

GIS II: Data Management Essential Geoprocessing Tasks Exercise

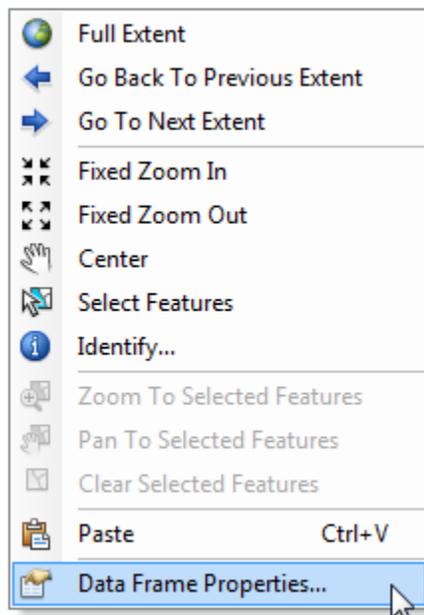
*** Files needed for exercise: *NY_Counties.shp*, *NY_FQHCs_Urban.shp*, *NY_FQHCs_Rural.shp*, *NY_FQHCs_Unknown.shp*

Goals: The goal of this exercise is to understand how to use geoprocessing tools in ArcGIS.

Skills: After completing this exercise, you will be able to use the Merge, Project, Dissolve, Clip, and Buffer tools to perform basic geoprocessing tasks in ArcGIS.

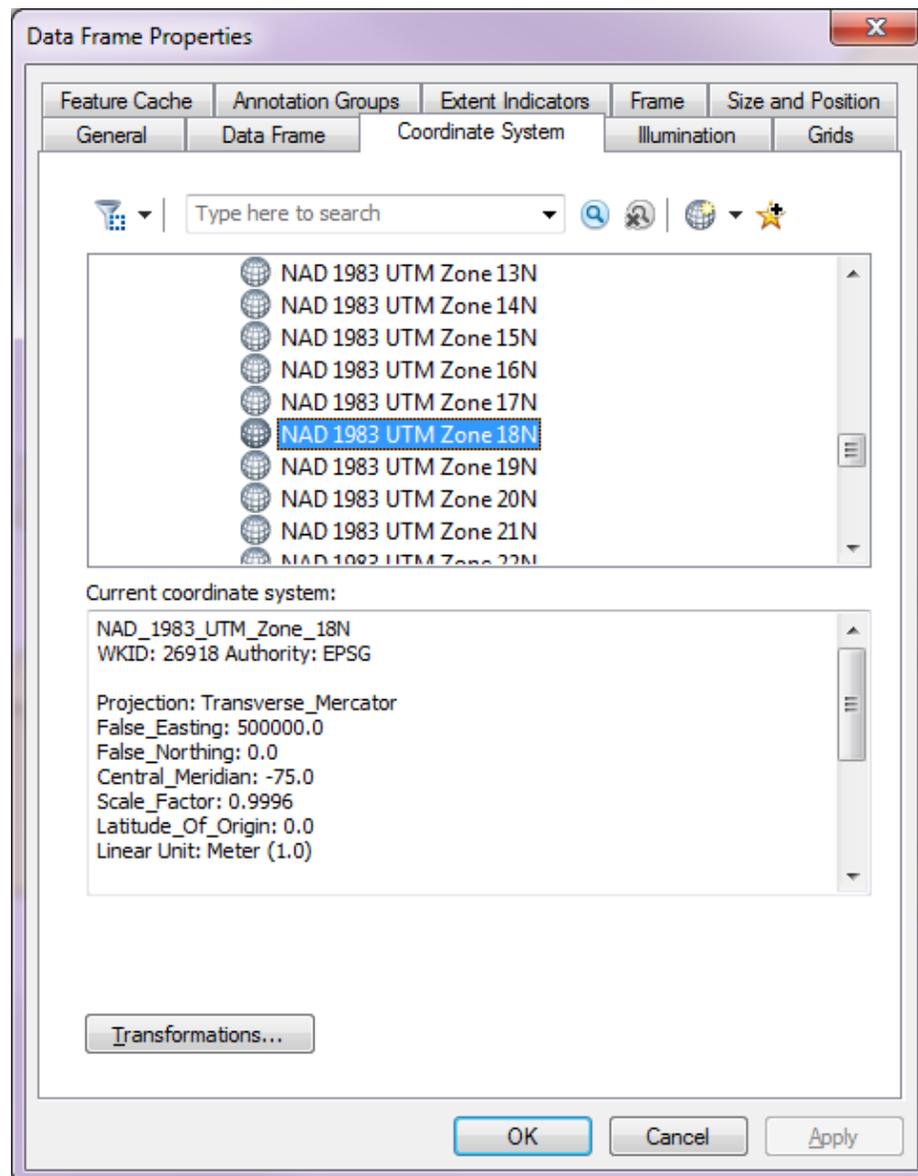
Setting the Data Frame Coordinate System

