

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

Standard Operating Procedure #12: Cave Database

Version 2017Feb10

Citation:

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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 the design of the database(s) that will store data for this protocol, including the relationship diagrams and data dictionaries. To learn how to enter data, see SOP #13: Data Entry.

2 Databases

Four databases are used in this monitoring project: a master and working version of the Klamath Network (KLMN) cave monitoring database, a bat database managed by Lava Beds National Monument (LBE), and the Aquarius database managed by the NPS Water Resources Division for continuous climate data, such as temperature and relative humidity. Table 12-1 provides a comparison of the functionality of the 4 databases, and each is described in more detail below.

2.1 Klamath Network Cave Monitoring Working and Master Databases

The Klamath Network (KLMN) developed a cave monitoring database based on the Natural Resource Database Template (NRDT) provided by the National Park Service that will be used for the KLMN master and working databases (see below). The NRDT standardizes location and observation data to facilitate the integration of datasets. At the beginning of each field season, the KLMN Data Manager will provide the KLMN working database (Figure 12-1) to the Lava Beds National Monument (LBE) Natural Resource Program Manager (NRPM; the primary coordinator for project implementation among parks). Park staff will enter annual data into this database.

After verification and validation procedures have been followed, the KLMN working database will be used to create summaries and conduct data analysis for annual reports. At the end of the year, the data from the KLMN working database will be uploaded to the KLMN master database for long-term storage and future analysis.

2.2 Lava Beds National Monument Bat Database

Lava Beds National Monument, working with the USDA Forest Service Pacific Southwest Research Station (PSW; Principal Investigator: Ted Weller) developed a LBE bat database to store all historical and current bat monitoring and inventory data collected at the park (i.e., scope of data in their database is beyond that of this protocol). LBE will use this bat database to store bat data associated with the KLMN protocol. A copy of the LBE bat database will be delivered to KLMN, and KLMN-related bat data will be uploaded into the KLMN working database.

While information about climate data loggers (e.g., deployment dates, locations) will be maintained in the working and master databases, Aquarius will be used to manage the continuous climate data in accordance with upcoming guidance on using Aquarius from NPS Water Resources Division.

