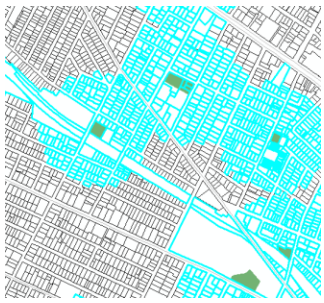
Tip Sheet: Using the Selection Tools for Querying



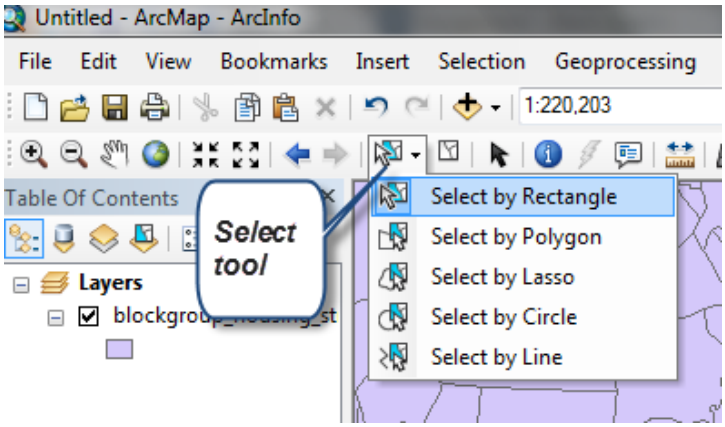
Written by Barbara M. Parmenter, revised 10/2/2015

Understanding how to use the selection tools in GIS is fundamental to basic queries and analysis. You should read the software help for each of these tools (links are provided below), but here are some tips. To be an effective user of GIS, you need to be very comfortable with these tools - they are the most common tools you will use in your GIS work.

Overview of the Selection Tools

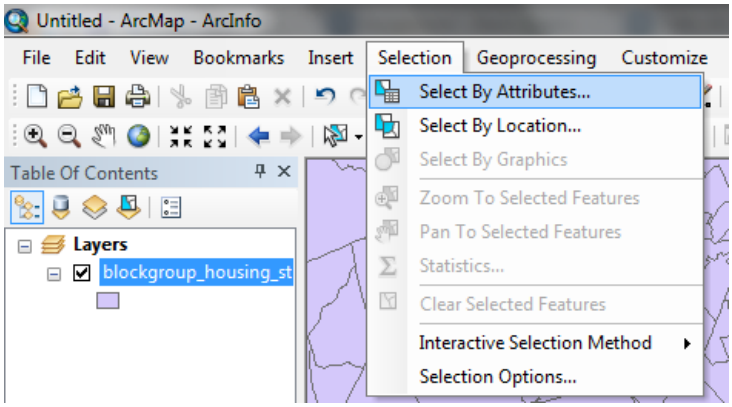
There are four methods in ArcGIS for selecting features:

1. **Interactive selection** –You can click on the screen or draw a box with *the select tool* to select out underlying features.



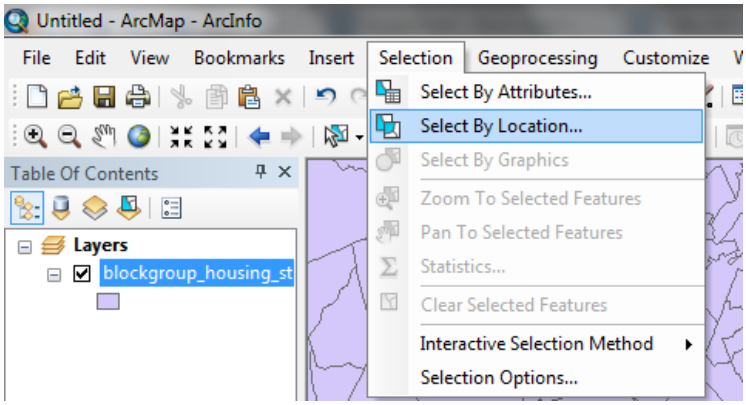
   See *ArcGIS Desktop 10 Help* for **Selecting Features Interactively**

2. **Select by Attributes** – This allows you to select features based on values in the attribute table (e.g., select all parcels with an assessed value of over $500,000).