1. Open a new blank map in ArcMap.
2. Right click in white space and choose **Data Frame Properties**



3. You want to set the coordinate system for the data frame before you start so that it remains consistent throughout the project. Click on the **Coordinate System** tab.
4. Browse to **Projected Coordinate Systems > UTM > NAD 1983 > NAD_1983_UTM_Zone_18N**. Remember that this is the standard coordinate system for New York. Click **OK**.

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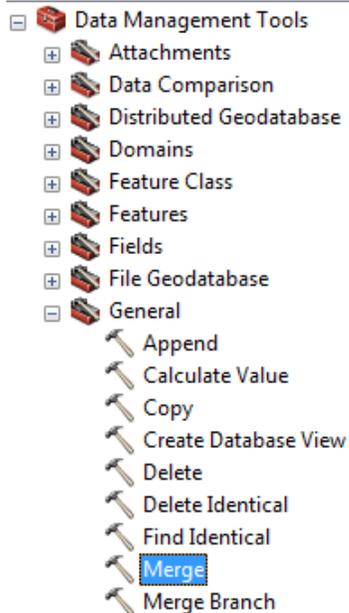


Merging Data

1. Click the **Add Data** button  and browse to the Geoprocessing Exercise_Data folder.
2. The FQHC service location data that are available to us came in three parts. Add all three: *NY_FQHCs_Rural.shp*, *NY_FQHCs_Unknown.shp*, *NY_FQHCs_Urban.shp*. Ignore the warning saying that the FQHC data uses a geographic coordinate systems that is different from the one used by the data frame; we will deal with this issue at a later time.

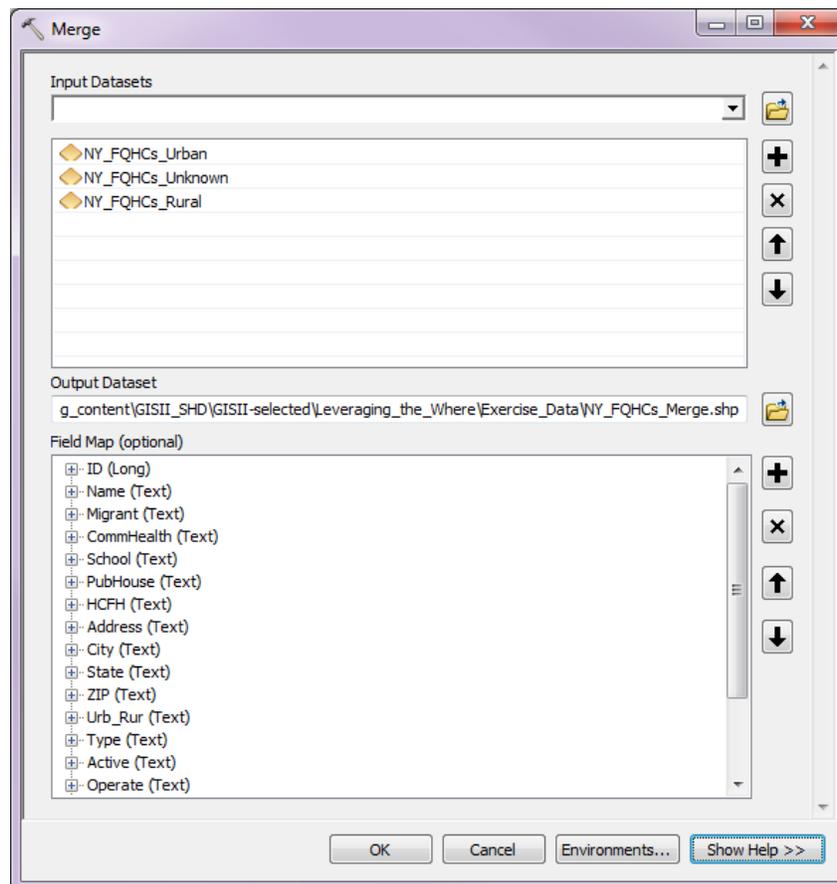
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3. You can see that the point level datasets cover three separate parts of New York. You want to merge them together into one dataset that you can use for analysis.
4. In ArcToolbox, click on **Data Management Tools > General > Merge**.



