6
▶ Millipede-cave	11
*	

Figure 13-21. *Invertebrate* data entry form in the Cave Monitoring Database.

h. *Bats* tab (Figure 13-22).

Bat data from LABE are entered into the Lava Beds BatBase database. The Data Manager will migrate the data into the KLMN working database where users can view/edit data, if necessary. ORCA will enter data into the working database. Enter **Survey Type**, **Observers**, **Date Sampled**, sampling **Start Time** and **Stop Time**, **Relative Humidity**, and any **Comments** (Figure 13-22). Enter **Zone** (enter 0 if it is a cave without zones), **Species**, **Number of Bats**, **Solitary/Cluster**, check if **Photographed**, and add any **Notes**. In the form below this, enter the **Zone**, **Cluster Size**, **Ceiling temp**, **Air temp** and **Temp units**.

Zone	Species	Number of Bats	Solitary/Cluster	Photographed	Notes
2	Corynorhinus townsendii	1	Solitary	☐	
2	Corynorhinus townsendii	35	Cluster	☐	very back high room at zone 1-2 junction
*				☐	

Zone	Cluster Size	Ceiling temp	Air temp	Temp units
1	0	59.5	59.9	F
1	0	55.6	59.6	F
2	35			
3	0	60.3	62.7	F
4	0	43.8	51.4	F
4	1	59	60.9	F

Figure 13-22. Bat data entry form in the Cave Monitoring Database.

Once the LABE bat data are entered into the LABE bat database and have been reviewed, a copy of this database should be sent to the KLMN Data Manager. The KLMN Data Manager will extract the bat data related to this project and upload it into the working database.

3.2.2.2 Back up data button

Clicking the **Back up data** button on the *Main menu* tab will open a Yes/No box asking if the user would like to make a backup copy of the data. If **Yes** is selected, the user will be prompted to select a folder in which to place the backup copy. The backup files will be named by adding the current date, time, and user's initials to the end of the back-end file name (e.g., cave_BE_20160901_1711_KS.mdb for a backup file created on September 1, 2016, at 5:11PM by Katrina Smith). Backup copies are used for the current field season only and will not be archived. All such backups may be deleted after data are validated. Clicking the **Save** button creates the backup file and displays a success message.

3.2.2.3 Connect Data Tables

The application has 2 parts, a user interface front-end and a database back-end (see Section 3.2.1.3). For the application to work properly, the front-end must be connected to the correct back-end. Clicking the **Connect data tables** button on the *Main menu* tab opens the *Update Data Table Connections* form (Figure 13-23), which is used to establish the link from the front- end to the back-end.

When this form is opened, the database name, file name and path of the current back-end file are displayed. To change the back-end file connection, click the **Browse** button, navigate to the new back-end file, and click the **Open** button. To make the actual connection, click the **Update links** button. If the connection is successfully made, an “Update complete” message will be displayed.

Figure 13-23. *Update Data Table Connections* form in the Cave Monitoring Database.

3.2.2.4 Manage HOB0 units

Data loggers are managed through the *Logger Details* form (Figure 13-24), which can be accessed by clicking on the **Manage HOB0 units** button from the *Switchboard*. Select a **Serial Number** at the top of the form and any previously entered data should appear in the form below. Then enter new data about **Site**, **Zone**, **Deployment Date**, **Rest Start Date**, and any **Notes**.

Site	Zone	Deployment Date	Rest Start Date	Notes
SENT	deep	5/29/2012	1/16/2013	
BEAC	entrance	9/10/2014	2/2/2015	
*				

Figure 13-24. *Logger Details* data entry form in the Cave Monitoring Database.

4 Data Verification

In order to ensure the data collected are as accurate as possible, each datasheet should be compared to the database to verify that they match. The person performing the verification should add their name to the **Data Verified By** field, which is populated in the *Main Data Entry* form (Figure 13-6). Once all records have been verified, a copy of the database should be sent to the KLMN Data Manager for validation. In addition, a copy of the database will be archived on the KLMN server.

5 Data Validation

At the end of the field season, the Project Lead will review all data collected by the field crew. Techniques such as outlier detection and automated data analysis should be utilized to detect errors. The Data Manager will help construct new database queries or modify existing ones as needed.

Then the KLMN Data Manager will evaluate the data and look for any errors. The Data Manager will contact the Project Lead to correct any problems. Errors and inconsistencies that cannot be fixed are described in the *Flag_ID* field of individual data tables and in *tlu_Flag*. Once errors are fixed or noted, the *Certification_ID* fields, within individual data tables, are populated. Then a copy of the validated working database will be moved to the KLMN archive, and the Data Manager will load data into the Master Cave Monitoring Database.

6 Editing Data

Once data are validated, the dataset is considered accepted. Any editing of accepted data must be documented in an edit log (*tbl_edit_log*) and accompanied by an explanation that includes pre-and post-edit data descriptions. Datasheets can be reconciled to the database through the use of the edit log. If park staff find an error in the data, they should communicate the error to the Data Manager, who will edit the data in the master database (working databases will not be updated after data are validated and appended to the master database).

7 Equipment and Event Log

An Equipment and Event Log (see end of SOP) will be used to document aspects of the field work that may be useful when interpreting data but were not recorded on field datasheets. The log may be invaluable for determining the validity of previously collected data and for determining if trends in the data are natural, an artifact of the methods used during data collection, or caused by equipment malfunction. It can be used to track events that might alter future data analysis or data organization in some way. A log does not need to be created each year; it can just be added to year after year.

Examples of log entries are:

- a HOBO data logger unit is upgraded
- a field crew forgets to download the HOBO data logger units in a cave, and does not notice until it is time to download the units again.

It is the responsibility of the Project Lead to submit an updated copy of the log books to the Data Manager every January and the Data Manager will ensure that log information is represented in the database.

