

## CHAPTER 5

### **KEY CONCEPTS**

*understanding unique IDs*

*understanding FIPS codes*

*joining Excel files to maps*

# Joining data to maps

One of the most frequently used GIS skills involves connecting an Excel spreadsheet to a shapefile.

This is where the magic of GIS happens! Often, the purpose of joining data to a map is to visually display the distribution of a dataset through a thematic map (covered in the next chapter). Joining your own data to a shapefile can be extremely useful.

In this exercise, you will learn how to join your own data to a map, emphasizing the concept of a unique ID.

## Files and tools

**Files needed:** You will need age.xlsx (chapter 4) and countiesprj.shp (chapter 3). Or, if you prefer, you can install this book's DVD and access chapter files at C:\EsriPress\GIS20\05. Don't know how to install the DVD? See "DVD installation" on page xii.

**Tools needed:** ArcGIS 10.1 for Desktop.

### 1 Add two files to a join

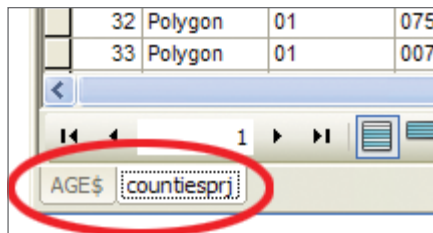
1. Open ArcMap. Click the Add Data button and add countiesprj.shp from chapter 3. (If you are unable to find this file, you can access a similar one at C:\EsriPress\GIS20\05.)
2. Click the Add Data button, add age.xlsx by double-clicking the file name, and then double-click AGE\$. If you did not change the name of the worksheet in the last exercise, the existing worksheet will be called Sheet1\$ or Sheet0\$. Worksheets are denoted with \$ in the name.

### 2 Double-check and find the FIPS columns

1. Check to make sure the data is correct. The AGE\$ data table should now appear in the table of contents. To view the data table, right-click the data table name, and then click Open. Review the data to make sure it looks as you would expect it to look.

To join data to maps, we must link two columns that have overlapping data, one column from the data table and its comparable column in the map layer.

2. Identify the two columns you will use for joining by opening the attributes table for each. The table for Age is already open. Right-click the county shapefile in the table of contents, and then click Open Attribute Table. Notice two tabs are now open at the bottom of the table. →



- Click each tab in the lower left corner, review each, and find two columns that match. The column names do not have to be the same, but the content of the columns does. In this example, the column name in the shapefile attribute table is GEOID and the column name in the spreadsheet is ID.

The diagram shows two attribute tables. The left table is titled 'countiesprj' and the right table is titled 'Table'. Both tables have columns that match in content, though not in name. A red arrow highlights the 'GEOID' column in the left table and the 'ID' column in the right table.

FID	Shape *	STATEFP	COUNTYFP	COUNTYNS	GEOID	NAME	NAMESAD	LSAD	CLASS
0	Polygon	01	005	00161526	01005	Barbour	Barbour County	06	H1
1	Polygon	01	113	00161583	01113	Russell	Russell County	06	H1
2	Polygon	01	087	00161569	01087	Macon	Macon County	06	H1
3	Polygon	01	097	00161575	01097	Mobile	Mobile County	06	H1
4	Polygon	01	031	00161541	01031	Coffee	Coffee County	06	H1
5	Polygon	01	059	00161555	01059	Franklin	Franklin County	06	H1
6	Polygon	01	115	00164997	01115	St. Clair	St. Clair County	06	H1
7	Polygon	01	099	00161576	01099	Monroe	Monroe County	06	H1
8	Polygon	01	015	00161533	01015	Calhoun	Calhoun County	06	H1
9	Polygon	01	081	00161566	01081	Lee	Lee County	06	H1
10	Polygon	01	069	00161560	01069	Houston	Houston County	06	H1
11	Polygon	01	127	00161589	01127	Walker	Walker County	06	H1
12	Polygon	01	035	00161543	01035	Conecuh	Conecuh County	06	H1
13	Polygon	01	061	00161556	01061	Geneva	Geneva County	06	H1
14	Polygon	01	133	00161592	01133	Winston	Winston County	06	H1
15	Polygon	01	009	00161530	01009	Blount	Blount County	06	H1
16	Polygon	01	083	00161567	01083	Limestone	Limestone County	06	H1
17	Polygon	01	105	00161579	01105	Perry	Perry County	06	H1
18	Polygon	01	011	00161531	01011	Bullock	Bullock County	06	H1
19	Polygon	01	001	00161526	01001	Autauga	Autauga County	06	H1
20	Polygon	01	073	00161562	01073	Jefferson	Jefferson County	06	H1
21	Polygon	01	129	00161590	01129	Washington	Washington County	06	H1
22	Polygon	01	053	00161552	01053	Escambia	Escambia County	06	H1
23	Polygon	01	067	00161559	01067	Henry	Henry County	06	H1
24	Polygon	01	025	00161538	01025	Clarke	Clarke County	06	H1
25	Polygon	01	039	00161545	01039	Covington	Covington County	06	H1
26	Polygon	01	003	00161527	01003	Baldwin	Baldwin County	06	H1
27	Polygon	01	093	00161573	01093	Marion	Marion County	06	H1

