

Chapter 7

A Quick Tour of ArcGIS Desktop (ArcMap)

Skills you will learn: This tutorial is intended to get you going using ArcMap, which is the traditional desktop application that is part of ArcGIS Desktop. The latest versions of ArcGIS Desktop also include an application known as ArcGIS Pro, which may supersede ArcMap in time. A separate tutorial gives a basic overview of ArcGIS Pro.

This tutorial assumes you have installed ArcMap Basic or Advanced on your computer and that you are using version 10, which as of the writing of this tutorial is in version 10.4.1. Illustrations in this tutorial depict functionality in ArcMap 10.4.1.

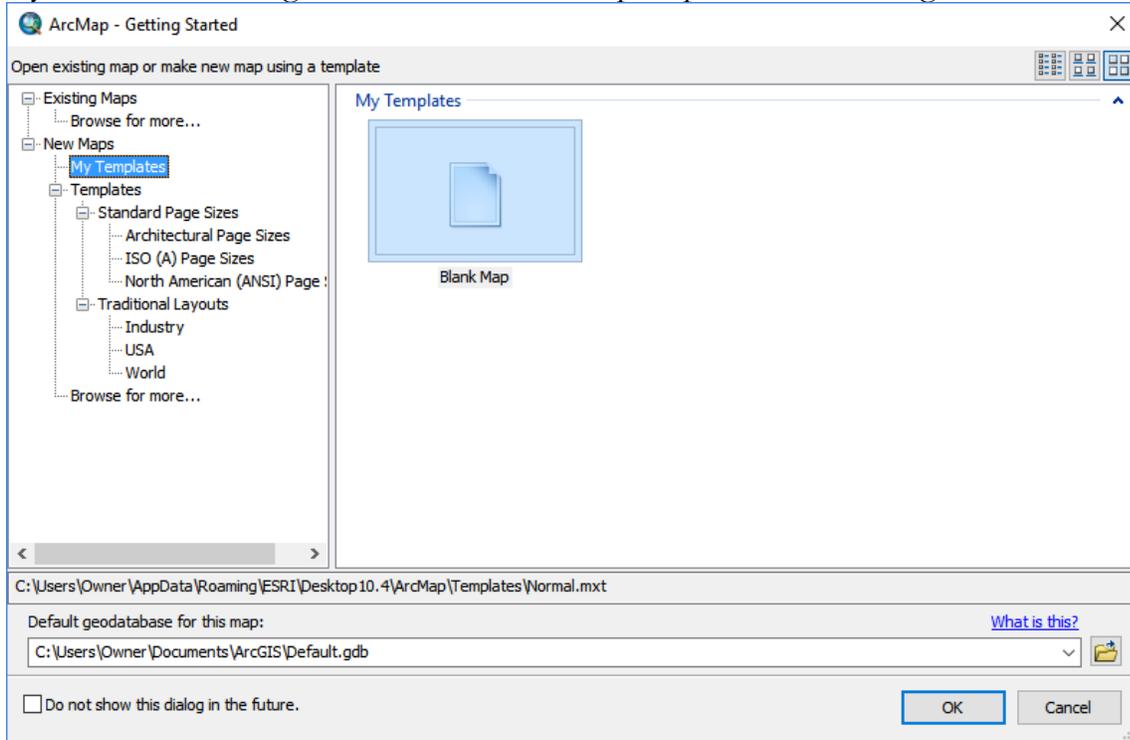
Throughout this tutorial, we will use a shapefile of Toronto electoral wards available from the City of Toronto's open data website at <http://www1.toronto.ca/wps/portal/contentonly?vgnextoid=b1533f0aacaaa210VgnVCM1000006cd60f89RCRD> We used the 2010 ward map, with the NAD27 datum.

Getting started, the basics

ArcMap is a sophisticated and powerful application that has been refined over many years. It is not always the most intuitive program to use, and features typically used by journalists are accessed via a potentially bewildering array of menus, toolbars, and icons. The purpose of this tutorial is to provide you with a roadmap to the most important features.

Chapter 7 of *The Data Journalist* provides an introduction to how journalists use GIS programs, as well as important theoretical background for using any GIS, and it should be read prior to working with this and the other tutorials.

When you first open ArcMap—assuming you have left the default options in place—you will be presented with this Getting Started screen. If you are using a file geodatabase to store map layers, as discussed later in this tutorial, you can set that layer as the default geodatabase for the map as part of this dialogue.



In the illustration above, clicking OK will open a new blank map.

