Working with Excel, Displaying X/Y Data

Note: This is from one of my classes and shows how to bring Excel data into ArcGIS and how to use this. I do not supply any data with this, but you should be able to see how this will work with your own data.

◈ Working with Excel files in ArcGIS

- ▶ Supported directly starting with ArcGIS 9.2 as read-only tables.

    - ♦ Functionality is limited because Autonumber fields, which are the equivalent of the Objectid fields in ArcGIS, cannot be created in Excel. Excel tables can be queried and can be used to display event themes, but joins and relates might not work. Once the Excel table is read in ArcMap, it can be exported into a more functional format if needed.

- ▶ ArcGIS treats worksheets and named ranges as tables and these are displayed in ArcCatalog with $ at the end.

- ▶ ArcGIS will accept long field names with spaces. If you might convert the Excel table to a feature class or export the table to another format, it is best to keep field names to 10 characters or less with no spaces.

- ▶ ArcGIS determines the data type for fields based on the first 8 rows of data.

    - ♦ If 4 or more rows have numbers the field is treated as a number field, which could cause some problems if this is a situation where the values should be treated as text instead of numbers.

- ▶ First non-empty row is treated as the field headers. If there are extra empty rows, this might cause problems.

    - ♦ Best to make data in Excel look like a table without any extra rows or columns.

- ▶ To name a "table" in Excel, highlight the cells and then type a name into the box to the left of the formula area.

❖ Getting point location field data into ArcMap

▶ Download from GPS into Shapefile or Geodatabase Format.

♦ Most GPS software allows direct conversion to GIS data formats. If not, the data can be exported to a text file, usually called an ASCII file.

♦ 3rd Party programs like DNR Garmin, which is a free program written by Minnesota Department of Natural Resources to convert Garmin GPS data to ArcGIS formats. Google on "DNR Garmin" to get to the site and download the program.

▶ ArcPad – Software that allows you to bring GIS data into the field, and then enter data directly into GIS in the field.

▶ Other software formats that can be imported into or read by ArcGIS in a tabular format.

♦ Comma-delimited text files, such as .txt or .csv, which ArcGIS can read. GPS can download to this format if the software can't download directly to a GIS format.

♦ Database programs like Access, which can be read by ArcGIS, or database programs that generate .dbf files.

♦ Programs that can export to .dbf or .txt format, such as Excel.

♦ Data needs to be in a "table" format with "rows" and "columns".

• "Column" names should be 10 characters or less, with no spaces or funny characters.

• There should not be any empty rows or summary rows.

• The "table" needs to have separate fields for coordinate pairs, x/y; lat/long, etc.

	A	B	C
1	Take	x	y
2	1	535930	5288435
3	2	542138	5282010
4	3	539396	5276326
5	4	535608	5299539
6	5	535930	5288435
7	6	530511	5290520
8	7	541833	5295550
9	8	544795	5279816
10	9	541364	5280225
10	10	539681	5283093

MooseTakings.txt - Notepad

File Edit Format View Help

```
Take,x,y
1,535930,5288435
2,542138,5282010
3,539396,5276326
4,535608,5299539
5,535930,5288435
6,530511,5290520
7,541833,5295550
8,544795,5279816
9,541364,5280225
10,539681,5283093
```
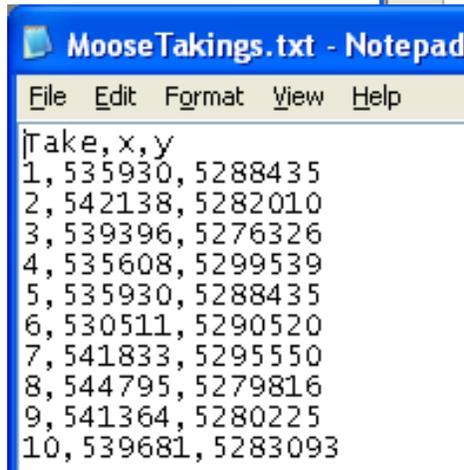
Exercise 16: Working with Excel; Displaying X/Y Data

We will use a map and data from the Black Crater wildfire that burned near Sisters Oregon in July 2006. This exercise is based on data gathered by structural fire fighters used to evaluate which homes they could protect if the fire moved into the Edgington subdivision just west of Sisters. The key data is the "Triage Class" which runs from green to brown, with brown being a house that could not be defended during a wildfire.

The base data is stored in a personal geodatabase while the data gathered in the field was entered into Excel. Those entries have been simplified for this exercise, and we've also added a few errors in data entry so you can see how to work with a less than optimum spreadsheet.

Part A: Working with Excel

1. **Open ArcCatalog** and navigate to **C:\ArcGIS_NR\ SistersAreaTriage**. You may need to create a folder connection to the SistersAreaTriage folder.

   → Expand the **SistersAreaTriage** folder, the **StructFireData** Geodatabase and the **Edgington_Subdivision.xls** file.

