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## Groundwater Dependent Ecosystems Inventory Database User's Guide

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Groundwater Dependent Ecosystems Inventory

Edit/View Sites

Reports

Edit Lookup Tables

Send Feedback

<http://www.fs.fed.us/geology/groundwater.html>

Database User Guide

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## Introduction – Database Overview

The Groundwater Dependent Ecosystems (GDE) Database provides a standard agency-wide repository for data collected using the **USDA Forest Service GDE Level I and Level II Inventory Field Guides** (GDE Inventory Field Guides). The GDE Database is designed using Microsoft Access, and is compatible with Access 2007 or 2010 (32-bit version only). It is designed to facilitate data entry, storage, and reporting of Level I and Level II GDE data. This User's Guide provides detailed instructions to support the data entry process and report generation. It assumes the reader has familiarity with the GDE Inventory Field Guides as well as basic knowledge of computer use.

The GDE database was designed with three primary rules in mind. First, it should take no longer to enter data than it does to collect them. This is achieved through a user-friendly interface that can be used by those with limited database experience. The database layout matches the format of the field sheets provided in the GDE Inventory Field Guides, facilitating transfer of data from paper to electronic forms. Design features that facilitate quick data entry include **Tab** or **Enter** key to move from one field to the next, and dropdown fields that autofill after typing a few keystrokes. Users should not have to use the mouse often, except to switch to another tab or activate a button. Buttons and tabs allow the operator to easily move between forms.

Second, the interface should provide structure that assures consistency of data while still providing flexibility for anomalous situations. Data consistency is achieved by using drop-down boxes that draw from related look-up tables, thereby minimizing data entry errors and enabling report generation. Flexibility is achieved by providing simple mechanisms for adding new items to look-up tables, and by providing text fields for notes to explain different situations and describe additional observations.

Third, it is critical that the information be accessible and useful once the data have been entered. This is achieved through report generation tools that have been designed into the database. These include basic summaries of the data that can easily be viewed, or exported to Excel or to PDF documents.

### Quick Tips

- Use the **Tab** or **Enter** key to move from one field to the next; using the mouse to move from one field to the next requires a good deal more time and peering at the screen.
- **Shift-Tab** will move the cursor to the previous field.
- Double-click a field to open a form where you can view and edit the list of available choices.
- From the **Site Form**, double-click the survey date to enter and edit that survey.
- Clicking the door symbol closes the form you are viewing.
- Although you can attach more than one image, **use restraint**. Attaching high resolution images, or multiple images, will increase the size of the database and likely corrupt it.
- **Ctrl-apostrophe** will copy the values of the cell immediately above the active cell.

## Linking the Database Files

The database is divided into two files referred to as the **Front End** and **Back End**. The **Front End** provides the interface—the interactive, user-friendly forms, queries, and reports. The **Back End** contains the data—more than 50 tables that are related to each other by a common field. The **Back End** file is unwieldy for anyone not familiar with relational databases. It would be inadvisable to make any changes to this file.

The database may be used on a network by more than one user. However, the **Front End** file must be loaded onto each computer that will be accessing the **Back End** file across the network. If more than one person uses the same **Front End** at the same time, the database will likely become corrupted.

When a user opens the database for the first time, or if either file is moved to a different location, it will be necessary to link these two files. If this is not necessary, you may skip steps 1-4, and move on to step 5.

### Opening the database for the first time

1. Copy both files to a hard drive where the file may be edited. As noted above, if the database is to be used across a network, the **Front End** file must be loaded onto each computer.
2. Open the **GDE.accdb** file; this is the database **Front End**, which contains the user interface — the forms and queries.
3. A security warning may open across the top of the screen notifying you that certain content in the database has been disabled.
  - a. Should this happen, click **Options**, and a security alert screen will open.
  - b. Click Enable this content; otherwise the database code won't function.
  - c. To avoid this happening each time the database is opened, click on “File” at the top left of the screen, then click on Options at the bottom left of the screen. The Access Options form will open, choose Trust Center at the bottom of the lefthand list. (Figure 1)

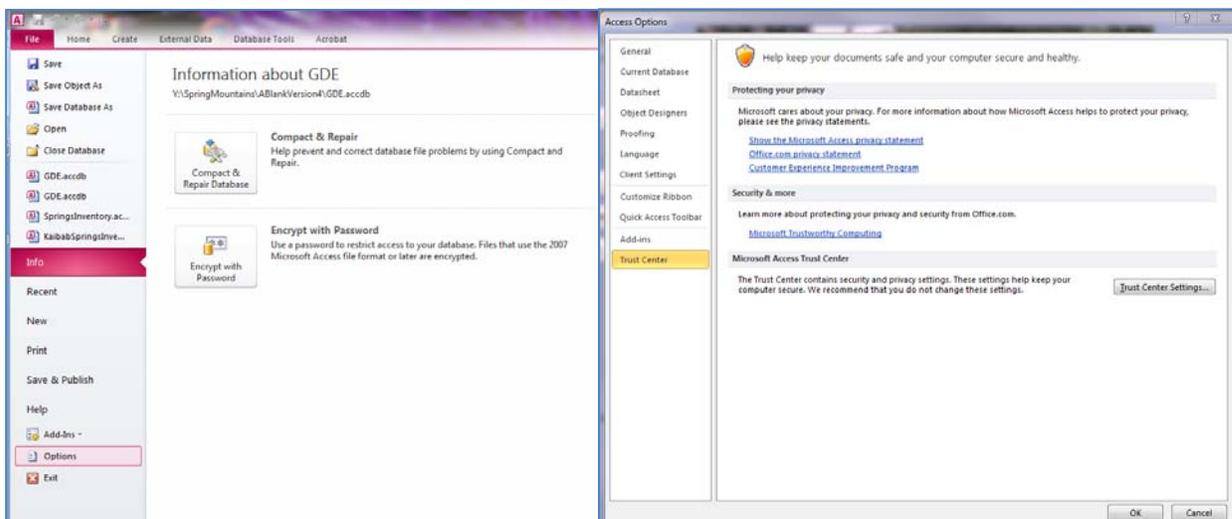


Figure 1. The File Menu (left) and Access Options (right).

- d. Click on the button **Trust Center Settings** on the right side of the screen. The Trust Center Form will open (Figure 2). Select **Trusted Locations** from the list on the left.
- e. If you will be using the file across a network, check **Allow Trusted Locations on my network** (found at the bottom of the screen).
- f. Click **Add new location**, and enter the path of the folder in which the file resides.
- g. If the file is in a subfolder, you should check **Subfolders of this location are also trusted**.
- h. Click **Ok**, and **Ok** a couple more times to exit this area of the database.

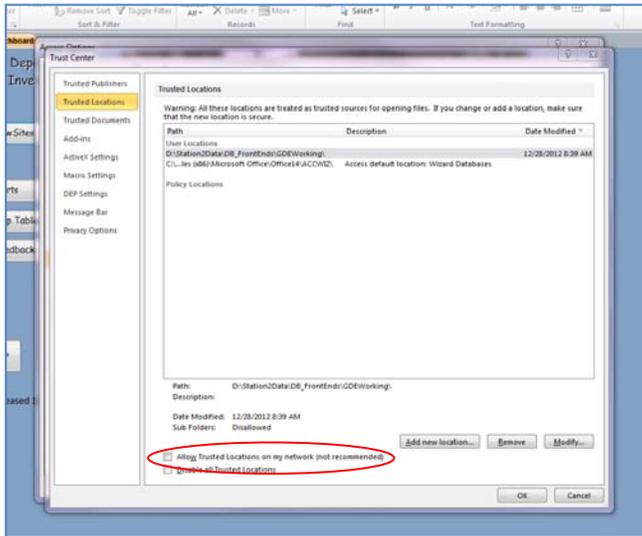


Figure 2. Trust Center Screen

4. Now you must tell the database Front End where to find the Back End data tables.
  - a. Click on **External Data** in the top menu, then select **Linked Table Manager**.
  - b. A list of all linked tables will appear. Click **Select All**, and then **OK**.
  - c. Browse to the location of the **Back End** file on your hard drive, or the network drive.
  - d. Select the GDE\_be.accdb file, and click **Open**.
  - e. You should get a message that all the linked tables were successfully refreshed.
  - f. Once you get this message, click **Ok**, and **Close** on the linked table manager.

Watch a video to see the process in action

[http://springstewardship.org/Videos/GDE\\_1\\_LinkTables.mp4](http://springstewardship.org/Videos/GDE_1_LinkTables.mp4)

5. If you have not accessed the database before, you will need to add a login name.
  - a. This information can help a lot with recovering from serious errors.
  - b. Click **Add Name**, and the **Add New Login Information** form will open.
  - c. Enter your initials, first and last name, and title. The User level will default to "User" and can only be changed by a database administrator. Choose a password or use one provided to you by your supervisor. Hit **Save** and **Close**.
  - d. Your initials will be entered in the login field; click the **Enter Database** button. You will need to enter your password on the next form, then hit **Enter** twice (or click **Submit**).

## Main Switchboard

After you log in the **Main Switchboard** will open. From there you can access all sections of the database. The **Edit/View Sites** button opens the **Locations** form. **Reports** opens a switchboard where you can select a variety of reports and queries. **Edit Lookup Tables** allows you to easily edit the options in the various dropdown lists. Many of these dropdown lists are already populated, such as State, County, Region, etc. However, you will need to add records for fields like ecological units, map sources, HUCCS, and USGS Quads. Although these can be entered while you are entering data for a site, it might save time to enter them in advance using this switchboard. **Send Feedback** allows a user to comment on database performance, provide suggestions, or document errors. Please report any problems you are having through this system so that the database can be fixed or improved. Throughout the database, clicking the door symbol closes the form you are viewing. However, from the **Main Switchboard**, clicking this close button exits the database entirely.

One thing to keep in mind with an Access database is that the contents of each field are saved immediately after exiting it (pressing Enter or Tab, or clicking another field or button with the mouse.) This, of course, can be good and bad. The good part is that it is not necessary to manually save data, aside from making sure the **Back End** file is backed up regularly. However, if you make a mistake, it too is saved right away. If you notice it immediately, click the **Esc** key and the last entry you made will revert. It also might help to type **Ctrl-Z** or select "undo" in the menu. In Access 2010, "undo" is generally provided as an icon in the "Quick Access Toolbar" which is at the very top of the Access screen. The "undo" icon is a curved arrow pointing to the left next to the "save" icon.

