

## MAPPING EXERCISE

### Data Entry

GIS software, with its ability to associate data with map layers, is well suited for production of thematic maps. Data for thematic mapping comes from a variety of sources, including state and federal agencies. While much geographical information is distributed as shapefiles (with associated data tables), it is not always available in this format.

In the Base Map exercise, you learned one method of creating a map layer when no such layer previously existed. In this exercise, you will learn how to bring data into a shapefile which can then be used for thematic mapping.

In this exercise, you will:

- |   |  |
|---|--|
| ✓ Browse an attribute table               | ✓ Join a data table to an attribute table          |
| ✓ Add a field to an attribute table       | ✓ Select fields for display in the attribute table |
| ✓ Edit an attribute table                 | ✓ Export an attribute table                        |
| ✓ Sort records in an attribute table      | ✓ Print an attribute table                         |
| ✓ View descriptive statistics for a field |  |

### **Entering Data, Part I—Manual Entry**

---

- Start ArcMap (**Start All Programs >ArcGIS >ArcMap**); if there is an icon on the computer desktop, you can start ArcMap by double-clicking it. You will be shown a window asking whether you want to open a new empty map, a template, or an existing map.
- Make sure the **An existing map:** radio button is selected and click OK. If you did not see this window, click **File >Open**.
- Browse to where you saved the **DataEntry.mxd** project file and open it. You will have a data frame called **Wyoming**. You should see two layers: the **State outline** and **Counties**.

When adding geospatial data (data with geographical properties) to ArcMap, you work with **attribute tables**. Attribute tables are organized in rows and columns. In ArcMap, the rows are referred to as **records** while the columns are referred to as **fields**. Records are geographical features like counties, states, census tracts, roads and rivers. Fields are used to describe a particular characteristic of that feature. For example, a dataset for counties of the United States may include the following fields: county name, State name, and population.

Figure 1 shows this organizational structure for a hypothetical attribute table for counties in the Dallas, Texas metropolitan area.

Fields

County	State	Population
Collin	Texas	491,675
Dallas	Texas	2,218,899
Denton	Texas	432,976
Ellis	Texas	111,360
Henderson	Texas	73,277
Hunt	Texas	76,596
Kaufman	Texas	71,313
Rockwall	Texas	43,080

Records

Figure 1. Records as rows, Fields as columns.

- In this exercise, you will be working with the attribute table for the Counties layer of your project file. To view it, **right-click Counties in the table of contents** and then select **Open Attribute Table**. A new window will open with the following table.

Figure 2. The attribute table for the Counties layer.

**i** You can manipulate the display properties items within an attribute table in ArcMap. For example, you can:

- ✓ To change the width of a column...
  - Position the mouse pointer at the **right edge** of the heading (field name) of the column you want to resize.
  - When the icon changes (see image at right), click and drag the edge to the desired width
- ✓ To rearrange a table's columns...
  - Click and drag a column's heading (field). A red line indicates where the column will be positioned. Release the mouse button to place the column in the new position.
- ✓ To freeze or unfreeze a column...
  - Click the heading of the column you want to freeze
  - Right-click the selected column's heading and click **Freeze/Unfreeze Column** to freeze the column
  - The frozen column will move to the leftmost position in the table and stay in place when you scroll to the right.
  - To unfreeze the column, repeat the previous steps.
- ✓ To hide a column...
  - Right-click the layer (or table) in the **Table of Contents** and click **Properties**.
  - Click the **Fields** tab. Here you can set whether a field is visible or not.

There are several ways to get data values into your attribute table. You can manually enter the data by adding a new field to the table and typing the data values. You can load a data table in a format that ArcMap can read and link that table to the shapefile through a process called **joining**. You can also use ArcCatalog to manipulate tables (this method will not be covered in this exercise).

Let's start by employing the first of these methods. Below is a data table showing the land area in square mile of the various counties in Wyoming. You will need to **add a field** to you data table and then **manually enter** in the values listed below.

<u>County</u>	<u>Population</u>	<u>County</u>	<u>Population</u>
Albany	32014	Natrona	66533
Big Horn	11461	Niobrara	2407
Campbell	33698	Park	25786
Carbon	15639	Platte	8807
Converse	12052	Sheridan	26560
Crook	5887	Sublette	5920
Fremont	35804	Sweetwater	37613
Goshen	12538	Teton	18251
Hot Springs	4882	Uinta	19742
Johnson	7075	Washakie	8289
Laramie	81607	Weston	6644
Lincoln	14573		

- Click the **Options** button in the lower right-hand corner of your data table and select **Add Field**. A context window will appear.