   → Preview some of the data in the Geodatabase if you want.
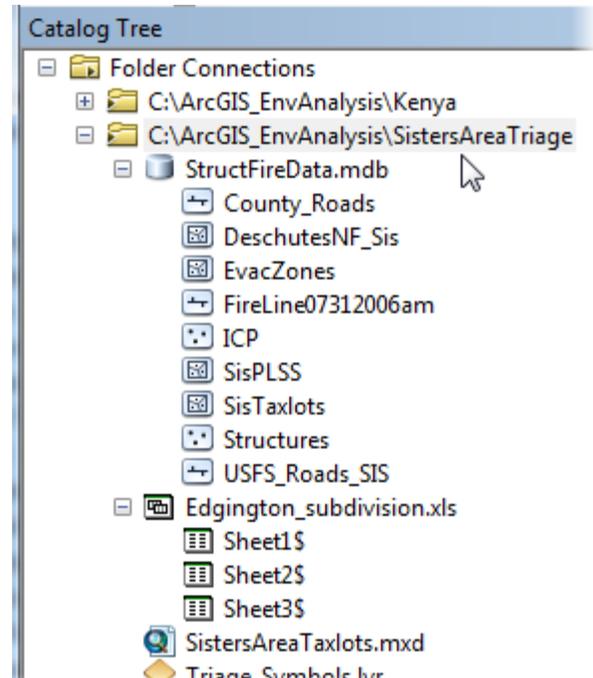
2. Let's look at the Excel data and see how it looks in ArcCatalog. Right now, you should see three "tables" as numbered sheets with a $. Preview each of these. Sheet1 will look sort of like a table, but not too useable in ArcGIS and sheets 2 and 3 will just show one empty field with a generic name like F1.

F1	Edgington_Subdivision_Data	F3	F4	F5
		Structures		
	Taxlot Number	Triage Class	Longitude	Latitude
	1510180000300	Brown	-121.577214	44.274431
	1510180000303	Green	-121.578352	44.276275
	1510180000400	Green	-121.579836	44.27523
	1510180000401	Green	-121.581328	44.274684
	1510180000600	Blue	-121.585538	44.276483
	1510180000700	Not Triaged	-121.589045	44.273585
	1510180001300	Not Triaged	-121.58564	44.272109
	1510180001400	Blue	-121.583357	44.270629
	1510180001500	Brown	-121.580933	44.270558
	1510180001600	Green	-121.577018	44.271622

3. **Close ArcCatalog**. Next we will open Excel and make a few changes to the Edgington_ Subdivision.xls file to make it more compatible with ArcGIS.

4. Open Excel and then open the **Edgington_Subdivision.xls** file from the **C:\ArcGIS_NR\SistersAreaTriage** folder.

→ You will see a name for the spreadsheet at the top, then two groups or "tables" of data. One shows taxlot numbers and triage class plus latitude and longitude, (*this is already shown as being selected*) while the other shows some water sources and their location.
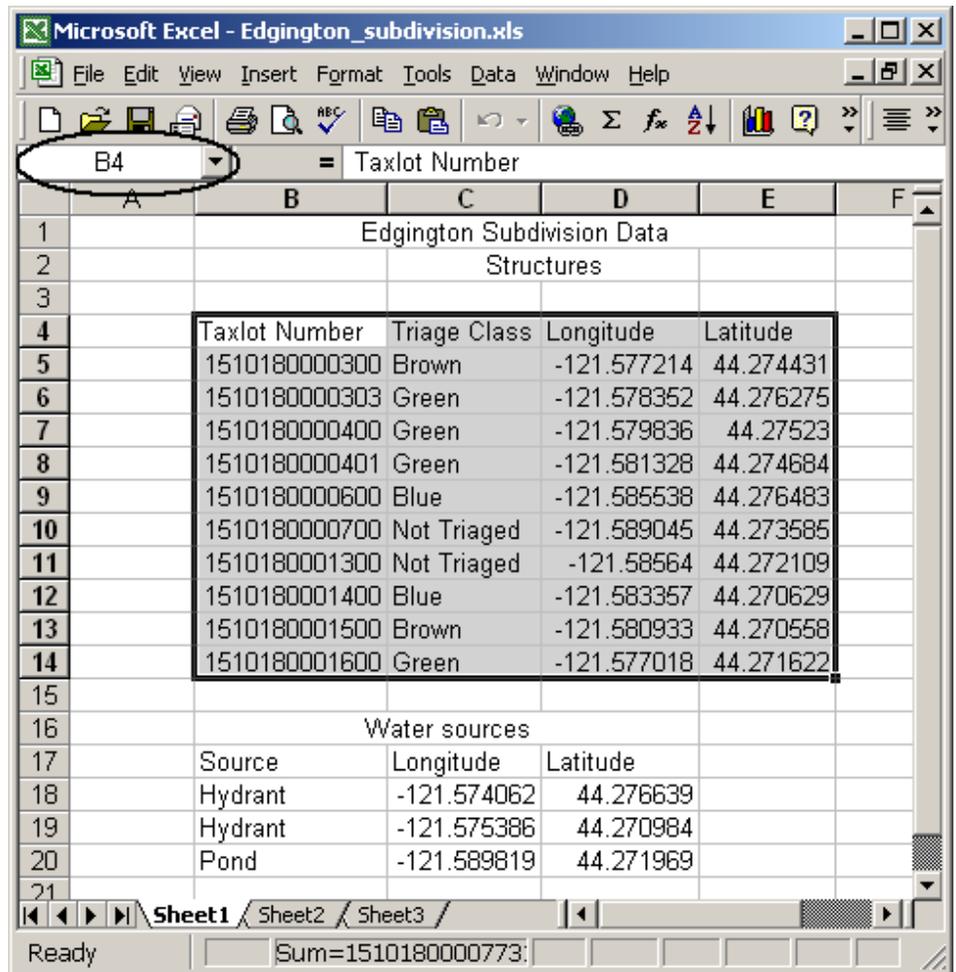
5. Now we will give these two groups names so that ArcGIS will recognize them as tables.

→ Select the top "table" by dragging a window from cell **B4** to cell **E14** as shown in the illustration.

→ Then in the "Name" section near the upper-left of the Excel window (it should say B4 now) click your cursor and type in the name **Structures**. Be sure to hit the Enter key after typing in the name.

→ Then select the next "table" from cell **B17** to cell **D20** and name this **Water_Sources**.

6. The Excel file will work pretty well now in ArcGIS, but we should make a couple more changes to make it more compatible with ArcGIS. While ArcGIS will read tables with long field names or field names with spaces, this might cause some problems with some operations.