5. The **Merge** tool combines like datasets. Choose all three health services shapefiles for input datasets. Save the output dataset in the Exercise_Data folder and name it *NY_FQHCs_Merge.shp*.

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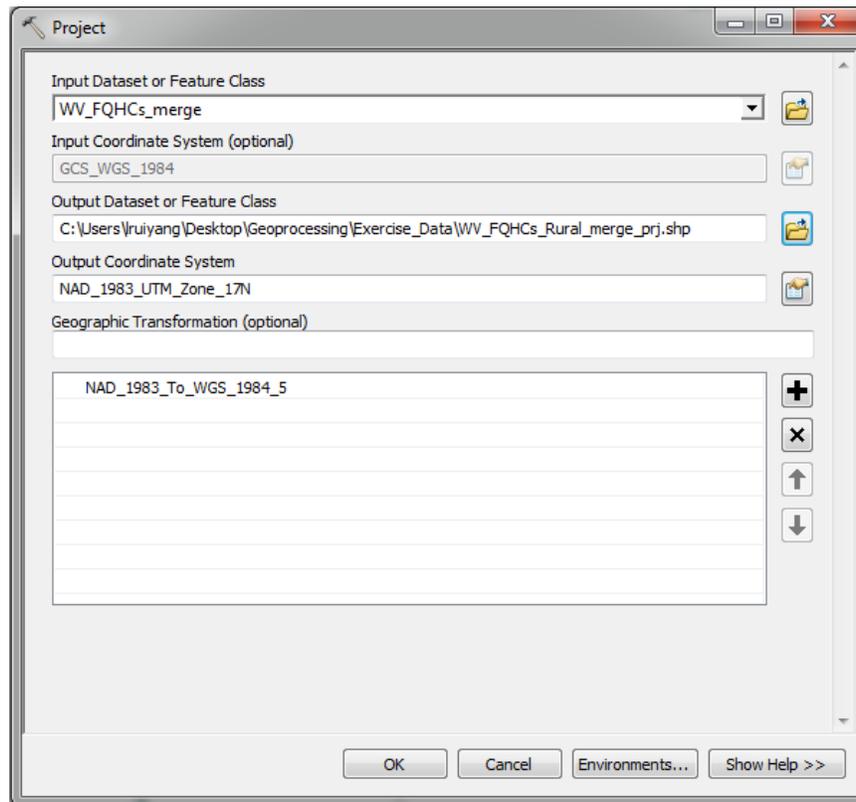
- Note the **Field Map** in the Merge tool. Since the fields are identical in all three input datasets, they will be merged together into common fields. If the fields were not all identical, the Field Map would list all fields from all input datasets.
- Click **OK** to run the tool. The new merged shapefile should be automatically added to the Table of Contents. You can remove the three original FQHC layers.

Projecting Data

- Now that you have the FQHCs merged, you can look more closely at FQHCs in just one Behavioral Risk Factor Survey (EMS) group. There are few things you need to do to set this up.
- Click the **Add Data**  button and add the last piece of data, *NY_Counties.shp*.
- Use the **Source** tab in the **Layer Properties** window to check the coordinate systems for both the FQHC points and the New York counties. Do they match?

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- Use the **Search** function to find the **Project (Data Management)** tool. You want to project the merged FQHC points to have the same coordinate system as the counties. Set the appropriate input and output datasets as in the image below.