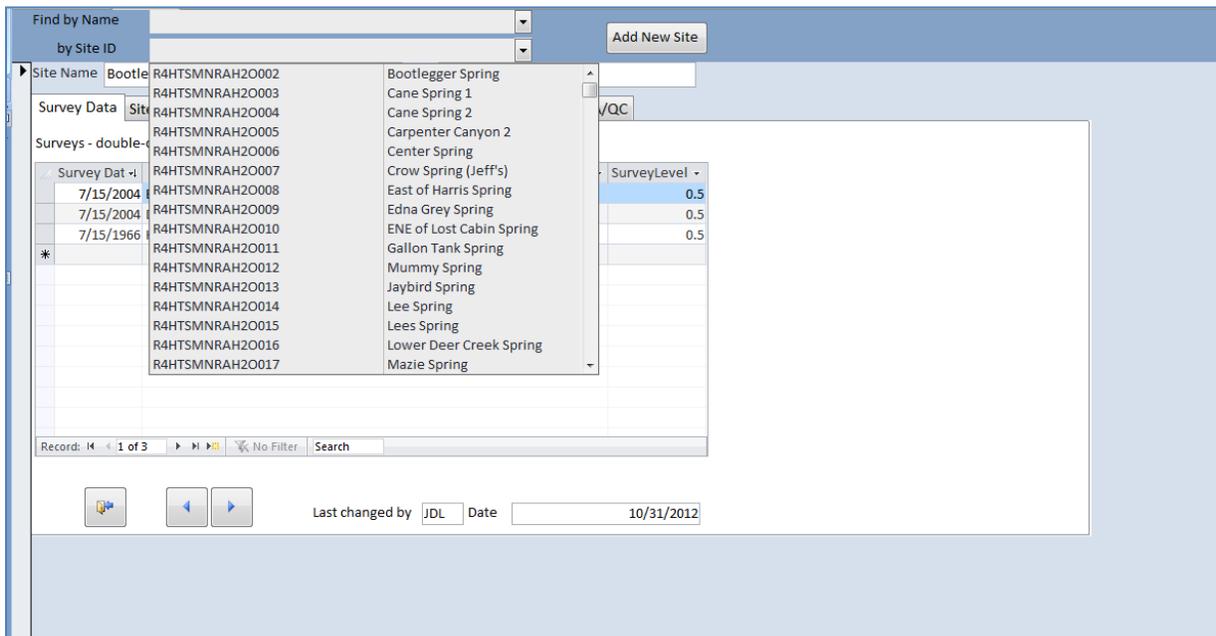
## Entering Sample Data

To demonstrate the use of the database, a sample field sheet for Cave Spring 1 in the Spring Mountains has been provided in Appendix A. The first step is to add a new site.

### Adding a New Site

Click on **Edit/View Sites**; this opens the **Site** form. At the top of this page are two search fields – **Find by Name** and **Find by Site ID** (Figure 3). First, check to make sure that the site has not already been entered. Type in the site name, Cave Spring 1, in the **Find by Name** field. This field will autofill, so it should quickly become obvious that the site has not yet been entered.

Note that the system will not allow a duplicate Site ID entry. However, it does allow duplicate Site Names (as there are many springs named “Willow” or “Cold”).



The screenshot shows a web-based form for managing sites. At the top, there are two search fields: "Find by Name" and "by Site ID". To the right of these fields is a button labeled "Add New Site". Below the search fields is a table with columns for "Site Name", "Site ID", and "Survey Data". The "Site Name" column is currently selected, and a dropdown menu is open, displaying a list of site names including "Bootlegger Spring", "Cane Spring 1", "Cane Spring 2", "Carpenter Canyon 2", "Center Spring", "Crow Spring (Jeff's)", "East of Harris Spring", "Edna Grey Spring", "ENE of Lost Cabin Spring", "Gallon Tank Spring", "Mummy Spring", "Jaybird Spring", "Lee Spring", "Lees Spring", "Lower Deer Creek Spring", and "Mazie Spring". The "Survey Data" column shows dates such as "7/15/2004" and "7/15/1966". At the bottom of the form, there is a status bar indicating "Record: 1 of 3", a search box, and a "Last changed by" field with the name "JDL" and a "Date" field with the value "10/31/2012".

Figure 3. Site form with **Find by Site ID** field selected.

Because this site has not been previously entered, click **Add New Site**, and enter the site name and ID number in the fields. This information is found on the first field sheet in Appendix A under **Pre-Field Survey**.

## Site and Geographic Data

Next click on the **Site and Geographic** tab (Figure 4). In the **State** field enter "NV". All states are included in the drop-down menu. Note the small "+" next to this field. This is for the rare situations when a site crosses a state boundary. Clicking this symbol will make a second drop-down field visible, where you can enter the second state. This option is also available for County, Land Status, Region, Proclaimed NF, and District.

The screenshot shows a web-based form for site management. At the top, there are search options: 'Find by Name' and 'by Site ID', both with dropdown menus. To the right is an 'Add New Site' button. Below this is a header bar with tabs: 'Survey Data', 'Site and Geographic' (selected), 'Mapping', 'Georeferencing', 'Route', 'Other', and 'QA/QC'. The main form area contains several fields: 'State' (dropdown with 'NV' and a '+' icon), 'County' (dropdown with 'Clark' and a '+' icon), 'Land Status' (dropdown with 'USFS' and a '+' icon), 'Region' (dropdown with '4' and a '+' icon), 'Proclaimed NF' (dropdown with 'Humboldt-Toiyabe' and a '+' icon), 'District' (dropdown with 'SMNRA' and a '+' icon), and 'Designation' (dropdown). Below these are text input fields for 'Grazing Allotment Number' (with 'none' selected), 'Name', 'NRM Infra Reference', 'Water Rights Number', 'Water Rights Status', 'Primary HUC 12' (dropdown), 'HUC 8', 'Ecological Unit Code' (dropdown with '322Aac' and a '+' icon), and 'Ecological System' (dropdown). At the bottom, there is a 'Local Feature Type' field, navigation arrows, and a 'Last changed by' field with the value 'mnh' and a 'Date' field with the value '12/28/2012 10:33:17 AM'.

Figure 4. Site form with **Site and Geographic** tab selected.

Next, click **Enter** to move to the **County** field. Once the state has been entered, the county list will be limited to only counties within that state. Enter Clark county, and continue by entering the Land Status (USFS), Region (4), Proclaimed NF (Humboldt-Toiyabe), and District (SMNRA).

If the drop-down list does not contain a the appropriate entry, you can easily add it, as long as the field guide allows a drop-down list to be edited. Double-clicking the field opens a form where you can view, add, or edit these entries. For example, double-click the **Designation** field, and the **Designation** form will open (Figure 5).

The screenshot shows a 'View/Edit Designation' form. At the top, there is a 'Search List' dropdown menu and an 'Add New Designation' button. Below this is a 'Datasheet View' button. The main area contains a 'Designation' field with the text 'National Recreation Area'. At the bottom, there are two buttons: 'Add to Site Form' and 'Close'.

Figure 5. **Designation Form**, accessed by double-clicking **Designation** field in Site Form.

Click **Add New Designation** and then enter "National Wildlife Refuge". Then click **Add to Site Form** (or click **Enter** twice). The **Designation** form will close, and the entry will be added to the **Designation** field for the site.

There is no information for the **Grazing Allotment Number** and **Name**, **NRM Infra Reference**, **Water Rights Number**, and **Water Rights Status** for this site. Tab through these fields, leaving them blank. However, should you have data for a site, these are "free" fields with no dropdown list.

## 12-digit HUC

12-digit HUCs are the smallest element in the hierarchy of cataloging units created by the USGS to divide the US into hydrologic areas. These cataloging units represent drainage basins or distinct hydrologic features. The United States has over 104,000 12-digit HUCs; some have the same name. Having all of these in the drop down menu would be unwieldy. All are available, however, in a lookup table. The **Primary HUC 12** field is a drop down "working list" of 12-digit HUCs. If you know the number of the HUC, you may type it in. If it is present in the list, it will appear. For example, type 160600150601. Upper Lovell Canyon should appear in the name field, and the HUC 8 number and name will automatically fill in.

If you do not see the HUC code you want to enter, or if you would like to search based on the name, double click on the **Primary HUC 12** field (the field with the number, not the one with the name). The HUC 12 form will open. Here you can search by name or number in the dark gray area at the top of the form. You will also see an **Import New 12-digit HUC** button on the top left. If you cannot find the appropriate HUC, click this button to open the **Full HUC List** form (Figure 6). You

HUC 12 Code	HUC 12 Name	HUC 8 Name	States	HUC 8 Code
160600150101	Upper Wheeler Wash	Ivanpah-Pahrump Valleys NV	NV	
160600150102	Lower Wheeler Wash	Ivanpah-Pahrump Valleys NV	NV	
160600150103	160600150103	Ivanpah-Pahrump Valleys NV	NV	
160600150104	Manse Ranch Springs	Ivanpah-Pahrump Valleys CA,NV	CA,NV	
160600150201	Pah Rump Spring	Ivanpah-Pahrump Valleys NV	NV	
160600150202	Johnnie	Ivanpah-Pahrump Valleys NV	NV	
160600150203	Last Chance Range	Ivanpah-Pahrump Valleys NV	NV	
160600150204	Sixmile Spring	Ivanpah-Pahrump Valleys NV	NV	
160600150205	160600150205	Ivanpah-Pahrump Valleys CA,NV	CA,NV	
160600150301	Stump Springs	Ivanpah-Pahrump Valleys CA,NV	CA,NV	
160600150302	Shadow Mountain	Ivanpah-Pahrump Valleys CA,NV	CA,NV	
160600150401	Wild Rose Spring	Ivanpah-Pahrump Valleys NV	NV	
160600150402	Appaloosa Springs	Ivanpah-Pahrump Valleys NV	NV	
160600150403	Lost Cabin Spring	Ivanpah-Pahrump Valleys CA,NV	CA,NV	
160600150404	Stump Spring-Calvada Springs	Ivanpah-Pahrump Valleys CA,NV	CA,NV	
160600150501	Headwaters Pahrump Valley	Ivanpah-Pahrump Valleys CA,NV	CA,NV	

Figure 6. The **Full HUC List** form opened with the **Find by Number** field selected.

can search for the appropriate HUC by Name, Number, or by 8-digit HUC at the top of the screen. Once you have located the correct HUC, click the **Import to Working List** button. This will reopen the **HUC 12** form and will have the new HUC selected in the light gray area.

Click the **Add to Primary HUC** button and this will return you to the **Site and**

**Geographic** tab in the **Sites** Form with the new HUC inserted into the **Primary HUC 12** field and the appropriate 8-digit HUC entered in the **HUC 8** field.

Next select “322AAc” as the **Ecological Unit Code** and the **Ecological Unit Name** fills in. At times, the first letter typed will bring up the appropriate entry for the field, at others (such as this one) you will need to type in almost the entire entry before the autofill finds the correct choice. It is important to double-check to make sure the fields are filled in with the choices you intend. Again, should the **Ecological Unit Code** that you wish to enter isn't on the list, double-click it to open a form. Add the code and name, and click the **Add to Site Form** button to enter it.

### Notes About Navigating Through the Database

At the bottom of the **Sites** form, note the button with a door icon (Figure 4). This will close the form and return you to the switchboard. It is always better to use the door buttons, rather than closing the forms or database any other way, because these buttons activate code that is important to operation of the database. To the right of the **Close** button, there are right and left arrows that allow you to navigate through the site records. Although it is more efficient to use the **Find by Name** dropdown box to look for a specific site, sometimes it is helpful to scan through site records using these buttons.

### Mapping Data

Click the **Mapping** tab (Figure 7). Click the dropdown box on the **USGS Quad** field and note that only Quads within the **State** field under **Site and Geographic** data appear as options. The list will be blank if the state has not been entered. Generally if you enter data by working through the tabs from left to right, you will avoid such difficulties. Enter “La Madre Spring” and click **Enter**. Enter “14” for **Magnetic Declination**. The geologic map name begins with “Geologic and Geophysical maps of the Las Vegas...” Once you type the first few letters, however, your work is done, and you can click **Enter** to move on.

