How to Select Features from NHGIS Boundary Files

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This tutorial shows the NHGIS user methods of selecting features from GIS boundary files so they can be displayed without the other features. Unlike the prior version of NHGIS, users do not select a specific location (feature) for which to select data but instead receive data for the entire country, or the state for the smallest geographic levels. Boundary and data files for geographies at, or larger than, the census tract level have a nationwide extent. Boundary and data files for geographies smaller than the census tract level have a statewide extent. For example, rather than downloading a boundary file of census tracts in Minnesota, a user would get a boundary file that has every census tract in the country. Likewise, rather than receiving a boundary file of a single block or a cluster of block groups in Minneapolis, MN, for example, users would get a boundary file of all block groups in the state of Minnesota. In addition, please note that the nationwide boundary file is actually 3 individual boundary files (1 contiguous USA, 1 Alaska, 1 Hawaii).

These instructions are based on Esri's ArcGIS 10 software package. While the steps are essentially the same, those using a version of ArcGIS 9 may notice their screen looks different than the images shown here. In addition, other GIS packages (MapInfo, Intergraph's GeoMedia, GRASS, etc.) may have different methods, so check your software's help documentation for more information.

This tutorial assumes that you have already downloaded a zipped shapefile from NHGIS to your computer and have unzipped all files. Be aware that the now unzipped shapefile folder may contain additional zipped files.

Please note that this tutorial does not use the tabular data available through NHGIS, but instead uses only the GIS boundary files. For additional information on attaching the tabular data to the boundary files, please review the *How to Join NHGIS Data and Boundary Files* user's guide on the website.

This tutorial uses a GIS boundary file that was extracted in Scenario 2 of the *Using the NHGIS Data Finder* user's guide. The GIS boundary file for year 1990 at the state level is used for demonstrative purposes. The steps used are the same regardless of the geographic level you are working on (census tract, county, place, etc.). Feel free to follow along using your own shapefile of interest.

Methods

This tutorial is formatted to show users, in three steps, how to select features out of a much larger shapefile and then create a new shapefile of only the selected feature(s). While the first and third steps do not change, the second step is broken into 4 alternative methods.

Step 1: Add Data to Your Map Document

Step 2A: Select by Attribute
Step 2B: Select by Rectangle (or other shape)
Step 2C: Select by Features In the Attribute Table
Step 2D: Definition Query

(Optional) Step 3: Export to Make Selection Permanent

Users only need to use one of the four methods to complete the three step process. The four methods, however, can be used in combination with one another as the user creates the selection set he or she desires. In addition, the third step is not always necessary for every mapping situation.

While this tutorial uses a GIS boundary file, the same steps can be used when selecting features from the comma and column delimited tabular data formats that NHGIS provides. The only exception is that Step 2B cannot be used with tabular data because the data is not mapped.