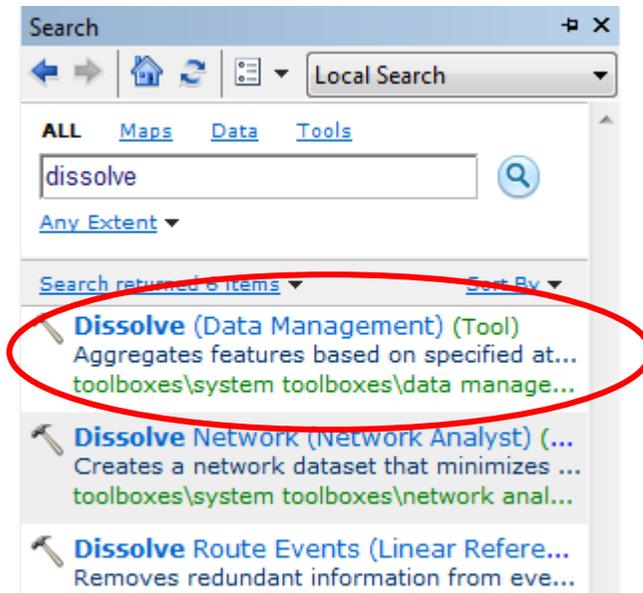
- To quickly find the **Output Coordinate System** you want, you can use the **Layers** feature. From the Spatial Reference Properties window, click the **Layers** folder which displays coordinate systems for layers already in use in the map project. You can then choose **NAD_1983_UTM_Zone_18N**.
- You will also need to remove the existing transformation and select the transformation: **NAD_1983_to_WGS_1984_5**
- Click **OK** to run the tool and the new file will be added to the Table of Contents. Remove the *NY_FQHCs_Merge* file.

Dissolving Features

- Now that the datasets are in the same coordinate system, you can begin to do analyses that use both of them in conjunction. However, you are interested in EMS regions, and you have been given a county shapefile. You can create an EMS area shapefile using the **Dissolve** tool.

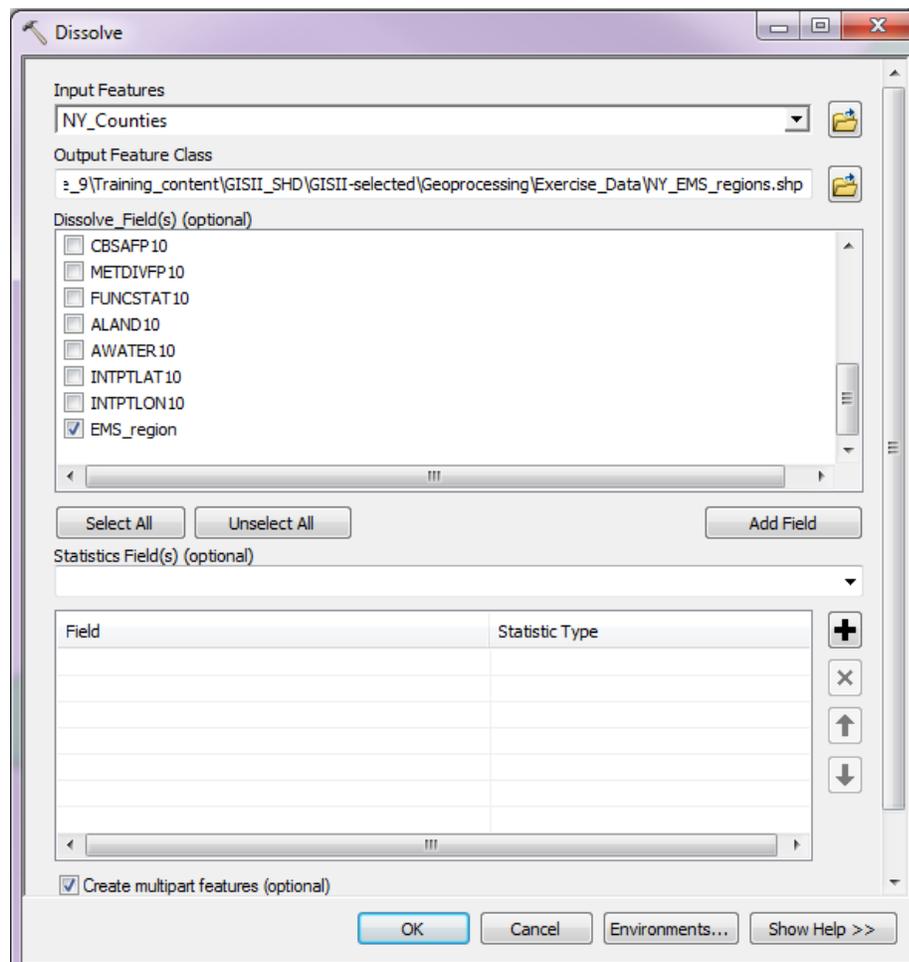
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2. Use the Search function to find the **Dissolve tool**.