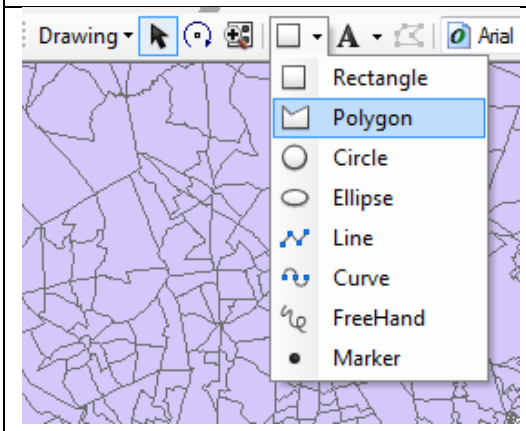
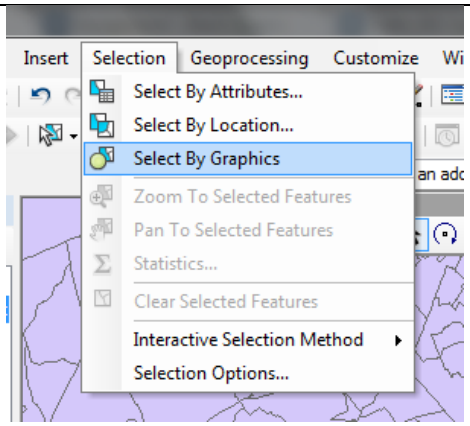
See *ArcGIS Desktop Help* 10 for **Using Select by Attribute**

3. **Select by Location** – This allows you to select features based on their relationship to another layer (e.g., select all brownfield points within the Boston city limits).



See *ArcGIS Desktop Help 10* for **Using Select by Location**

4. **Select by Graphics** – This allows you to select features using a graphic that you created using the DRAW toolbar (Customize – Toolbars – Draw).

*First draw a graphic using the **Draw** toolbar*	*Then use **Select by Graphic***
	

See *ArcGIS Desktop Help 10* for **Using Select by Graphic**

Important! For each of these select functions, you can do the following – these allow you to string queries together (e.g., select all parcels with a lot size of over 20,000 square feet and then select from that selection all of those parcels that are within ¼ mile of a transit station):

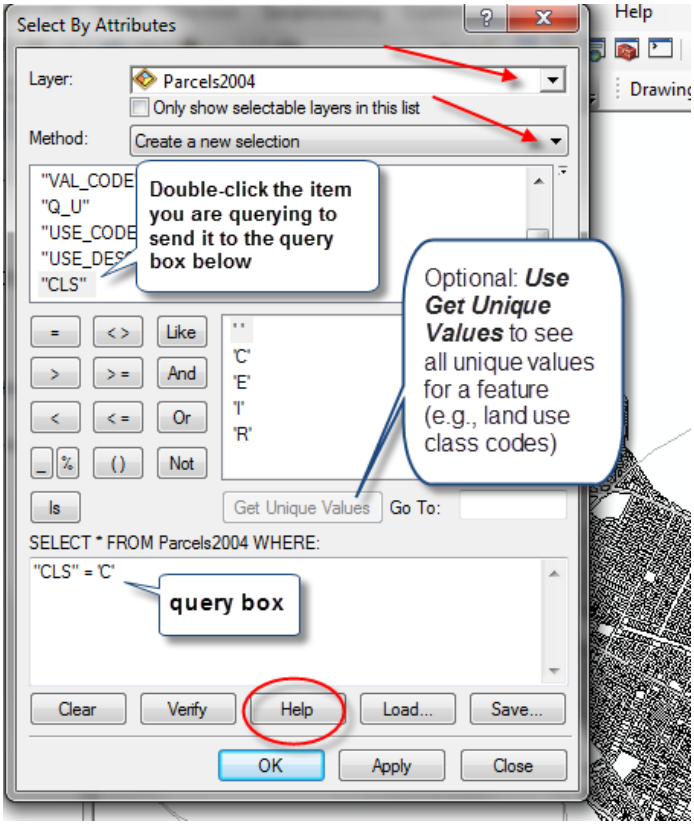
- Create a *new* selection
- *Add* to the *current* selection
- *Remove* from the *current* selection
- *Select* from the *current* selection