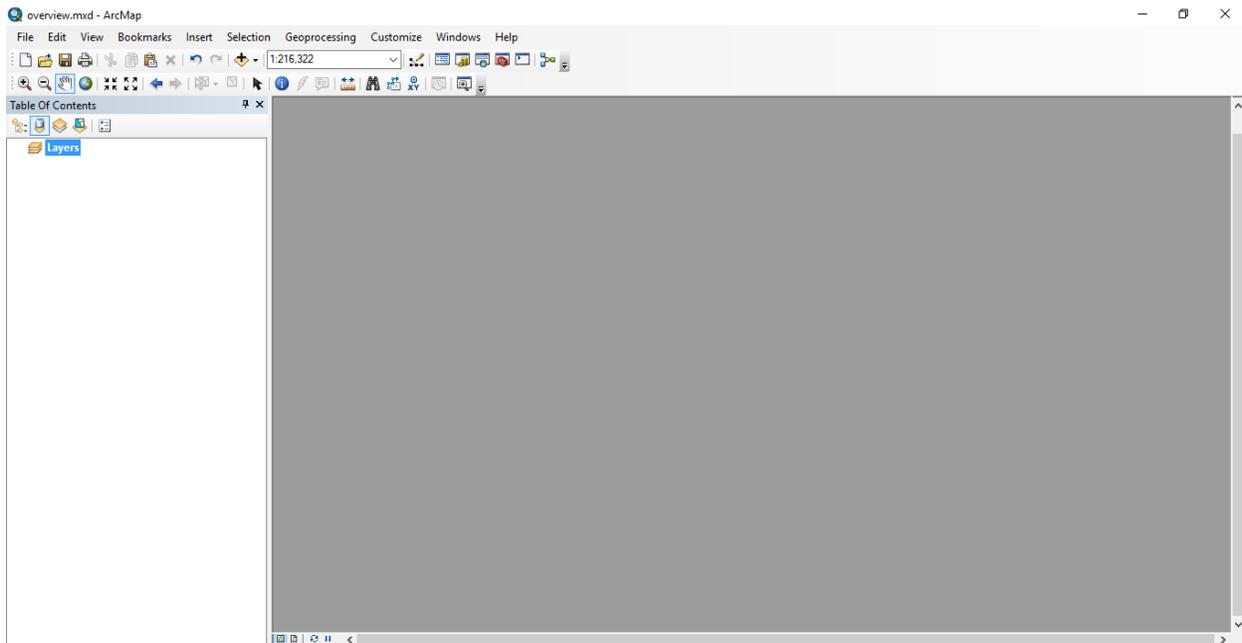
The map document

In ArcMap, all of the information about how a map is put together is stored in what Esri calls a map document, or .mxd file. The .mxd file doesn't contain the actual map data, but instead contains pointers to the various layers and datasets that go together to make the map. The layers may be Esri shapefiles or feature classes stored in geodatabases. Datasets may be .csv files, Excel files or in relational databases if open database connectivity (ODBC) is used. You can also connect to a Microsoft Access database. Instructions for the latter task are available at

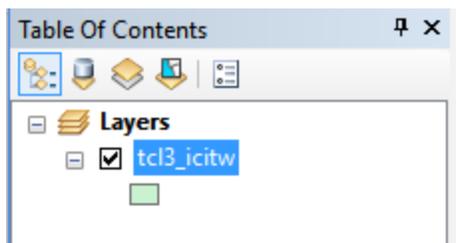
<http://desktop.arcgis.com/en/arcmap/10.3/manage-data/tables/connecting-to-a-microsoft-access-database.htm>

The data frame

In ArcGIS, the map on which you are currently working appears in what is called the data frame, by default positioned to the right of the screen. It is the darker area in this illustration.

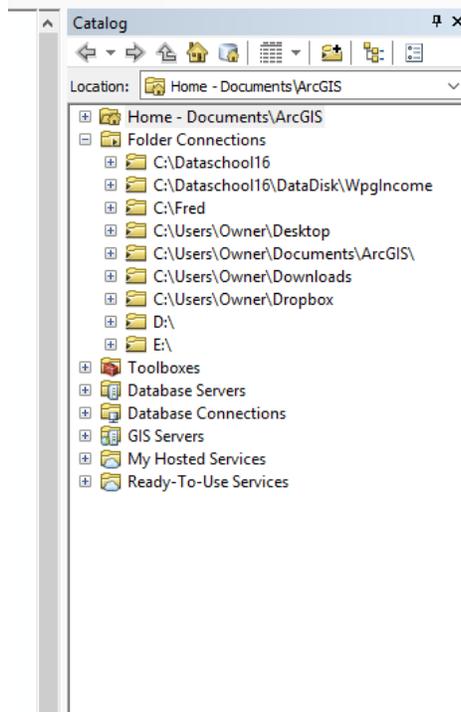


The various layers that make up the map are shown in the table of contents, by default to the left. The table of contents has four available views, represented by the four icons across the top. From left to right, you can show the layers by their drawing order, by their source (location on your hard drive or in a geodatabase), by whether they are currently visible in the data frame, and by whether they are selectable. You can make layers visible or invisible by clicking on the checkmark beside the layer's name in the drawing order and source views, or in the properties for the layer (discussed later in this tutorial). Here, we see the drawing order view.