The screenshot shows a web-based form for site management. At the top, there are search options: "Find by Name" and "by Site ID", both with dropdown menus, and an "Add New Site" button. Below this, the "Site Name" is "Cave Spring 1" and the "ID" is "R4HTSMNRAH2O136". A series of tabs are visible: "Survey Data", "Site and Geographic", "Mapping" (which is selected and highlighted), "Georeferencing", "Route", "Other", and "QA/QC". Under the "Mapping" tab, several fields are populated: "USGS Quad" is "La Madre Spring", "Magnetic Declination" is "14", "Geologic Map Name" is "Geologic and Geophysical maps of the Las Vegas 30' X 60' Quadrangle, Clark and Nye", "Geologic Unit" is "Young fan alluvium (Holocene and latest Pleistocene)", "Land Resource Region" is "D--Western Range and Irrigated Region 30 -- Mojave Desert", "Soil Map Name" is "Soil Survey of Clark County Area", and "Soil Map Unit" is "LaStone association". At the bottom of the form, there are navigation buttons (a door icon, left and right arrows) and a status bar showing "Last changed by" "mnh" and "Date" "12/28/2012 12:04:10 PM".

Figure 7. **Site Form** with **Mapping** tab selected.

Should you need to add a map source, double-click the **Geologic Map Name** field to open the **References** form (Figure 8). All references including soil maps, geologic maps, and other useful information can be entered here. You can also attach documents in the **Attachment** field or enter hyperlinks in that field. Note that because this form was accessed by double-clicking **the Geologic Map Name** field, the **Add to Geologic Map Source** button is visible. When you add a new reference or select an existing entry, you can click this button. The form will close and the reference will be entered into the **Geologic Map Name** field for the site on which you are working. However, you can access this form also by double-clicking the **Soil Map Name** field. In that event, a different button will be visible that will enter the selected reference into that field.

When you double click on a field that is already populated, the form will open to that reference. The same is true for any other forms accessible by double-clicking the associated field.

The screenshot shows a web-based form titled "References - Search by Title". At the top, there is a search input field and a dropdown arrow. Below this are two tabs: "Titles" and "Authors". To the right of the tabs is a button labeled "Add New Reference". The main content area is divided into several sections. On the left, there are input fields for "Title" (containing "Bedrock Geology of NH. (digital)"), "Year" (containing "1997"), "Author(s)" (containing "Lyons et al"), "Agency", and "Keywords" (containing "Geology"). On the right, there are input fields for "Type" (containing "Shapefile"), "Hyperlink", and "Attachment". At the bottom of the form are two buttons: "Add to Geologic Map Source" and "Cancel".

Figure 8. **Reference Form**, accessed by double-clicking the **Geologic Map Name** field in the **Site Form**.

Enter the other data into the **Mapping** tab, as shown in Figure 7. This information is also found on the **Pre-Field Survey** form in Appendix A. Typically, this information should be entered during the pre-trip planning phase.

## Georeferencing Data

Click on the **Georeferencing** tab (Figure 9). This information should be entered during the Pre-Field Survey process, although it often must be modified after the survey is complete. Latitude/Longitude values are required to be able to export site data to ArcPad. For field work it is helpful to have UTM coordinates as well. Enter the **UTM Zone** ("11"), **Easting** ("626104"), and **Northing** ("4003285") readings. Then enter the **Latitude** degrees, minutes, and seconds. (36, 9, and 58.05). The **Decimal Degrees** value is automatically populated. Next, enter the **Longitude** coordinates (-115, 35, 52.53). Note that the database will only allow negative longitude (Western hemisphere) coordinates. If only UTM values are available, those can be converted to latitude/longitude values with the **UTM Conversion Tool** link that opens the USGS **UTM to Geodetic Tool** web page. There you can easily convert UTM's to latitude/longitude coordinates in either NAD-27 or NAD-83.

The screenshot shows a web-based form for site data. At the top, there are search fields for 'Find by Name' (Cave Spring 1) and 'by Site ID'. An 'Add New Site' button is on the right. Below these are fields for 'Site Name' (Cave Spring 1) and 'ID' (R4HTSMNRAH20136). A navigation bar contains tabs: Survey Data, Site and Geographic, Mapping, Georeferencing (selected), Route, Other, and QA/QC. The Georeferencing section includes: UTM Coordinates (Zone: 11, Easting: 626104, Northing: 4003285); Latitude (Degrees: 36, Minutes: 9, Seconds: 58.05, Decimal Degrees: 36.1661); Longitude (Degrees: -115, Minutes: 35, Seconds: 52.53, Decimal Degrees: -115.5979); Horizontal Datum: NAD-83; Elevation (m): 1900 with an 'Enter Feet' button; Elevation Determined By: 10m DEM; and a GPS Comments field. At the bottom, there are navigation arrows, a 'Last changed by' field (JDL), and a 'Date' field (8/28/2011). A link for 'UTM Conversion Tool' is also present.

Figure 9. **Site Form**, with **Georeferencing** tab selected.

If you need to enter elevation in feet, click the **Enter Feet** button, and an additional field will appear to its right. Enter the elevation in feet, 6233.6, in this field and then **Enter**. The elevation in meters will be entered. Continue to fill in the data as shown in Figure 9.

## Route

Click on the **Route** tab (Figure 10). This information should also be entered during the Pre-Field process with instructions for accessing the site and any associated concerns with conducting the survey.

The screenshot shows a web-based form for a site named "Cave Spring 1" with ID "R4HTSMNRAH20136". The form has a top navigation bar with "Find by Name" and "by Site ID" dropdowns, and an "Add New Site" button. Below the navigation bar is a tabbed interface with tabs for "Survey Data", "Site and Geographic", "Mapping", "Georeferencing", "Route" (selected), "Other", and "QA/QC". The "Route" tab contains three text input fields: "Driving" with the text "From Mountain Springs NV, go west about 3 miles on SR 160, and turn north on Lovell Canyon Road 11 miles, then west on Lovell Summit Road about 1.2 miles. There is a short spur road that leads toward the spring.", "Hiking" with the text "The spring is marked within 50 meters from the end of this spur road. The spring was reported in the past about 200 meters east of where it is marked on the map.", and "Other" with the text "This spring was reported as a rheocrene, with water quality data in the past. Although it eluded all search in 2010, but it was sleeting at the time, with standing water from heavy rain.]. Below these fields is a "Concerns" field with the text "Dense thickets of Rosa woodsii near GPS coordinates." At the bottom of the form, there are navigation buttons (back, forward, home), a "Last changed by" field with "JDL", and a "Date" field with "8/28/2011".

Figure 10. **Site Form**, with **Route** tab selected.

## Other Site Data

Next click the **Other** tab. If the site has been surveyed before, knowing the type of GDE can help you to locate it. For example, if it was previously referred to as a rheocrene, that means the spring should be located in a channel rather than on a nearby hillslope. Also, if it is a hanging garden or gushet, the site will be steep and access may be challenging. Any associated cultural concerns may also be entered in the **Cultural Notes** field. You can also attach small documents (previous surveys, endangered species or cultural resource information) in the **Available Data** field. Click inside this field, then click on the paper clip symbol. An **Attachments** box will open. Click **Add**, and browse to the file you wish to attach. You can also browse through or remove attachments. Attachments are not linked, but are contained within the **Back End** file of the database. **Therefore, adding a large number of attachments or large files would be inadvisable, as it will greatly increase the size of the database file.**

The **QA/QC** tab contains a record of changes to the site record with the login name and the date. This information can be very helpful with recovering data should mistakes be made.

You have now completed entry of data associated with the site. Click on the door icon to close the **Site** form and return to the **Main Switchboard**.

### Importing Site Data

Much of the information required for the Pre-Field datasheet can best be obtained through using spatial joins in a GIS. For an area with a large number of sites, importing this information can save a good deal of time. Also, the Pre-Field form in Appendix A was printed using the MailMerge function in Microsoft Word. This also saved time and repetitive work.

### Entering Survey Data

You can enter the survey data once the field sheets have been filled in. As an example, this text will follow survey data provided in Appendix A.

### Adding a New Survey

If you do not already have the site opened up on the database, you can access it from the Main Switchboard. Click **Edit/View Sites** to open the **Site** form. In the dropdown list at the top of the **Site** form, start typing "Cave Spring 1". When the correct site appears in the field, press **Enter**. The **Survey** tab will be selected, but no surveys will be listed. Click the **Add New Survey** button, and a blank **Add Survey** form will open. Refer to Page 2 of Appendix A for this section. Enter the **Survey Date** (8/1/11), **Time Start** (16:45), **Time End** (19:00), and **Examiners** names as shown in Figure 11. Choose the appropriate survey level (0.5 for partial data, 1 for a Level 1 survey, and 2 for a Level 2 survey).

Add Survey			
Survey Date	8/1/2011	Site ID	R4HTSMNRAH20136
Time Start	16:45	Survey ID	1356727128
Time End	19:00		
Examiners	Larry Stevens, Jeri Ledbetter, Patty West, E		
Survey Level	▼		
Save Survey Data		Cancel	

Figure 11. **Add Survey Form**.

After entering the survey level, press enter twice (once to highlight the **Save Survey** button and again to activate the button.) You could also use the mouse, of course, to click the button. The database is designed to reduce the need for using the mouse. You should be returned to the **Site** form, and the survey will appear in the subform. The system is capable of handling multiple surveys. Double-click the

date field of the survey you added, and the **Survey Form** will open (Figure 12). There are two rows of tabs in this form, with each tab containing a category of data that generally matches the field sheets.

Cave Spring 1	ID	R4HTSMNRAH2O136	Survey Date	8/1/2011	Level	2	Survey ID	1356727128
<b>Soils</b>	<b>Hydrology/Flow</b>	<b>Water Quality</b>	<b>Fauna</b>	<b>Disturbance</b>	<b>Mgmt Indicators</b>	<b>Planning</b>	<b>QA/QC</b>	
<b>Survey Info</b>	<b>Georeferencing</b>	<b>Geology</b>	<b>Images</b>	<b>Quadrat Data</b>	<b>Woody Vegetation</b>	<b>Additional Plants</b>	<b>Extra Quadrats</b>	

Survey Date  Time Start  End   
 Examiners   
 Weather  Air Temp ( C)    
 Area (sq m)  Area Determined by   
 Area Sampled, if divided (sq m)   
 Reference Point   
 True North  
 Compass Bearing Long Axis    
 Aspect of Site   
 Transect Interval (m)  Slope %     
 Dominant Surrounding Vegetation  Cut Level   
 Relative Area of GDE Wetland/Riparian  
 Spring  Open Water   
 Channel  Other/Unknown   
 Wetland  Total   
 Last Changed by  Date

Figure 12. **Survey Form** with **Survey Info** tab highlighted.

## Survey Information

The **Survey** tab is highlighted. The **Survey Date**, **Times**, and **Examiners** have already been entered.

**Weather**—Begin to type “Re” in the **Weather** field, and the correct option “Recent Rain” should appear. Press **Enter**. Throughout the database, these dropdown fields will typically fill in with the correct option with minimal typing. However, take care that you don’t end up with an incorrect selection. For example, typing only “R” will first suggest the option “Rain during survey.”