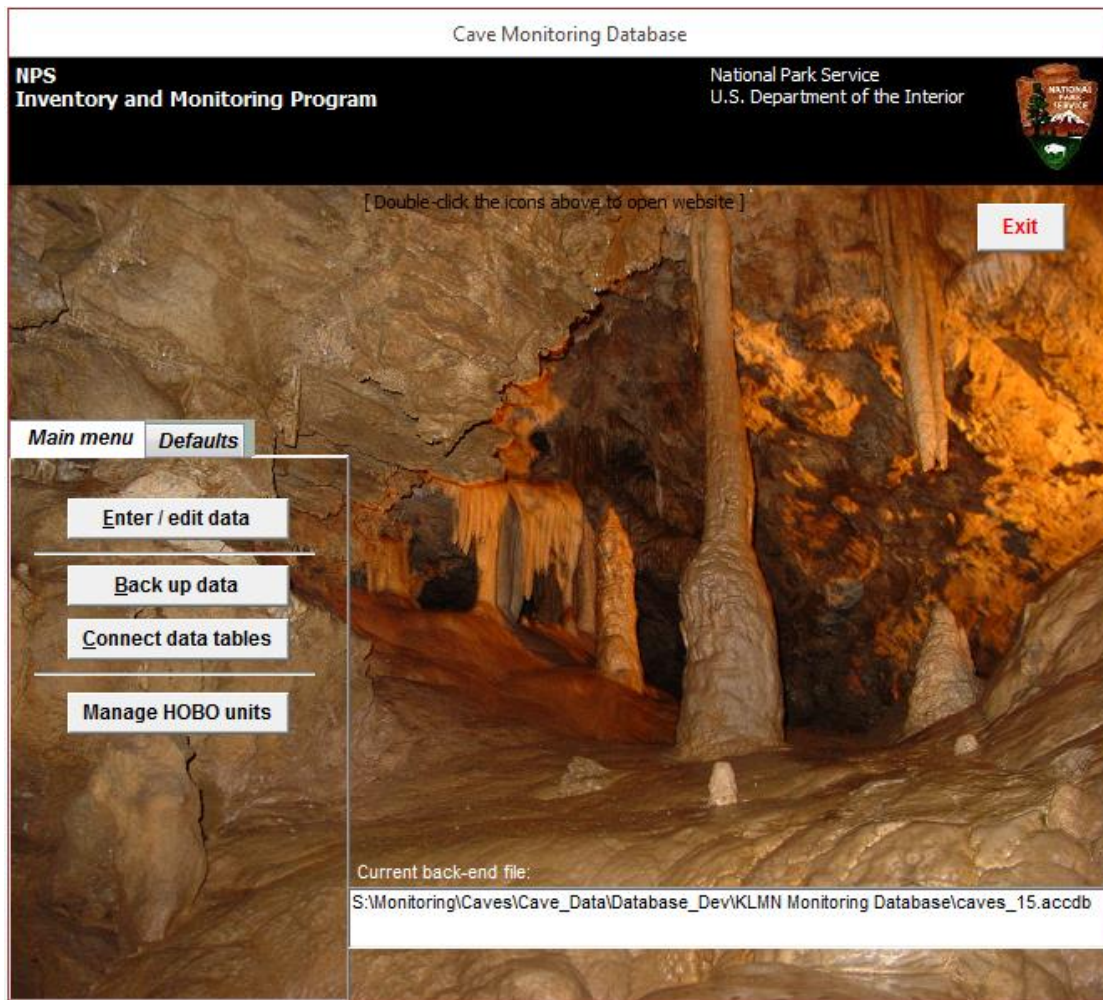


Figure 12-1. Main screen of the Master and Working Cave Monitoring Database.

Table 12-1. Comparison of the functionality of the databases being used for the Klamath Network cave monitoring protocol.

Functions	LABE Bat Database	KLMN Working Database	Aquarius Database	KLMN Master Database
Software platform	MS Access	MS Access	SQL Server	MS Access
Stores annual data	X	X		
Stores multi-year data	X		X	X
Contains full list of sampling location			X	X
Contains validated data			X	X
Links to data logger data			X	X
Portable for remote data entry		X		
Quality assurance and data validation tools	X	X	X	X
Preliminary data summarization tools	X	X	X	
Full analysis, summarization, QA, and export tools	X		X	X
Data import tools			X	X
Fully automated backups			X	X

3 Metadata

The KLMN Data Manager is responsible for creating and maintaining metadata for the working and master databases. Each year that fieldwork occurs, the LABE NRPM must work with the Data Manager to update the data dictionary (if changes to the project have occurred) following the timeline in SOP #15: Data Transfer, Storage, and Archiving. The working and master databases have the same structure and a data dictionary is provided in this SOP.

For each relational database used in this project, the following metadata should be populated:

- For each field in a table, the field name, data type, and description should be completed.
- A description should be provided in the properties field of each table.
- The revision history should be populated each time a change to the database occurs. This includes providing the revision date, reason, and description.

4 Updating the Database

Prior to field season, the KLMN Data Manager will work with the LABE NRPM to ensure that the contacts, locations, and species lists are up-to-date in the working database.

At any point during data entry or validation, the NRPM and/or Field Lead should let the Data Manager know if any changes need to be made to the database. If changes are not communicated immediately, they should be provided to the Data Manager at least a month before the start of the next field season to give adequate time for the changes to be made.

5 Tables

For the working and master databases, tables are located in the back-end database, whereas the other object types (forms, queries) are located in the front-end of the database. 6 Relational Diagram

Figure 12-2 shows the relationship of tables in the working and master cave database. The database centers on visits (tbl_events) to the monitoring sites. Location and site specific data are linked to each visit using the unique identifiers labeled “Event_ID” and “Location_ID.”