3. The Dissolve tool will combine polygons within a shapefile together based on a common attribute. Choose the New York counties as the **Input Features**. Make sure to give the **Output Feature Class** an appropriate name and save it in an appropriate place.
4. If no **Dissolve Field** is specified, all polygons within the shapefile will be merged together to create one shape. In this case, that would create the state outline of New York. You want to have *EMS regions* as the result, so choose *EMS_region* as the Dissolve Field. This will dissolve the boundaries between any counties that have the same value for *EMS_region*.

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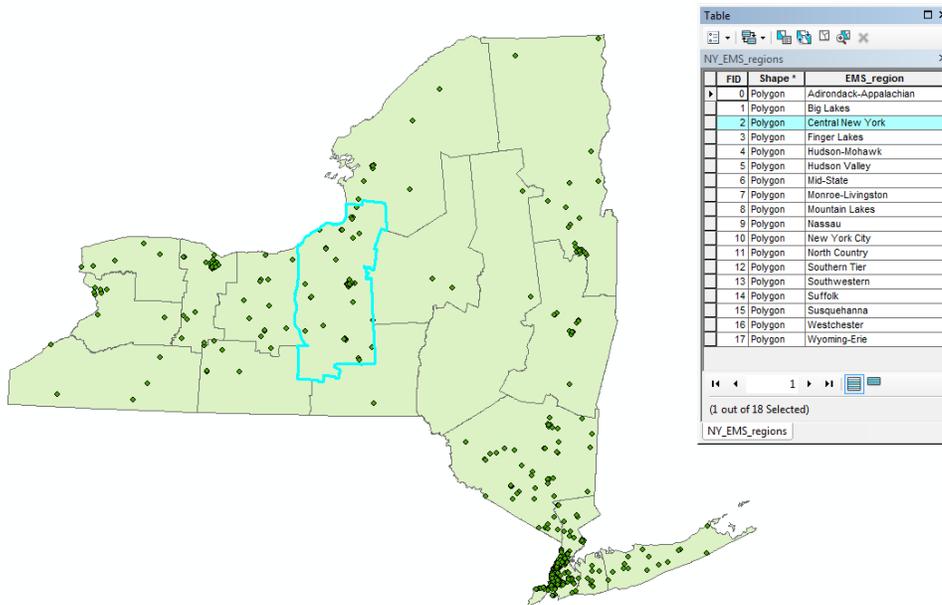


