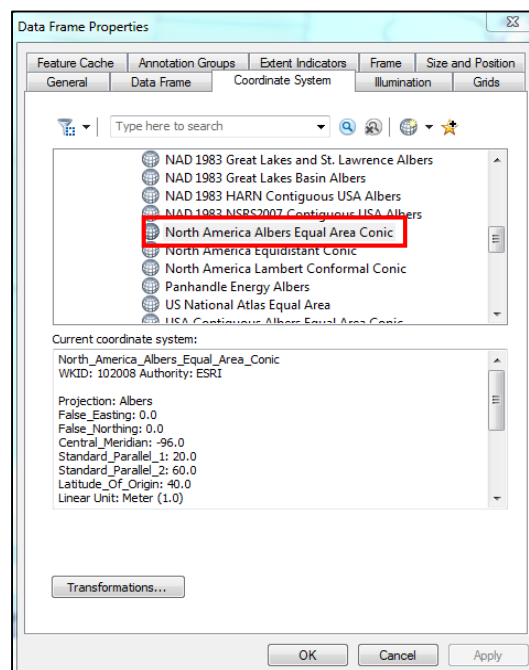# Joins Workshop – Join by Attribute and Spatial Join
Spring 2015 – Spatial Analysis Lab

Join by Attribute

1. Open a blank map in ArcMap
2. Project data frame:
   a. Double-click data frame, go to **Coordinate System** tab
   b. Navigate to:
      Projected Coordinate System → Continental → North American → North_America_Albers_Equal_Area_Conic
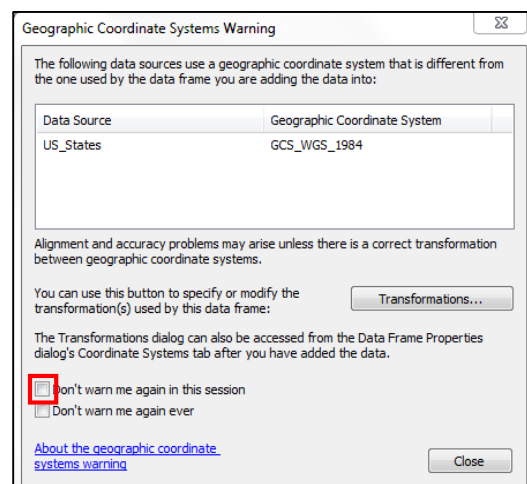
   c. Click **Ok**

3. In the **Catalog** tab on the right-side of the screen locate the **US_States.shp** in:

   Q:\Classes\Workshops\Spring2015

4. Click layer and drag into the map

   a. A warning will tell you that the data does not match, check the box saying **"Don't warn me again in this session"**

   b. Click **Close**

5. Locate the **Zip_Codes.shp** and drag it in to the map as well
    a. Go ahead and turn off the layer (uncheck box)

6. Find the excel spreadsheet: **Alums_April2005.xls** – expand and drag the **sheet1$** into the map
    a. Right-click on this layer and choose **Open Attribute Table**
    b. Observe the NewZip field – this is what we'll use to summarize and join our data
    c. Note the number of features

Sheet1$

	PrefClass	Zip	NewZip	SmithMajor
	0	1038	01038	Spanish & Portugeuse
	0	1027	01027	<Null>
	0	3833	03833	<Null>
	1919	55423-1033	55423	<Null>
	1922	06488-1882	06488	<Null>
	1923	01730-1267	01730	<Null>
	1923	02176-2701	02176	<Null>
	1923	10022-1105	10022	<Null>
	1923	94709-1000	94709	<Null>
	1924	19087	19087	<Null>

|◄ ◄   0 ► ►| ▤ ▤ | (0 out of 44918 Selected)

7. Summarize based on NewZip field
    a. Right-click on the field name for **NewZip** and choose **Summarize**
    b. Leave the default settings and click **Ok**
    c. Click **Yes** to add new table to map

8. Open that attribute table of the new table – **Sum_Output**
    a. Double-click on the Count_NewZip field to sort to see smallest quantity – should be 1, and again to see largest quantity of people in a specific zip code
    b. Right-click on Count_NewZip field and go to statistics—the **Sum** should be equal to our original number of features, which are now summarized by zip code
   c. Now our number of features represents the total number of zip codes that smith alums live in

	OBJECTID *	NewZip	Count_NewZip
	8102	99901	2
	8101	99840	1
	8100	99835	1
	8099	99827	1
	8098	99821	1
	8097	99802	1
	8096	99801	8
	8095	99775	1
	8094	99762	1
	8093	99752	1

|◄ ◄   0 ► ►| ▤ ▤ | (1 out of 8102 Selected)