**Temperature**—For consistency, the database requires temperatures to be entered in Celsius. However, these surveyors recorded measurements in Fahrenheit. Leave the **Air Temp (C)** field blank and press **Enter** twice—once to move to the **Convert from F** button and again to activate the button. The **Enter Temp F** field should become visible. Type “82” and press **Enter**. The converted air temperature will be added to the **Air Temp (C)** field.

**Area**—Enter “200” as the **Area** in square meters and “Measure average length and width” in the **Area determined by** field. If the site was not divided, just press **Enter** to move to the next field. If only a sample area was surveyed, enter that value in the **Area Sampled, if divided (sq m)** field. If a value is entered here, two more fields will appear – **Determined by**, which is the same as the one mentioned above, and **Describe Sample Area**, a free text field where you can describe this area and how it was selected. This field will accept 255 characters. Clicking the pencil icon in the lower right of the field will open a window that will allow you to see and edit all of the text more easily.

**Reference Point**—Enter a short description of the **Reference Point** field, which is limited to 100 characters. Press **Enter**.

**Compass Bearing Long Axis and Aspect**—The database requires True North values. If you have these, you can enter them in the next two fields. If you have Magnetic North values, the system will convert, as long as you enter the **Declination** as well. To do this, click on the **Enter Magnetic Bearings** button, (pressing Enter four times will achieve the same result.) New fields will appear where you can enter “66” in both the **Long Axis** and **Aspect** fields, and the converted values will be automatically entered. The **Magnetic Declination** should be automatically entered from the **Mapping** tab in the **Site** Form. If you have not yet entered a **Magnetic Declination** value, you will be admonished by a message box, and the cursor will move to that field. Once you have entered these values, press **Enter** to move on.

**Transect Interval (m)** —Enter the transect interval in meters. Note that the database requires metric values for transect measurements and does not offer an easy way to make the conversion. It is not possible to enter measurements in feet, as the calculations used to generate reports would be incorrect. Enter “4” in the **Transect Interval** field, and press **Enter** to move on.

**Slope** —The database requires this field to be entered as a percent value. If you have this measurement in percent, enter it in the next field. However, some surveyors use equipment that only measures slope in degrees. Also, some sites may be very steep, vertical or overhung, thus precluding the ability of measuring in percent. As a 45 degree slope equals a 100% slope, a 90 degree (vertical) slope would equal 200%. If the measurement was made in degrees, as in the example survey for Cave Spring 1, press **Enter** twice to activate the **Enter Degrees** button, and type “13” in the field that appears to its right. Press **Enter** again, and the converted percent value will be placed in the **Slope %** field.

**Dominant Surrounding Vegetation**—Type “S” and **Enter** to select Shrub dominated surrounding vegetation.

**Cut Level**—Type “C” and **Enter** to select Complete cut level.

**Relative Area of GDE**—Enter values for percent relative area of the GDE—only enter the number, not the percent symbol. **Spring** = 3, **Channel** = 75, and **Wetland** = 22. Not that the total value is

calculated each time you make an entry. The total should equal 100%. If it does not, adjust this by entering a value in the **Other/Unknown** category.

Your **Survey Info** tab should look something like Figure 13. Upon closing and re-opening the survey, the extra fields for converting values will again be invisible.

Cave Spring 1		ID	R4HTSMNRAH2O136		Survey Date	8/1/2011	Level	2	Survey ID	1356727128
Soils	Hydrology/Flow	Water Quality	Fauna	Disturbance	Mgmt Indicators	Planning	QA/QC			
Survey Info	Georeferencing	Geology	Images	Quadrat Data	Woody Vegetation	Additional Plants	Extra Quadrats			
Survey Date	8/1/2011	Time Start	16:45	End	19:00					
Examiners	Larry Stevens, Jeri Ledbetter, Patty West, Kyle Paffett									
Weather	Recent rain	Air Temp ( C )	27.8	Convert from F						
Area (sq m)	200	Area Determined by	Measure average length and width							
Area Sampled, if divided (sq m)										
Reference Point	Uppermost point of seepage at a small clearing									
Compass Bearing Long Axis	52	True North	Magnetic	66	Long Axis					
Aspect of Site	52	Aspect	66	Magnetic Declination	14					
Transect Interval (m)	4	Slope %	23	Enter Degrees	13					
Dominant Surrounding Vegetation	Shrub dominated			Cut Level	C					
Relative Area of GDE Wetland/Riparian										
Spring	3	Open Water								
Channel	75	Other/Unknown								
Wetland	22	Total	100							
		Last Changed by	mnh	Date	12/28/2012 2:01:22 PM					

Figure 13. **Survey Form** with **Survey Info** tab highlighted and Cave Springs 1 sample data entered.

## Georeferencing

From the **Survey** form, click the **Georeferencing** tab. This page looks very much like the one on the **Site** form, and the fields refer to the same data. However, it is likely that coordinates collected in the survey will not match those obtained in the office. If you believe the latter to be more trustworthy than data collected using a GPS, you may not want to change the information. However, many GDEs are poorly mapped.

The Cave Spring 1 site was not found at the coordinates obtained prior to the survey. The GPS error was low, and the reading was consistent with the topographic map, so it is appropriate to change the coordinates recorded in the office to those obtained during the field survey.

Enter the **Horizontal Datum** ("NAD-83"), and **GPS Unit** ("Delorme Earthmate PN-60"). To enter your data, you may need to add one or more GPS units to this list. Double-click the GPS Unit field, and a **View/Edit GPS Units** form will open. Click **Add New GPS Unit**, and enter your unit in the field. Press

**Enter** twice to activate the **Add to Survey Form** button. The form will close, and the unit you added will be entered in the **GPS Unit** field. Press Enter, and enter the accuracy of the measurement in the **GPS Accuracy** field, “2 meters averaged over 3 minutes”. Then adjust the **Easting** (“626072”) and **Northing** (“4003264”) readings. It is only necessary to adjust the Seconds reading for **Latitude** (“57.38”) and Longitude (“53.82”). Note that as you make these changes, the **Decimal Degrees** values are adjusted. Then change the **Elevation** to “1952”, and the **Elevation Determined by** field to “GPS”. In GPS comments, you could include 10m DEM values or other information, such as where the measurement was taken.

## Geology

Continuing to the bottom of Page 2 of the survey forms in Appendix A, click the **Geology** tab.

**Evidence of Groundwater**—This is one field that will not autofill because it allows multiple entries. Click the arrow on the right side of the dropdown box, then click the checkboxes for “Flow from spring source”, “Standing water”, and “Wetland vegetation.” Then you need to click “Ok” to save the changes. Then press Enter.

**GDE Type**—A site may have up to four GDE Types. For Cave Spring 1 the primary GDE Type is rheocrene. Type “r” and **Enter** to make this selection. A **Secondary 1** field will appear. If there is a secondary type, you can enter it, and a third field will appear. If there is not another type to enter, leave the field blank and press **Enter**.

**Geological Structure Type**—Enter “Bedding” in the **Geologic Structure Type** field, and “observation” in the **Determined by** field.

**Surficial Material**—There should be a primary Surficial Material, and may be several secondary Surficial Materials at a site. **Enter** “Alluvium” as the Primary, and press **Enter**; another field will appear. Enter “Colluvium” here, and press **Enter**. Another field will appear, but leave this one blank and press **Enter** to move on.

**Lithology**—Begin typing “sedimentary” in the **Primary Lithology** field, and press Enter. The secondary lithology dropdown box will only display sedimentary rock types. Type “limestone” and press **Enter**. Answer the question, “**Is primary lithology also source aquifer?**” by typing a “Y” and press enter. The **Level of Certainty** of this response is “Assumed.”

**Landform**—Type “channel” in the **Primary Landform**, and “seep” in the **Secondary Landform** fields. The **Filter** button will apply a filter to the **Secondary Landform** dropdown box, based on the Landform selected.

Add any notes regarding Geology in the next field. The **Geology** tab should now appear something like Figure 14. The empty fields will not appear next time the survey is opened.

Cave Spring 1		ID	R4HTSMNRAH2O136	Survey Date	8/1/2011	Survey ID	1314556678	
Soils	Water Table	Hydrology/Flow	Water Quality	Fauna	Disturbance	Mgmt Indicators	Planning	QA/QC
Survey Info	Georeferencing	Geology	Images	Quadrat Data	Woody Vegetation	Additional Plants	Extra Quadrats	

Evidence of Groundwater

<b>GDE Type</b>	<b>Structure Type</b>	<b>Surficial Material</b>
Primary <input type="text" value="rheocrene"/>	<input type="text" value="Bedding"/>	Primary <input type="text" value="Alluvium"/>
Secondary 1 <input type="text"/>	Determined by <input type="text" value="observation"/>	Secondary 1 <input type="text" value="Colluvium"/>
		Secondary 2 <input type="text"/>

<b>Lithology</b>	<b>Landform</b>	<input type="button" value="Apply Filter"/>
Primary <input type="text" value="Sedimentary"/>	Primary <input type="text" value="channel"/>	
Secondary <input type="text" value="Limestone"/>	Secondary <input type="text" value="seep"/>	

Is primary lithology also source aquifer?

Level of Certainty

Notes on Geology

 Last Changed by  Date

Figure 14. **Survey Form** with **Geology** tab highlighted and Cave Spring 1 sample data entered.

## Water Table

Continuing to page 3 of Appendix A, with Hydrology data, click the **Hydrology/Flow** tab. In the **Inflow Pattern** field, type “G” and enter to select the “Groundwater inflow dominated” option. Then type “B” and **Enter** in the **Outflow Pattern** field to select “Both groundwater and surface water outflow significant” option. Then, under **Occurrence of Surface Water**, click anywhere on the **Extensive standing water** and **Some flowing water in developing channel** text to activate those checkboxes.

Enter the **Water Table Type** as “Unknown”.

In the subform below, enter the **Transect number**, **Distance**, **Source of Water Table Measurement**, **Hole Depth**, and **Water Table Depth** for each measurement. Also click the **Dry** checkbox if the soil hole was dry.

The upper part of this form should look like Figure 15. Note that the average of water table measurements has been calculated. This value will also be recalculated whenever a survey is opened.

Cave Spring 1		ID	R4HTSMNRAH20136	Survey Date	8/1/2011	Survey ID	1314556678
<b>Survey Info</b>	<b>Georeferencing</b>	<b>Geology</b>	<b>Images</b>	<b>Quadrat Data</b>	<b>Woody Vegetation</b>	<b>Additional Plants</b>	<b>Extra Quadrats</b>
<b>Soils</b>	<b>Hydrology/Flow</b>	<b>Water Quality</b>	<b>Solar</b>	<b>Fauna</b>	<b>Disturbance</b>	<b>Mgmt Indicators</b>	<b>Planning</b>
<b>QA/QC</b>							

Inflow Pattern: Groundwater inflow dominated  
Outflow Pattern: Both groundwater and surface water outflow significant

Notes: Much of the outflow from the site is diffuse, and impossible to measure.