5. Click **OK** to run the tool. A new shapefile will be added to the Table of Contents with the resulting EMS regions.

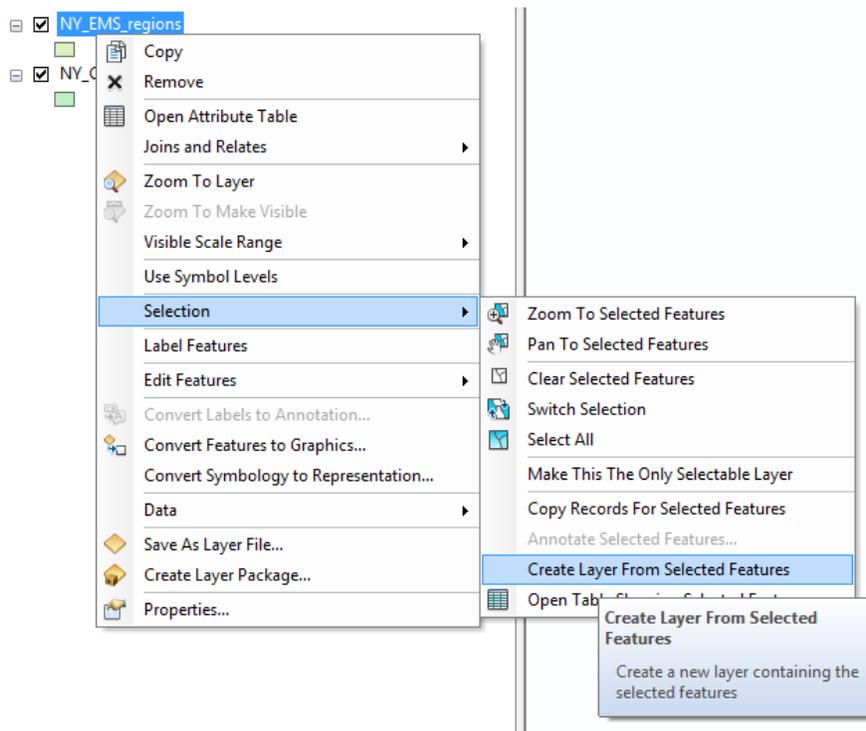
Selecting Features

1. Now that you have *EMS regions*, you want to select just one: Central New York. There are many ways to do this. You can use the Select Features tool  from the toolbar to click on the county interactively. You can also select it using the Attribute Table, or by writing a Selection Query using the Select by Attributes option.

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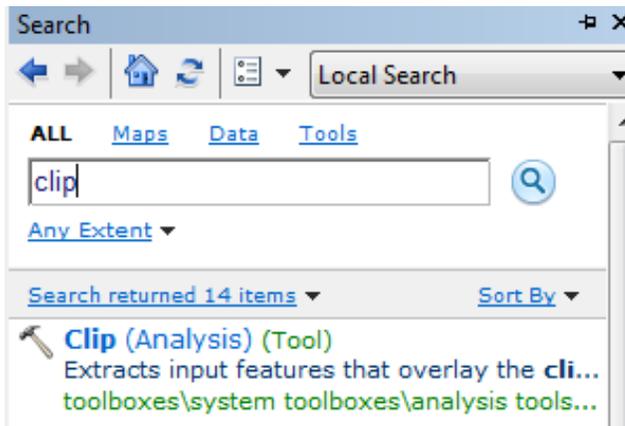
- Once you have the district selected, right click on the *NY_EMS_regions* shapefile (the one you just created by dissolving) and click on **Selection > Create Layer From Selected Features**. Rename the layer properly. This is only a temporary layer. Export the new layer if you want it to be saved permanently.



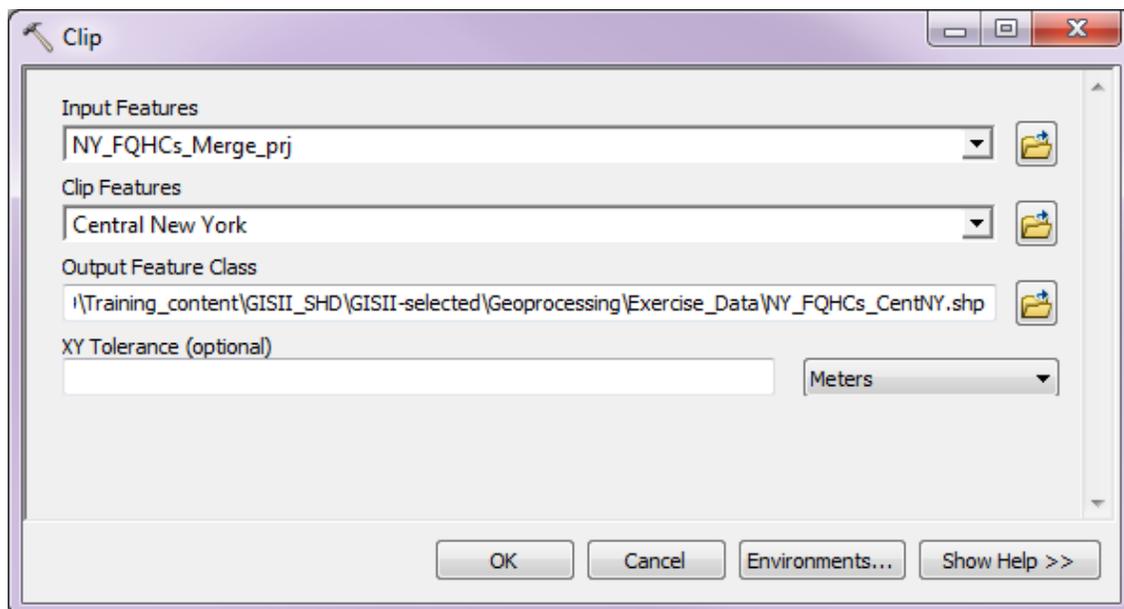
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Clipping Features