Catalog Window

The Catalog window, available by clicking on the Catalog icon, is an inline version of the ArcCatalog application that ships with ArcMap. Today, the window is mostly used for certain specialized file management functions, such as creating an address locator for geocoding, creating an ODBC connection to an external data source such as a Microsoft Access database, adding a folder connection, or creating a new file geodatabase. Geocoding is discussed in the tutorial **Geocoding in ArcGIS Desktop**. We discuss file geodatabases below. Here is an image the catalog window:



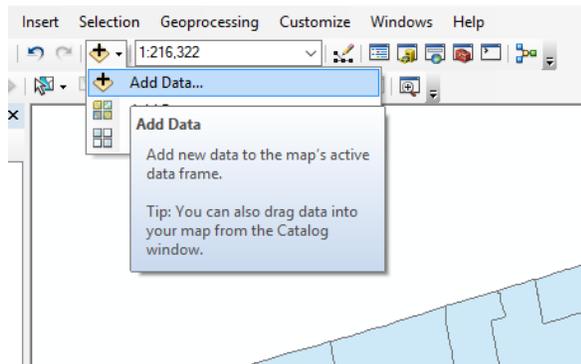
The table of contents and the catalog window can be moved to either side of the data frame, or the top or bottom of the frame, and either can also be pinned to the side of the frame, or allowed to float freely.

Adding data to the data frame

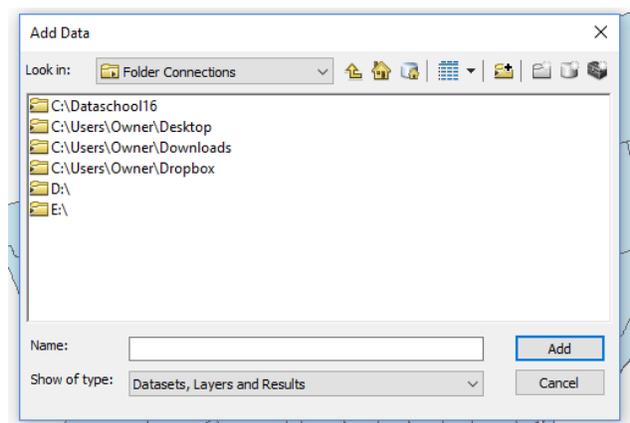
We can begin a new analysis in ArcMap begins with the addition of one or more datasets to the data frame. We'll discuss adding map layers first.

ArcMap can directly open shapefiles, feature classes contained in file geodatabases, and ArcMap layer files. See chapter 6 of *The Data Journalist* for a discussion of different map data formats. ArcMap also has conversion utilities that allow you to convert formats such as KML for use in ArcMap. Some require extra-cost extensions.

If you are adding a shapefile, feature class from a geodatabase, or a layer file, click on the Add Data icon on the standard toolbar.



This opens the add data directory dialogue.



If you have not done so already, you will need to create a connection to the folder that contains your data. You can create a connection to a folder as high in your folder hierarchy as you like, including to a root drive on your computer. It is usually more convenient, however, to create a connection to the specific directory that contains your data. That way the data is easily accessed without having to navigate to the folder every time.

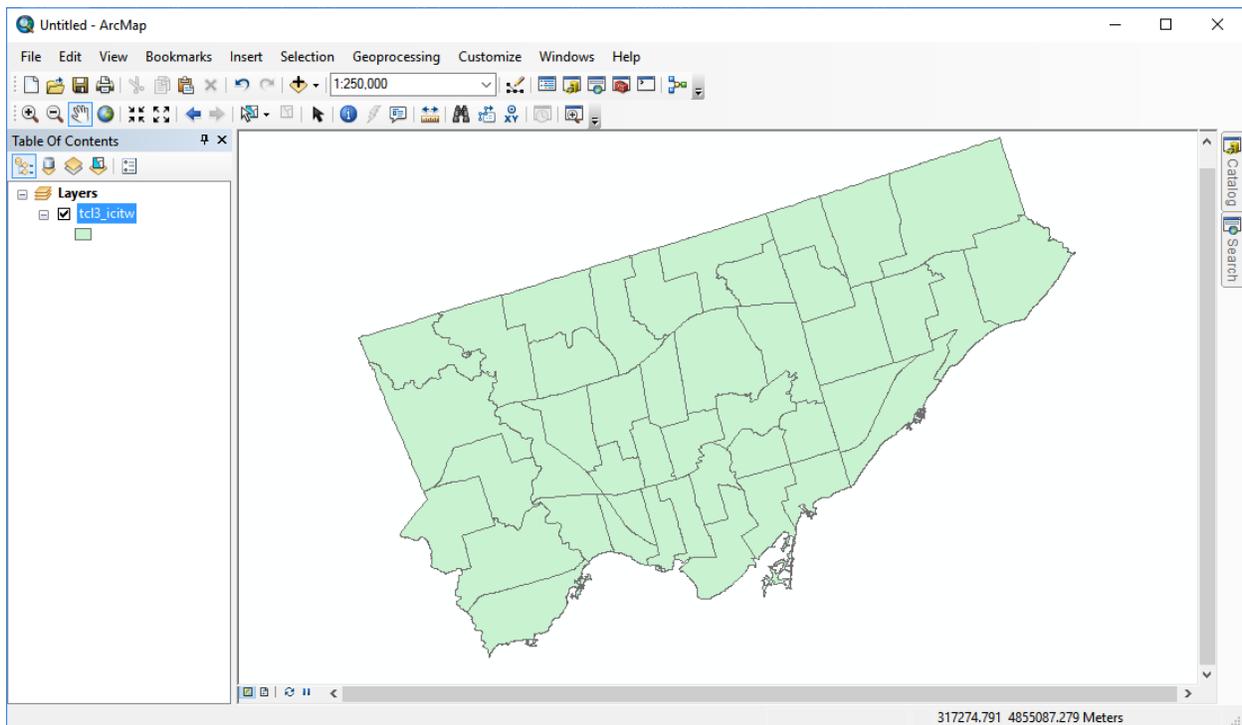
Click on the icon of a small file folder with a + sign, navigate to the directory location you are going to use for the connection, then click OK.