→ In the **Structures** table, change the field **Taxlot Number** to **Taxlot**, and change the Triage Class field to **TriageVal**.

→ Since there is no data in **Sheet2** or **Sheet3**, delete these by right-clicking on them (at the bottom of the spreadsheet) and selecting **Delete**.

→ Then **Save** and close Excel.

7. **Open ArcMap**, click on **Browse for more…** under the Existing Maps section and then browse to **C:\ArcGIS_NR\SistersAreaTriage** and open the **SistersAreaTaxlots.mxd**.
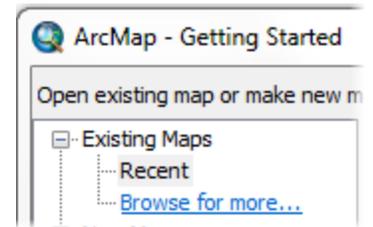
→ The map should look similar to the one below. The Edgington subdivision, for which we have the Excel data, is in the center, with the fire line to the west. You will notice another subdivision to the north where we already have information on which houses have been surveyed for fire defensibility, and the city of Sisters to the northeast.
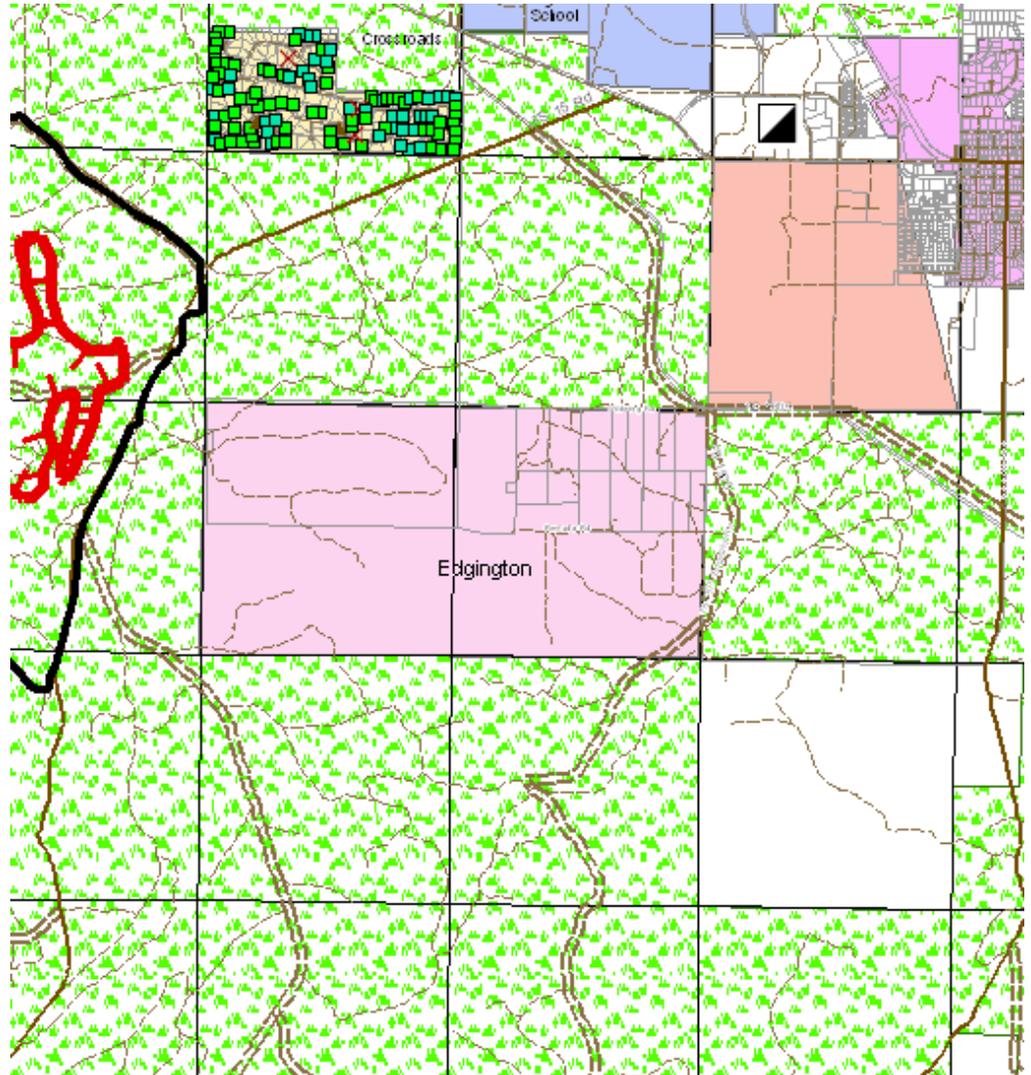
→ If you want, zoom to the full extent to see all the area of the fire and the surrounding areas. To return to the starting view, you can select **Bookmarks> Edgington-Crossroads**.

8. Next we will bring in the Excel data and see how it works in ArcMap.

→ Click on the **Add Data** button, navigate to **C:\ArcGIS_NR\SistersAreaTriage**, double-click on **Edgington_subdivision.xls** and you will see the two tables you named and Sheet1$.

→ Select both of the tables and click **Add**.
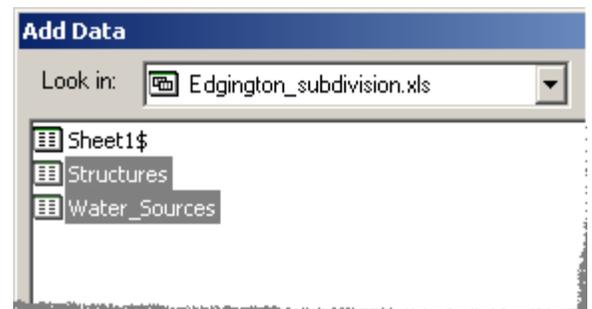
9. Let's see how the Excel table looks and works in ArcMap.