Statistics of Sum_Output_2

Field
Count_NewZip   ▼

Statistics:
Count: 8102
Minimum: 0
Maximum: 446
Sum: 44900
Mean: 5.541842
Standard Deviation: 13.783526
Nulls: 0

9. Join the Zip_Code layer and sum_output table to assign alumni data to the zip codes:

    a. Right-click **Zip_Code** layer

    b. Go to **Joins and Relates → Join**

    c. Make sure **"Join attributes from a table"** is selected

    d. Choose **Zip** as the field to join from the layer

    e. Choose **Sum_Output** as the table to join to the layer

    f. Choose **NewZip** as the field to join from the table

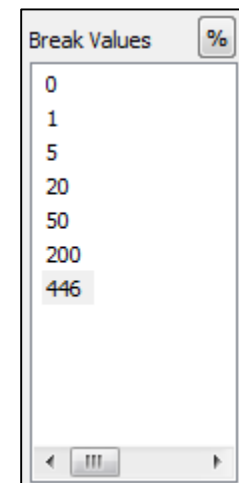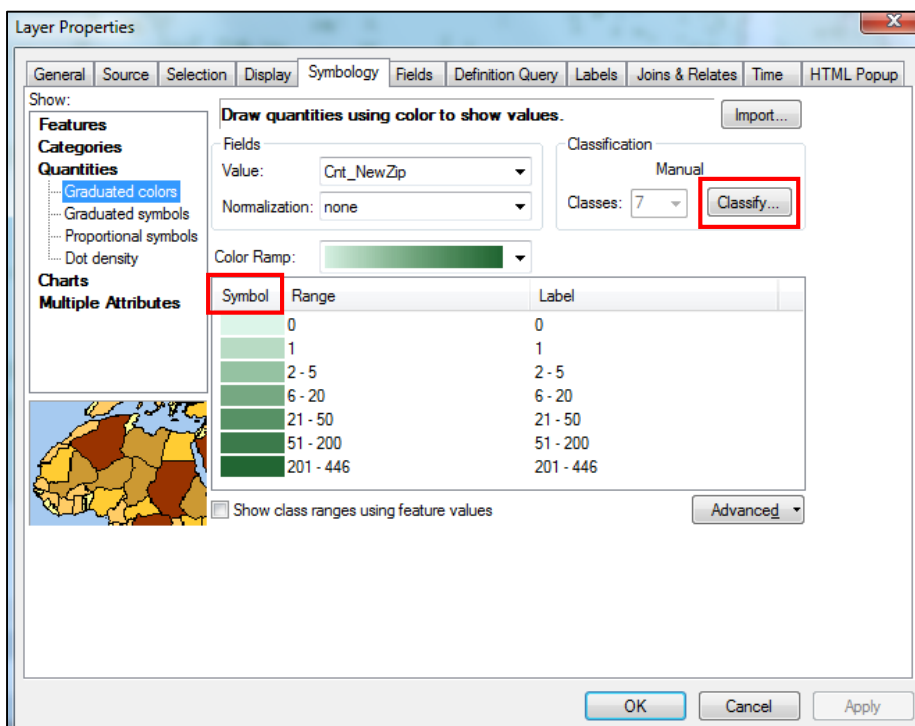   g. Click **Ok**
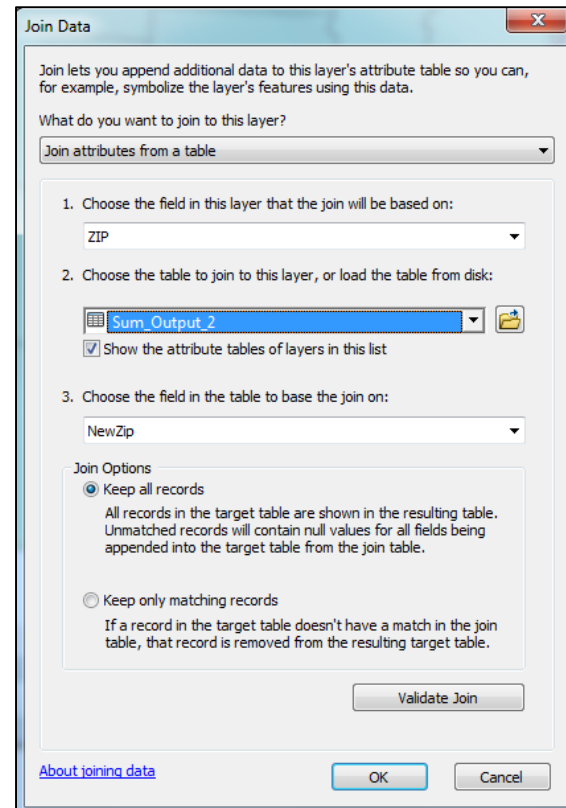
10. Export layer to make join permanent:
    a. Right-click **Zip_Code** layer, go to **data → export data**
    b. Change the output layer name to **ZipCodes_Joined**
    c. Click **Ok** and **Yes** to add new layer to map
    d. Turn layer off in map