Please note that this tutorial does not include an exhaustive list of methods of selecting or isolating a feature from the larger file from which it comes. Rather, the methods included here represent the most straight forward approaches that users new to ArcGIS will hopefully find the least confusing.
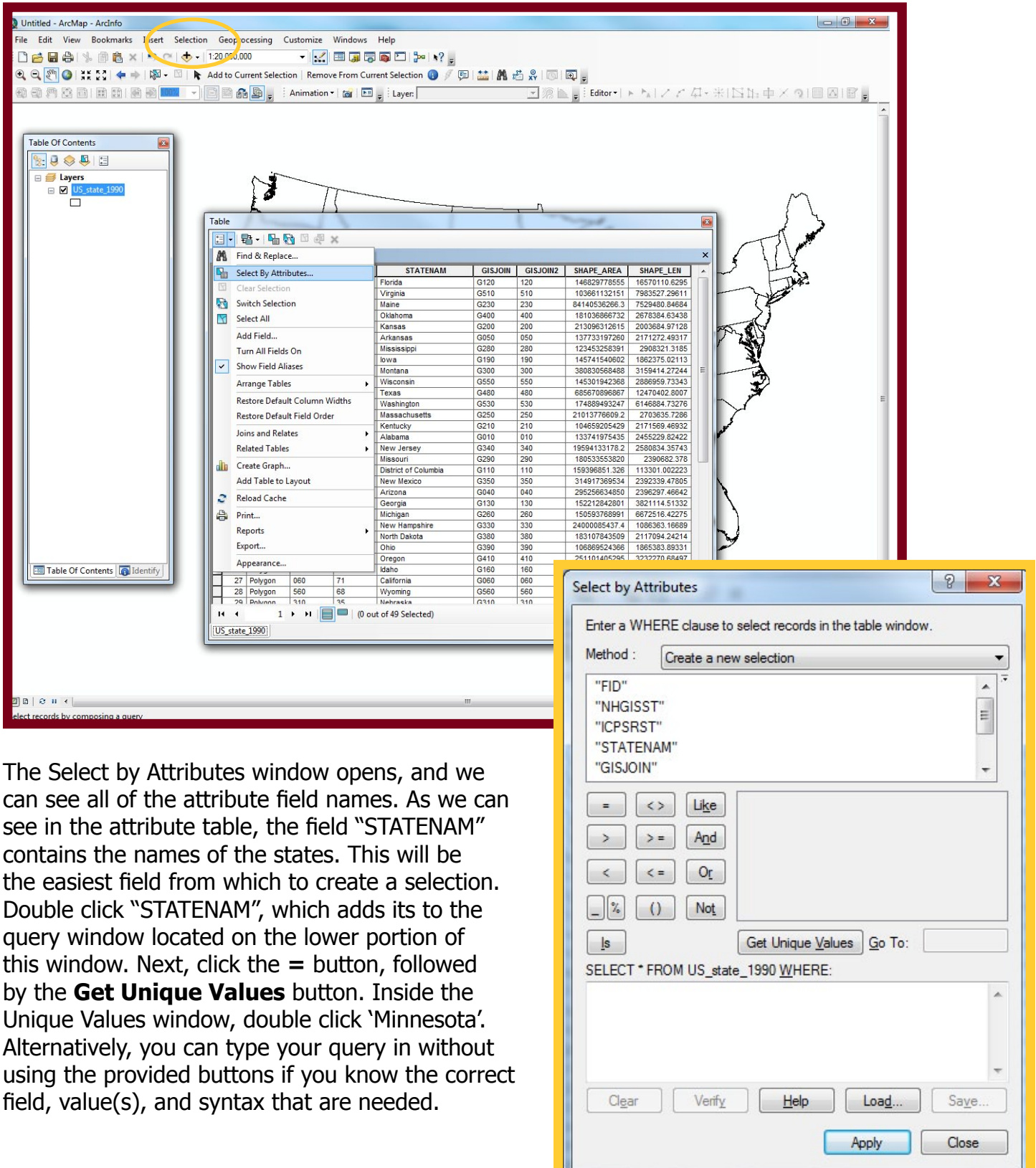
Step 1: Add data to your map document