→ Open the **Structures** table. (If both tables are still highlighted, click in a blank area of the table of contents to unselect them). It looks just like any other table. If you select Options from the table window, you will see that all the choices are available except Add Field. (*If the values in the Taxlot field show <NULL> instead of values, this is a quirk. The values are actually there and when you export the Excel table to a GDB format, which you will do in the next step, you should see valid values.*)

→ To verify that querying works just like any other table use **Select by Attributes** to query on all the structures where the TriageVal is Green. Clear the selection when you're done but keep the table open.
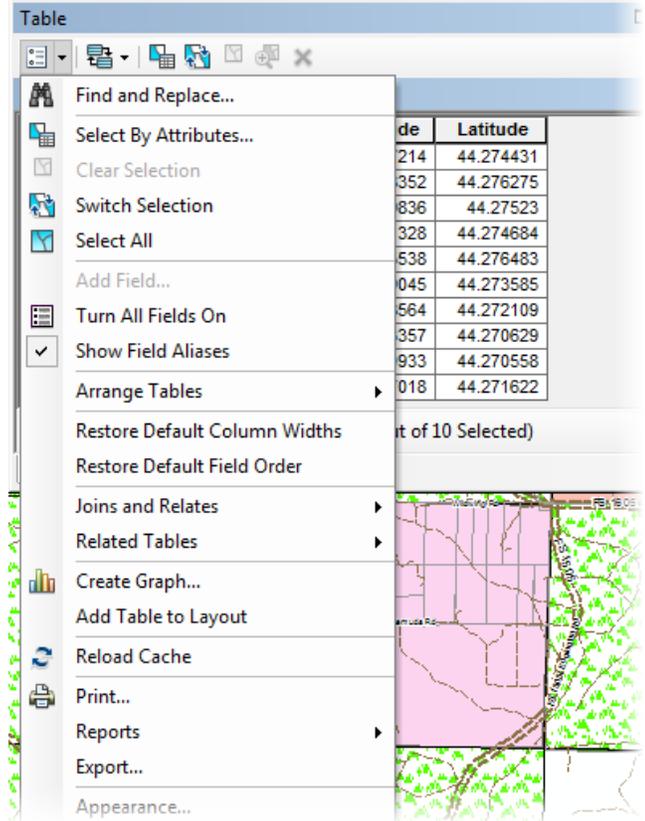
10. It would be useful to join the Structures table to the Sisters Taxlot layer so that we could display the taxlots by triage class.
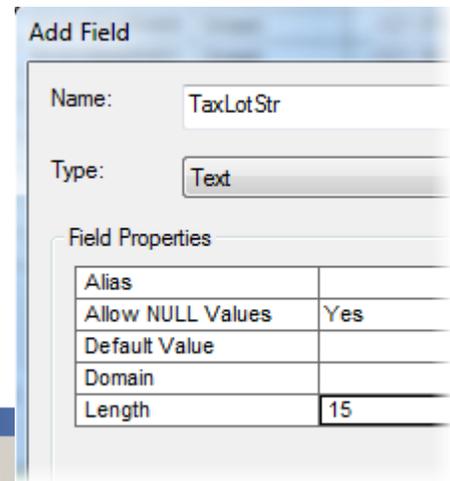
→ Open the attribute table for the **Sisters Taxlots layer** and select **Options>Arrange Tables>New Horizontal Tab Group** you can see the **Taxlot** fields for the both tables.

  → Note that in the Structures table the data is <u>right-justified</u> and in the Sisters Taxlots table the data is <u>left-justified</u>. This indicates that in the Structures table the data is a <u>numeric</u> data type, but in the Sisters Taxlots table, the data is a <u>text</u> data type. Tables can only be joined when the data in the common fields is the same data type. Because we can't edit the Excel data to create a text field, we will need to export this to a table that ArcMap can edit.
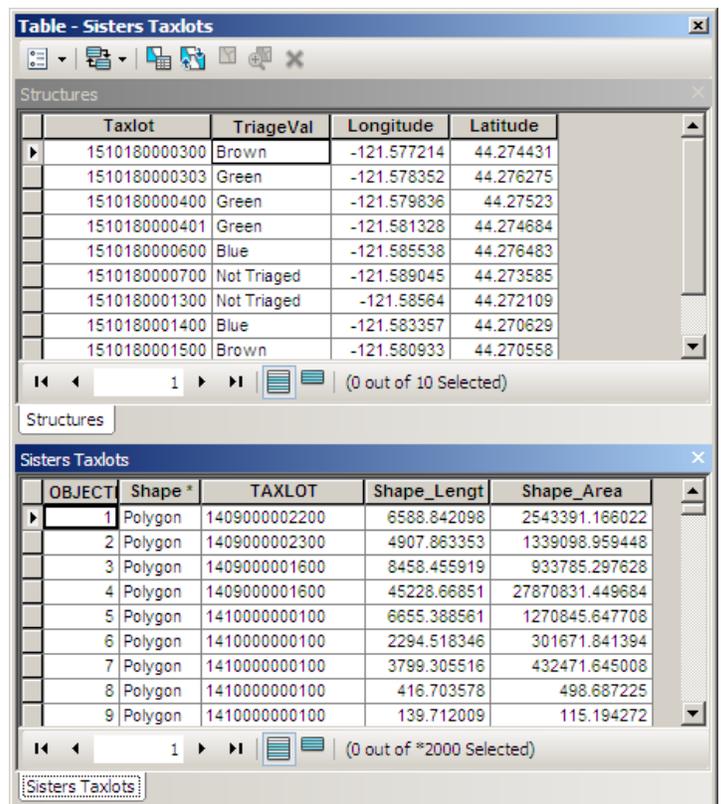
→ **Close** the **Sisters Taxlots** table, but leave the Structures table open.