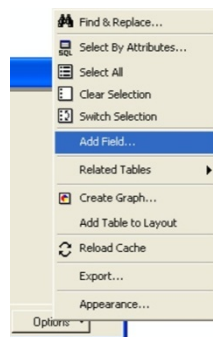


Figure 3. The Add Field... option will insert a new column in your attribute table.

- Name the new field **Population**. In ArcMap, a field name may not be longer than thirteen characters and can have no spaces or special characters (#, %, &, etc.). You may use an underscore.
- Make the type a **Short Integer** and keep the precision at **5**.

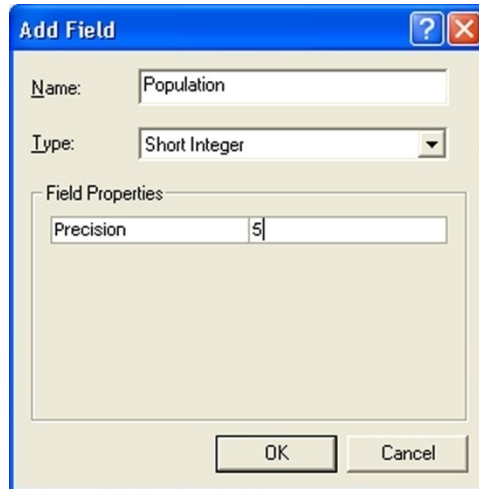


Figure 4. Adding the Population field.

**i** There are six field types available to you in the **Add Field** dialog: Short Integers, Long Integers, Floats, Doubles, Text, and Dates.

- Short and Long Integers. If your data values are all whole numbers (i.e., no numbers to the right of the decimal place), use Short or Long Integer. The **precision** of the field refers to width, in digits, of the number (e.g., a precision of 6 would allow for numbers between -99999 and 999999. The negative sign counts as a digit). If you leave precision at 0 (the default), you can have numbers up to four digits wide. The maximum you can have is 19 digits (even if you make your precision higher than 19).
- Floats and Doubles. Unlike integers, floats and doubles allow for numbers to the right of the decimal place. As with integers, **precision** refers to the width of the field (including the decimal place). **Scale** refers to the number of decimal places. Thus, a precision of 6 and a scale of 2 will allow you to enter numbers between -99.99 and 999.99.
- The difference between Short and Long Integers and between Floats and Doubles is in how the data types are stored. Please refer to the ArcMap help menu for more information on these differences.

You are now ready to add the data values. Even though you have added the field to the data table, you cannot enter the data values yet. In order to do this, you need to be in the **edit mode**.

- Make sure the **Editor toolbar** is visible. If it is not, turn it on (**Tools >Editor Toolbar** or press the **Editor Toolbar** button on the standard toolbar).

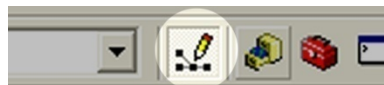


Figure 5. The Editor Toolbar button.

- On the Editor toolbar, press the **Editor** button and then select **Start Editing**.

Note that the counties listed in the earlier table are in alphabetical order, but the counties in your attribute table are not shown in this order.

- **Right-click** the **County** field name in the table and select **Sort Ascending**. The counties will now be in the same order as the table on the previous page.

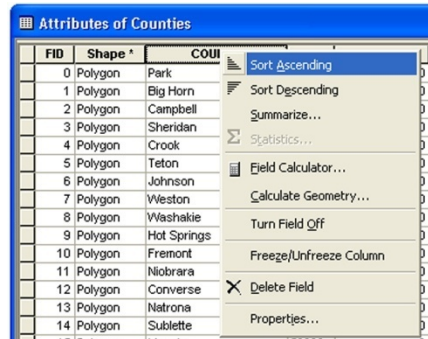


Figure 6. Right-click on a field name to open this menu.

- Enter the population data values from the earlier table (click in the first cell in the column). After typing the value, press Enter and you will be moved to the cell below. Continue this process until all values have been entered.