In your map document, click the **Add Data** button and navigate to the folder where you saved your NHGIS extract. Click on the ..._shape folder and add the desired shapefile. In our example, we want to use the *US_state_1990.shp* which is the lower 48 states; click **Add**. Note that the states of Alaska and Hawaii are included as separate shapefiles. Since we are not interested in those areas, we can ignore them. The fourth shapefile, *US_msacmsa_1990.shp*, can also be ignored unless you would like to use that file instead to follow the steps in the tutorial.
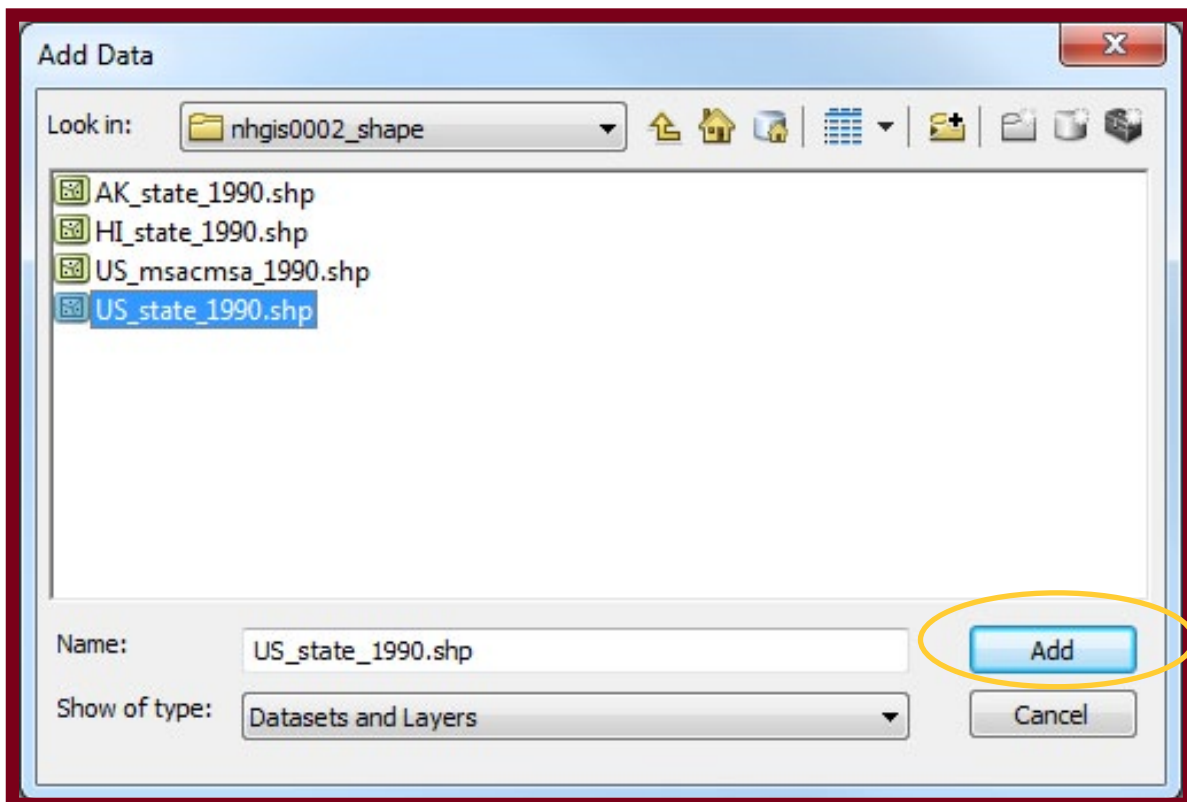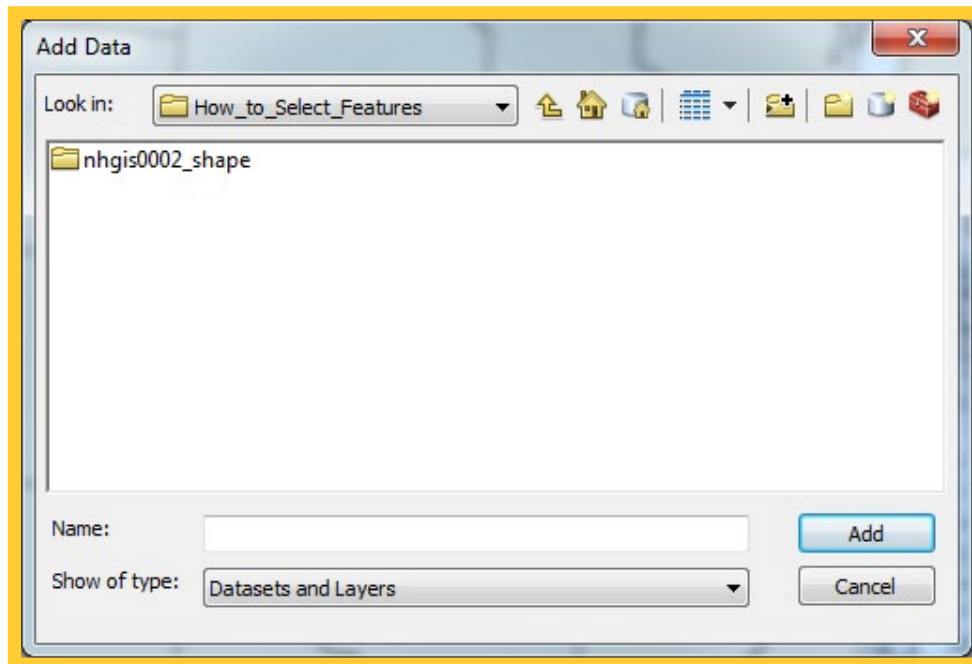
Step 2A: Select by Attribute

Right-click on the shapefile in the Table of Contents and then select *Open Attribute Table* from the context menu. Within the attribute table, select the table options icon in the top left. Alternatively, you can click on **Selection** on the Menu Bar, and then choose *Select by Attribute***.**

The Select by Attributes window opens, and we can see all of the attribute field names. As we can see in the attribute table, the field "STATENAM" contains the names of the states. This will be the easiest field from which to create a selection. Double click "STATENAM", which adds its to the query window located on the lower portion of this window. Next, click the **=** button, followed by the **Get Unique Values** button. Inside the Unique Values window, double click 'Minnesota'. Alternatively, you can type your query in without using the provided buttons if you know the correct field, value(s), and syntax that are needed.