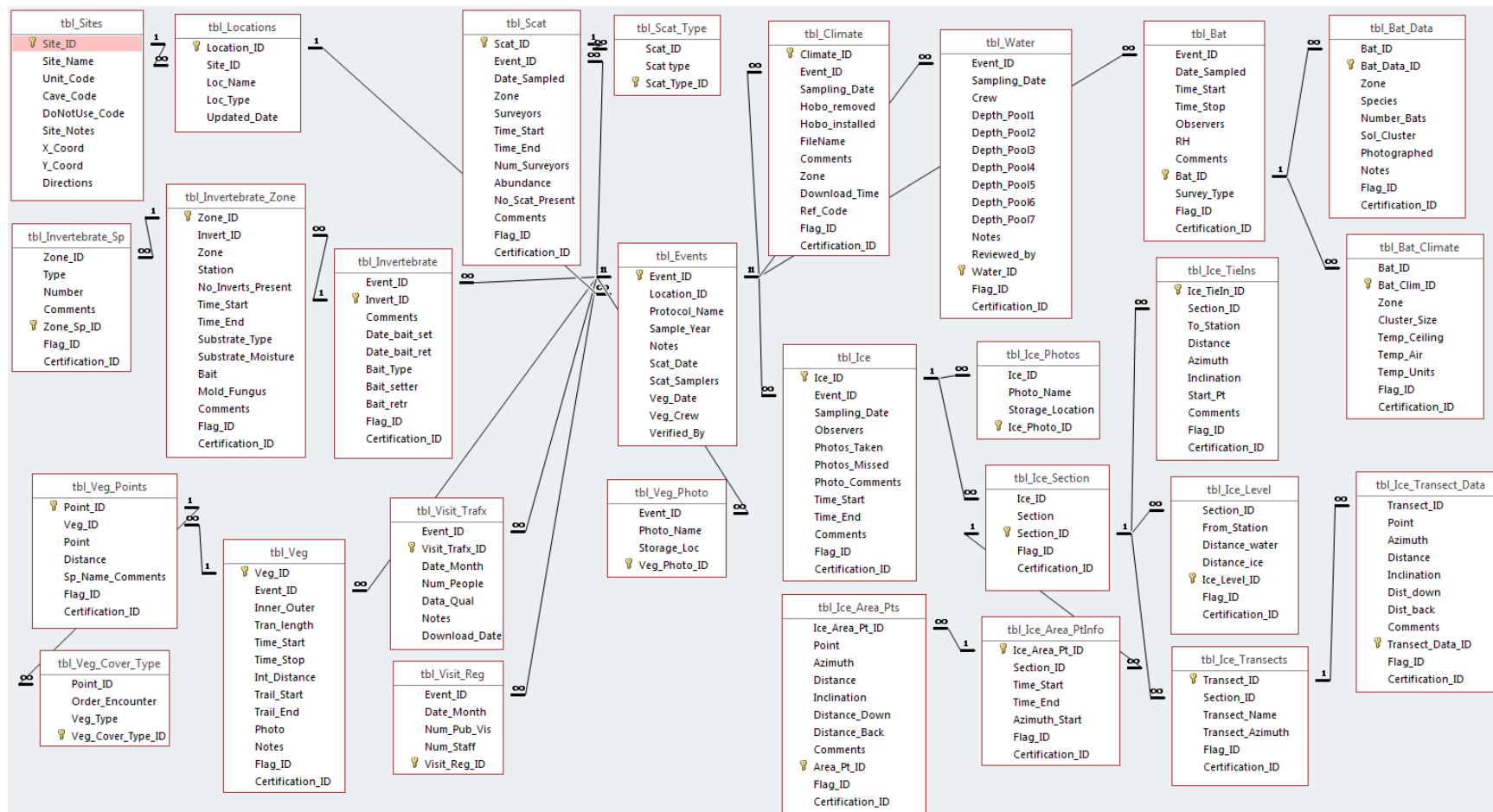


Figure 12-2. Relational diagram of the back-end for the working and master database used to record Klamath Network cave monitoring data.

7 Data Dictionary for the Working and Master Databases

The following tables provide the data dictionary for the working and master databases.

tbl_Bat: Table links to tbl_Events. Holds general information about bat sampling.

Field Name	Field Type	Field Size	Field Description
Bat_ID	Text	255	Primary key- unique bat sampling record identifier
Comments	Long Text		Any comments about bat sampling
Date_Sampled	Date/Time	8	Date of bat sampling
Event_ID	Text	255	Foreign key- links to tbl_Events
Observers	Text	255	Bat sampling observers
RH	Single	4	Percent relative humidity
Survey_Type	Text	30	Survey type (e.g. maternity)
Time_Start	Date/Time	8	Time bat sampling started
Time_Stop	Date/Time	8	Time bat sampling ended
Flag_ID	Integer	2	An ID number is entered (see tlu_Flags ID field) to note if this record has an error
Certification_ID	Integer	2	An ID number is entered (see tlu_DataCertification ID field) to note if the record has been quality checked and to what level

tbl_Bat_Data: Table links to tbl_Bat. Holds data about bat detections.

Field Name	Field Type	Field Size	Field Description
Bat_Data_ID	Text	255	Primary key- unique bat data record identifier
Zone	Text	10	Cave zone where bats were detected
Notes	Text	255	Any notes about the bat detection
Number_Bats	Integer	2	Number of bats detected
Sol_Cluster	Text	20	Solitary bat or cluster of bats
Species	Text	50	Bat species detected
Photographed	Boolean	1	Checked if bat/bat cluster was photographed
Bat_ID	Text	255	Foreign key- links to tbl_Bat
Flag_ID	Integer	2	An ID number is entered (see tlu_Flags ID field) to note if this record has an error
Certification_ID	Integer	2	An ID number is entered (see tlu_DataCertification ID field) to note if the record has been quality checked and to what level

tbl_Bat_Climate: Table links to tbl_Bat. Holds data about climate conditions in the cave zone.

Field Name	Field Type	Field Size	Field Description
Bat_Clim_ID	Text	255	Primary key- unique bat climate record identifier
Bat_ID	Text	255	Foreign key- links to tbl_Bat
Cluster_Size	Single	4	Number of bats in cluster
Temp_Air	Single	4	Air temperature
Temp_Ceiling	Single	4	Ceiling temperature adjacent to a bat cluster
Temp_Units	Text	15	Units in which the air and ceiling temperature were measured – degrees Fahrenheit or Celsius
Zone	Text	20	Cave zone where bats were detected
Flag_ID	Integer	2	An ID number is entered (see tlu_Flags ID field) to note if this record has an error
Certification_ID	Integer	2	An ID number is entered (see tlu_DataCertification ID field) to note if the record has been quality checked and to what level

tbl_Climate: Table links to tbl_Events. Holds cave climate data logger information (used to collect temperature and humidity data).