Tips for using Select by Attribute

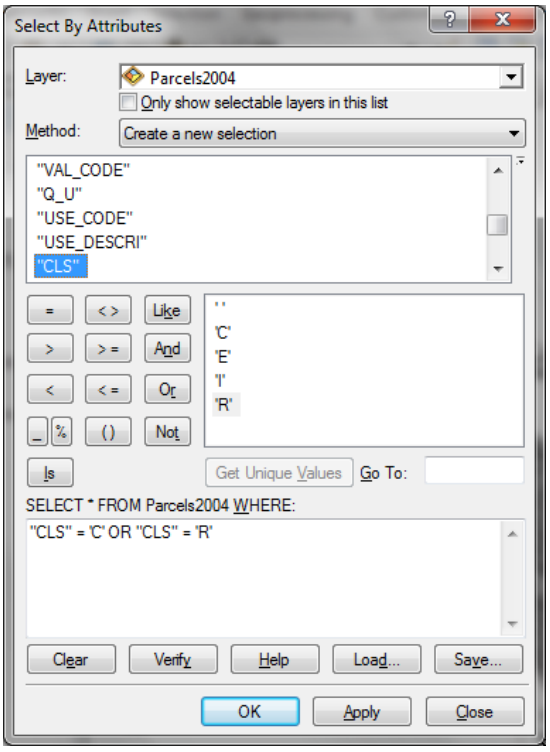
Use the **HELP** button in the *Select by Attribute* dialog box for more information on how to perform queries, including wildcard queries (e.g., find all parcels for which the owner name has the word University in it).

See the graphic and directions below for how to use the Select by Attribute query box.

1. Make sure you've selected the correct layer for which you want to select features.
2. Confirm the **Method** is set to the type most suitable for your analysis.
    a. Create a *new* selection
    b. *Add* to the *current* selection
    c. *Remove* from the *current* selection
    d. *Select* from the *current* selection
3. Double click on the item/field name to send it to the query box.
4. Use the "buttons" to insert your function.
5. Use **Get Unique Values** to see the unique values for a feature listed in the attribute table.
6. Press **Apply** to see the selection.

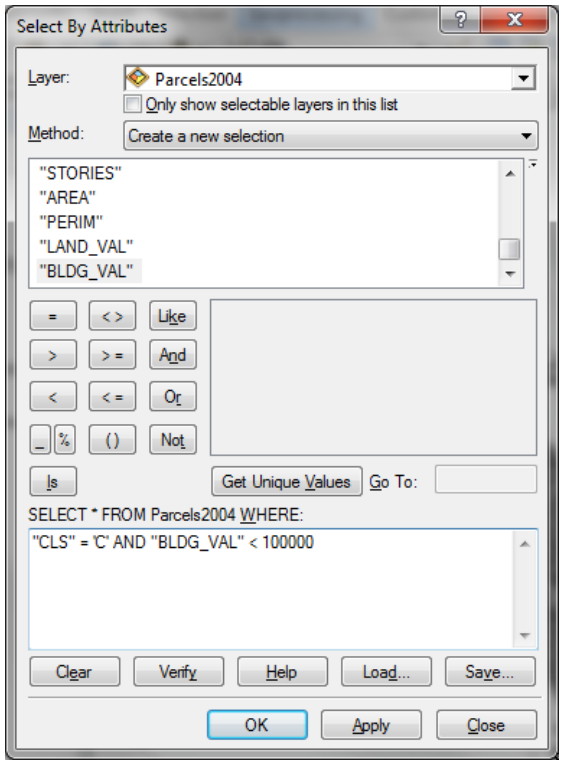


When selecting for multiple values within the same attribute column (e.g., select all commercial **and** residential land use polygons), use the **OR function** as follows – there is no parcel where the CLS (class) equals *both* Residential and Commercial:

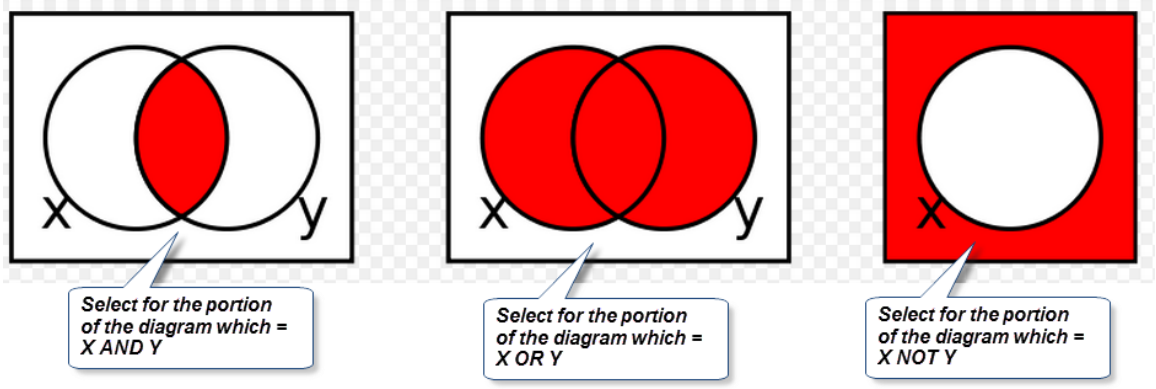


Note: You must **REPEAT** the field name in the query (in the above case "CLS" has to be repeated twice).

Use the **AND** function to find two values from two *different* fields. E.g., select parcels where land use is commercial AND the building value is less than $100,000:



Make sure you understand why we didn't use **AND** in the first query above and why we did use **OR** in the second. These *logical operators* are very important to understand!



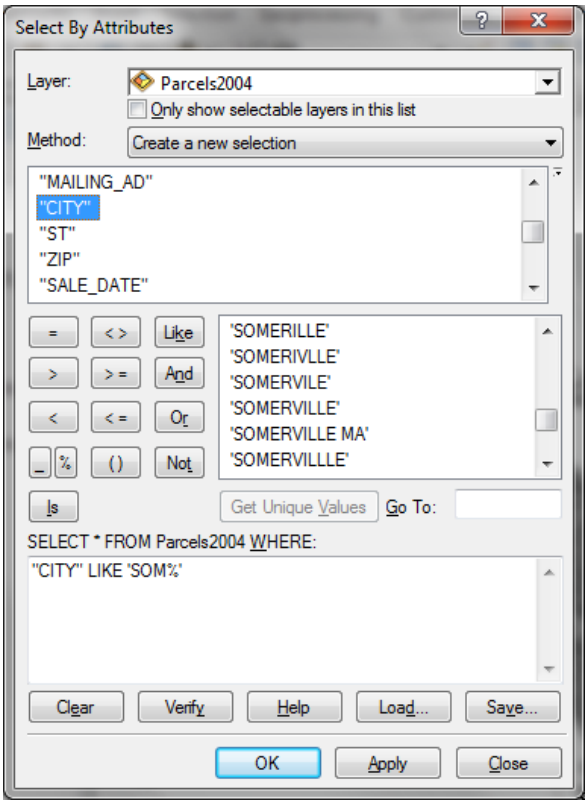
Read through the HELP button and ArcGIS 10 Desktop Help for using Select by Attributes.