ID	County	Pop	Seniors	Percent
01001	Autauga	54571	6546	12
01003	Baldwin	182265	30568	16.8
01005	Barbour	27457	3909	14.2
01007	Bibb	22915	2906	12.7
01009	Blount	57322	8439	14.7
01011	Bullock	10914	1469	13.5
01013	Butler	20947	3489	16.7
01015	Calhoun	118572	16990	14.3
01017	Chambers	34215	5706	16.7
01019	Cherokee	25989	4651	17.9
01021	Chilton	43643	5921	13.6
01023	Choctaw	13859	2519	18.2
01025	Clarke	25833	4174	16.2
01027	Clay	13932	2449	17.6
01029	Cleburne	14972	2361	15.8
01031	Coffee	49948	7210	14.4
01033	Colbert	54428	9463	17.4
01035	Conecuh	13228	2362	17.9
01037	Cosa	11539	1970	17.1
01039	Covington	37765	6939	18.4
01041	Crenshaw	13906	2210	15.9
01043	Cullman	80406	12810	15.9
01045	Dale	50251	6759	13.5
01047	Dallas	43820	6165	14.1
01049	DeKalb	71109	9875	13.9
01051	Elmore	79303	9436	11.9
01053	Escambia	38319	5812	15.2

It is imperative you understand the concept here. We have two columns and we are going to link the map to the data table using these columns. They contain identical information. Note the five-digit FIPS code in each. You can even sort these so you can compare line by line.

- Close the attribute tables.

### 3 Join the data table to a map

- In the table of contents, right-click the countiesprj.shp shapefile (not the data table from Excel).
- Click Joins and Relates, and then click Join.
- In the "What do you want to join to this layer?" field, select "Join attributes from a table."
- In the "Choose the field in this layer that the join will be based on" field, select the appropriate column heading, in this case GEOID.
- In the "Choose the table to join to this layer" field, AGE\$ will already be selected.
- In the "Choose the field in the table to base the join on" field, ID will already be populated. (If it is not, the column is incorrectly formatted. The genesis of this error is not importing the Excel spreadsheet into Excel, but rather just opening it. You will need to close ArcMap and Excel, go back to chapter 4, step 5.)
- Select the "Keep Only Matching Records" option and click OK. To save a step here, skip the Validate Join button.

**INCREDIBLY USEFUL TIP**

*If the join does not work, go back and select **Validate Join**, which will give you clues about why it didn't work.*


**4 Verify the join worked correctly**

- 1. Right-click the shapefile name, and then click **Open Attribute Table**.
- 2. Scroll to the far right to see if data from the spreadsheet has been appended to the end of the attribute table. You should not see any error messages or null values. ➔
- 3. Double-check the number of records in the Age\$ tab by right-clicking the file and clicking **Open**. In the lower right corner, the number of records is listed (in this case, 67). Now check the number of records in the newly joined shapefile—it should be the same number. If it is not, then the two columns are not identical and must be corrected.
- 4. Close the attribute table.