11. Open **ZipCodes_Joined** attribute table

ZipCodes_Joined

FID	Shape *	ObjectID	ZIP	PO_NAME	STATE	Zip_Int	OBJECTID_1	NewZip	Cnt_NewZip
0	Polygon	234	0100	Amherst	MA	1002	33	01002	222
1	Polygon	237	0100	Belchertown	MA	1007	36	01007	40
2	Polygon	242	0101	Chicopee	MA	1013	41	01013	19
3	Polygon	243	0102	Chicopee	MA	1020	42	01020	14
4	Polygon	244	0102	Chicopee	MA	1022	43	01022	1
5	Polygon	246	0102	Easthampton	MA	1027	45	01027	144
6	Polygon	253	0103	Hadley	MA	1035	52	01035	42
7	Polygon	257	0104	Holyoke	MA	1040	57	01040	95
8	Polygon	259	0105	Leeds	MA	1053	60	01053	43
9	Polygon	260	0105	Leverett	MA	1054	61	01054	22

12. Change layer symbology:
   a. Double-click **ZipCodes_Joined** layer to open the properties window
   b. Go to **Symbology** tab
   c. Choose **Quantities**
      i. Graduated Colors
      ii. Value: Cnt_NewZip
      iii. Say **Ok** to warning

   d. Use Manual classification to set custom classes:
      i. Click **Classify**
      ii. In the new window choose 7 classes
      iii. To the right set the **Break Values** to match the image below
      iv. Click **Ok**

   e. Color settings:
      i. Choose a sequential color ramp
      ii. Click "**Symbol**" to change properties for all symbols
      iii. Set the Outline color to **No Color**, click **Ok**
      iv. Click **Ok** to save symbology changes and close the properties window

13. Turn on **ZipCode_Joined** layer to see results

Spatial Join

You may find yourself wishing that zip-code alumnae data also existed at the state-level. Good news – we can transform the zip-code data to state data using a Spatial Join!

1. Right-click on the **US_State** layer
    a. Choose **Joins and Relates → Joins**
    b. This time choose "Join data from another layer based on spatial location"
        aka: a spatial join
    c. Use **ZipCodes_Joined** for the join
    d. Check the box next to **Sum** so that the value fields that contain our alumnae count data will be further summarized for the larger area
    e. Rename the Output States_Joined
    f. Click **Ok**, it will take a few minutes – a perfect time to get a cup of tea or read eDigest
    g. The new layer will be automatically added to the map
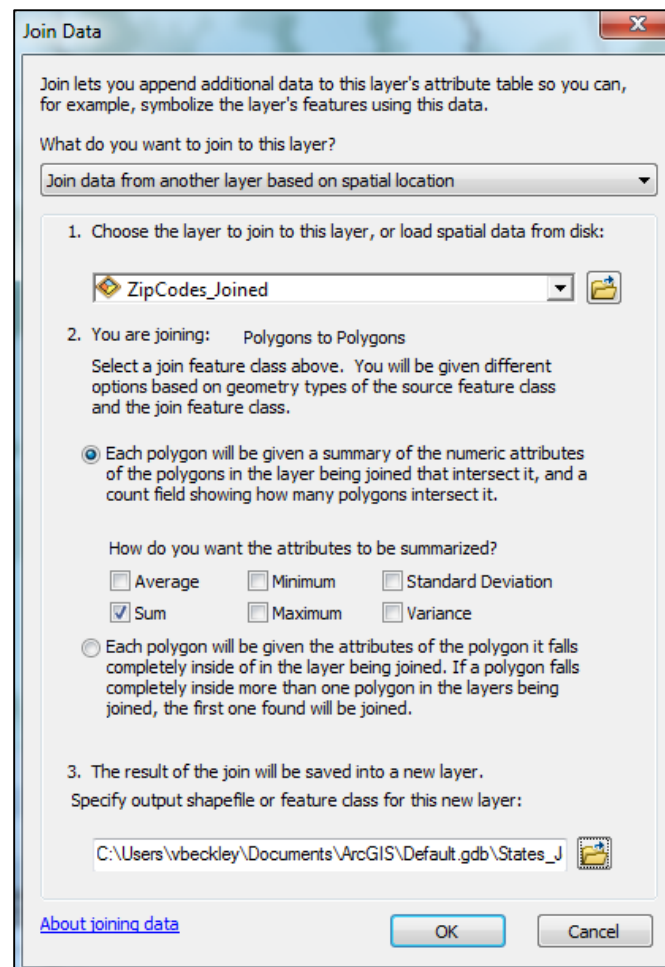
2. Open the new attribute table and change the layer symbology as before