Performing a Wildcard Search

In some cases, **Wildcard** searches need to be performed. To understand the purpose of a wildcard, see the example below:

In this example of Somerville parcels, the "City" field has the mailing address of property owners, which is a good indication of residents who own property versus out of town owners. Unfortunately there is a lot of variation and errors in the spelling of town names, including Somerville. So, selecting by City = 'Somerville' doesn't select all the properties, only the ones spelled correctly.

However, we can do a wildcard query, **where the % sign is the wildcard character for shapefiles** (note you have to use "Like" rather than = if you're doing a wildcard search). This will select all attributes that start with SOM.



Finally, note that numeric values can simply be typed in, as in "BLDG_VAL" < 100000. But text values need to be enclosed by single quotation marks as in "CLS" = 'R'.

It is **extremely** helpful to use the option for *Get Unique Values* when querying a text field – it will show you all the possible text values and you can simply click on one and the single quotation marks will come with it. For numeric fields, it's not necessary to get unique values (it's a pain, actually!) because you can simply type the number criteria you want (e.g., < 100000).

Tips for using Select by Location

Use Select by Location to select out features based on their **geographic relationship to features in another layer**. Select by Location can be a confusing interface, so think carefully how to fill out the dialog box. You can always click on the Help button to clarify what each menu option means.

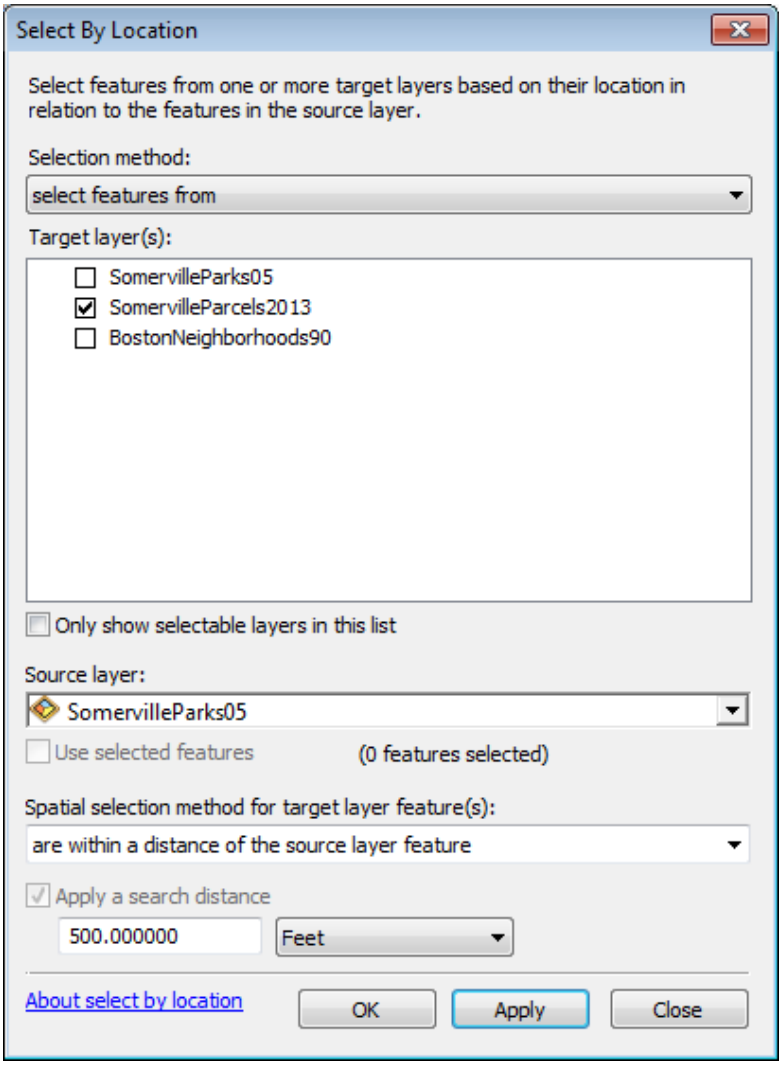
For this example, we will select all parcels within 500 feet of a park:

1. Select your **Target layer**. This is the layer from which you want to select. In this case, our target layer are **parcels** because we want to select the Parcels within 500 ft from a park.