Field Name	Field Type	Field Size	Field Description
Climate_ID	Text	255	Primary key- unique climate record identifier
Comments	Long Text		Any comments about the climate event
Download_Time	Date/Time	8	Time that the instrument was downloaded
FileName	Text	50	Name of file that was downloaded from the Hobo that was removed
Event_ID	Text	255	Foreign key- links to tbl_Events
Hobo_installed	Text	20	Serial number of Hobo unit that was installed
Hobo_removed	Text	20	Serial number of Hobo unit that was removed
Ref_Code	Text	20	IRMA reference number- to track which SOP was used
Sampling_Date	Date/Time	8	Date that the data logger (Hobo) was checked, downloaded, etc.
Zone	Text	20	Cave zone in which the Hobo unit was placed (out, entrance, middle, or deep)
Flag_ID	Integer	2	An ID number is entered (see tlu_Flags ID field) to note if this record has an error
Certification_ID	Integer	2	An ID number is entered (see tlu_DataCertification ID field) to note if the record has been quality checked and to what level

tbl_Edit_Log: Holds data about edited records. Used after data entry is complete.

Field Name	Field Type	Field Size	Field Description
Date_Change	Date/Time	8	Date the change was made
Field	Text	30	Name of field that was edited
ID	Text	255	Primary key from respective data table
Person	Text	50	Person who made the edit
Reason	Text	255	Reason for edit
Table	Text	30	Name of table that was edited
Value_New	Text	255	New value
Value_Old	Text	255	Original value

tbl_Events: Table links to tbl_Locations. Holds information about sampling.

Field Name	Field Type	Field Size	Field Description
Event_ID	Text	50	Primary key- unique event identifier
Location_ID	Text	50	Foreign key- links to tbl_Locations
Notes	Long Text		Any notes about the sampling event
Protocol_Name	Text	100	The name or code of the protocol governing the event
Sample_Year	Integer	2	Year that all sampling was done for the cave
Scat_Date	Date/Time	8	Date scat was sampled
Scat_Samplers	Text	255	People who sampled scat
Veg_Crew	Text	255	People who sampled vegetation
Veg_Date	Date/Time	8	Date the vegetation was sampled
Verified_By	Text	255	Person who verified the event data

tbl_Ice: Table links to tbl_Events. Holds ice data.

Field Name	Field Type	Field Size	Field Description
Ice_ID	Text	255	Primary key- unique ice record identifier
Comments	Long Text		Any comments about ice sampling event
Event_ID	Text	255	Foreign key- links to tbl_Events
Observers	Text	255	People who performed ice sampling
Photo_Comments	Long Text		Any comments about photos
Photos_Missed	Integer	2	Number of photos missed
Photos_Taken	Integer	2	Number of photos taken
Sampling_Date	Date/Time	8	Date that ice sampling occurred
Time_End	Date/Time	8	Time ice sampling ended
Time_Start	Date/Time	8	Time ice sampling started
Flag_ID	Integer	2	An ID number is entered (see tlu_Flags ID field) to note if this record has an error
Certification_ID	Integer	2	An ID number is entered (see tlu_DataCertification ID field) to note if the record has been quality checked and to what level

tbl_Ice_Area_PtInfo: Table links to tbl_Ice_Section. Holds data about ice areas.

Field Name	Field Type	Field Size	Field Description
Ice_Area_Pt_ID	Text	255	Primary key- ice area point info record identifier
Azimuth_Start	Integer	2	Starting azimuth for ice area measurements
Section_ID	Text	255	Foreign key- links to tbl_Ice_Section
Time_End	Date/Time	8	Time ice area sampling ended
Time_Start	Date/Time	8	Time ice area sampling started

tbl_Ice_Area_Pts: Table links to tbl_Ice_Area_PtInfo. Holds data about ice area points (e.g., azimuth, distance).

Field Name	Field Type	Field Size	Field Description
Area_Pt_ID	Text	255	Primary key- unique ice area point identifier
Azimuth	Integer	2	Azimuth of point, in degrees
Comments	Text	255	Any comments about the ice area point record
Distance	Single	4	Distance along ice perimeter, in meters, to nearest 0.00m
Distance_Back	Single	4	Distance (m) back to ice edge (when overhanging rock blocks direct path to ice edge)
Distance_Down	Single	4	Distance (m) down to ice edge (when rock blocks direct path to ice edge)
Ice_Area_Pt_ID	Text	255	Foreign key- links to tbl_Ice_Area_PtInfo
Inclination	Single	4	Inclination in degrees, to the nearest 0.1 degrees
Point	Integer	2	Point along ice perimeter
Flag_ID	Integer	2	An ID number is entered (see tlu_Flags ID field) to note if this record has an error
Certification_ID	Integer	2	An ID number is entered (see tlu_DataCertification ID field) to note if the record has been quality checked and to what level

tbl_Ice_Level: Table links to tbl_Ice_Section. Holds data about ice level.