The connection will now appear under folder connections.

Adding a layer to your map is now a matter of going to your folder connection, and navigating to the actual folder that contains the map data you wish to add. If the data

is in a file geodatabase, you will need to double click on the file geodatabase name, and select the layer from the list in the geodatabase.

Here is the data frame showing a map of Toronto, Ontario municipal electoral districts, obtained from the city's open data site in Esri shapefile format and added to the frame.



Adding non-geographic datasets

You are not limited to adding map layers to your map document. You can also add non-geographic data, often as a first step to joining the data with a geographic layer as described in the tutorial **Joining Maps to Other Datasets in ArcGIS**.

The task of adding non-geographic data is so common that delimited text files (see chapter 2 of *The Data Journalist* for a discussion of various data formats) are a native file type that can be added directly to a map document. Any file with a .csv or .txt extension will be assumed to be a comma-delimited file, while any file with a .tab extension will be assumed to be a tab-delimited file. The most recent versions can also work with Excel format files.

To add a non-geographic file to the map document, simply click on the Add Data button, and navigate to the folder containing the file. It will then be added to the table of contents.

ArcMap uses its own set of rules to determine the field types for the columns in the delimited text file. Normally, this works fine. Columns that are obviously numbers will be imported as number types, while text fields will be imported as text types. Occasionally, however you will need to import a text file that has fields with ambiguous data. For example, Canada's national statistical agency, Statistics Canada, identifies some urban census tracts with numbers that have trailing 0s after a decimal place, such as 20400078.00. ArcMap interprets these columns as being number columns, and strips off the trailing 0s. This is a problem because if one is joining the data in the census file with a map of census tracts, the trailing 0s need to be intact to make the join properly.

Fortunately, there is an easy fix. If you have such a file, create another text file and call it schema.ini. Place it in the same folder as the text file you want to import. In the schema.ini file, you need to two lines. The first identifies the file to be imported, and the second sets the field in question to be imported using the data type you want. For example, consider this csv file with two fields:

```
ID, Population
2345.00, 1246
678.00, 2129
453.12, 1047
```

ArcMap would normally interpret the ID column as a number type, as well as the Population column. For the population column, this is correct, but the ID column needs to be imported as text, because the trailing 0s are an integral part of the ID field value.

To fix this, created a schema.ini file containing this:

```
[test.csv]
Col1= ID Text
```

This would tell ArcMap to import column 1, which has the name ID, as a text field. To control how more than one column is imported, just add additional column instructions, each one on a new line.