2. Select your **Source Layer.** This is the layer that the spatial information and relation is based off of. In our case, we want to know which parcels are within 500 feet of the **parks.** Therefore, parks are our source.

3. Make sure to choose the correct selection method. Look through the list, there are quite a few.

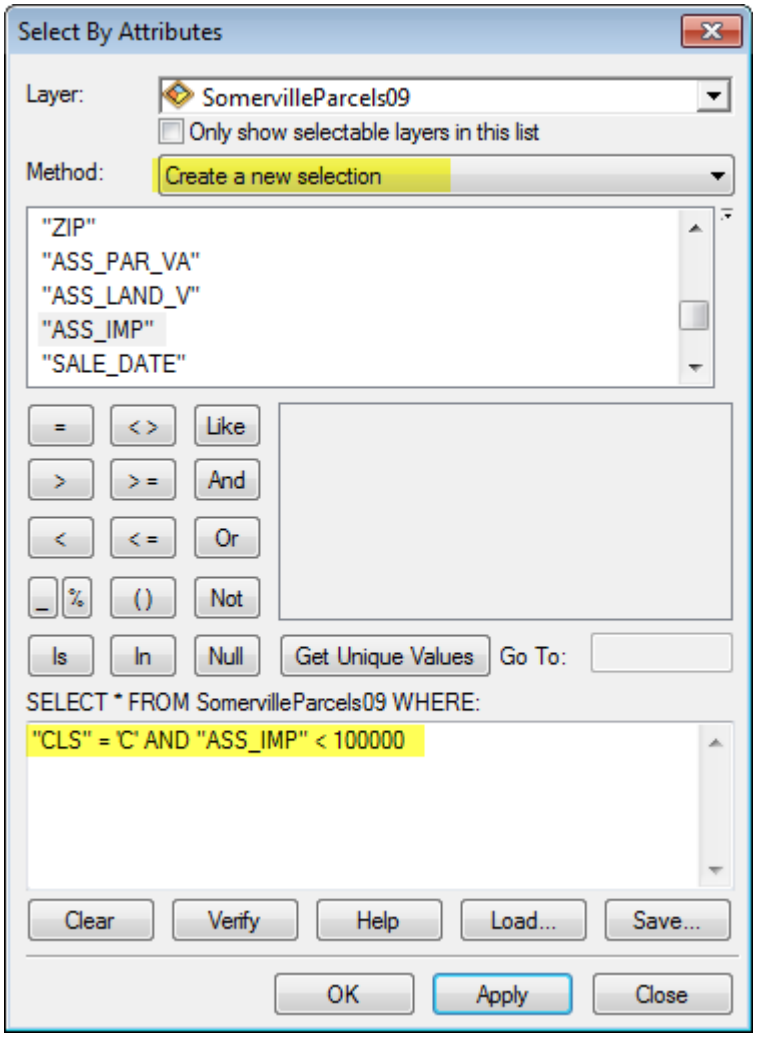
4. Add a search distance, if applicable. Make sure to select the correct units.



Tips for chaining selections as part of a larger, longer query

It is possible to chain together many selections. For example, if we wanted to determine which parcels are used for commercial purposes, have a building value of less than $100,000 and are within walking distance of a park, we could use a string of selection tools.