**i** You cannot add a field while in Edit mode. If you already in Edit mode, you must stop editing, add the field, and then return to Edit mode to add the values.

- Type the value for the county and press Enter. The table is updated.
- Continue this process until all areas have been added to the appropriate counties.
- When you are done, click **Editor** then **Stop Editing**. A window will appear asking if you want to save your edits. Click **Yes**.

When dealing with long numbers it is useful to display these numbers with commas separating the thousands. In addition to ArcMap allowing you to specify your field width, you may also control the field formatting.

- Right-click the Population field name and select **Properties**. Press the **Numeric** button to the right of Number Format. The Number Format window will open.
- In the Number Format window, check the **Show thousands separators** buttons box.

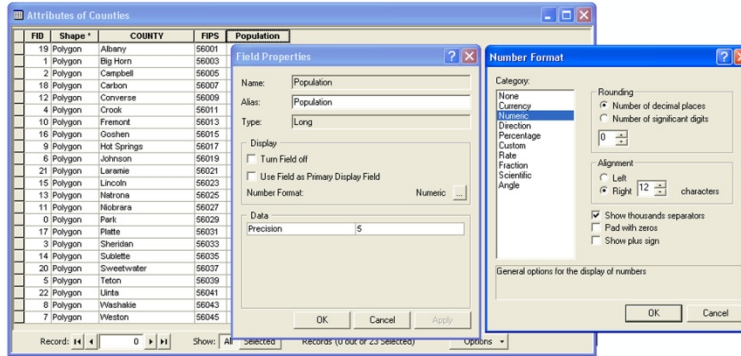


Figure 7. Formatting the numbers in your field.

- Click **OK** to close the Number Format window and **OK** again to close the Field Properties window. Note the change in your field values.

**i** You may also format the numbers in your fields without having to open the attribute table. In the Table of Contents, right-click the layer name and select **Properties**. In the Properties window, select the **Fields** tab. In all numeric fields, the Number Format button shown in Figure 7 will appear in the list of fields.

ArcMap allows you to view descriptive statistics for attribute table fields. Let's view these statistics for the Population field.

- **Right-click** the **field name** (Population) and select **Statistics** from the context menu.

A new window appears showing values for the following: count, minimum and maximum values, sum of all values, the mean, and the standard deviation. The window also displays a histogram which is a graphical representation of a frequency distribution.

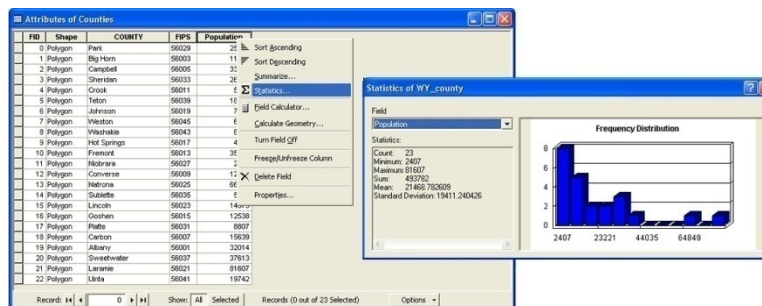


Figure 8. Use the Statistics command to display summary statistics and a histogram.

**i** If you select a subset of records (either by performing a query or interactive selection on the map), the statistics widow will display the descriptive statistics for only the selected records.

Save your project file before moving on to the next part of the exercise.

## Entering Data Part II—Using an Existing Data Table

Manual data entry is a fairly easy way to add data to your project. However, it is useful only if you have a small number of records for which you are entering data. Imagine how time consuming it would be if you have hundreds of records to add or if you wish to add dozens of fields, or both!

When creating thematic maps, cartographers often use data that is not stored within a shapefile's attribute table. Such data may come from public sources (e.g., state and federal agencies), private sources, or it may be created internally within the organization employing the cartographer.

If this information is stored as a data table (in text format), a spreadsheet, or a database (e.g., dBASE, Microsoft Access, or geodatabase formats), you can associate it with your geographic features and display the data on your map by linking it to the attribute table of an existing map. In ArcMap, you can establish this kind of link by either **joining** or **relating** two tables together.