→ From the **Options** menu on the **Structures** table, select **Export…** and click the Browse button.

→ In the Saving Data dialog, select **File and Personal Geodatabase tables** as the **Save as type:** (When exporting to a dbase format, Excel sometimes rounds off or truncates numbers; export to an Access or GDB format usually works better.)

→ Then navigate to the **StructFireData.mdb** Geodatabase and save the output table as **StructuresMDB**, *(I added MDB at the end so I know this is the geodatabase version of the table)* and add it back into the map when asked.

→ Now **close** the **Structures** table and **open** the new **StructuresMDB** table.
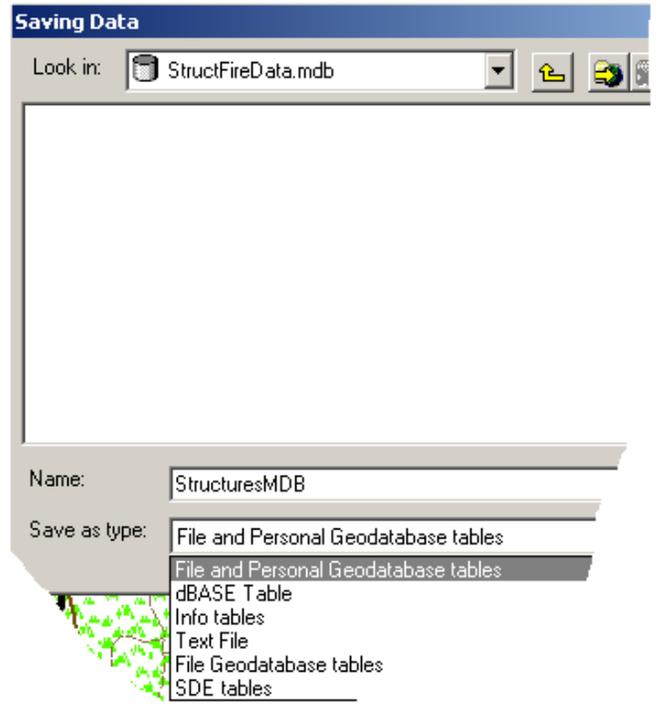
→ Select **Options>Add Field…** and create a new field named **TaxlotStr** (Taxlot String) with a data type of **Text** and a length of **15**.

→ After the new field is added to the table, right-click on the field and select **Field Calculator…** and calculate the **TaxlotStr** field to be equal to the **Taxlot** field.

→ The values in the **TaxlotStr** field will be the same as in the **Taxlot** field, but they are now left-justified, indicating a text data type.

Note: If it was necessary or preferable to keep the Excel data in an Excel format, we could have added the TaxlotNum field to attribute table for the Sisters Taxlot and then been able to join the Excel data to the Sisters Taxlot layer. Or you could create a model that would automate adding and calculating the field.
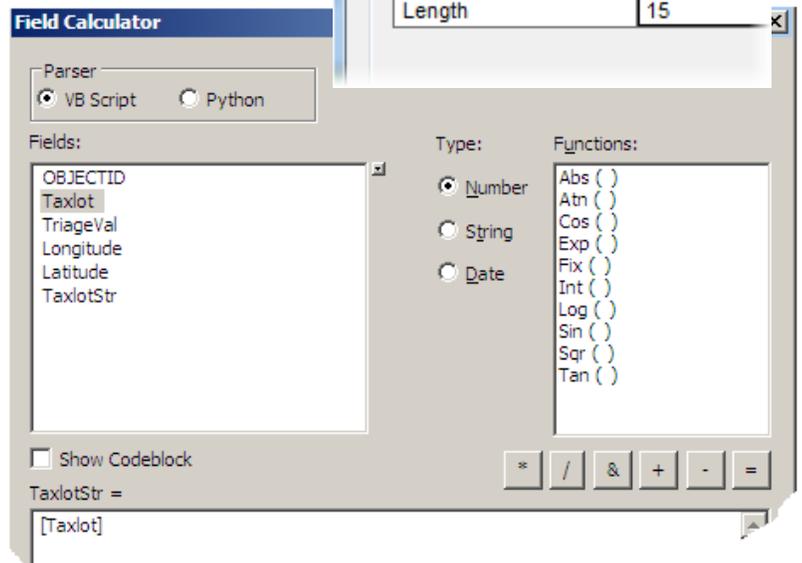
11. Now that we have a common field between the Sisters Taxlot layer and the StructuresMDB

table, we can create a join between these and use that to symbolize the parcels based on the triage class.

→ Right-click on the **Sisters Taxlots** layer and select **Joins and Relates>Join…** and create a join to the **StructuresMDB** table based on the **Taxlot** and **TaxlotStr** fields.
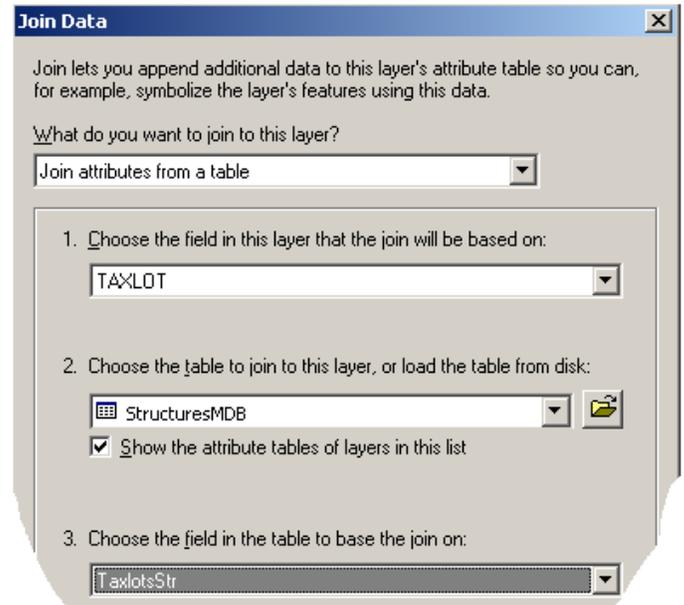
→ Open the Layer **Properties** dialog for the **Sisters Taxlot** layer and select **Symbology**.