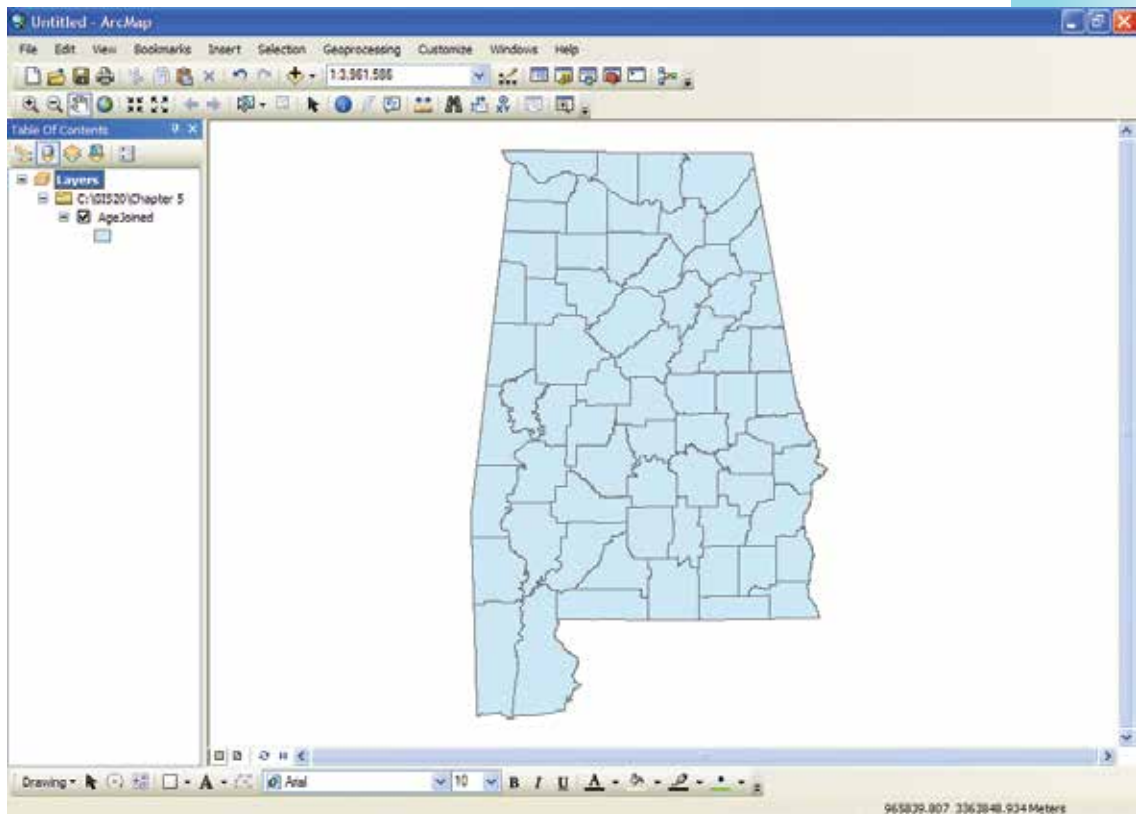
ID	County	Pop	Seniors	Percent
01005	Barbour	27457	3909	14.2
01113	Russell	52947	6720	12.7
01087	Macon	21452	3031	14.1
01097	Mobile	412992	53321	12.9
01031	Coffee	49948	7210	14.4

**5 Create a new shapefile**

When files are joined, it is a temporary join. To permanently join these files, create a new shapefile out of one that was just joined. To do this, do the following:

- 1. In the table of contents, right-click the shapefile name, click **Data**, and then click **Export Data**.
- 2. Click the **Browse** button  to browse to your save folder, name the new shapefile **agejoined** (no spaces in file names). The **Save as type** should be **shapefile**. Click **Save**. Verify it is saving where you would like, and then click **OK**.
- 3. When asked if you want to add the exported data to the map as a layer, click **Yes**. Notice the new file added to the table of contents.

4. The original Excel file and shapefile are no longer needed. To remove them, right-click the AGE\$ file and click Remove. Then, right-click the original county file and click Remove.



Congratulations! You now have a permanently joined a shapefile (agejoined) that contains data about the senior population. We will use this file in the next chapter.