**i** ArcMap can import certain types of data files. The most commonly imported are files in dBase format (.dbf) and comma-delimited or tab-delimited ASCII text files (text files that use commas or tabs to separate values). ArcMap can import certain database formats (e.g., dBASE, Access, etc.) as well as Microsoft Excel spreadsheets (up to Excel 2003 format—ArcMap 9.2 does read Excel 2007 files).

Typically, you'll *join* a data table to a layer's **attribute table**. Joins are based on the value of a field that can be found in both tables. **The name of the field does not have to be the same**, but the **data type has to be the same**. In other words, you join numeric fields to numeric fields, text to text, etc.

Two data files exist in the DataEntry folder, wyoming.xls (an Excel 2003 file) and wyoming2.txt (a comma-separated text file).

- Add the Excel file project by using the **Add Data** button. Navigate to wyoming.xls and **double-click** the file name. When you do this, a new window opens. The new window lists all of the tables (worksheets) within the Excel file. In this file, there is only one worksheet, **Housing\$**.

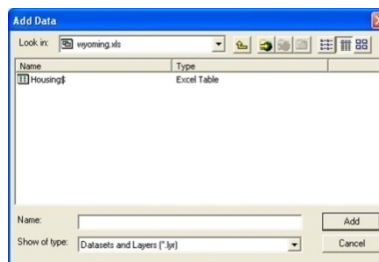


Figure 9. Adding the Excel Housing\$ worksheet.

- Select this table and click **Add**.

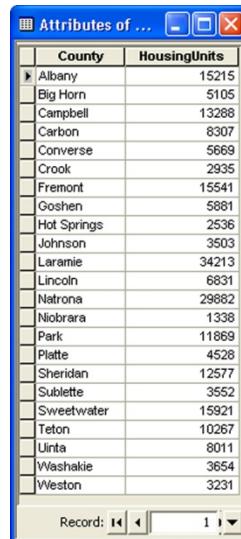
**i** When importing an Excel spreadsheet, you must **double-click** the file name in order to view the list of available worksheets. If you highlight the file name and click Add, you will get an warning message stating that your selected item could not be added.

When the table is added, it appears in the Table of Contents. Note, however, that the tab at the bottom of the Table of Contents switched from **Display** to **Source**.



Figure 10. The Source tab.

When the Display tab is selected, the Table of Contents lists only the map layers that are (or can be) visible in the data or layout view. When the Source tab is selected, the Table of Contents lists all files that have been added to the document. Also note that when the Source tab is selected, the layers are organized by folders (e.g., if you add layers from different folders or drives on your computer) and by databases. The third tab, Selection, allows you to choose which layers you wish to be able to be selectable.



County	HousingUnits
Albany	15215
Big Horn	5105
Campbell	13288
Carbon	8307
Converse	5669
Crook	2935
Fremont	15541
Goshen	5881
Hot Springs	2536
Johnson	3503
Laramie	34213
Lincoln	6831
Natrona	29882
Niobrara	1338
Park	11869
Platte	4528
Sheridan	12577
Sublette	3552
Sweetwater	15921
Teton	10267
Uinta	8011
Washakie	3654
Weston	3231

Figure 11. The Excel worksheet

The County field includes the same counties as are in the table you have been working on. Also note that, in this case, the name of the field is the same (i.e., “County”). As mentioned previously, the names of the fields do not need to be the same in order for a join to work—the join takes place according to the *values* in the field. For example, one of the tables could have had a field name of “County” and the other “WY\_County.” As long as the *values* in the imported table match those in the attribute table, the join will be successful. It is also important to note that the imported table need not have *all* the value names as the attribute table in order for the join to be successful. For example, if you have a data table that has only three of the Wyoming counties, the information in the imported table will be added *only* to the county records in the attribute table that they match.

- To join the imported table to your existing attribute table **right-click the County layer**, select **Joins and Relates** and then click **Join**.



- Click the first dropdown arrow and click Join attributes from a table.
- Click the dropdown arrow and click the field name in the layer that the join will be based on. In this case, select **County**.
- Click the dropdown to choose the table to join to the layer (as this you have added only the **Housing\$** table, it should appear without having to select it).
- If it does not appear automatically, click the dropdown arrow and select **County** as the field in the table to base the join on.