Field Name	Field Type	Field Size	Field Description
Ice_Level_ID	Text	255	Primary key- unique ice level record identifier
Distance_ice	Single	4	Distance to ice, in meters
Distance_water	Single	4	distance to water, in meters, to the nearest 0.00m
From_Station	Integer	2	Station measured from
Section_ID	Text	255	Foreign key- links to tbl_Ice_Section
Flag_ID	Integer	2	An ID number is entered (see tlu_Flags ID field) to note if this record has an error
Certification_ID	Integer	2	An ID number is entered (see tlu_DataCertification ID field) to note if the record has been quality checked and to what level

tbl_Ice_Photos: Table links to tbl_Ice. Holds data about ice photos.

Field Name	Field Type	Field Size	Field Description
Ice_Photo_ID	Text	255	Primary key- unique ice photo record identifier
Ice_ID	Text	255	Foreign key- links to tbl_Ice
Photo_Name	Text	255	Name of photo
Storage_Location	Text	255	Location where photo is stored

tbl_Ice_Section: Table links to tbl_Events. Holds data about ice sections.

Field Name	Field Type	Field Size	Field Description
Section_ID	Text	255	Primary key- unique ice section record identifier
Ice_ID	Text	255	Foreign key- links to tbl_Ice
Section	Text	20	Section of ice
Flag_ID	Integer	2	An ID number is entered (see tlu_Flags ID field) to note if this record has an error
Certification_ID	Integer	2	An ID number is entered (see tlu_DataCertification ID field) to note if the record has been quality checked and to what level

tbl_Ice_TieIns: Table links to tbl_Ice_Section. Holds data about Ice Tie-Ins.

Field Name	Field Type	Field Size	Field Description
Ice_TieIn_ID	Text	255	Primary key- unique ice Tie-in record identifier
Azimuth	Single	4	Azimuth to station, in degrees
Comments	Text	255	Any comments about the ice tie-in record
Distance	Single	4	Distance to station, in meters
Inclination	Single	4	Inclination to station, in degrees
Section_ID	Text	255	Foreign key- links to tbl_Ice_Section
Start_Pt	Boolean	1	If more than one station is present, check this box if this is the station that was used as the starting point for the perimeter survey (so that starting azimuth is known)
To_Station	Text	20	From tripod to this station
Flag_ID	Integer	2	An ID number is entered (see tlu_Flags ID field) to note if this record has an error
Certification_ID	Integer	2	An ID number is entered (see tlu_DataCertification ID field) to note if the record has been quality checked and to what level

tbl_Ice_Transect_Data: Table links to tbl_Ice_Transects. Holds data about ice transect points (e.g., azimuth, distance).

Field Name	Field Type	Field Size	Field Description
Transect_Data_ID	Text	255	Primary key- unique ice transect data record identifier
Azimuth	Single	4	Azimuth of measurement
Comments	Text	255	Any comments about the transect data record
Dist_back	Single	4	Distance back to edge of ice, in m (when overhanging rock prevents direct path to ice edge)
Dist_down	Single	4	Distance down to ice, in m (when rock blocks direct path to ice edge)
Distance	Single	4	Distance, in meters, to the nearest 0.00m
Inclination	Single	4	Inclination, in degrees
Point	Integer	2	Point along transect
Transect_ID	Text	255	Foreign key-links to tbl_Ice_Transects
Flag_ID	Integer	2	An ID number is entered (see tlu_Flags ID field) to note if this record has an error
Certification_ID	Integer	2	An ID number is entered (see tlu_DataCertification ID field) to note if the record has been quality checked and to what level

tbl_Ice_Transects: Table links to tbl_Ice_Section. Holds general data about ice transects.

Field Name	Field Type	Field Size	Field Description
Transect_ID	Text	255	Primary key- unique ice transect record identifier
Section_ID	Text	255	Foreign key- links to tbl_Ice_Section
Transect_Azimuth	Single	4	Transect azimuth
Transect_Name	Text	20	Transect name or number, to identify the transect
Flag_ID	Integer	2	An ID number is entered (see tlu_Flags ID field) to note if this record has an error
Certification_ID	Integer	2	An ID number is entered (see tlu_DataCertification ID field) to note if the record has been quality checked and to what level

tbl_Invertebrate: Table links to tbl_Events. Holds general information for invertebrate sampling (e.g., dates, bait).