    → Select **Categories>Unique values**

    → Select **TriageVal** as the Value Field. (Earlier versions of ArcGIS might show StructuresMDB.TriageVal for the field name.)

    → Uncheck **<all other values>** and click on **Add All Values**.
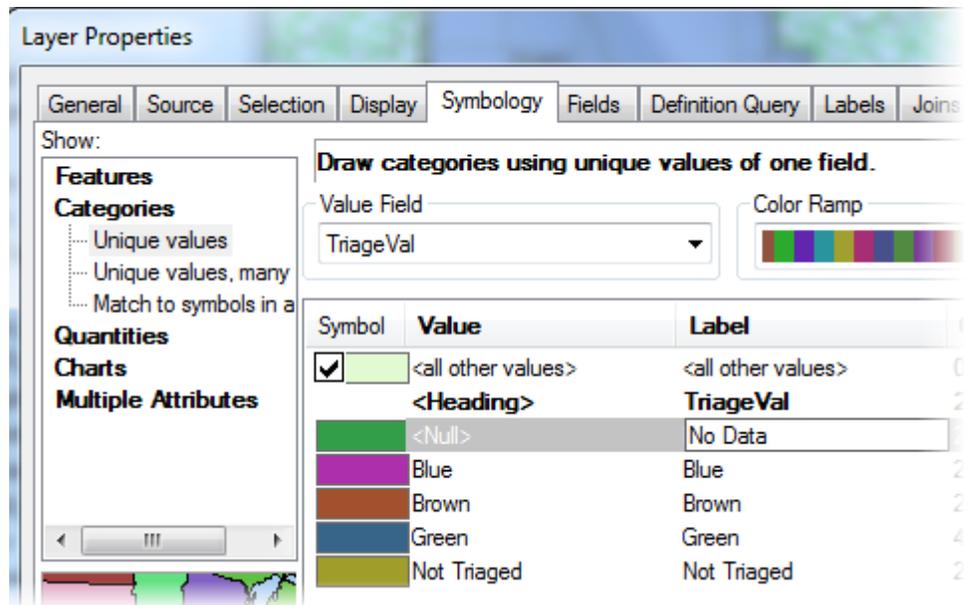
    → Since most of the data is <Null>, in the Label section of the symbology dialog, change **<Null>** to **No Data**.

    → Change the color for the <Null> value to a light gray, the color for Not Triaged to yellow, and the colors for the other values to match the triage color name.

→ **Save ArcMap**; in the next section we will see how to display the actual structures from the Latitude/Longitude values in the Excel table.

Part B: Generating point data from a table.

ArcGIS can display data from coordinate pairs as point features, but as part of the process, it is necessary to tell ArcGIS the coordinate system of the point data. If the datum of this coordinate system differs from the datum in the data frame, then you need to set the geographic transformation correctly for "project on the fly" to work. In this case, the firefighters collected the data with a GPS unit working in the WGS84 datum, and our data is in Oregon State Plane South NAD83, which is different datum.

1. First we will set the transformation so ArcGIS will correctly project from WGS84 to Oregon State Plane South NAD83.

   ➔ Open **Properties…** for the **Triage Maps** Data Frame; select the **Coordinate Systems** tab and then click on **Transformations…**.

   ➔ Select **GCS_North_America_1983** in the top part of the dialog; then select **World/WGS 1984** from the Into: dropdown list (it will be near the very bottom). In the Using: section, select **NAD_1983_To_WGS_1984_5**.
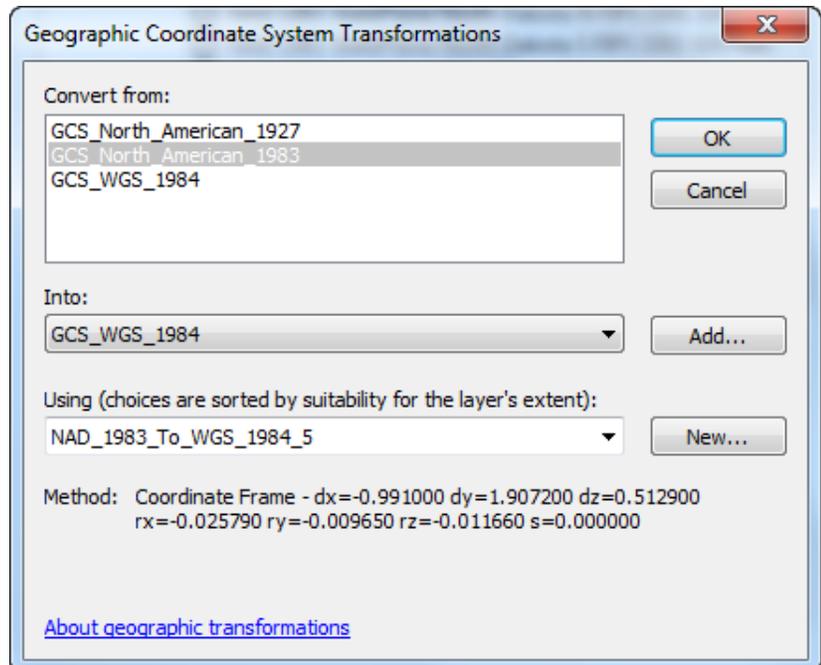
2. Next we will use the Latitude and Longitude fields in the Excel Structures table to display the building structures themselves. We could use the StructuresMDB table we created, but it would be good to have a little more practice working with Excel tables.