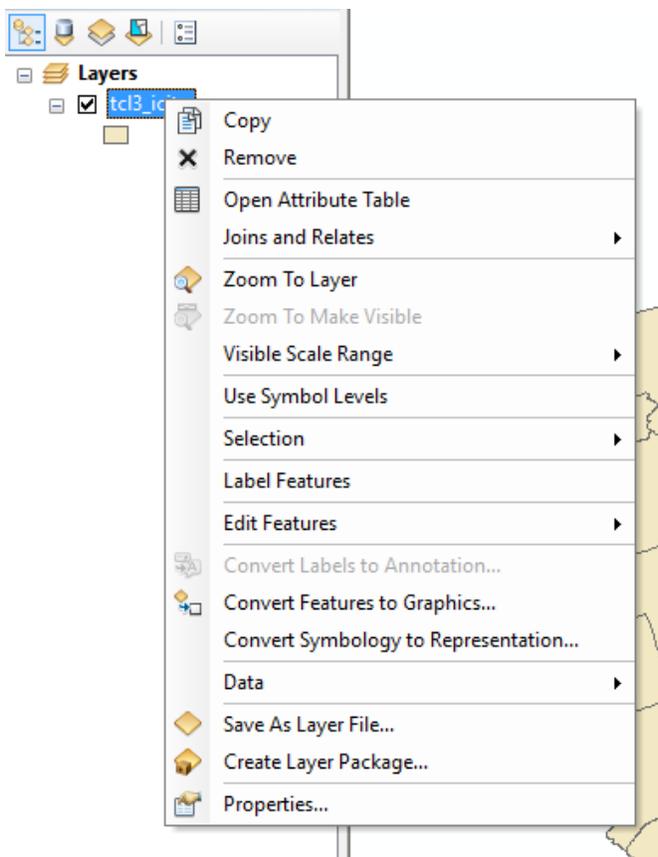
You can read more about this issue at

<http://resources.arcgis.com/en/help/main/10.1/index.html#//005s00000010000000>

Once you have some data in the data frame, you can begin to work with it.

The layer menu

Once the layer has been added to the data frame, its name will appear in the table of contents. In the drawing order, source, and visibility tabs, if you right click on the name of the layer, a new menu will open, as seen here.



There are a number of key choices in this menu that are at the centre of most workflows in ArcMap. Some of these lead to further submenus, which we will discuss as we get to them.

Copy allows you to copy the layer to the clipboard and then paste an identical copy into this or another map document, while **remove** does exactly what it suggests, removing the layer from the map document.

If you click on **Open Attribute Table**, you will be able to see the underlying attribute table for the map layer. See Chapter 7 of *The Data Journalist* for a full discussion of attribute tables and the nature of map layers as data tables.

This is what the attribute table of the Toronto election wards map looks like when opened.

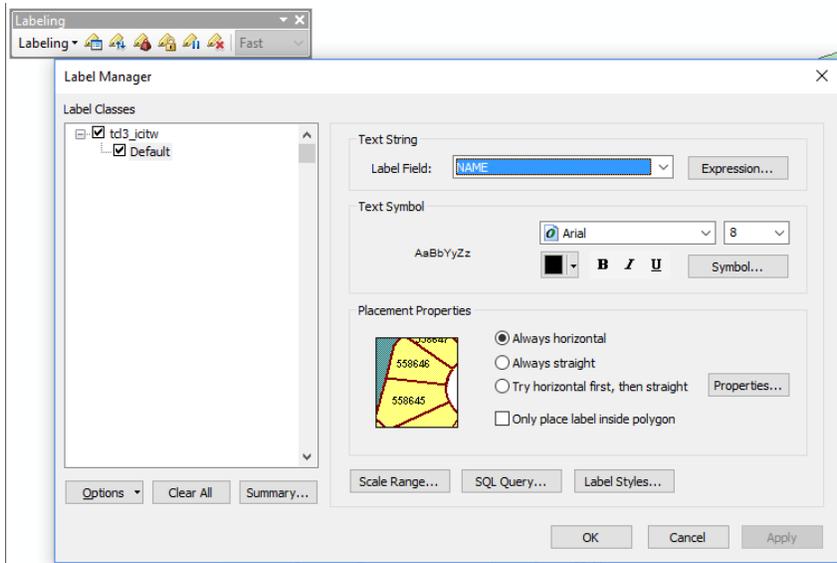
FID	Shape *	GEO_ID	CREATE_ID	NAME	SCODE_NAME	LCODE_NAME	TYPE_DESC	TYPE_CODE	OBJECTID	SHAPE_AREA	SHAPE_LEI
0	Polygon	14630026	63519	Scarborough-Rouge River (41)	41	EA41	Ward	CTW	1	0	
1	Polygon	14630028	63519	Scarborough East (44)	44	EA44	Ward	CTW	2	0	
2	Polygon	14630024	63519	Scarborough-Rouge River (42)	42	EA42	Ward	CTW	3	0	
3	Polygon	14630027	63519	Scarborough-Agincourt (39)	39	EA39	Ward	CTW	4	0	
4	Polygon	14630035	63519	Willowdale (24)	24	NO24	Ward	CTW	5	0	
5	Polygon	14630029	63519	Scarborough-Agincourt (40)	40	EA40	Ward	CTW	6	0	
6	Polygon	14630036	63519	Don Valley East (33)	33	NO33	Ward	CTW	7	0	
7	Polygon	14630037	63519	Willowdale (23)	23	NO23	Ward	CTW	8	0	
8	Polygon	14630039	63519	York West (8)	08	NO08	Ward	CTW	9	0	
9	Polygon	14630031	63519	Scarborough Centre (38)	38	EA38	Ward	CTW	10	0	
10	Polygon	14630040	63519	York West (7)	07	WE07	Ward	CTW	11	0	
11	Polygon	14630041	63519	Don Valley East (34)	34	NO34	Ward	CTW	12	0	
12	Polygon	14630010	63519	Don Valley West (25)	25	NO25	Ward	CTW	13	0	
13	Polygon	14630030	63519	Scarborough East (43)	43	EA43	Ward	CTW	14	0	
14	Polygon	14630038	63519	York Centre (10)	10	NO10	Ward	CTW	15	0	
15	Polygon	14630043	63519	York Centre (9)	09	NO09	Ward	CTW	16	0	
16	Polygon	14630033	63519	Scarborough Southwest (36)	36	EA36	Ward	CTW	17	0	
17	Polygon	14630032	63519	Scarborough Centre (37)	37	EA37	Ward	CTW	18	0	
18	Polygon	14630044	63519	Etobicoke North (1)	01	WE01	Ward	CTW	19	0	
19	Polygon	14630019	63519	Eglinton-Lawrence (15)	15	NO15	Ward	CTW	21	0	
20	Polygon	14630034	63519	Scarborough Southwest (35)	35	EA35	Ward	CTW	22	0	
21	Polygon	14630012	63519	Don Valley West (26)	26	NO26	Ward	CTW	23	0	
22	Polygon	14630017	63519	York South-Weston (11)	11	WE11	Ward	CTW	24	0	
23	Polygon	14630045	63519	Etobicoke North (2)	02	WE02	Ward	CTW	25	0	