Field Name	Field Type	Field Size	Field Description
Invert_ID	Text	255	Primary key- unique invertebrate record identifier
Bait_retr	Text	100	Person(s) retrieving and surveying
Bait_setter	Text	100	Person(s) setting bait
Bait_Type	Text	100	Bait type and amount
Comments	Long Text		Any comments about the invertebrate sampling
Date_bait_ret	Date/Time	8	Date the bait was retrieved
Date_bait_set	Date/Time	8	Date the bait was set
Event_ID	Text	255	Foreign key- links to tbl_Events
Flag_ID	Integer	2	An ID number is entered (see tlu_Flags ID field) to note if this record has an error
Certification_ID	Integer	2	An ID number is entered (see tlu_DataCertification ID field) to note if the record has been quality checked and to what level

tbl_Invertebrate_Sp: Table links to tbl_Invertebrate_Zone. Holds data about invertebrates detected (e.g., type, number).

Field Name	Field Type	Field Size	Field Description
Zone_Sp_ID	Text	255	Primary key- unique invertebrate zone species record identifier
Comments	Long Text		Any comments about the invertebrate record
Number	Integer	2	Number of individuals of each invertebrate type
Type	Text	50	Invertebrate type (e.g., millipede, ant, cricket)- see tlu_Invertebrate
Zone_ID	Text	255	Foreign key- links to tbl_Invertebrate
Flag_ID	Integer	2	An ID number is entered (see tlu_Flags ID field) to note if this record has an error
Certification_ID	Integer	2	An ID number is entered (see tlu_DataCertification ID field) to note if the record has been quality checked and to what level

tbl_Invertebrate_Zone: Table links to tbl_Invertebrate. Holds data about zones where invertebrate sampling is done.

Field Name	Field Type	Field Size	Field Description
Zone_ID	Text	255	Primary key- unique invertebrate zone identifier
Bait	Text	20	Was bait used? Y= yes, present; N= No, not present
Comments	Long Text		Any comments about invertebrate sampling
Invert_ID	Text	255	Foreign key- links to tbl_Events
Mold_Fungus	Text	20	Was mold/fungus present? Y= yes, present; N= No, not present
No_Inverts_Present	Boolean	1	Checked if invertebrates were searched for but not found
Station	Text	20	Sampling station number (LABE only)- 1, 2, or 3
Substrate_Moisture	Text	20	Sampling station substrate moisture level- Dry (D), Moist (M), or Wet (W)
Substrate_Type	Text	20	Sampling station substrate type-bedrock (BR), breakdown (BD), sediment (S), or Pumice/Gravel (P/G)
Time_End	Date/Time	8	Time sampling of station ended
Time_Start	Date/Time	8	Time sampling of station started
Zone	Text	20	Cave zone where invertebrate sampling occurred- entrance, middle, or deep
Flag_ID	Integer	2	An ID number is entered (see tlu_Flags ID field) to note if this record has an error
Certification_ID	Integer	2	An ID number is entered (see tlu_DataCertification ID field) to note if the record has been quality checked and to what level

tbl_Locations: Holds sampling location data. In this case, a location is a cave or a site within a cave.

Field Name	Field Type	Field Size	Field Description
Location_ID	Text	50	Primary key- unique location record identifier
Site_ID	Text	50	Foreign key- links to tbl_Sites
Loc_Name	Text	100	Name of the cave (LABE) or name of location within the cave (ORCA)
Loc_Type	Text	25	Location type- either Cave (LABE) or Cave Site (ORCA)
Updated_Date	Text	50	Date of entry or last change

tbl_Scat: Table links to tbl_Events. Holds data about scat sampling (e.g., zone, time).

Field Name	Field Type	Field Size	Field Description
Scat_ID	Text	255	Primary key- unique scat record identifier
Abundance	Integer	2	New scat abundance tally
Comments	Long Text		Any comments about scat sampling
Date_Sampled	Date/Time	8	Date scat was sampled
Event_ID	Text	255	Foreign key- links to tbl_Events
No_Scat_Present	Boolean	1	Checked if scat was searched for but not found
Num_Surveyors	Integer	2	Number of scat surveyors
Surveyors	Text	100	Names of people who sampled scat
Time_End	Date/Time	8	Time scat sampling ended
Time_Start	Date/Time	8	Time scat sampling started
Zone	Text	20	Cave zone where sampling occurred- entrance, middle, or deep
Flag_ID	Integer	2	An ID number is entered (see tlu_Flags ID field) to note if this record has an error
Certification_ID	Integer	2	An ID number is entered (see tlu_DataCertification ID field) to note if the record has been quality checked and to what level

tbl_Scat_Type: Table links to tbl_Scat. Holds data about scat detected.

Field Name	Field Type	Field Size	Field Description
Scat_Type_ID	Text	255	Primary key- unique scat type record identifier
Scat type	Text	50	Type of scat detected- see tlu_Scat
Scat_ID	Text	255	Foreign key- links to tbl_Scat

tbl_Sites: Table that holds site information. Here, the site is the cave name.