1. Next you want to limit the FQHCs to just those within Central New York. You'll use the Clip tool to do this.
2. Use the **Search** function to find the **Clip tool**.



3. You want to clip the FQHCs (Input Features) to the shape of Central New York (Clip Features). Name the output something appropriate and put it in an appropriate place.

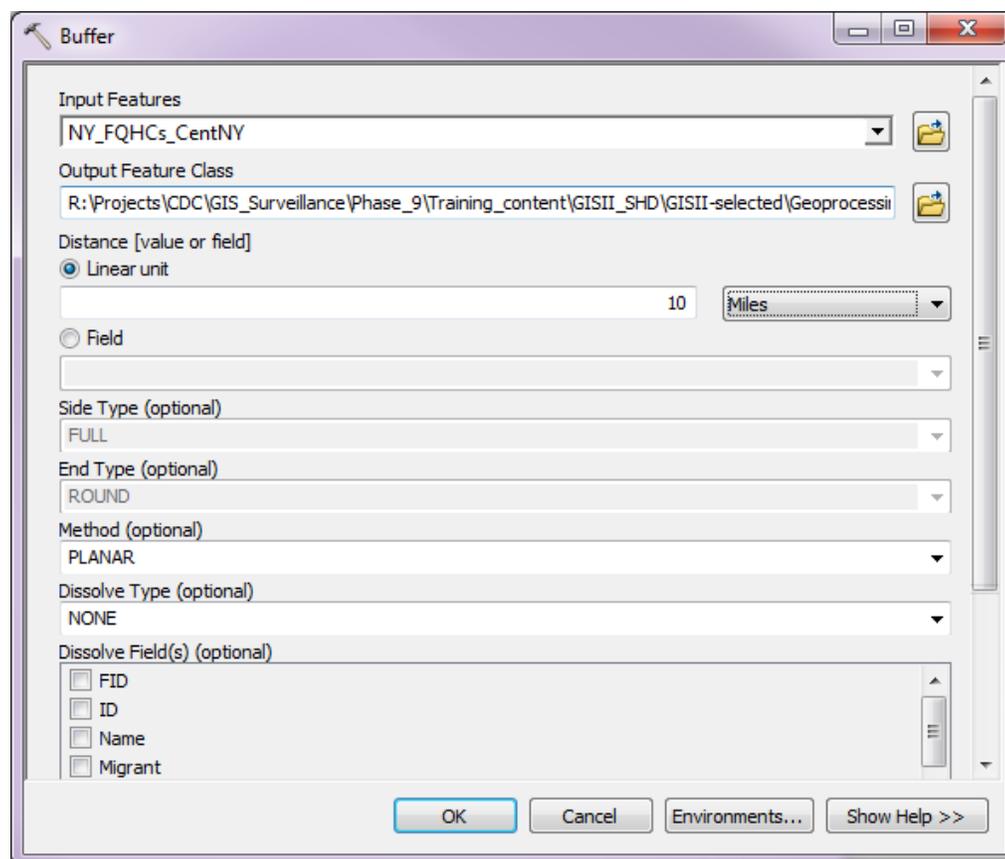


4. Click **OK** to run the tool and the new clipped FQHC file will be added to the Table of Contents.

Buffering Features

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1. Finally, you would like to see if there are areas in Central New York EMS Region that are not within ten miles of a FQHC. You will use the Buffer (Analysis) tool to do this.
2. Find the **Buffer** tool using the **Search** function. You want to create buffers around the District 10 FQHCs (Input Features). Name the **Output Feature Class** something logical (it should include the distance of the buffer for easy reference) and put it in an appropriate place.
3. Specify the **Linear unit** as 10 Miles. If you have time, try buffers of other sizes.
4. Choose **NONE** for the **Dissolve Type**. If you have time, experiment with different dissolve options.