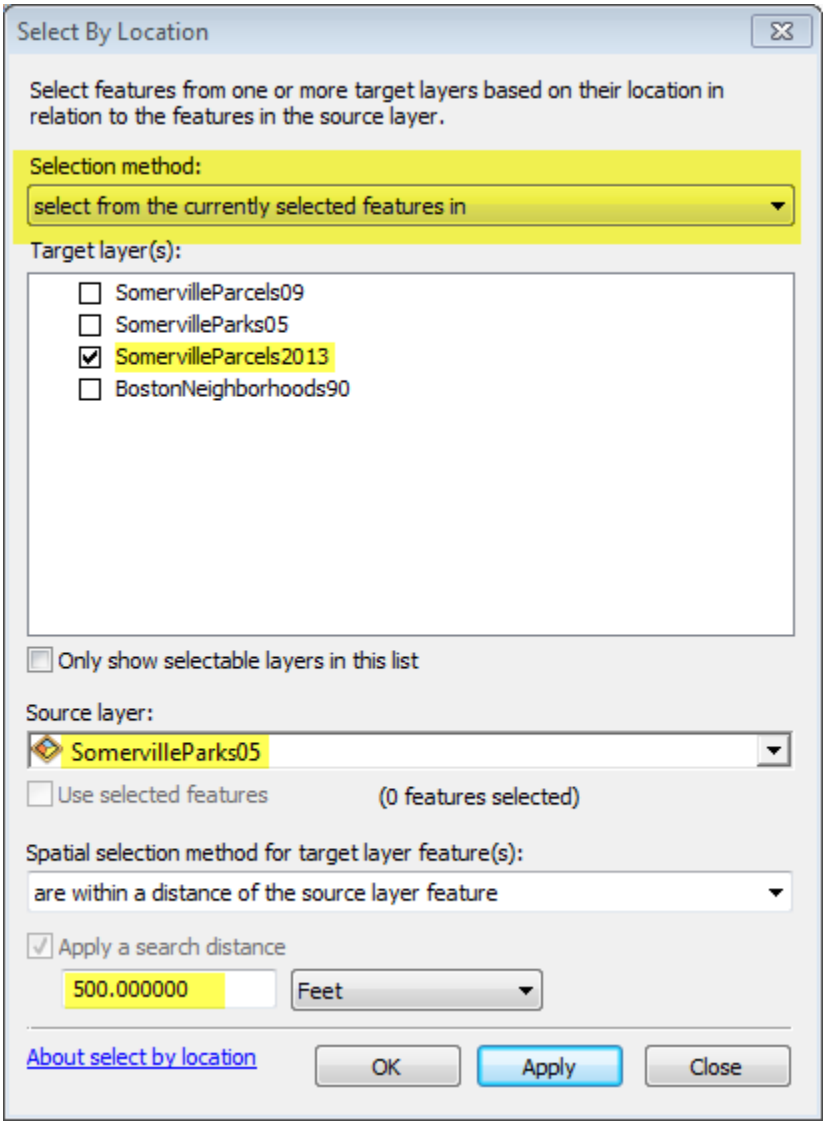
1. In Select by Attributes, we would select from the **Parcels** layer the features that are **commercial** AND are **less than $100,000**. Since these attributes come from two different fields, we can perform this query in one string using the AND function. Let's select CLS = C AND ASS_IMP < 100,000. Remember to use the buttons!



2. Now that we have the features that are commercial and less than $100,000, we can use **Select by Location** to narrow down the selection to those within a fixed distance of a park. In the **Select by Location**, make sure to set the ***Selection Method*** to **"Select from the currently selected features in:"**

   NOTE: If you do not change the selection method, ArcMap will forget the previous query and reselect features only taking in account the distance to the park!

3. Fill out the **Select by Location** query with the Somerville Parcels being the target layer (the layer with the features we want to select) and choose Somerville Parks as the Source layer. Again, set the distance value to 500 feet and choose "are within a distance of the source layer feature".



Now, within 2 easy steps, we have the parcels that are commercial use, less than $100,000 and within 500 ft. of a park!