Field Name	Field Type	Field Size	Field Description
Site_ID	Text	255	Site identifier
Site_Name	Text	100	Unique name or code for a cave
Unit_Code	Text	12	Park, Monument or Network code
Cave_Code	Text	255	Code used to describe the cave in reports (to protect sensitivity of caves, names are not used)
DoNotUse_Code	Boolean	1	If checked, the full came name should not be used in public documents or files
Site_Notes	Long Text		General notes on the site
X_Coord	Double	8	X coordinate in UTM Zone 10, NAD 83
Y_Coord	Double	8	Y coordinate in UTM Zone 10, NAD 83
Directions	Long Text		Directions to the cave entrance

tbl_Veg: Table links to tbl_Events. Holds data about vegetation sampling (e.g., time, transect length).

Field Name	Field Type	Field Size	Field Description
Veg_ID	Text	255	Primary key- unique vegetation record identifier
Event_ID	Text	255	Foreign key- links to tbl_Events
Inner_Outer	Text	20	Notes whether this is the inner vegetation transect or the outer vegetation transect
Int_Distance	Single	4	Interval distance, in cm
Notes	Long Text		Notes about general vegetation monitoring
Photo	Boolean	1	Was photo-monitoring completed?
Time_Start	Date/Time	8	Time vegetation sampling started
Time_Stop	Date/Time	8	Time vegetation sampling ended
Trail_End	Single	4	Width of trail, in meters, at end of survey
Trail_Start	Single	4	Width of trail, in meters, at start of survey
Tran_length	Single	4	Transect length, in meters
Flag_ID	Integer	2	An ID number is entered (see tlu_Flags ID field) to note if this record has an error
Certification_ID	Integer	2	An ID number is entered (see tlu_DataCertification ID field) to note if the record has been quality checked and to what level

tbl_Veg_Cover_Type: Table links to tbl_Veg_Points. Holds data about vegetation detected.

Field Name	Field Type	Field Size	Field Description
Veg_Cover_Type_ID	Text	255	Primary key- unique vegetation cover type record identifier
Order_Encounter	Integer	2	Order in which the vegetation types were encountered
Point_ID	Text	255	Foreign key- links to tbl_Veg_Points
Veg_Type	Text	10	Type of vegetation detected- see tlu_Cover_Types

tbl_Veg_Photo: Table links to tbl_Events. Holds data about vegetation photos.

Field Name	Field Type	Field Size	Field Description
Veg_Photo_ID	Text	255	Primary key- unique vegetation photo record identifier
Event_ID	Text	255	Foreign key- links to tbl_Events
Photo_Name	Text	255	Name of photograph
Storage_Loc	Text	255	Location where photo is stored

tbl_Veg_Points: Table links to tbl_Veg. Holds data about vegetation sampling points.

Field Name	Field Type	Field Size	Field Description
Point_ID	Text	255	Primary key- unique vegetation point record identifier
Distance	Single	4	Distance, in cm
Point	Integer	2	Sampling point number
Sp_Name_Comments	Long Text		Species that were encountered at sampling point and any other comments
Veg_ID	Text	255	Foreign key- links to tbl_Veg
Flag_ID	Integer	2	An ID number is entered (see tlu_Flags ID field) to note if this record has an error
Certification_ID	Integer	2	An ID number is entered (see tlu_DataCertification ID field) to note if the record has been quality checked and to what level

tbl_Visit_Reg: Table links to tbl_Events. Holds visitation data collected from visitor registers, logs, and ticket sales.

Field Name	Primary?	Field Type	Field Size	Field Description
Visit_Reg_ID	Yes	Text	255	Primary key- unique visitation registry record identifier
Date_Month	No	Text	50	Month of visitation records
Event_ID	No	Text	255	Foreign key- links to tbl_Events
Num_Pub_Vis	No	Integer	2	Number of public visitors who entered the cave
Num_Staff	No	Integer	2	Number of LABE staff who came to the cave

tbl_Visit_Trafx: Table links to tbl_Events. Holds visitation data collected automatically with TRAFx counter.

Field Name	Field Type	Field Size	Field Description
Visit_Trafx_ID	Text	255	Primary key- unique visitation TRAFx record identifier
Data_Qual	Text	30	Data Quality/ Unit status
Date_Month	Text	20	Month of visitation records
Download_Date	Date/Time	8	Date TRAFx logger was downloaded
Event_ID	Text	255	Foreign key- links to tbl_Events
Notes	Long Text		Any notes about the TRAFx sample
Num_People	Integer	2	Number of people who came to the cave

tbl_Water: Table links to tbl_Events. Holds data about water depth sampling at Oregon Caves National Monument and Preserve (ORCA).