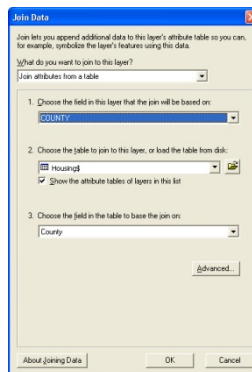


Figure 12. Performing the Join.

- Click **OK**.
- The attributes of the table are appended to the layer's attribute table. To check, **right-click the Counties layer and select Open Attribute Table**.

WY_county_ID	WY_county_Shape	WY_county_COUNTY	WY_county_EPS	WY_county_Population	Housing\$.County	Housing\$.HousingUnits
0	Polygon	Park	56029	25796	Park	11869
1	Polygon	Big Horn	56003	11461	Big Horn	5105
2	Polygon	Campbell	56005	33698	Campbell	13289
3	Polygon	Cherokee	56033	26560	Cherokee	12577
4	Polygon	Crook	56011	5887	Crook	2935
5	Polygon	Teton	56039	18251	Teton	10267
6	Polygon	Johnston	56019	7075	Johnston	3603
7	Polygon	Weston	56045	6844	Weston	3231
8	Polygon	Washakie	56043	8289	Washakie	3654
9	Polygon	Hot Springs	56017	4882	Hot Springs	2636
10	Polygon	Fremont	56013	36804	Fremont	15541
11	Polygon	Northwest	56027	2407	Northwest	1338
12	Polygon	Converse	56009	12052	Converse	5669
13	Polygon	Natrona	56025	66533	Natrona	29682
14	Polygon	Sublette	56035	2300	Sublette	3552
15	Polygon	Lincoln	56023	14573	Lincoln	6831
16	Polygon	Goshute	56015	12538	Goshute	5681
17	Polygon	Platte	56021	8607	Platte	4520
18	Polygon	Carbon	56007	15839	Carbon	8307
19	Polygon	Albany	56001	32014	Albany	15215
20	Polygon	Sweetwater	56037	37613	Sweetwater	15921
21	Polygon	Laramie	56021	81687	Laramie	34213
22	Polygon	Uinta	56041	19742	Uinta	8911

Figure 13. The fields from the Excel file are now added to the end of your attribute table.

Note that the field names that were in the original County layer now are preceded by “WY\_county” (the name of the shapefile) and the fields that were joined from the Housing\$ table are preceded by “Housing\$.”

Now you will add the second data table included in your data folder.

- Just as you did with the Excel table, **add the wyoming2.txt table.**
- **Open** the table. You will see the following fields: COUNTY, FIPS, and SQUARE\_MIL.

COUNTY	FIPS	SQUARE_MIL
Park County	56029	6944.994
Big Horn County	56003	3149.151
Campbell County	56005	4789.951
Sheridan County	56033	2538.503
Crook County	56011	2859.699
Teton County	56039	4206.8
Johnson County	56019	4148.914
Weston County	56045	2401.204
Washakie County	56043	2255.143
Hot Springs County	56017	1998.018
Fremont County	56013	9270.577
Niobrara County	56027	2631.134
Converse County	56009	4247.642
Natrona County	56025	5371.141
Sublette County	56035	4928.058
Lincoln County	56023	4084.471
Goshute County	56015	2223.492
Piute County	56031	2109.418
Carbon County	56007	7932.418
Albany County	56001	4307.039
Sweetwater County	56037	10474.795
Laramie County	56021	2675.062
Lincoln County	56041	2090.923

Figure 14. The Wyoming2 text file.

**i** FIPS is an acronym for Federal Information Processing Standard. The federal government of the United States has established a unique identifier (code) for every state, county, and place in the U.S. as well as for countries. The number you see in this field is the county FIPS code—it is actually a combination of the two-digit state FIPS code (56 for Wyoming) and the three-digit county identifier (which start at 001 and proceed alphabetically, usually with odd numbers).

One of the things to be careful of when joining files is that in order for a join to be successful the records in the joined field must be **identical**.

Note that, while there is a COUNTY field in this table, each county name is followed by “County.” If you join this table to your County layer based upon this field, you will encounter a problem. Let’s perform the join to see what happens.

- Using the steps you used with the Housing\$ table, **join the wyoming2.txt table to your County layer.** Choose “WY\_county.COUNTY” as the field in the layer to join on and select the COUNTY field from the wyoming2.txt file.
- Open the Attribute Table for the Counties layer and scroll all the way to the right until you see the County, FIPS, and SQUARE\_MIL fields.