Occurrence of Surface Water  
 No standing or flowing water visible  Extensive standing water  Patches of standing water  Some flowing water in developing channel

Water Table Type: Unknown Average of Water Table Measurements: 1.5

Transect Or Location	Distance	Msrmt Location	Source	Hole Dpth cm	Water Table Depth cm	Dry?
1	3.25	Randomly chosen point	Soil hole	3	2	<input type="checkbox"/>
2	2	Randomly chosen point	Soil hole	5	1	<input type="checkbox"/>
3	6.5	Randomly chosen point	Soil hole	2		<input checked="" type="checkbox"/>

Figure 15. **Survey Form** with **Hydrology/Flow** tab highlighted and Cave Spring 1 sample data entered.

### Flow and Spring Channel

Next, still on the **Hydrology/Flow** tab enter the flow data. If there were no flow measurements, enter the reason in the **Reason for No Measurement** field. Otherwise, leave this field blank. In the subform below, enter the flow measurements, including **Location**, **Method**, **Instrument**, **Measurement in Liters per Second**, and **% Captured**. For fields like these that do not have drop down menus, it is useful to know that hitting Ctrl and the apostrophe key at the same time will copy the values of the cell immediately above the active cell. For example, if you do not want to type the location in each time, you can type it in once and then hit Ctrl and the apostrophe to copy the value

**Flow Conversion**

	Enter Value	Converted Value
gallons per minute (US)	<input type="text" value=".038"/>	<input type="text" value="0.002"/>
gallons per second (US)	<input type="text"/>	<input type="text"/>
cubic feet per second	<input type="text"/>	<input type="text"/>
cubic meters per second	<input type="text"/>	<input type="text"/>
Calculated Value	<input type="text" value="0.002"/>	

Figure 16. **Flow Conversion Form**.

into the rows below. The estimated flow will be automatically calculated, based on the percent captured. To convert flow from other units, click the **Flow Conversion** button to open a conversion form (Figure 16).

Enter the total estimated percent of flow captured by the measurements in the **Site Percent Capture** field and whether the measurements should be averaged or cumulative. If you

enter "Average", the total estimated flow will be automatically entered in the **Site Flow Estimate** field. If the surveyors calculated an estimated flow, you can simply enter this value in the **Flow Estimate L/sec** field. This is the field that appears in reports.

Enter “Perennial” in the **Hydroperiod** field, and “>20” for the **Length of Outflow Stream**. Respond to the What Happens to Stream Outflow question with “Outflow becomes channelized.” The **Hydrology/Flow** form should look something like Figure 17.

The screenshot shows the 'Hydrology/Flow' tab of a survey form for 'Cave Spring 1'. The form is populated with the following data:

- Survey Info:** ID: R4HTSMNRAH20136, Survey Date: 8/1/2011, Survey ID: 1314556678
- Inflow Pattern:** Groundwater inflow dominated
- Outflow Pattern:** Both groundwater and surface water outflow significant
- Notes:** Much of the outflow from the site is diffuse, and impossible to measure.
- Occurrence of Surface Water:**
  - No standing or flowing water visible
  - Extensive standing water
  - Patches of standing water
  - Some flowing water in developing channel
- Water Table Type:** Unknown
- Average of Water Table Measurements:** 1.5
- Water Table Measurements Table:**

Transect Or Location	Distance	Msrmt Location	Source	Hole Dpth cm	Water Table Depth cm	Dry?
1	3.25	Randomly chosen point	Soil hole	3	2	<input type="checkbox"/>
2	2	Randomly chosen point	Soil hole	5	1	<input type="checkbox"/>
3	6.5	Randomly chosen point	Soil hole	2	2	<input checked="" type="checkbox"/>
- Flow Measurements Table:**

Location	Method	Instrument	Msrmt L/Sec	% Captured	Flow Estimate
4 m to R of 7.7m mark mair	Volumetric	pipe/bucket	0.025	100	0.025
4 m to R of 7.7m mark mair	Volumetric	pipe/bucket	0.025	100	0.025
4 m to R of 7.7m mark mair	Volumetric	pipe/bucket	0.024	100	0.024
- Flow Summary:**
  - Site Percent Capture: 5
  - Avg. Or Cum. Measure: Average
  - Flow Estimate L/sec: 0.49
- For springs with outflow brooks:**
  - Hydroperiod:** Perennial
  - Length of Outflow Stream (m):** >20 m
  - What happens to stream outflow?:** becomes channelized
- Last Changed by:** JDL **Date:** 11/9/2011

Figure 17. **Survey Form** with **Hydrology/Flow** tab highlighted and Cave Spring 1 sample data entered.

## Water Quality

Next, click the **Water Quality** tab. This form allows you to enter water quality data at multiple locations. At Cave Spring 1, only one measurement was taken. In the **Targeted Location** field, enter “Down-gradient from spring source”, and “Flow” in the **Source of Water** field. Enter the time of the measurement (as military time) and the **Water Temperature** in degrees Celsius. Next, enter the characteristics and measurements in the subform in the lower part of the form. Note that as you enter these measurements, the average value is calculated in fields below.

The completed form should resemble Figure 18. If additional measurements were taken at other locations, you would click the **Add New Location** button to add them.

Cave Spring 1		ID	R4HTSMNRAH2O136		Survey Date	8/1/2011	Survey ID	1314556678	
Survey Info	Georeferencing	Geology	Images	Quadrat Data	Woody Vegetation	Additional Plants	Extra Quadrats		
Soils	Hydrology/Flow	Water Quality	Solar	Fauna	Disturbance	Mgmt Indicators	Planning	QA/QC	

Transect  Distance along Transect

Targeted Location

Source of Water

Time  Water Temperature (C)

Data

Characteristic	Measurement	Comments
pH (field)	8.02	YSI
Specific conductance (field) (uS/cm)	652	YSI
Dissolved oxygen (field) (mg/L)	5.92	YSI
Oxidation-Reduction Potential (mV)	95.5	YSI
* <input type="text"/>	<input type="text"/>	<input type="text"/>

Record: 1 of 4 | No Filter | Search

Average PH:  SC  ORP:  DO  TempC:

Last Changed by  Date

Figure 18. **Survey Form** with **Water quality** tab highlighted and Cave Spring 1 sample data entered.

## Soils

Click the **Soils** tab to enter the soils data found on page 4 of the sample field sheets in Appendix A. Each row on the datasheet is entered on a separate form. This is done because there are many fields that would extend wider than the screen were they displayed in a row.

On the first line of the field sheet are measurements taken on a transect/distance. Therefore, enter "1" in the **Transect** field and "3.25" in the **Distance\_m** field. Next, for location, select "unbiased, systematic-transect/dist". For **Method**, select "shovel". Next, enter the depths of Peat, Mucky Peat, and Muck into the table as recorded on the field sheet. Be sure to include units of measurement if they are in anything other than centimeters. Enter the remaining information found on the field sheet, as shown in Figure 19.

To enter data for the next line on the sample field sheet, click **Add Record**. This measurement was at the center of the site; therefore, don't enter a value for **Transect** or **Distance** and select "targeted, center of site" for the **Location**. Enter the remaining information as shown on the field sheet. Note that you can use the left and right arrows next to the **Add Record** button to scan through all the entries.

**Important** - provide a summary of the soils data into the **Soil Notes** field, as this is the only information that will appear on the comprehensive report. Below is an example from a Spring Mountains survey:

" Of six unbiased, systematic soil locations, one was bedrock. The others were dug with a shovel to a mean depth of 11.4 cm. Depth to the mineral layer was 0 cm in all pits; texture varied from medium sand (2.0-.43mm) to coarse sand (4.8-2.0mm). There were no redoxomorphic features, no hydrogen sulfide odor, and no reaction to HCl."

Respond to the questions about Fen characteristics and Histosol or Histic Epipedon with yes/no.

The screenshot shows a web-based survey form titled "GDE Database Version 4". The "Soils" tab is selected. The form contains the following data:

- Survey Info:** Cave Spring 1, ID: R4HTSMNRAH2O136, Survey Date: 8/1/2011, Level: 2, Survey ID: 1356727128
- Georeferencing:** (empty)
- Geology:** (empty)
- Images:** (empty)
- Quadrat Data:** (empty)
- Woody Vegetation:** (empty)
- Additional Plants:** (empty)
- Extra Quadrats:** (empty)
- Soils Data:**
  - Transect: 1, Distance\_m: 3.25, Location: unbiased, systematic-transect/dist, Method: shovel
  - Layer table:
 

Layer	Upper Depth (cm)	Lower Depth (cm)
Peat (fibric)	0	8
Mucky Peat (hemic)	8	12
Muck (sapric)	12	14
  - Depth to mineral layer (cm): 14, Texture: silty .08 mm, Color: 10 YR 4/2
  - Redox Concentrations: none, Depletions: none
  - Reduced Matrices: none, Hydrogen Sulfide Odor: , Reaction to HCl?: , Hole Depth (cm): 16
  - Comments: (empty)
- Soil Notes:** sample data only
- Fen characteristics observed?:** Yes (Comment: small areas)
- Histosol or Histic Epipedon observed?:** no (Comment: )
- Last Changed by:** mnh, **Date:** 12/28/2012 2:44:08 PM

Figure 19. **Survey Form** with **Soils** tab highlighted and Cave Spring 1 sample data entered.

## Quadrats

The vegetation component of the protocols represents a large share of the time required for data collection. The same is true for data entry; however, the database interface has been designed to make the process as easy as possible.

Refer to the Vegetation Quadrats datasheet, page 5 in Appendix A, and click on the **Quadrat Data** tab. You will be entering the data column by column for each quadrat. Information for each quadrat is entered and displayed on a single form. On the first form, enter “1” as the **Transect #** and “2” as the **Distance**. A list of settings has been provided in the **Setting** drop-down box to encourage consistency. In this particular field, you may choose either to add a setting to the drop-down box if it is one that you feel will be fairly common or if it is a unique setting, you can just type it into the box without saving it for future use on other sites. It would be inadvisable to make this list too long. For example, if at one site the quadrat fell on a bridge abutment, it would be better not to add it to the list. In this case, enter “channel dry” as the setting. Next, enter the quadrat corner values – in this case” 3” **basal vegetation** and "1" **bryophyte**. If the sum of the values does not equal 4, the database will admonish you and require that you correct the error. Enter “10” as the **Bryophyte % Cover**. Next you will be entering the vegetation in the subform. Click on the Species dropdown field, type the genus “Carex”, and **Enter**. The cursor will move to the **% Cover** field, where you will enter “65”. As the species could not be determined in the field, a specimen was collected and named “Carex 8.” Enter this in the Collection ID. You may also enter any short comments noted by the botanist, or click **Enter** to move to the next line. Here you will type “Mimulus guttatus.” Enter the % Cover of 15%. The completed form should look like Figure 20.

The screenshot shows a web-based survey form for 'Cave Spring 1'. The 'Quadrat Data' tab is active. The form contains the following data:

- Transect #: 1, Distance: 2, Setting: channel dry
- Basal veg: 3, Water: [blank], Bryophyte % Cover: 10
- Gravel: [blank], Boulder: [blank], Litter: [blank], Wood: [blank]
- Cobble: [blank], Bedrock: [blank], Bryophyte: 1, Total: 4

The species table below shows:

Species	Symbol	% Cover	Collection ID	Comments
Carex	CAREX	65	carex 8	
Mimulus guttatus	MIGU	15		
*				

At the bottom, the form shows 'Species Count' as 7 and 'Quadrat Count' as 9. The user 'JDL' last changed the data on 9/2/2011.

