

SOP #4. Data Management and Archiving, version 1.0

Revision History Log:

Previous Version #	Revision Date	Author	Changes Made	Reason for Change	New Version #

4.1 Purpose

Accurate collection and stewardship of data are critical to the success of the monitoring program. Ensuring data quality must be a priority during crew training, and throughout the data collection, entry, and verification and validation process.

4.2 Scope and Applicability

This SOP gives step-by-step instructions for managing the data collected in the Shenandoah Salamander Monitoring Protocol. This SOP describes the procedure for field checking data, data entry, data verification and correction, and database organization and documentation.

4.3 Procedures and General Requirements

4.3.1 Data collection

During the data collection process, ensure that all handwriting is legible and concise, and all values reflect those observed or measured in the specified units on the datasheet.

4.3.2 Field checking data

Prior to leaving a field site, ensure that field datasheets are complete and that there are no omissions or unusual values.

4.3.3 Post-processing of field datasheets in office

Field data sheets are reviewed at the conclusion of each field day for omissions and again prior to data entry to ensure personnel can read entries and any additional data sources are present if needed (e.g., GPS points, photographs, field notebooks). Following data entry, hard copies of data sheets are scanned (see below) and filed at the NEARMI office.

4.3.4 Electronic files

Files of scanned datasheets or other accessory data (temperature logger files, field photos) will be stored outside the Local ARMI database on servers maintained by USGS Patuxent Wildlife Research Center, organized/maintained as linked information with survey data, and current year data transferred to SHEN annually.

4.3.5 Database system

The access database system includes four tables that retain information about site locations (“Site Constants”) (Table 4.1), habitat data (“Habitat”) (Table 4.2), site visit data (“Survey Event”) (Table 4.3), and individual animal data (“Individual”) (Table 4.4). Database table fields and descriptions are noted below.

Table 4.1. Standardized table for storing general information about each monitoring location (“Site Constants”).

Field Name	Type	Field Description
ID ¹	Autonumber	Unique ID automatically assigned to each site record
Site Name ²	Text	Name of site
Latitude	Number	Latitude in decimal degrees of site origin
Longitude	Number	Longitude in decimal degrees at site origin
Elevation	Number	Elevation in meters at the origin of the transect, obtained from DEM
Aspect	Number	Aspect in degrees at the origin of the transect, obtained from DEM
Location Notes	Text	Treetag # and additional information on the location of the transect origin, e.g. distance and bearing from treetag, type of tree, description of area near treetag

¹ID: PrimaryKey

²SiteName linked to Site in Habitat and Survey Event tables

Table 4.2. Primary table that stores data about habitat data (“Habitat”), which does not change over the sample period (e.g., season) such as substrate type and canopy cover. These data do not include variables that are specific to a survey event such as temperature, sky and wind code, and data on each individual animal encountered (these items are stored in table “Survey Event”).

Field Name	Type	Field Description
HabID ¹	AutoNumber	Unique record identifier for each habitat data record
Site Name ²	Text	Name of site, same as SiteName in Site Constants
Transect	Text	Letter identifier for transect at site (A, B)
Date	Text	Date of collection in MM/DD/YYYY format
Bearing	Number	True bearing in degrees of direction of transect from origin
Canopy cover_1	Number	Canopy cover in percent
Canopy cover_2	Number	Canopy cover in percent
Canopy cover_3	Number	Canopy cover in percent
Soil Depth_1	Number	Soil depth in mm at the origin of the transect
Soil Depth_2	Number	Soil depth in mm at the midpoint of the transect
Soil Depth_3	Number	Soil depth in mm at the end of the transect furthest from the origin
Leaf litter depth_1	Number	Leaf litter depth in mm at the origin of the transect
Leaf litter depth_2	Number	Leaf litter depth in mm at the midpoint of the transect
Leaf litter depth_3	Number	Leaf litter depth in mm at the end of the transect furthest from the origin

Field Name	Type	Field Description
%Soil	Number	Total % of the transect surface area that is composed of soil
%Cobble	Number	Total % of the transect surface area that is composed of cobble (64-256 mm)
%Boulder	Number	Total % of the transect surface area that is composed of boulder (>256 mm)
%Moss	Number	Total % of the transect surface area that is composed of moss
%LWD	Number	Total % of the transect surface area that is composed of large woody debris (>5 cm diameter)
%Leaf Litter	Number	Total % of the transect surface area that is composed of leaf litter
%Other_1	Number	Total % of the transect surface area that is composed of other substrates
Other ID_1	Text	Type of substrate estimated in %other_1 field
%Other_2	Number	Total % of the transect surface area that is composed of other substrates
Other ID_2	Text	Type of substrate estimated in %other_2 field
Notes	Text	Miscellaneous habitat information about the transect

¹HabID: PrimaryKey

²linked to Site Constants

Table 4.3. Standardized table containing the survey-specific data for each survey occasion ("Survey Event").