Step 2A: Select by Attribute

Once the query is constructed, we can select **Verify** to ensure the syntax is correct, or simply click **Apply** to finish the selection.
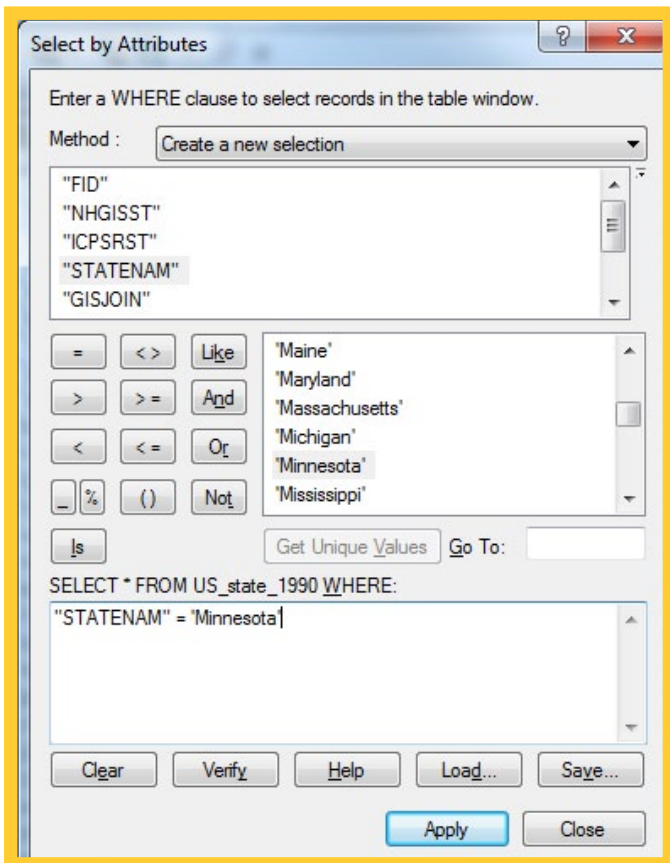
Notice that once you click **Apply**, your query selection will become highlighted. You may need to zoom out or pan over to see your selected feature(s).

From here, you may wish to refine your selection if you have too many features selected. This can be done by using the various options under the **Method** dropdown window.
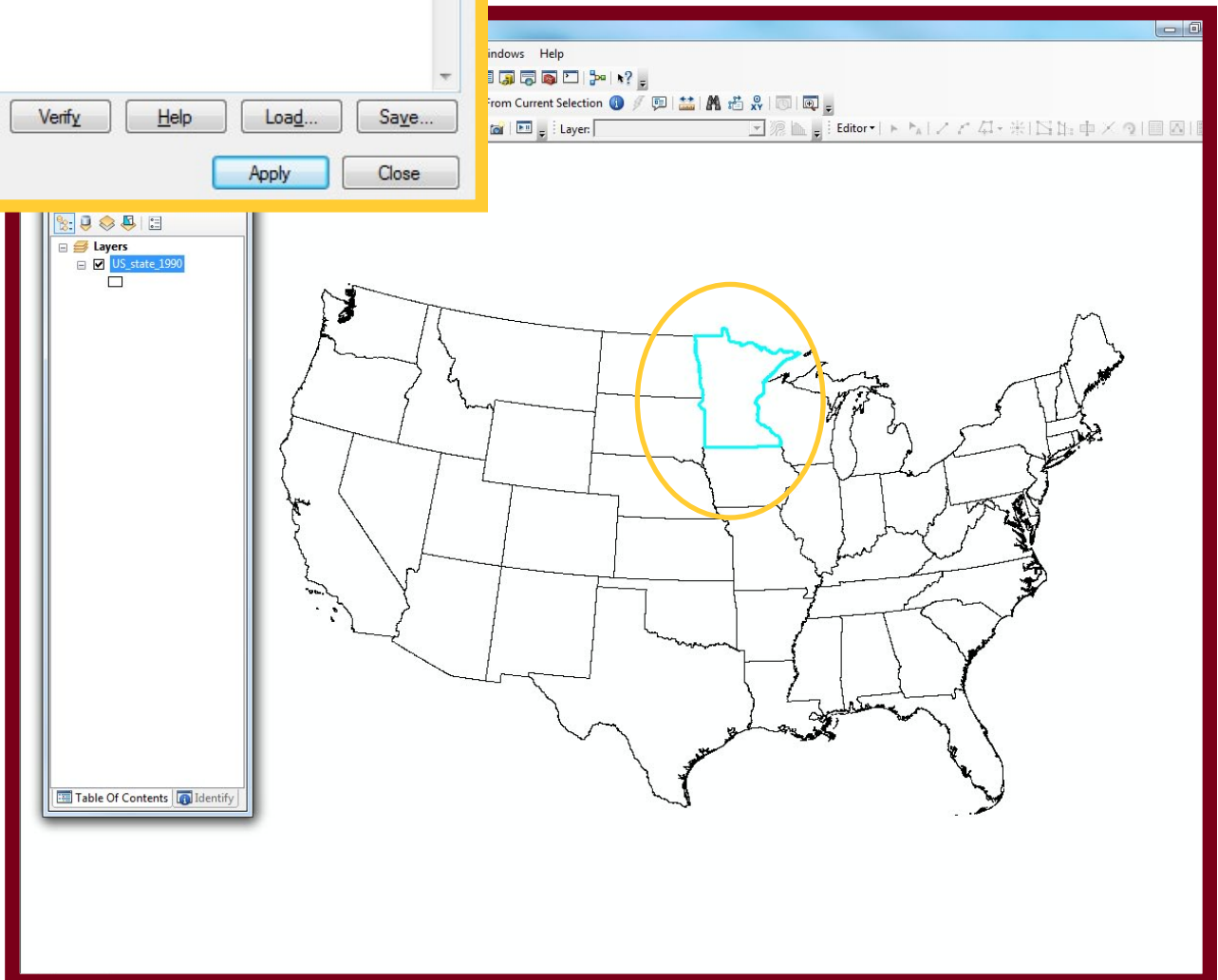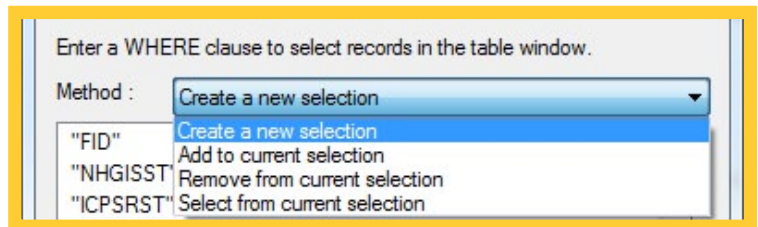
Step 2B: Select by Rectangle (or other shape)