Figure 20. **Survey Form** with **Quadrat Data** tab highlighted and the first quadrat’s information entered.

**Importing a New Species** - The Species dropdown box refers to a “working list” of plants. There is a complete list of all US plants in the database. However, including these 65,000 records would bog

down the database and make it difficult to search for a particular species. Therefore, only species that are encountered during the surveys are added to the working list. At first you will be adding many new species, but as the database is populated, the need to enter new species will decrease.

For example, try to add “*Abronia elliptica*,” and you will find that it is not on the working list. Instead, type “Unknown”(otherwise the database will have a problem later). Once that species has been accepted, double-click the **Species** field. This will open the **Plant Species** form. (Figure 21).

The screenshot shows the 'Plant Species' form. At the top, there's a green header with the title 'Plant Species' and three search fields: 'Search by Species', 'Common Name', and 'USDA Symbol'. Below the header are two buttons: 'Search' and 'Datasheet View'. The main form area contains several input fields: 'Scientific Name' (with 'unknown' entered), 'USDA Symbol', 'Author', 'Common Name', 'Other Names', and 'Comments'. To the right of these fields are three buttons: 'Import New Species' (blue), 'Delete Record', and 'Cancel'. Below these are two sections: 'Local Status' and 'USDA Status Detail', each containing several dropdown and text input fields. At the bottom is a 'Flora Locations' table with columns: Site Name, State, County, Proclaimed NF, Date, Elev M, and Ecological Unit. The table has four rows, with the last row highlighted. To the right of the table is a button 'Add to Quadrat'. At the very bottom is a record navigation bar showing 'Record: 4 of 4'.

Site Name	State	County	Proclaimed NF	Date	Elev M	Ecological Unit
Edna Grey Spring	NV	Clark	Humboldt-Toiyabe	7/26/2011	2596	Mojave Elevation Mountain
Unnamed 1 Spring	NV	Clark	Humboldt-Toiyabe	10/21/2010	1847	Mojave Mountain Woodland
Fletcher Spring	NV	Clark	Humboldt-Toiyabe	7/28/2011	2400	Mojave Elevation Mountain
Upper Horse Springs	NV	Clark	Humboldt-Toiyabe	10/23/2010	1610	Arid Foothills

Figure 21. **Plant Species Form** to search for a plant on the working list, or import a species from the full list.

On this form, you can search for a species by a common name, USDA symbol, or species name using the search fields at the top. You can also click the **Search** button to look for particular text in all or part of any field. You can also click the **Datasheet View** to peruse the species on the working list. *Abronia elliptica* is not included in this list, so you will need to add it. Click the **Import New Species** button. This opens a form that reads from the full list of plants in the US. The first time this is opened, there might be a delay while it runs a query for the state where the site is located, (in this case, Nevada.) In the State Search by Species Name search box at the top, enter “*Abronia elliptica*”. Click the **Add to Working Plant List** button. The form will close, and the species will be added to the

working plant list. Back on the **Plant Species** form, click the **Add to Quadrat** button on the lower right. Whereupon that form will close, and “Abronia elliptica” will magically be added to the quadrat list. (Note - If this does not work, the most likely reason is that you did not finish adding a species to the subform by tabbing off or clicking elsewhere. It seems counterintuitive, but you must have a species entered in that blank before you change it. Another reason this will fail is if the plant is already on the working list. The system won't allow duplicates.)

To demonstrate another example, double-click on the Species entry you just made, “Abronia elliptica”. The **Species** form will open with that species selected. In the common name search box, look for “Abajo fleabane.” It should soon become obvious that this species is not in the working plant list. Delete the text from the dropdown field to avoid an error message. Then click the **Import New Species** button, then the **View All** button on the form that opens. This will remove the Nevada filter. Search for the species using the **Search by Common Name** field. Click the **Add to Working Plant List** button, and after that form closes, the **Add to Quadrat** button. “Abajo fleabane now appears to have been found in Nevada. When searching for a plant, it is important to make sure you are using the accepted name for the plant. This database uses the USDA Plants database (<http://plants.usda.gov>) as the basis for the plant lists. If you cannot find your target species, use the search functions on the website to make sure the name has not been changed.

Once you have practiced adding species a bit, this process will go smoothly. Delete the fleabane entry by clicking just to its left on the “\*” symbol, thereby highlighting the row, and pressing the **Delete** key. Then click the **Add New Quadrat** button to enter the next quadrat data. Enter “1” as the **Transect**, “5” as the **Distance**, and “channel dry” as the **Setting**. Then enter “1” **Gravel** and “3” **Litters**, and “0” **Bryophyte % Cover**. Enter “Carex” as the **Species**, 20 in **% Cover**, and “Carex 8” in the **Colledtion ID** field. Be careful to type the “Carex 8” exactly as you typed it before or the database will treat them as different species. On the next row, enter “Pinus monophyla” at 1% cover.

Click the **Add New Quadrat** button, and continue to enter the rest of the quadrat data from Appendix A. You will need to import *Oenothera longissima* to the working list. Also, note that three of the quadrats contained no vegetation. After you enter the Bryophyte % Cover and click Enter, the cursor will move to the **Add New Quadrat** button. Clicking Enter again will then move you to the next quadrat.

Also note that you can move through the quadrat records using the left and right arrows on the lower right of the subform. Note that just left of those buttons, the total % cover is calculated. Monitoring this value may be helpful for finding errors. For example, although the percent cover can be over 100% because of overlapping species, very large values such as 300% could indicate a problem.

Click the **Left Arrow** button to scan through the quadrats, and find one that contains *Bromus inermis* (transect 3, distance 6 or 3.) Double-click the **Species** field to open the **Plant Species** form.

Note that any site where this species has been found in a quadrat is listed in the subform at the bottom of the form. You can sort the entries in this subform by any field, and resize the column widths. Right-click the **Site Name** heading and select “Sort A to Z”. Then you can sort by elevation

Tran	Dist	Setting	Bare	Grav	Cobb	Stone	Boul	Bedr	BVeg	Litt	Bryo	Water	Wood
1	2	channel dry							3		1		
1	5	channel dry		1					3				
2	0.5	channel dry								4			
2	3.5	channel dry								4			
2	6.5	channel dry								4			
2	9.5	channel dry								4			
3	3	channel dry								4			
3	6	channel dry		2						2			
3	9	channel margin								3	1		

by right-clicking the **Elevation M** heading. Click **Cancel** to close this form.

Figure 22. **Survey Quadrat** form, opened by clicking the **View Quadrat Data** button.

On the **Survey** form with the **Quadrat Data** tab selected, click the **View Quadrat Data** form. This opens a form that displays the cover information that you have entered for each

quadrat (Figure 22). This is helpful for reviewing for errors, and editing the data. Use the scroll bar at the bottom to view all the data in this form. Click the button with the door at the top of the form to return to the **Quadrat Data** tab.

Next, click the **View Species Data** button. This opens a second form that contains the species information you have entered (Figure 23). Do not change the species names or codes here. If you find an error, it’s best to fix the problem using the quadrat and plant forms. To close this form, click button with the door at the top of the page.

Trans	Dist	Setting	Species	% Cover	Native	Wetland	Comment
3	9	channel margin	Carex	40	N	OBL	
3	6	channel dry	Carex	10	N	OBL	
2	0.5	channel dry	Carex	20	N	OBL	
1	5	channel dry	Carex	20	N	OBL	
1	2	channel dry	Carex	65	N	OBL	
3	3	channel dry	Galium bifolium	2	N		
3	6	channel dry	Juncus	10	N	OBL	
1	2	channel dry	Mimulus guttatus	15	N	OBL	
3	3	channel dry	Oenothera longissima	20	N	OBL	
3	6	channel dry	Oenothera longissima	20	N	OBL	
1	5	channel dry	Pinus monophylla	1	N	FACU-	
3	6	channel dry	Poa pratensis	7	NI	FACU	
*							

Figure 23. **Quadrat Species** data form, opened by clicking the **View Species Data** button.

## Line Intercept

Next enter the Line Intercept data, found on page 6 of Appendix A. Click on the **Woody Vegetation** tab. The species on this form are read from the same plant species working list as the quadrat data. On the first line in the subform, enter “1” in the **Transect field**, and “Rosa woodsii” as the **Species**. Then enter “0” under **Canopy Start**, “.3” in **Canopy End**, and “6.5” in **Transect End**. For each transect, you should enter one, and only one, length. The system will calculate the total transect lengths. Continue to enter line intercept data for transect 1, leaving the transect end blank until you arrive at transect 2, where you will enter “10” in **Transect End**. Note that the system will count the number of transects you have entered, as well as the number of lengths (Figure 24).

Cave Spring 1		ID	R4HTSMNRAH20136		Survey Date	8/1/2011		Survey ID	1314556678	
Soils	Water Table	Hydrology/Flow	Water Quality	Fauna	Disturbance	Mgmt Indicators	Planning	QA/QC		
Survey Info	Georeferencing	Geology	Images	Quadrat Data	Woody Vegetation	Additional Plants	Extra Quadrats			
Line Intercept - distance in meters										
Transect	Species	Symbol	Canopy Start	Canopy End	Transect End					
1	Rosa woodsii	ROWO	0	0.3	6.5					
1	Rosa woodsii	ROWO	2.8	3.3						
1	Quercus gambelii	QUGA	0	0.9						
1	Rosa woodsii	ROWO	4.6	5.6						
1	Rosa woodsii	ROWO	6.4	6.5						
2	Salix lasiolepis	SALA6	0	0.2	10					
2	Rosa woodsii	ROWO	0.1	0.8						
2	Salix lasiolepis	SALA6	0.8	1.5						
Record: 14 of 9 of 9   No Filter   Search										
Transect Count =			2	Transect lengths entered totaling			16.5			

Figure 24. **Survey Form** with the Woody Vegetation tab selected and Line Intercept data entered.

If the number of transects do not match, a message will appear requesting that you correct the error. Note that if there is no canopy cover, you should just enter the **Transect** and the **Transect End**, leaving the **Species**, **Canopy Start**, and **Canopy End** blank.

Once again, if you have more than one row with the same value for a field, is to hold down the **Control** key and press the ‘quote’ key at the same time to copy the value from the previous row into the current field. Please note that for some reason if you use this technique for the transect #, you will still have to use the tab key to get to the next field. If you use it on the species field; however, the cursor will automatically go to the Canopy Start field. If you are entering data fast, you might run into some errors due to this difference.

## Tree DBH

The Tree DBH measurements are entered on the lower subform of the **Woody Vegetation** tab. On the first line, enter “1” for **Transect**, “.5” for **Distance**, “Quercus gambelii” as the **Species**, a **DBH** of “5”, and the **Status** as “live” (Figure 25).