   ➔ Right-click on the **Structures** table and select **Display X/Y data…**.
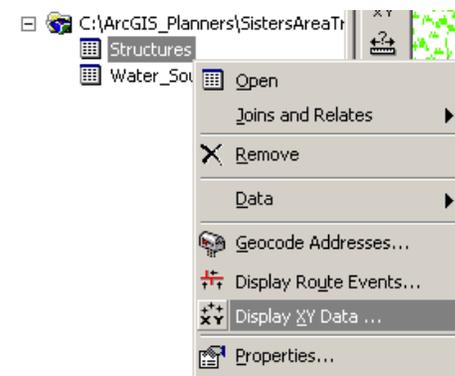
→ In the next dialog, verify that the **X Field** is set to **Longitude** and that the **Y Field** is set to **Latitude**.

→ Then click on the **Edit…** button to set the coordinate system. Scroll to the top of the XY Coordinate System dialog
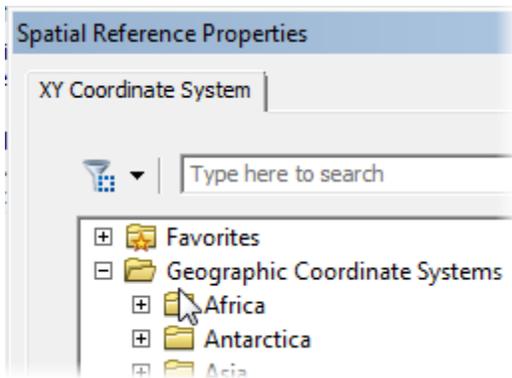
and then select **Geographic Coordinate Systems> World>WGS84**.

→ After setting the coordinate system, click **OK** to finish the operation. You will get a warning about limited functionality, but we will show how to take care of that later.
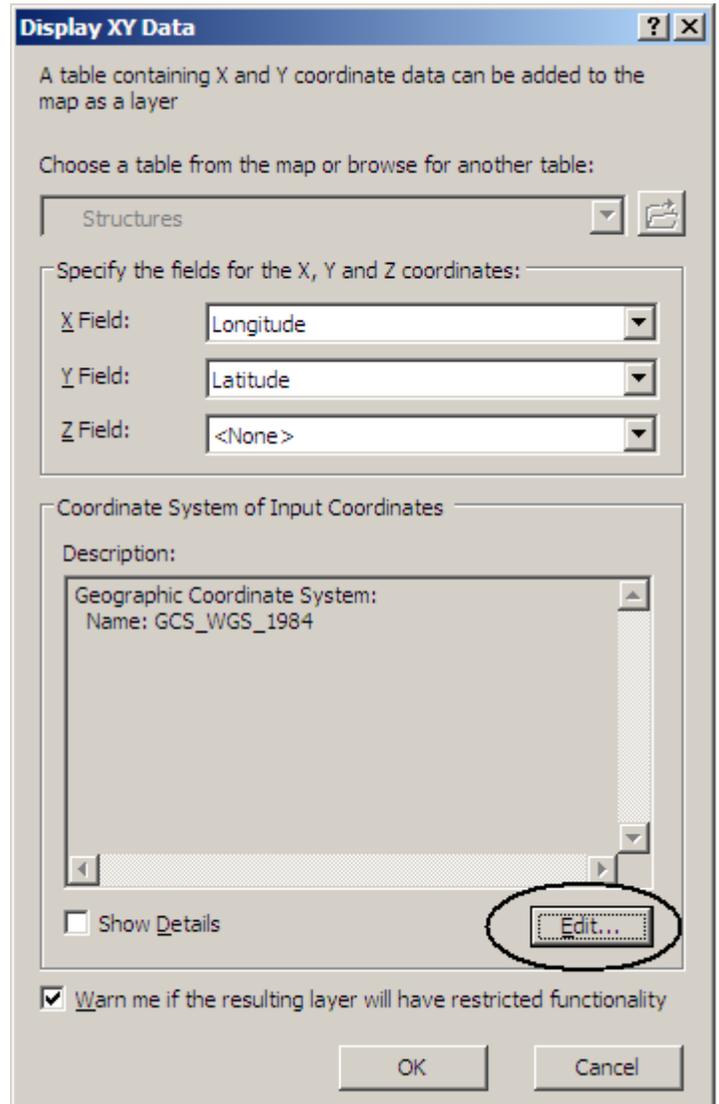
3. You will now have a new layer named Structures Events with a simple point symbol. We will zoom in and change the symbology and then later see how to add to or change the data by changing the original Excel file.

→ Select **Bookmarks** and select the **Edgington** bookmark to get a closer view of the structures.