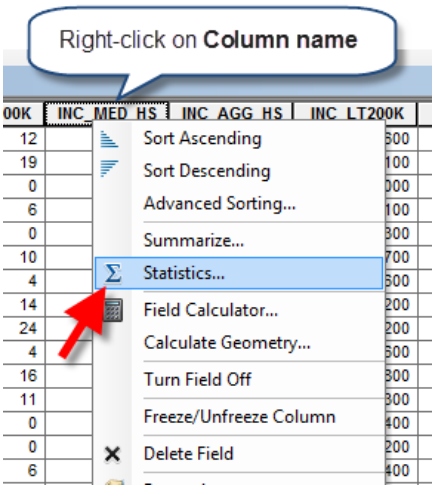
Viewing statistics for selected records

In addition to selecting features that meet certain criteria, you often need to view **summary information** about these features (e.g. Medium income for households in blockgroups).

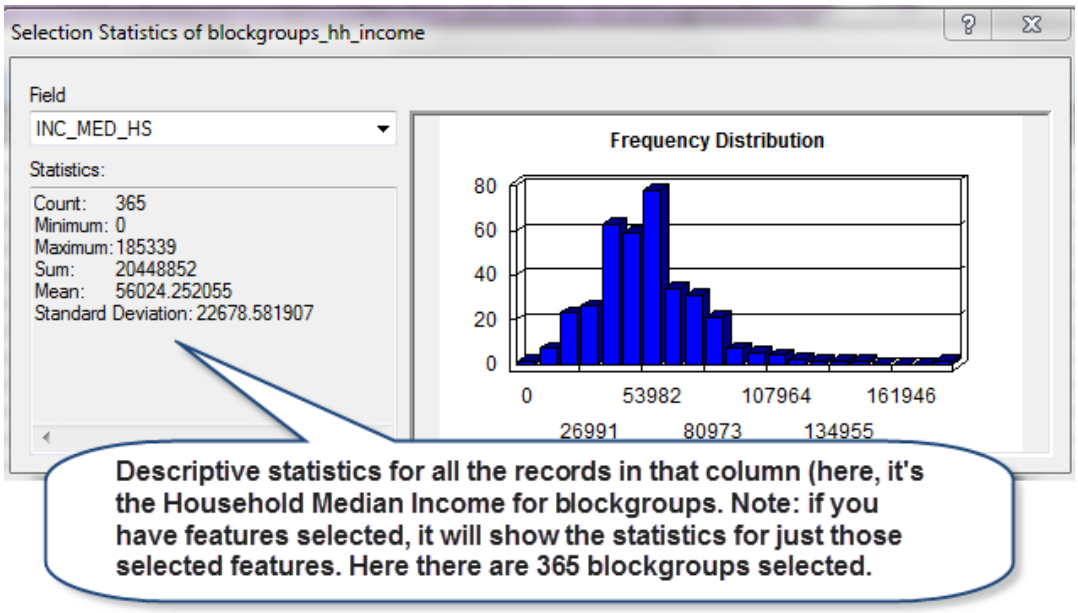
To view this kind of **numeric** data, ArcGIS has a **statistics** function in its **attribute table**. Get used to using this function as it can be very useful for exploring your data layers. You can view the statistics for the entire field, or selected attributes.

1. Open the attribute table for the layer you are exploring.

2. *Right-click the heading of an attribute field* that contains numeric data you want to see and click **Statistics**.



3. In the *Statistics* dialog box, you'll see information about the values in the field whose heading you clicked. The information includes the count of selected features, the sum of the numeric value, as well as the mean, minimum, maximum, and standard deviation, plus a histogram (frequency chart) showing the distribution of values.



4. If you want to see statistics for another numeric field, click the *Field* drop-down arrow and click the field's name.

5. Click the *Close* button when you are finished exploring statistics.

See a full description of how to use this tool on the online *ArcGIS 10 Help*, see **Viewing Statistics as a Table**.