Cave Spring 1		ID	R4HTSMNRAH20136		Survey Date	8/1/2011	Survey ID	1314556678	
Soils	Water Table	Hydrology/Flow	Water Quality	Fauna	Disturbance	Mgmt Indicators	Planning	QA/QC	
Survey Info	Georeferencing	Geology	Images	Quadrat Data	Woody Vegetation	Additional Plants	Extra Quadrats		

Line Intercept - distance in meters

Transect	Species	Symbol	Canopy Start	Canopy End	Transect End
3	Rosa woodsii	ROWO	7.9	9.2	
3	Cornus sericea	COSE16	8.2	8.4	
3	Rosa woodsii	ROWO	9.8	9.9	
4	Quercus gambelii	QUGA	0	5.1	10.7
4	Rosa woodsii	ROWO	1	4.8	
4	Rosa woodsii	ROWO	5.5	7.6	
4	Rosa woodsii	ROWO	8.2	10.7	
4	Salix lasiolepis	SALA6	3.4	5.5	

Record: 33 of 33 No Filter Search

Transect Count = 6 Transect lengths entered totaling 51.2

Tree DBH

Transect	Distance m	Species	Symbol	DBH cm	Status
1	0.5	Quercus gambelii	QUGA	5	live
*					

Record: 1 of 1 No Filter Search

Last Changed by JDL Date 9/2/2011

Figure 25. **Survey Form** with the **Woody Vegetation** tab selected and **DBH** data entered.

### Additional Plants

Additional plant data are entered in a similar fashion. Click on the **Additional Plants** tab, and enter the species and settings found on Page 8 of Appendix A.

### Saving and Compiling Plant Data - Important!

After all the vegetation data have been entered, click the **Quadrat Data** tab, and the **Save Data** and **View Reports** button. This is a very important step, as it activates code that calculates totals and averages of vegetation data that populate a separate table. If you change any vegetation information, make sure you take this action again before you run any reports. These calculations occur automatically when a survey is closed by using the close (door) button. Note that if you have not entered certain information that is necessary for the calculations, such as the total area of the site, this form will not open properly.

Assuming that you have entered the vegetation data correctly from Appendix A, the report should look like Figure 26.

**Vegetation Report Options** Cave Spring 1  
Choose Report [dropdown]

**Quadrat Data**  
 Quadrat Count: 10    Area (sq m): 200  
 Bryophyte % Cover in Quadrats: 1.7

**Ground Cover**

Bryophyt	7.5
Bare	0
Gravel	7.5
Cobble	0
Stone	0
Boulder	0
Bedrock	0
Basal Veg	15
Litter	70
Water	0
Wood	0
Total	100

**Quadrat Cover Species**

	Native	Introduced	Unknown	Total
Species Count	6	0	1	7
Species/sq meter	0.03	0	0.005	0.035
Percent Cover	22.3	0	0.7	23

Prevalence Index: 1.105

**Woody Species**

	Live	Dead	
Species Count	4		Transect Total (m) 51.2
% canopy cover	108.984		Canopy Total (m) 55.8
Tree Belt Measured	1	0	
Trees per Hectare	50	0	
Total Basal Area (sqm)	0.002	0	
Basal Area per hectare	0.1	0	

**Additional Plant Species**      **All Species**

Species Count: 4      Species Count: 14

Figure 26. **Survey Form** with the Woody Vegetation tab selected and DBH data entered.

## Fauna

Click the **Fauna** tab. If invertebrates were collected, click that checkbox. Enter the number of sampling reps if applicable, the source of invasive species information, and any notes on fauna. Fauna detected are entered in much the same way as vegetation. Refer to the fauna field sheet on page 9 of Appendix A.

Invertebrates are entered on the upper subform. Although it is possible to develop an invertebrate list, accessible by double-clicking the **Invert Taxon** field, it is not necessary as entries are not limited to the species list. Enter "LEP Nymphalidae Limenitis weidemeyerii" (Weidemeyer's admiral) as the **Invert Taxon**, "1" in the **Number** field, "Adult" for **Lifestage**, "obs" for **Detection Type**.

Vertebrates are entered on the lower subform. These entries are limited to the list, but are quite easy to add by double-clicking the **Species** field. Species are listed by common name. Enter the

species listed on the fauna sheet, as well as **Detection Type**, **Age Class**, **Number**, **Substrate**, whether the species is **Invasive**, **Aquatic** or **Terrestrial**, and **Comments** (Figure 27).

Cave Spring 1 ID R4HTSMNRAH20136 Survey Date 8/1/2011 Level 2 Survey ID 1356727128

**Survey Info** **Georeferencing** **Geology** **Images** **Quadrat Data** **Woody Vegetation** **Additional Plants** **Extra Quadrats**  
**Soils** **Hydrology/Flow** **Water Quality** **Fauna** **Disturbance** **Mgmt Indicators** **Planning** **QA/QC**

Aquatic Invertebrates Collected:  Sampling Reps  Notes   
 Source of list for invasive species:  On Fauna

Invertebrate taxa

Invert Taxon	Number	Lifestage	Detection	Comments	CollectionID
*					

Record: 1 of 1 No Filter Search

Vertebrates

Species	Detection	AgeClass	Number	Substrate	Invasive	Aq or Ter	Comments
*					<input type="checkbox"/>		

Last Changed by mnh Date 12/28/2012

Figure 27. **Survey Form** with the **Fauna** tab selected.

## Images

Click on the **Images** tab. You should attach one representative photograph (.jpg is preferred) in the field on the left and the sketchmap in the field on the right (Figure 28). **Although it is possible to attach more images, it is inadvisable to include very many as it would unnecessarily swell the size of the database and eventually corrupt it. Also, very large image files should be reduced as much as possible.** Unless there is a compelling reason to scan the sketchmap in color, a grayscale image will be much smaller.

To attach an image, double-click inside the box. In the small form that pops up, click on the **Add** button. Browse to the location of the image, select it, and click **Open**. Follow the same procedure to attach the sketchmap. You can also manage images by double-clicking the field and selecting the **Add**, **Remove**, or **Open** button.

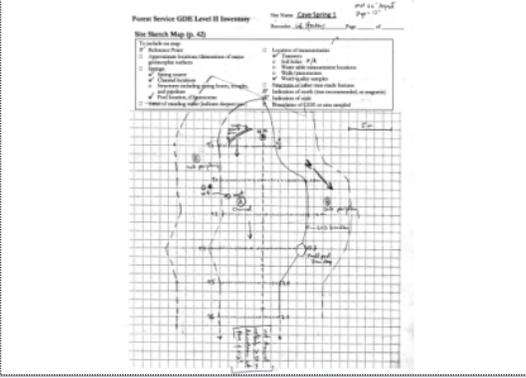
Login Form		Sites		Surveys							
Cave Spring 1			ID	R4HTSMNRAH2O136		Survey Date	8/1/2011		Survey ID	1314556678	
Soils	Water Table	Hydrology/Flow	Water Quality	Fauna	Disturbance	Mgmt Indicators	Planning	QA/QC			
Survey Info	Georeferencing	Geology	Images	Quadrat Data	Woody Vegetation	Additional Plants	Extra Quadrats				
Photo Comments	Cave 1 Reference Point View Down				Sketchmap Comments						
 											
		Last Changed by		JDL	Date	9/2/2011					

Figure 28. **Survey Form** with the **Images Tab** selected and the photograph and sketchmap attached.

## Disturbance

Click the **Disturbance** tab. Check any of the boxes marked on the Disturbance field form—page 10 of Appendix A and include any comments regarding disturbance in the **Notes on Disturbance** field. Also enter any notes regarding cultural or historic use (Figure 29). Note that you will need to use the scroll bar on the right side of the form to view all the fields.

Survey Info		Georeferencing	Geology	Images	Quadrat Data	Woody Vegetation	Additional Plants	Extra Quadrats	
Soils	Hydrology/Flow	Water Quality	Fauna	Disturbance	Mgmt Indicators	Planning	QA/QC		
<input type="checkbox"/> Pedestals or hummocks (people or animals) <input type="checkbox"/> Pedestals (small-scale, rain-splash induced) <input type="checkbox"/> Pipes <input type="checkbox"/> Rill erosion <input type="checkbox"/> Ruts (from vehicle tread) <input type="checkbox"/> Sheet erosion <input type="checkbox"/> Slump <input type="checkbox"/> Splash erosion/soil crust <input type="checkbox"/> Wind erosion <input type="checkbox"/> Soil mixing <input type="checkbox"/> Soil removal (peat mining) <input type="checkbox"/> Trails (by people or animals) <input type="checkbox"/> Other soil disturbance <input type="checkbox"/> None observed		<b>Miscellaneous</b> <input type="checkbox"/> Fire <input type="checkbox"/> Tree cutting (timber harvest or other) <input type="checkbox"/> Refuse disposal <input type="checkbox"/> Other misc disturbance <input type="checkbox"/> None observed <b>Cultural or Historic Use</b> <div style="border: 1px solid black; height: 40px; width: 100%;"></div> <b>Notes on Disturbance</b> <div style="border: 1px solid black; height: 40px; width: 100%;"></div>							
Record: 1 of 1    No Filter    Search    Last Changed by: mnh    Date: 12/28/2012									

Figure 29. *Survey Form* with the *Disturbance tab* selected.

### Management Indicators

Next, refer to the two-page Management Indicator field sheet on pages 11 and 12 of Appendix A. Click on the **Mgmt Indicators** tab. For each question, enter “True”, “False”, “NA” (not applicable), or “UA” (unable to answer). Should you enter a “False” or a UA response, the cursor will move to the associated comment field, and the field will turn yellow. This signals you to enter a brief explanation of why your response was “False”. Once you enter a comment, the field will again turn clear; if you do not, it will remain yellow to remind you (Figure 30).

Occasionally when entering data for this sheet, you will receive a "Cannot open any more databases" error. This problem remains unresolved. You will need to close the database and reopen it. If you regularly experience this problem, you can avoid it by closing the survey and re-opening it when you are about half way through entering Management Indicator data.

Cave Spring 1		ID	R4HTSMNRAH20136	Survey Date	8/1/2011	Survey ID	1314556678
Survey Info	Georeferencing	Geology	Images	Quadrat Data	Woody Vegetation	Additional Plants	Extra Quadrats
Soils	Water Table	Hydrology/Flow	Water Quality	Fauna	Disturbance	Mgmt Indicators	Planning
<b>Hydrology</b> 1) Aquifer (groundwater) not altered    True <input type="checkbox"/> <input type="text"/> 2) Watershed (surface water) not altered    True <input type="checkbox"/> <input type="text"/> 3) Water quality changes not affecting site    True <input type="checkbox"/> <input type="text"/> <b>Geomorphology and Soils</b> 4) Landform stability not altered    True <input type="checkbox"/> <input type="text"/> 5) Runout channel functioning naturally    True <input type="checkbox"/> <input type="text"/> 6) Soil integrity not altered    True <input type="checkbox"/> <input type="text"/> <b>Biology</b> 7) Vegetation composition as anticipated    False <input type="checkbox"/> <b>Some evidence of encroachment</b> 8) Vegetation condition is healthy <input type="checkbox"/> <input type="text"/> 9) TES, SOI/SOC, focal flora as anticipated <input type="checkbox"/> <input type="text"/> 10) Faunal species as anticipated <input type="checkbox"/> <input type="text"/> 11) TES, SOI/SOC, focal fauna as anticipated <input type="checkbox"/> <input type="text"/> 12) Invasive species not established <input type="checkbox"/> <input type="text"/> <b>Disturbances</b> 13) <input type="checkbox"/> <input type="text"/> 14) <input type="checkbox"/> <input type="text"/> 15) <input type="checkbox"/> <input type="text"/> 16) <input type="checkbox"/> <input type="text"/> 17) <input type="checkbox"/> <input type="text"/> 18) <input type="checkbox"/> <input type="text"/> 19) <input type="checkbox"/> <input type="text"/> 20) <input type="checkbox"/> <input type="text"/> 21) <input type="checkbox"/> <input type="text"/> 22) <input type="checkbox"/> <input type="text"/> 23) <input type="checkbox"/> <input type="text"/> 24) <input type="checkbox"/> <input type="text"/> 25) <input type="checkbox"/> <input type="text"/> 26) <input type="checkbox"/> <input type="text"/> 27) <input type="checkbox"/> <input type="text"/> 28) <input type="checkbox"/> <input type="text"/> 29) <input type="checkbox"/> 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## Data Summaries

Figure 31. **Project Report Switchboard**

The data summaries run queries that can be exported as spreadsheets for analysis or reporting. From the **Main Switchboard**, clicking the **Reports** button will open the **Reports Switchboard**. Select a **Forest**, and the number of Level II (full) surveys and all surveys, along with the range of dates, will appear. Select a **Date Range** for the surveys you wish to view. You can narrow the search by selecting a **Survey Level**.