Often, the easiest method of selecting a particular feature is the **Select by Rectangle** tool. This button, when chosen, allows the user to click a spot on the map to select that feature or, as the name implies, click and drag to create a rectangle. Any features that come in contact with this rectangle are selected once you release the left mouse button you held down. Once your selection is made, you can see the results both on the map, as well as in the attribute table. If you only want to see the selected features in the attribute table, select the icon at bottom center of the attribute table (circled in gold, below). Note that this selection method will not work with tabular data that is not geographically depicted (such as non-joined .csv, .dat, .dbf, or .xlsx files).

Step 2C: Select by Features in the Attribute Table

Often the easiest method of selecting, features can be clicked on within the attribute table to create a selection. Simply click on the far left portion each feature, in the gray box, to select that feature. You can drag the mouse and scroll up or down to select additional features, or use the Shift or Ctrl keys to create help make the selection set. Selecting one record and then holding down the Shift key while clicking on another feature will select all features between the two that were clicked on. Holding the Ctrl key down while selecting will expand the selection set to include additional feature clicked on.


Further refinement can be made after clicking on the **Show Selected Features** button. Right click on a feature (again, on the far left of the feature) and notice the options available. You can unselect the particular feature(s) or reselect it (meaning remove everything else from the selection set). Notice that selected features show up in blue, and highlighted features (the selection within the selection) show up in yellow. The colors can be changed, but these are the default colors you will most likely see.
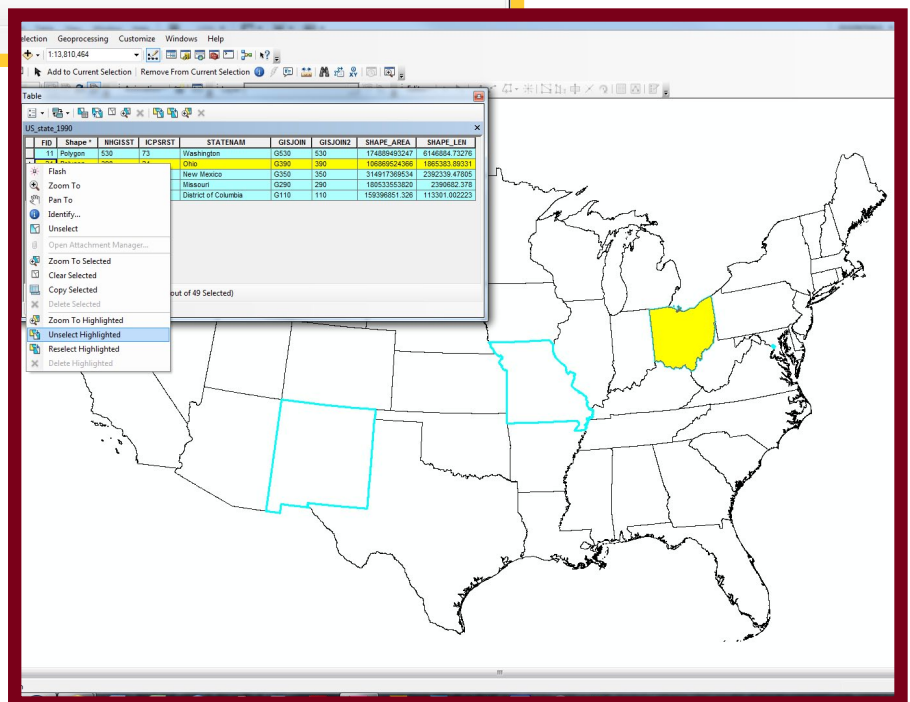
Step 2D: Definition Query

An often more direct method of selection that works well when you either want to include or exclude nearly every feature is the **Definition Query**. Operating slightly differently than the other selection methods, a definition query will not just select features, but it will make all other features disappear from both the map and the attribute table. This removal of unselected features is not permanent, however, and can easily be changed or undone.