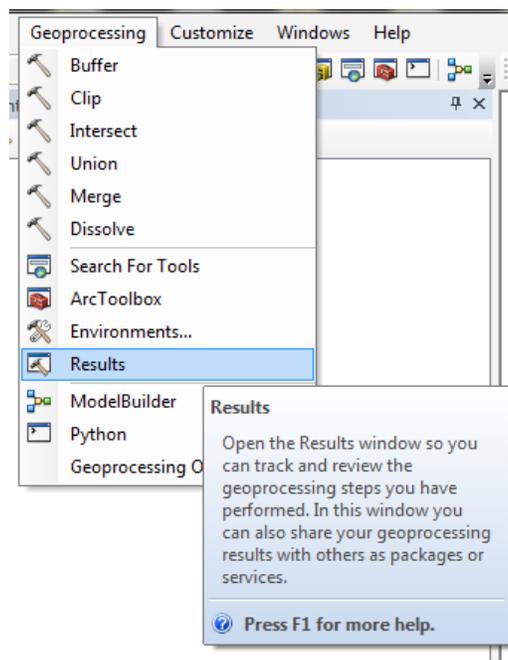
5. Click **OK** to run the tool. A new shapefile of the buffers will be added to the Table of Contents.
6. You can now see a visual representation of which areas of group 3 are within and not within ten miles of a FQHC location.
7. Edit the metadata of the buffer shapefile before you exit ArcMap. Right click on the layer in the table of contents and go to **Data > View Item Description**. Click the **Edit** button  at the top. Add basic summary, description, credits and use limitations. Some important things to include might be: What does this data represent? Where did the FQHC data originally come

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from? What is the geographic extent? Who geoprocessed this data and what was done? Is use of this data restricted in any way? Make sure to **Save** the edits when you have finished.

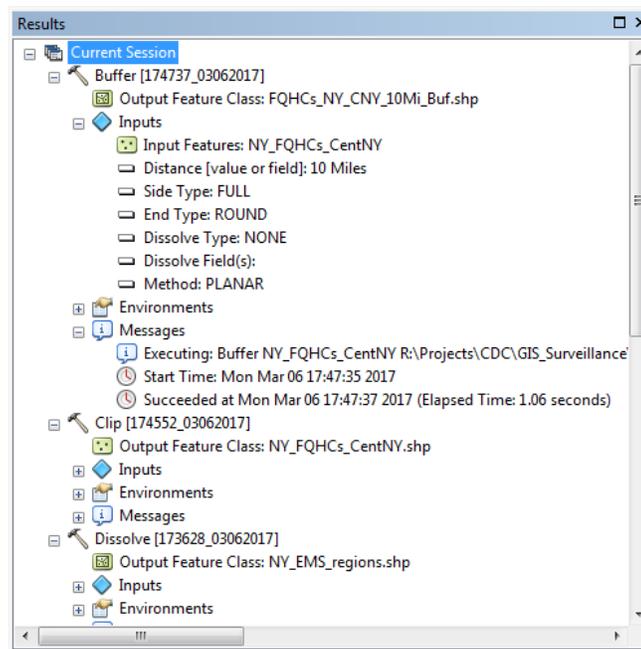
Review Results

1. After using all geoprocessing tools, it is a good time for us to review every operation we have done. Click **Results** from the **Geoprocessing** menu to open the Results window.



2. Click on the "+" icon next to the tool name to expand the results records. You can review your input parameters, output location, error messages, etc. Feel free to explore what's included.

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- Logs for historic tool-use will be saved in the map documents. It is a good way to document your process. However, the results will increase the file size of the map document quickly and cause some trouble or delay when you are using Arcmap. Right click on the tool name. You can use **Remove** to delete the tool record while keeping the output data. Or you can select **Delete** to erase both this entry and **ALL** output data generated by the tool.