Choose the format for your output report by using the **Format** drop down list. Options are Excel, Form, PDF, or Report. (Users are not allowed to select query reports. Clicking on the **Select Report** dropdown box will reveal a list of reports (and descriptions) that you can generate (Figure 31).

## Data Entry Forms

Several forms allow you to review and edit data for multiple surveys in a spreadsheet view. For example, enter a **Date** range, select the **Forms** format, then **General Survey Data**. Click Run Report, to open a form like the one shown in Figure 32. The **Site Name**, **Site ID**, **Survey Date**, and **Survey Level** fields cannot be edited in this view. As always, use the **Close** button to close this form.

General Survey Information																				
Site Name	Site ID	Survey Date	Survey Level	Time Start	Time End	Weather	Examiners	Air Temp C	Polygon	Reference Point	Area sq M	Long Axis TN	Aspect TN	Trans Int. m	Slope PC	Surrounding Vegetation	Cut Level	Spring %	Channel %	Wetl %
Big Timber Spring	R4HTSMNRA H2O073	5/31/2012	2	10:10	13:10	No current/recent precip.	Larry Stevens, Jeri Ledbetter, Patty West, Jon Griffith	25.6	No	Right of channel below upper pool	169	241	231	5	14	Tree dominated	C	1	35	10
Bill Smith Spring	R4HTSMNRA H2O095	5/27/2012	2	14:45	17:00	No current/recent precip.	Larry Stevens, Jeri Ledbetter, Patty West, Kyle Paffett, Lisa Schaller		No	Lower constructed dam at the top of the channel	80	179	179	3	36	Shrub dominated	C	3	75	
Cane Spring 1	R4HTSMNRA H2O003	10/22/2010	1	11:30	11:55	Rain during survey	Larry Stevens, Jeri Ledbetter, and Patty West	8	No	n/a	0	0	0	0				0	0	0
Carpenter Canyon 2	R4HTSMNRA H2O005	6/26/2012	2	8:45	11:30	No current/recent precip.	Jeri Ledbetter, Patty West, Dane Andersen, Anya Faylor	24.4	No	Turn in trail at top of site	2104	256	171	10	32	Shrub dominated	C	20	8	42
Cathedral Chute Spring	R4HTSMNRA H2O199	7/26/2011	2	15:45	18:15	Recent rain	Larry Stevens, Jeri Ledbetter, Patty West, Lisa Schaller, Anya Faylor	20	No	Top of uppermost source	444	330	330	6	53	Tree dominated	C	1	5	89
Cave Spring	R4HTSMNRA H2O206	7/1/2012	2	9:30	11:15	No current/recent precip.	Abe Springer, Jeri Ledbetter, and Anya Faylor	18.9	No	Pool at the base of the cliff	28	281	191	2	184	Tree dominated	C	1	3	

Figure 32. **General Survey Information** form.

Selecting a **Date** range, the **Forms** format, and Invertebrate List will open a form like the one shown in Figure 33.

Invertebrates Detected											
Site Name	Site ID	Survey Date	Level	Invertebrate Species	Number	Lifestage	Detection Type	Comments	Last Edit	Edit Date	
Big Timber Spring	R4HTSMNRAH20073	5/31/2012	2	LEP	1	Adult	spot		JDL	11/26/2012	
Big Timber Spring	R4HTSMNRAH20073	5/31/2012	2	LEP Lycaenidae Leptotes marina	1	Adult	spot		JDL	11/26/2012	
Big Timber Spring	R4HTSMNRAH20073	5/31/2012	2	LEP Hesperidae Hesperia juba	1	Adult	spot		JDL	11/26/2012	
Big Timber Spring	R4HTSMNRAH20073	5/31/2012	2	LEP Nymphalidae nymphalis antiopa	1	Adult	obs		JDL	11/26/2012	
Big Timber Spring	R4HTSMNRAH20073	5/31/2012	2	DIP Bombyliidae	1	Adult	spot		JDL	11/26/2012	
Big Timber Spring	R4HTSMNRAH20073	5/31/2012	2	DIP Syrphidae	1	Adult	spot		JDL	11/26/2012	
Big Timber Spring	R4HTSMNRAH20073	5/31/2012	2	LEP Nymphalidae Limenitis weidemeyerii	1	Adult	obs		JDL	11/26/2012	
Big Timber Spring	R4HTSMNRAH20073	5/31/2012	2	RAP Raphidiidae Agulla	1	Adult	spot		JDL	11/26/2012	
Big Timber Spring	R4HTSMNRAH20073	5/31/2012	2	COL Buprestidae	1	Adult	spot		JDL	11/26/2012	

Figure 32. **Invertebrates Detected** form opened from the Reports switchboard.

Available forms are listed in the table below:

Report Title	Report Description
General Survey Data	General data by survey -- air temp, aspect, area of site, etc.
Georeference Survey Data	Georeferencing data by survey -- coordinates, elevation, etc.
Geology Survey Data	Geology data by survey
Soils Data	Soils data by survey
Water Quality All	Water quality measurements, with parameters not in GDE field guide
Water Quality Required	Water quality measurements, for parameters in GDE field guide
Invertebrate List	Invertebrate species detected list by survey
Vertebrate List	Vertebrate species detected by survey
Management Indicators 1-12	Management indicator tool responses by survey, questions 1-12
Management Indicators 13-25	Management indicator tool responses by survey, questions 13-25

## Reports Exported to Excel

You can export nearly all of the data into Excel spreadsheets. This will allow you to create graphs, link survey data to GIS, or conduct other analyses. Should you find errors in the data, you will of course need to revise the database. Figure 33 displays an Excel spreadsheet exported directly from the database by selecting a **Forest**, a **Date** range, a **format** of Excel, and the **Quadrat Species % Crosstab** report.

Species	Symbol	Local Wetland	LocalNativeStatus	LocalSOC_SOI	LocalInvasive	Cave Spring	Cave West Spring	Unnamed 10 Spring
algae sp	2ALGA	OBL	N			5		
Angelica scabrida	ANSC9	FACW	N	SOC2				1.77
Aquilegia formosa	AQFO	FAC	N					18.3
Calamagrostis purpurascens	CAPU		N					0.47
Carex aurea	CAAU3	OBL	N					5.76
Jamesia americana var. rosea	JAAMR	FACU	N				0.2	
Juncus ensifolius	JUEN	FACW+	N					0.24
Maianthemum stellatum	MAST4	FAC	N					3.94
Platanthera sparsiflora	PLSP2	FACW	N					2.39
Primula fragrans	DOJER	OBL	N					14.7
unknown Graminoid (grass or grasslike)	2GRAM					1	8	
Viola sororia	VISO	FACW+	N					0.71

Figure 33. **Quadrat Species % Crosstab Report**, exported to Excel with some limited formatting.

When you click Run Report, you will need to browse to the location where you want the Excel spreadsheet saved. It is important that you save it fairly close to the root drive; otherwise the path address will be too long. You can always save it elsewhere later. The file will be given a name that identifies the user, the report, and the date that the file was created. Once the file is created, it will open in Excel.

**Important** - Note that if you export the same report twice in the same day, you will need to make sure that the previous report is closed; otherwise you will get an error message. Also, keep in mind that the new report will overwrite the previous one.

Available Excel products are listed in the table below:

Report Title	Report Description
General Survey Data	General data by survey -- air temp, aspect, area of site, etc.
HUC Crosstab	Count of surveys by 8-digit HUC
Georeference Survey Data	Georeferencing data by survey -- coordinates, elevation, etc.
Vegetation Totals	Vegetation summary by survey (not species lists) - Level 2
Quadrat Species % Crosstab	Plant species and cover in herbaceous layer by survey - Level 2
Woody Species % Crosstab	Woody plant species and cover by survey - Level 2
DBH Crosstab	DBH measurements by survey - Level 2
Additional Plants Crosstab	Additional plant species not in quadrats, woody species, or DBH - Level 2
Vegetation List	Plant list for all species encountered; union query - Level 2
Geology Survey Data	Geology data by survey
Spring Type Crosstab	Spring types and count by HUC12
Soils Data	Soils data by survey
Water Quality All	Water quality measurements, with parameters not in GDE field guide
Water Quality Required	Water quality measurements, for parameters in GDE field guide
Water Quality Crosstab	Water quality averages by survey, with parameters not in GDE field guide
Water Quality Required Crosstab	Water quality averages by survey, for parameters in GDE field guide
Hydrology Data	Flow and hydrology data
Invertebrate List	Invertebrate species detected list by survey
Invertebrate Crosstab	Count of invertebrate species detected by survey
Vertebrate List	Vertebrate species detected by survey
Vertebrate Crosstab	Crosstab of vertebrate species tected by survey
Disturbance	Disturbances by survey
Management Indicators	Management indicator tool responses by survey
Survey Compilation Level II	Compilation of Level II survey report data (exports to Excel)
Survey Compilation Level I	Compilation of Level I survey report data (exports to Excel)

## Comprehensive Reports - View

It is also possible to export multiple or single comprehensive survey reports to view within Access. Typically these reports are five pages, containing general survey data, the representative photograph, flora and fauna lists, soils notes, disturbance, and management indicators. They are not editable. This may take some time to create a report for multiple sites. To run a report, select

the Forest, a Date range, Report format, and the report type - Level I or Level II, single or multiple sites. These reports will run in print preview mode, and can then be exported to a PDF.

### **Comprehensive Reports - Export to PDF**

You can also export comprehensive reports directly into a PDF. Select the Forest, a Date range, Report format, and the report type - Level I or Level II, single or multiple sites. You will need to browse to the location where you want the report to be saved. It is important that you save it fairly close to the root drive; otherwise the path address will be too long. You can always save it elsewhere later. The file will be given a name that identifies the user, the report, and the date that the file was created. Once the file has been created, it will open in Adobe Acrobat.

### **Important Note on Editing Queries**

A suite of standard reports was developed. If Access skills are available, additional queries could be developed to meet other needs. Existing queries should not be changed because many queries build upon others, therefore editing one query may affect other objects. However, a copy of a query could be made (by saving it with another name) and the copy could be edited.