Right-click on the shapefile in the Table of Contents and then select *Properties* from the context menu. Within the properties window, select the **Definition Query** tab.
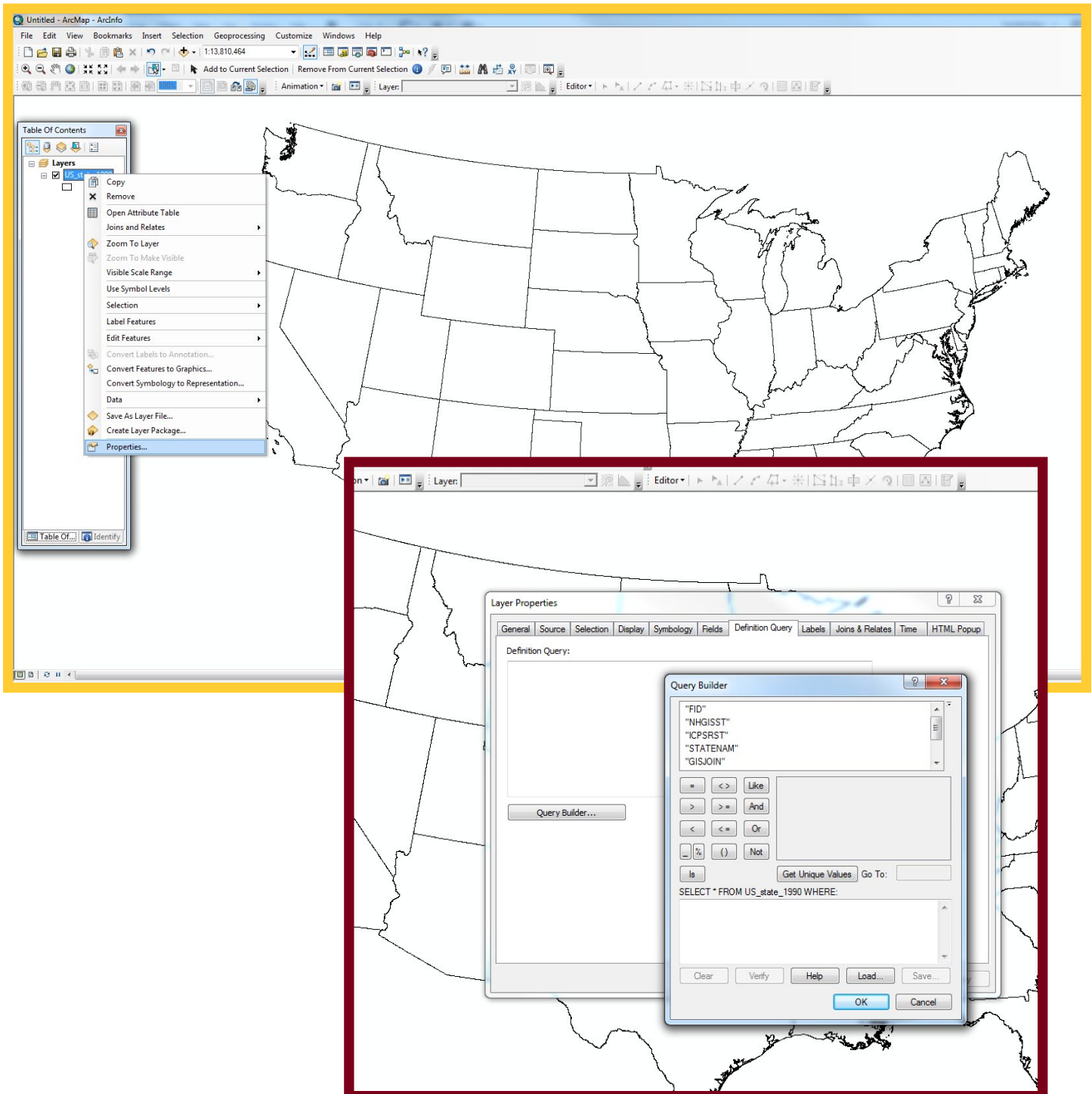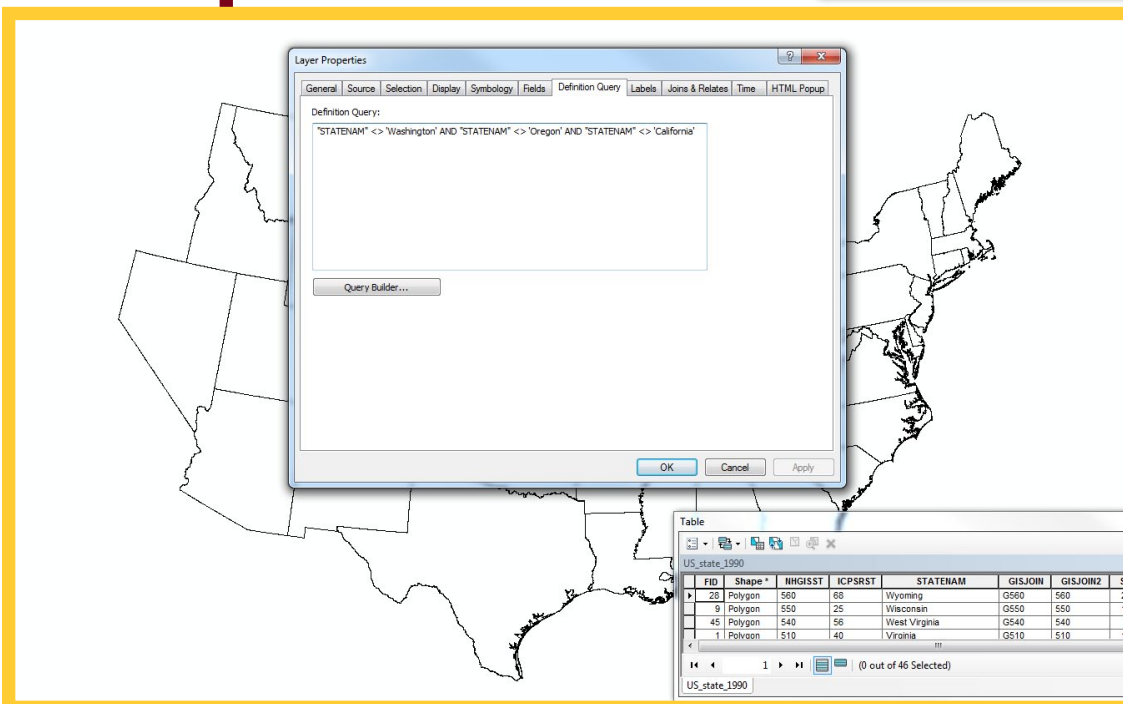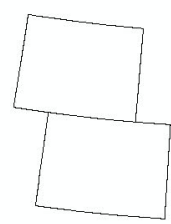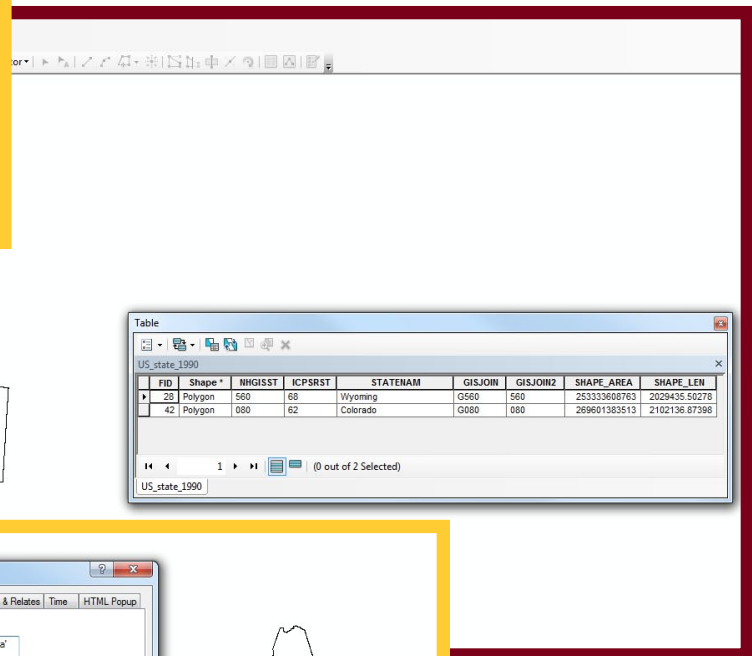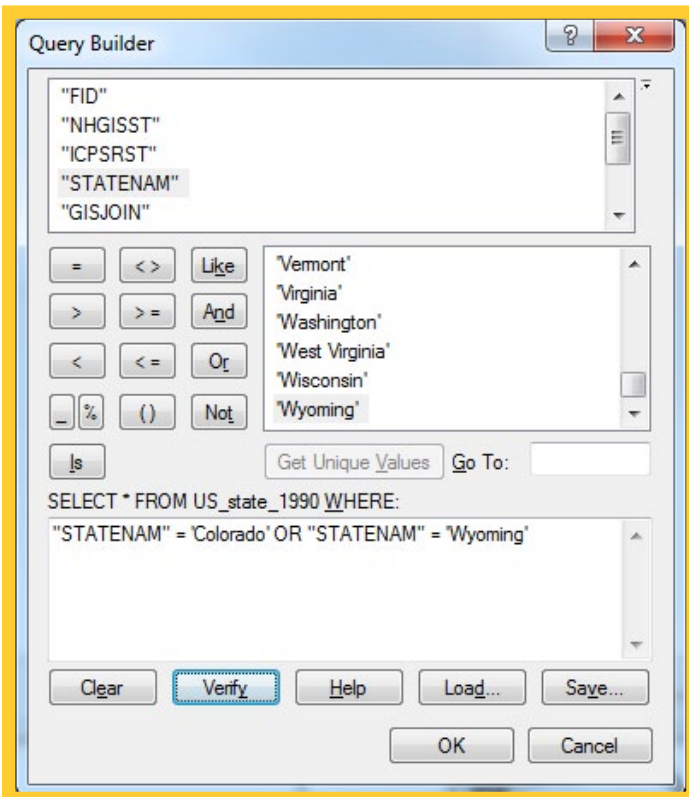
Step 2D: Definition Query