We'll return to attribute tables later.

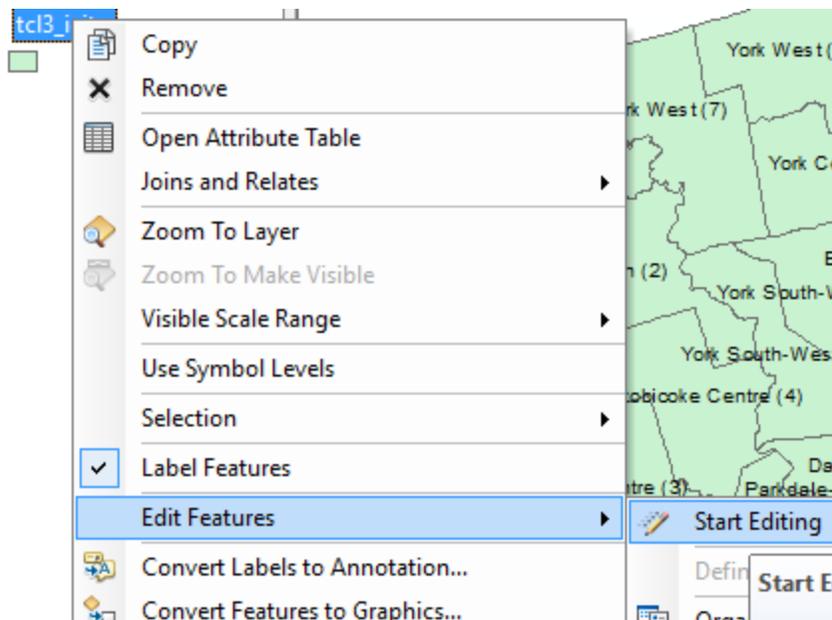
Back in the layer menu, the **Joins and Relates** option is used to create joins and relations between tables, including between geographic and non-geographic data. This functionality is explained in two additional tutorials, **Joining Maps to Other Datasets in ArcGIS** and **Spatial Joins in ArcGIS Desktop**.

The **Selection** menu item is covered in the tutorial **Selecting by Attributes and Location in ArcGIS Desktop**. It allows you to work with selections on the map and/or the attribute table.

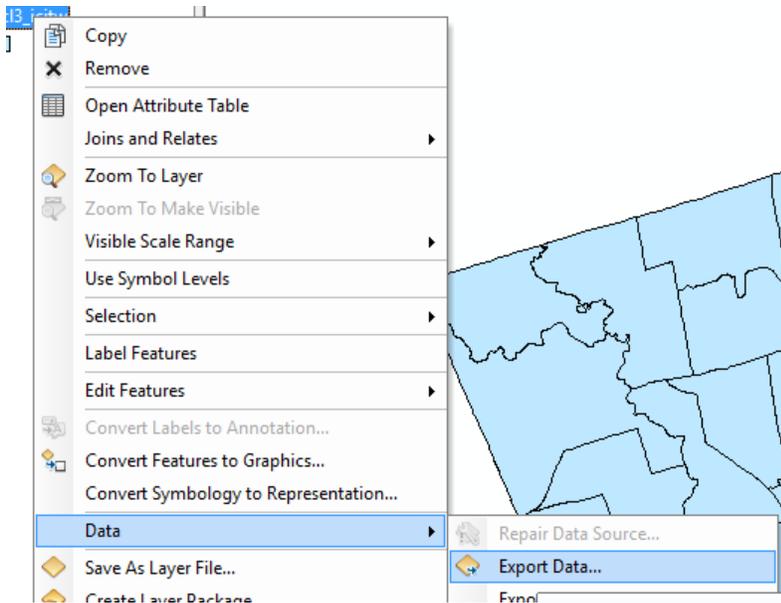
The **Label Features** item toggles text labels on and off. The text displayed, and its format, can be controlled using the Label Manager. It is accessed via the Labeling Toolbar, which can be made visible by selecting Labeling in Customize>Toolbars.