Field Name	Type	Field Description
VisID ¹	AutoNumber	Unique number assigned to each visit record
Site Name ²	Text	Same as Site Name in Site Constants
Transect	Text	Letter identifier for transect at site (A, B)
SurveyDate	Date/Time	Date (mm/dd/yyyy) when sampling occurred
ObserverA	Text	First initial, last name of observer on transect A (e.g. FLast)
ObserverB	Text	First initial, last name of observer on transect B (e.g. FLast)
SoilTemp	Number	Site soil temperature (degrees Celsius) at transect origin
AirTemp	Number	Site air temperature (degrees Celsius) at transect origin
Sky	Number	Code used to record weather condition
Wind	Number	Code used to estimate wind speeds
StartA	Number	Time active search began for observer on transect A, in 24-hr format (HHMM)
EndA	Number	Time active search ended for observer on transect A, in 24-hr format (HHMM)
StartB	Number	Time active search began for observer on transect B, in 24-hr format (HHMM)
EndB	Number	Time active search ended for observer on transect B, in 24-hr format (HHMM)
Cover_A	Number	Number of cover turned by observer on transect A during survey
Cover_B	Number	Number of cover turned by observer on transect B during survey

Field Name	Type	Field Description
Notes	Text	Additional information about the survey

¹VisID: PrimaryKey

²linked to Site Constants and Habitat Data

Table 4.4. Standardized table for storing information about encountered individuals (“Individual”).

Field Name	Type	Field Description
SplnIndivID ¹	AutoNumber	Unique number assigned to each visit record
Site Name ²	Text	Name of site, same as Site Name in Site Constants
SurveyDate ²	Date/Time	Date (mm/dd/yyyy) when sampling occurred
Transect ²	Text	Letter identifier for transect at site (A, B)
Species	Text Dropdown List	Species code of the individual
Loc	Number	Meter distance from origin of transect where individual was found
CoverType	Text Dropdown	Cover type where individual was found
Striped	Y/N	Has stripe (Y) or unstriped (N)
StripeCode	Number	Dorsal stripe color code
VentralCode	Number	Ventral pigment color code
SVL	Number	Snout-vent length (mm)
TL	Number	Total length (mm)
VD/T	Y/N	Indicates if vas deferens or testes were observed
Eggs	Y/N	Indicates if eggs were observed
No. Eggs	Number	Number of eggs observed
StrWidth1	Number	Width of dorsal stripe at head-body junction (mm)
StrWidth2	Number	Width of dorsal stripe at body-tail junction (mm)
Photo Number	Text	Photo ID numbers of individual
Species Notes	Text	Additional observations about individual

¹SplnIndivID: PrimaryKey

²linked to Site Constants and Habitat Data

4.3.6 Data entry and verification

Data will be collected in the field on data sheets, and these data will be entered into the NEARMI local database by the primary field person(s) who collected the data. Data verification (proofing) will be conducted within a month of data entry by a separate individual and will consist of comparing printed datasheets with database entries on the screen. Proofing includes assessing all entered data for unusual values, major discrepancies between observers at a site, errors in data collection such as missing values or differences in notation or units, and verifying entries as needed with field notes of individual observers. During proofing, if any discrepancies or errors are found on the data sheets,

consult with the personnel who collected the data and, if necessary, make corrections both on the data sheet itself (noting the date and person making the correction) and in the NEARMI local database.

4.3.7 Scanning field datasheets

Following data entry, hard copies of data sheets are scanned and filed at the NEARMI office.

Personnel should ensure that all scanned datasheets are legible in electronic format and no pages are omitted from electronic files.

4.3.8 Database archiving

The NEARMI database is stored at Patuxent Wildlife Research Center and is backed up daily to multiple locations within the center. Archive copies are created before new entries or modifications are made, and archive copies are backed up with the same procedures. Copies of the database with data from this monitoring program will be transferred to SHEN annually.

4.3.9 Metadata procedures

Metadata will be created or updated annually according to USGS Data Management Guidelines and transferred to SHEN as part of this monitoring program.

4.4 Reference Documents

None