Building the Definition Query is no different than shown in Step 2A: Select by Attribute. Be sure to click the **Help** button for assistance in building queries.

In this first example, the query will select the states of Colorado and Wyoming, while removing all other features from the map and the attribute table. Notice the results, below, and see how they differ than when completing a Select by Attribute.

In the second example, the query selects all states except for the three on the West Coast.

Step 3: Export to Make Selection Permanent

A selection or definition query is not a permanent creation that will stay on the shapefile if opened in another map document. Instead, it is considered temporary because it only exists within the confines of the map document in which it was created. If you want to make the selection set or definition query permanent, you must *export* the shapefile. To do this, right-click on the shapefile and select *Data* from the context menu and select *Export Data...* Notice that the **Export** dropdown menu differs in the two examples. This option will default to *Selected features* anytime there are features selected within the file you are attempting to export. If there is not a selection set made, ArcGIS defaults to *All features*. Definition queries, as has been discussed, do not technically create a selection and thus they default to *All features*.
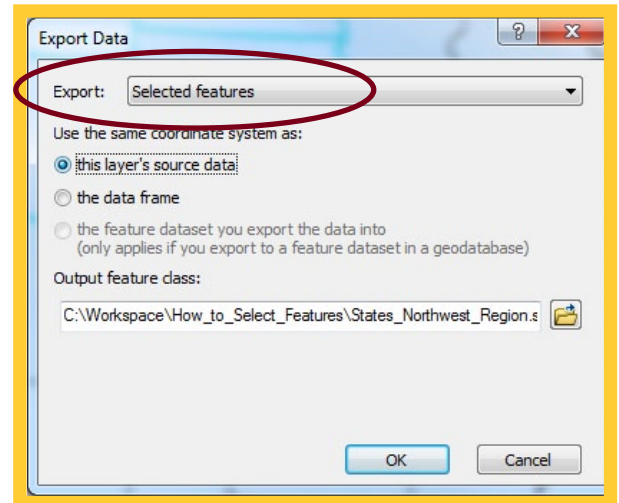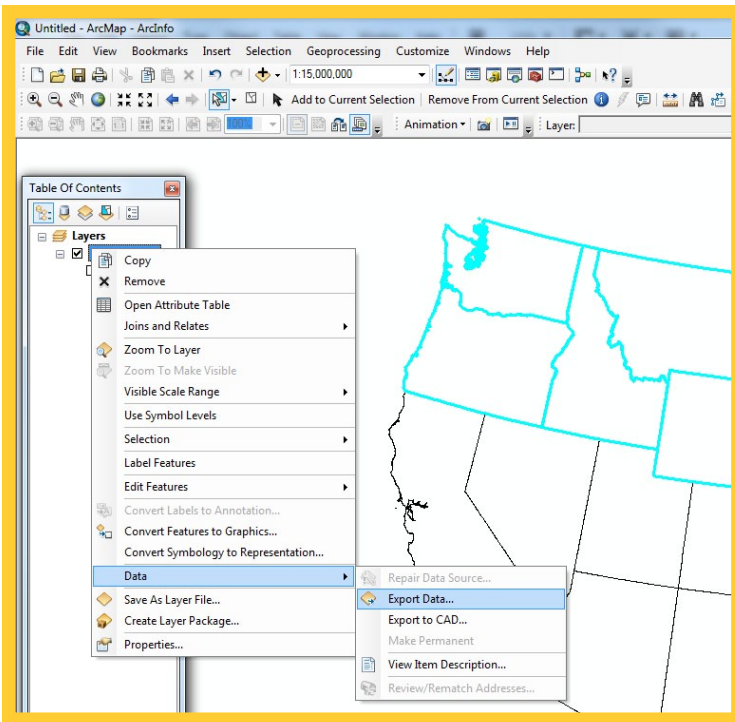
Save the new shapefile where ever you wish, click **OK**, and a new shapefile will be created. You can then add your new shapefile, which contains only the features you selected, to your map!