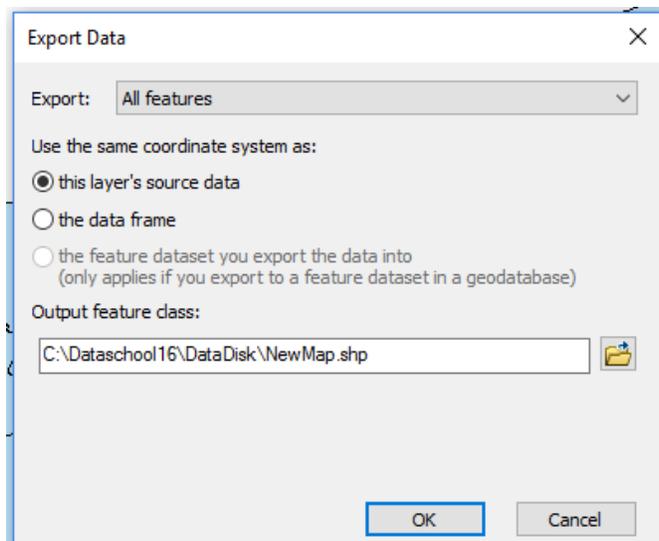
The **Edit Features** menu item can be used to start an editing session on the layer, to modify features, add new ones, or delete features.



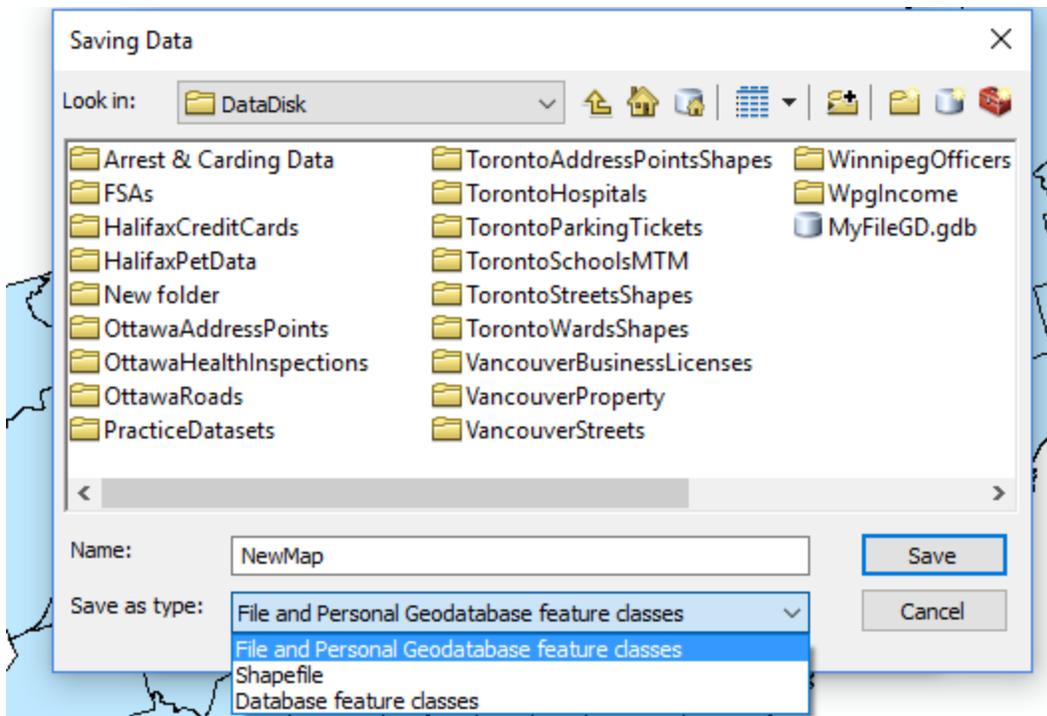
Clicking **Data** opens a submenu in which you can initiate an export of the map data in the layer.



When you choose Export Data, a file dialogue opens. You can choose to export the data with the coordinate system used by the layer, or the current coordinate system being used by the data frame (see the discussion of the data frame properties menu item later in this tutorial). See chapter 7 of *The Data Journalist* for a discussion of coordinate systems.



You can choose to export either to a shapefile or to a new feature class in a file geodatabase. Click on the file folder icon to make these choices.



Once exported, the new layer can be added to the data frame, at your option.