Field Name	Field Type	Field Size	Field Description
Water_ID	Text	255	Primary key-unique water record identifier
Crew	Text	255	People who measured water depth
Depth_Pool1	Single	4	Water depth, in cm, of Icebox Pool
Depth_Pool2	Single	4	Water depth, in cm, of Imagination Room Pool
Depth_Pool3	Single	4	Water depth, in cm, of First Pool above Banana Grove
Depth_Pool4	Single	4	Water depth, in cm, of Second Pool above Banana Grove
Depth_Pool5	Single	4	Water depth, in cm, of King & Queen's Throne Room Pool
Depth_Pool6	Single	4	Water depth, in cm, of Lake Michigan
Depth_Pool7	Single	4	Water depth, in cm, of Miller's Chapel Right Passage Pool
Event_ID	Text	255	Foreign key- links to tbl_Events
Notes	Text	255	Any notes about this set of water depth measurements
Reviewed_by	Text	50	Person who reviewed the datasheet
Sampling_Date	Date/Time	8	Date water depth was sampled
Flag_ID	Integer	2	An ID number is entered (see tlu_Flags ID field) to note if this record has an error
Certification_ID	Integer	2	An ID number is entered (see tlu_DataCertification ID field) to note if the record has been quality checked and to what level

tlu_Bat_Sp: Lookup table of bat species

Field Name	Field Type	Field Size	Field Description
Species	Text	50	Bat species name

tlu_Contacts: Lookup table of contact data for project-related personnel.

Field Name	Field Type	Field Size	Field Description
Contact_ID	Text	50	Contact identifier
Active	Boolean	1	Checked if the contact is for the current field season
Address	Text	50	Street address
Address_Type	Text	50	Address (mailing, physical, both) type
Address2	Text	50	Address line 2, suite, apartment number
City	Text	50	City or town
Contact_Notes	Long Text		Contact notes
Country	Text	50	Country
Email_Address	Text	50	E-mail address
First_Name	Text	50	First name
Last_Name	Text	50	Last name
Middle_Init	Text	4	Middle initial
Organization	Text	50	Organization or employer
Position_Title	Text	50	Title or position description
State_Code	Text	8	State or province
Work_Extension	Text	50	Phone extension
Work_Phone	Text	50	Phone number
Zip_Code	Text	50	Zip code

tlu_Cover_Types: Lookup table of vegetation cover types.

Field Name	Field Type	Field Size	Field Description
Category	Text	30	Vegetation category
Definition	Text	30	Defines VegType
VegType	Text	5	Vegetation type code

tlu_DataCertification: Lookup table for certification data fields that are populated in data tables.

Field Name	Field Type	Field Size	Field Description
ID	Long Integer	4	Unique ID that can be linked to Certification_ID fields in data tables
Code	Text	5	Flag Code
Label	Text	20	Code Description
Summary	Long Text		Summary of error
IsActive	Boolean	1	Allows data to be used if True
AllowLocks	Boolean	1	Allows data to be locked if True
CreatedBy	Text	50	Username of person who created the record.
LastModifiedBy	Text	50	Username of person who last modified the record.
CreatedDate	Date/Time	8	Date the record was created.
LastModifiedDate	Date/Time	8	Date the record was last modified.

tlu_Flags: Lookup table for flag data fields that are populated in data tables.

Field Name	Field Type	Field Size	Field Description
ID	Long Integer	4	Unique ID that can be linked to Flag_ID fields in data tables
Code	Text	5	Flag Code
Label	Text	35	Code Description
Summary	Text	100	Summary of error
CreatedBy	Text	50	Username of person who created the record.
LastModifiedBy	Text	50	Username of person who last modified the record.
CreatedDate	Date/Time	8	Date the record was created.
LastModifiedDate	Date/Time	8	Date the record was last modified.

tlu_Invert_Sub_Mois: Lookup table for invertebrate sampling substrate moisture

Field Name	Field Type	Field Size	Field Description
Code	Text	5	Substrate moisture code
Description	Text	20	Substrate moisture code definition

tlu_Invert_Sub_Type: Lookup table for invertebrate sampling substrate types

Field Name	Field Type	Field Size	Field Description
Code	Text	5	Substrate type code
Description	Text	20	Substrate type code definition

tlu_Invertebrate: Lookup table of invertebrates

Field Name	Field Type	Field Size	Field Description
Invertebrate	Text	50	Invertebrate
Order	Integer	2	Order for display purposes on form

tlu_Logger_Details: Lookup table holding details about climate data loggers.

Field Name	Field Type	Field Size	Field Description
Deploy_Date	Date/Time	8	Date deployed
Notes	Long Text		Any notes about the logger
Rest_Date	Date/Time	8	Date rested
Serial_Number	Text	20	Serial number of data logger
Site	Text	20	Cave name or location within cave where logger is deployed
Zone	Text	20	Cave zone- entrance, middle, or deep

tlu_Scat: Lookup table of scat types

Field Name	Field Type	Field Size	Field Description
Order	Integer	2	Scat order (for display purposes on form)
Type	Text	100	Scat (or other) type