Notice how “<Null>” appears in every record for these fields. This value is inserted when ArcMap has no match for that record. In this case, the County names did not match. For example, you had “Park” in the County layer but “Park County” in the wyoming2.txt table. “Park” and “Park County” are **not identical**, so the data values from the wyoming2.txt table were not inserted.

WY_county#ID	WY_county#Shape	WY_county#COUNTY	WY_county#FIPS	WY_county#Population	Housing#County	Housing#HousingUnits	COUNTY	FIPS	SQUARE_MILE
0	Polygon	Park	56029	25796	Park	11860	-NAUB-	-NAUB-	-NAUB-
1	Polygon	Big Horn	56032	11481	Big Horn	5105	-NAUB-	-NAUB-	-NAUB-
2	Polygon	Campbell	56005	53698	Campbell	13288	-NAUB-	-NAUB-	-NAUB-
3	Polygon	Sheridan	56033	29590	Sheridan	12577	-NAUB-	-NAUB-	-NAUB-
4	Polygon	Crook	56011	5887	Crook	2935	-NAUB-	-NAUB-	-NAUB-
5	Polygon	Teton	56039	18251	Teton	10287	-NAUB-	-NAUB-	-NAUB-
6	Polygon	Johnson	56019	7075	Johnson	3550	-NAUB-	-NAUB-	-NAUB-
7	Polygon	Wade	56045	8844	Wade	3221	-NAUB-	-NAUB-	-NAUB-
8	Polygon	Washakie	56043	8289	Washakie	3654	-NAUB-	-NAUB-	-NAUB-
9	Polygon	Hot Springs	56017	4882	Hot Springs	2536	-NAUB-	-NAUB-	-NAUB-
10	Polygon	Freemont	56013	35004	Freemont	15541	-NAUB-	-NAUB-	-NAUB-
11	Polygon	Niobrara	56027	2487	Niobrara	1338	-NAUB-	-NAUB-	-NAUB-
12	Polygon	Converse	56038	12052	Converse	3889	-NAUB-	-NAUB-	-NAUB-
13	Polygon	Nebraska	56025	66533	Nebraska	28892	-NAUB-	-NAUB-	-NAUB-
14	Polygon	Sublette	56035	5820	Sublette	3552	-NAUB-	-NAUB-	-NAUB-
15	Polygon	Laramie	56023	14873	Laramie	6831	-NAUB-	-NAUB-	-NAUB-
16	Polygon	Goshute	56015	12538	Goshute	5881	-NAUB-	-NAUB-	-NAUB-
17	Polygon	Platte	56031	8807	Platte	4528	-NAUB-	-NAUB-	-NAUB-
18	Polygon	Carbon	56007	15638	Carbon	8207	-NAUB-	-NAUB-	-NAUB-
19	Polygon	Albany	56001	32014	Albany	15215	-NAUB-	-NAUB-	-NAUB-
20	Polygon	Sweetwater	56037	37813	Sweetwater	18921	-NAUB-	-NAUB-	-NAUB-
21	Polygon	Laramie	56021	61807	Laramie	34213	-NAUB-	-NAUB-	-NAUB-
22	Polygon	Lincoln	56041	18742	Lincoln	8011	-NAUB-	-NAUB-	-NAUB-

Figure 15. If the field values do not match when performing a join, the data values from the text file will not be joined to the attribute table.

You **can** join these files correctly, however. To do this, you have two options. First, you can modify your text file to remove the word “County” from each county name. Second, you can join the files using a field other than the county name.

**i** An additional problem when joining tables is when there are multiple records with identical names. For example, there are many Washington counties in the United States. When attempting to join tables in a “many to many” situation (many Washington counties in each of the tables), **one** value will be assigned to all of the instances of Washington county in your attribute table. This circumstance occurs because you are joining **only** on one field, the county name. You are not joining one both the county and state names. Joining works best when there is a one-to-one relationship between records.

Let’s do the second of the joining options—joining on a field other than county name. As was explained earlier, the FIPS code is unique to each county in the United States. Therefore, even if counties in different states share the same name, e.g., Washington, their FIPS codes will be different.

First, you will need to **remove the join** that you just did.