→ Open the **Symbology** tab for the **Structures Events** layer and select **Import…**. In the upper-right of the dialog.
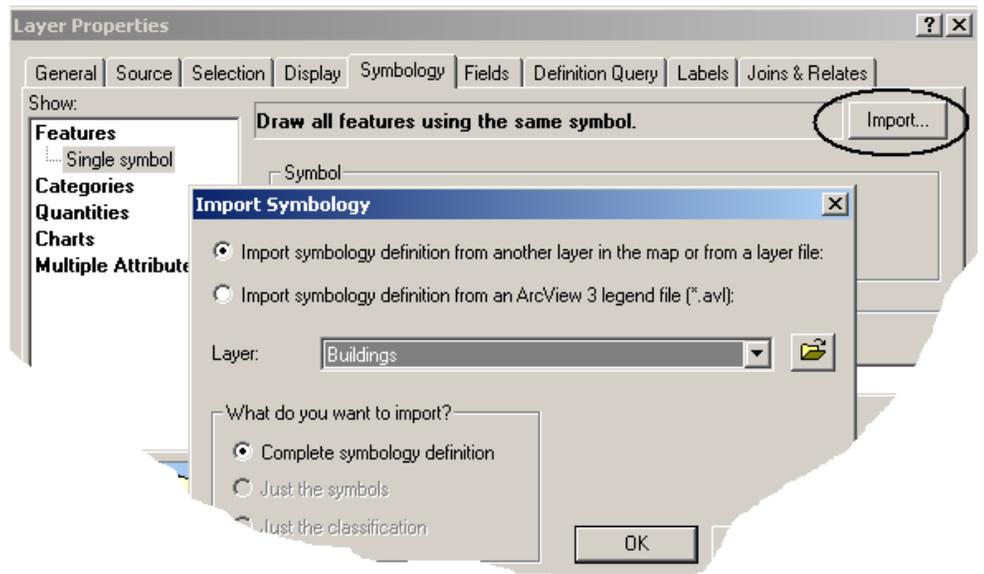
→ In the next dialog, select **Buildings** as the layer to import symbology from.

→ When prompted for **Value Field**, select **TriageVal** and then click **OK**.

4. Next we will add the water source points that the firefighters collected with GPS.

→ Open the **Water_Sources** table and review the data. You should have a field for type of source – Hydrant or Pond – and fields for Latitude and Longitude.

→ Use the same procedure –Display X/Y Data - you used with the Structures table in Step 2 to bring in the **Water_Sources** features. You will not need to set the coordinate transformation for the data frame as that has already been set.

→ After the new events layer has been added to the map, change the symbology for the different types of water source if you want.
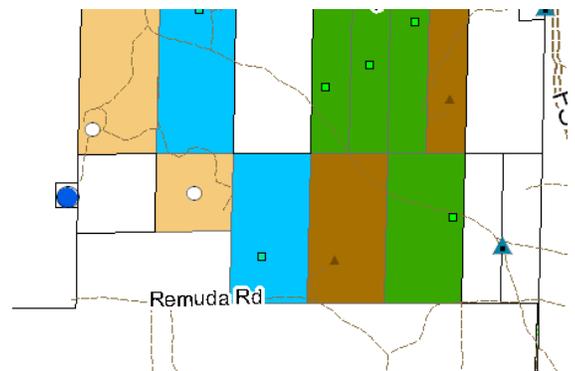
5. Now that we can see that there is a pond near the two "Not Triaged" structures on the west side of the subdivision, we could probably give these structures a value of green or blue. We could do that in ArcMap, but let's see how we can do this from Excel.

→ **Save** and **close ArcMap**.

6. Start **Excel** and open the **Edgington_subdivision** file.

→ Change the values for **Not Triaged** to **Green**. It is best to do this by copying from an existing Green cell rather than typing so that you keep the same spelling.
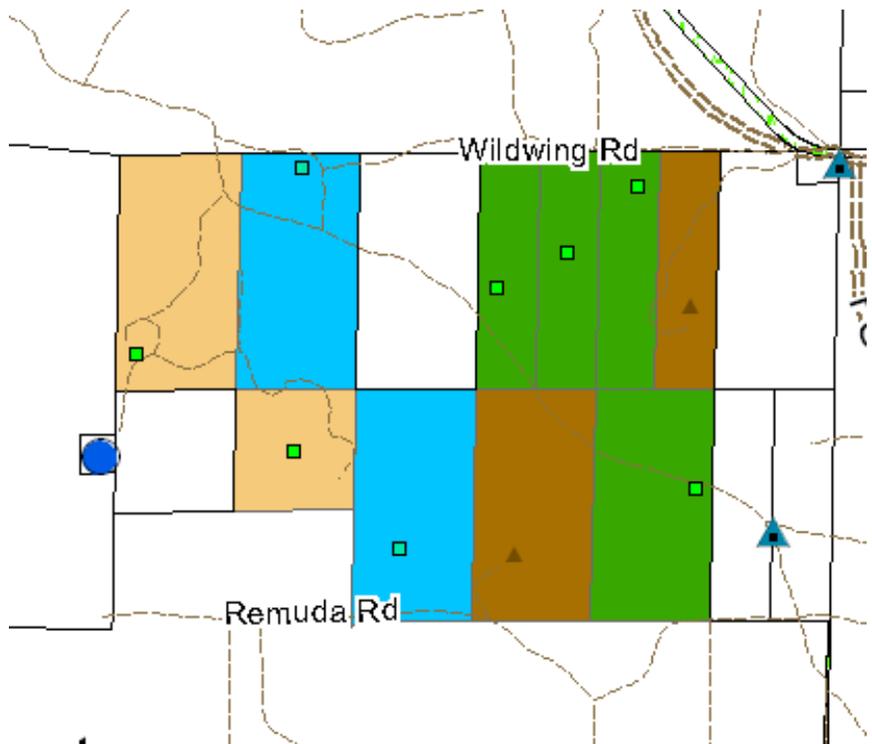
→ **Save** and close Excel.

7. Start **ArcMap** and open the **SistersAreaTaxlots** map.

→ Notice that the two structures on the west of the subdivision are now coded "Green."

While you might not have full functionality with the Events layer tied to the Excel file, note that any changes made to the Excel file are now reflected in this map anytime you reopen it. This might be handy if you like to use Excel as a data entry program.

→ If you want to create a file from the events layer that will have full functionality, you can right-click the layer and select Data>Export Data… like you did in the chapter on selections.

→ When you're done, **Save** and close **ArcMap**.