- To do this, right-click the Counties layer, select **Joins and Relates, Remove Joins**, then select **wyoming2.txt** from the list (be careful **not** to select Remove all joins).
- Next, redo the join, but this time use **FIPS** from both the layer and the table.

If you have done the join correctly, the data values from the wyoming2.txt table should now appear in the Attribute Table for the Counties layer.

WY_county#ID	WY_county#Shape	WY_county#COUNTY	WY_county#FIPS	WY_county#Population	Housing\$.County	Housing\$.HousingUnits	COUNTY	FIPS	SQUARE_MIL
0	Polygon	Park	56029	25796	Park	11869	Park County	56029	6944.894
1	Polygon	Big Horn	56033	11481	Big Horn	5126	Big Horn County	56033	3148.151
2	Polygon	Campbell	56005	53969	Campbell	12328	Campbell County	56005	4739.951
3	Polygon	Sheridan	56033	26560	Sheridan	12577	Sheridan County	56033	2538.503
4	Polygon	Crook	56011	5887	Crook	2935	Crook County	56011	2859.688
5	Polygon	Teton	56039	18251	Teton	10287	Teton County	56039	4206.8
6	Polygon	Johnson	56019	7075	Johnson	3553	Johnson County	56019	4148.914
7	Polygon	Weldon	56045	8844	Weldon	3223	Weldon County	56045	2491.284
8	Polygon	Washakie	56043	8289	Washakie	3654	Washakie County	56043	2255.143
9	Polygon	Hot Springs	56017	4882	Hot Springs	2536	Hot Springs County	56017	1996.018
10	Polygon	Freemont	56013	3504	Freemont	1544	Freemont County	56013	8275.577
11	Polygon	Niobrara	56027	2487	Niobrara	1338	Niobrara County	56027	2631.134
12	Polygon	Converse	56039	12852	Converse	3889	Converse County	56039	4241.842
13	Polygon	Nebraska	56025	66533	Nebraska	28892	Nebraska County	56025	5271.141
14	Polygon	Sublette	56035	5820	Sublette	3552	Sublette County	56035	4838.058
15	Polygon	Lincoln	56023	14573	Lincoln	6831	Lincoln County	56023	4884.411
16	Polygon	Goshute	56015	12538	Goshute	5881	Goshute County	56015	2223.482
17	Polygon	Platte	56031	8807	Platte	4528	Platte County	56031	2109.418
18	Polygon	Carbon	56007	15628	Carbon	8207	Carbon County	56007	7822.418
19	Polygon	Albany	56001	32014	Albany	15215	Albany County	56001	4307.038
20	Polygon	Sweetwater	56037	37813	Sweetwater	18923	Sweetwater County	56037	10474.795
21	Polygon	Laramie	56021	81807	Laramie	34213	Laramie County	56021	2675.062
22	Polygon	Hotchkiss	56029	4774	Hotchkiss	8914	Hotchkiss County	56029	3088.013

Figure 16. The join performed correctly.

You will now print out your attribute table, but before you do so, you can turn off some of the fields so that you do not have duplicate fields showing.

- In the Table of Contents, **right-click the Counties layer** and select **Properties**.
- In the Properties window select the **Fields** tab.
- **Deselect** the following (if you have difficulty reading the field names, you can widen the Name area by dragging the vertical line separating Name and Alias):
  - WY\_county.FID
  - WY\_county.Shape
  - Housing\$.County
  - County
  - FIPS

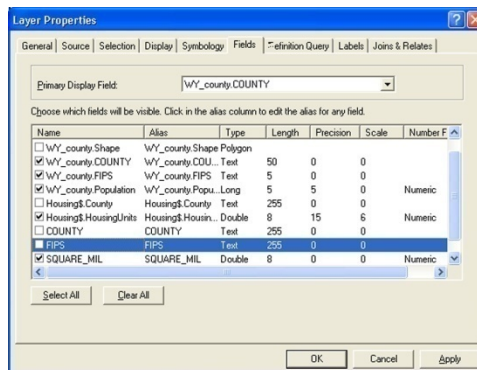


Figure 17. Deselecting the fields prevents the fields from being displayed. It does not delete them.

- Press **OK** to register the changes. (Make sure you didn't deselect WY\_county.COUNTY or WY\_county.FIPS.) If you are having difficulty seeing the field names, you can widen the first column by clicking and dragging the vertical bar separating Name from Alias.

**i** You may also turn off the display of fields from within the attribute table. To do so, right-click the field name and select "Turn Off Field."

- **Open the Counties attribute table.** Note how the deselected fields no longer appear. Your table should have the following fields: WY\_county.COUNTY, WY\_county.FIPS, WY\_county.Population, Housing\$.HousingUnits, and SQUARE\_MIL.

## Turning in your Joined Data Table

Prior to submitting a digital copy of your joined table, you will export the joined attribute table as a stand-alone table.

- With the attribute table still open, press the **Options** button. Select **Export**.

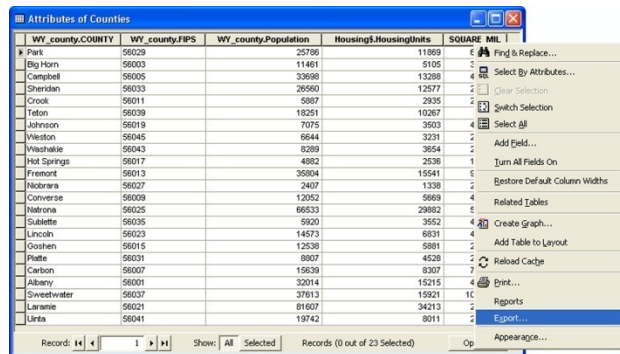


Figure 18. The Export command from the Options menu.

- In the Export Data window, specify a location to save your table (you may click the file folder button to browse to a location).

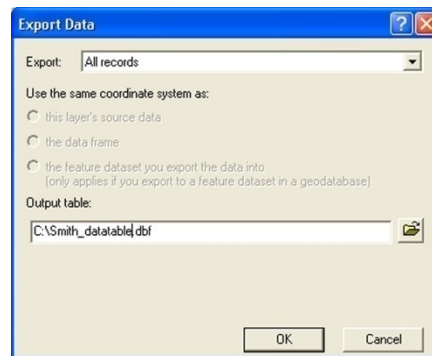


Figure 19.

- Change the file name to include your name using the following format:  
Lab3LastNameTable.dbf (e.g., Lab3SuttonTable.dbf)
- You will be asked if you wish to add the table to the current map. Click **OK**.
- You now have a digital copy of your data table to submit to your instructor as preferred (e.g., email, online posting, etc.).

- If you are to print out the table, **close your attribute table** and **open the table you just added**. You will notice that the “WY\_county” has been removed from your field names and the HousingUnits field name has been truncated to “HousingUni” (a function of saving in the dbf format).
- To print the table, press the **Options** button and then **Print**.
- Before printing the table, click the **Advanced Options** button.
- Make sure your name is in the **Print custom page header** area. This should be the case if you included your name in the file name. If not, add your name.

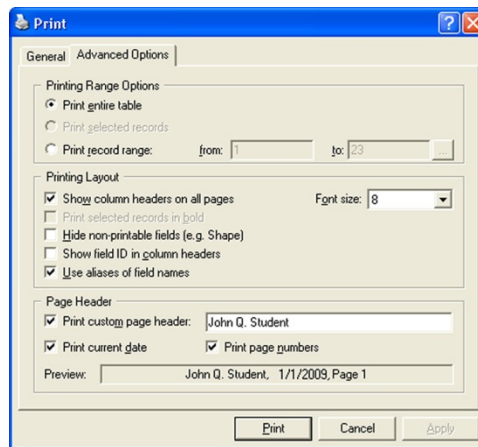


Figure 20. The Advanced Options allow for some flexibility when printing.

- Press **Print** to send the table to the printer.

## Exercise Questions

---

1. What are *records* and *fields* in an attribute table?
2. Why would **% Population in farms 1970** not be a valid field name in ArcMap?
3. How do you add thousands separators (commas) to numbers in a field?
4. How do you display descriptive statistics for a subset of records (for example, the counties in southeastern Wyoming)?
5. How do you *join* a data table to an attribute table?
6. What is the county in Wyoming with the smallest population?
7. What is the mean number of housing units per county in Wyoming?
8. What is the county in Wyoming with the largest area?
9. What is the total number of people living in Wyoming?
10. What is **FIPS** and what do the letters in the acronym stand for?