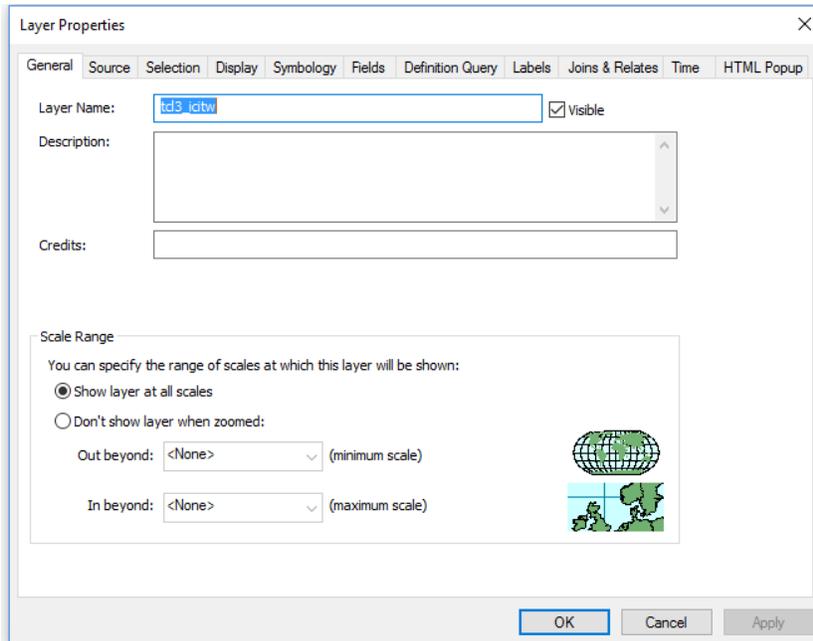
Data export is often used after you have joined non geographic data to a geographic layer and you wish to have a new geographic layer that includes the attributes from both.

The **Save as Layer File** menu option will save the layer to a layer file in ArcMap. This is often used after making a selection, as discussed in the tutorial **Selecting by Attributes and Location in ArcGIS Desktop**.

The last menu item, **Properties**, opens the properties dialogue for the layer, which again, offers a blizzard of options, the most important of which we will cover here.

The **General** tab allows control of basic properties, such as the name of the layer (the name only applies within the map document; the original name of the layer is not altered), whether it is visible (also controlled by the checkbox in the table of contents), and whether the layer is visible at all zoom levels, or only at some.

The Description area allows you to add your own description, such as where you got the layer, who provided it, and why you chose to use it. You can use the credits area to credit the source of the map layer.



The **Source** tab provides important metadata, such as the location of the file in your computer's file system, the type of feature (point, line, polygon), the projected coordinate system, projection and unit of linear measure of the layer, and the geographic coordinate system, datum and unit of angular measure of the layer. A quick glance at this data can help you determine if, for example, the map layer is unprojected. Please see the discussion of coordinate systems in Chapter 7 of *The Data Journalist* for a more complete explanation of what coordinate systems are, why they are used, and what you must consider when using them.

The **Selection** tab allows you to control how selected features will be highlighted on the map layer.

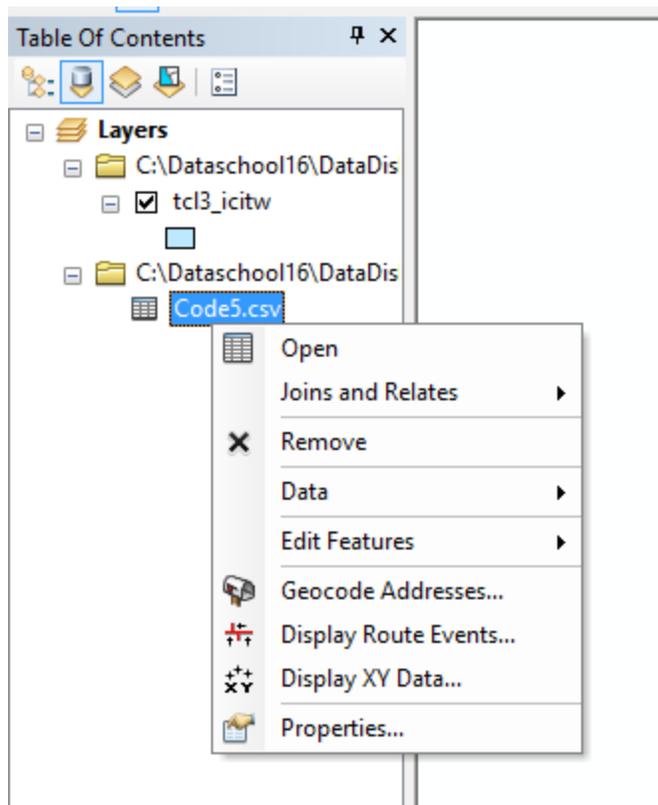
The **Display** tab gives you control over how the layer will be displayed, including whether it is opaque or transparent. You control the transparency, which is the degree to which other layers below the layer will be visible through it, by varying the transparency value from 0 per cent up to 100 per cent. Of course, at 100 per cent, the layer would not be visible.

The **Symbology** tab is used when creating choropleth maps, categorical maps, and other specialized display formats. See the tutorial **Making Choropleth Maps in ArcGIS Desktop** for a discussion of how to make categorical and choropleth maps.

The **Fields** tab allows you to determine which fields will be visible in the attribute table and in the HTML popup. Finally, the HTML Popup tab allows you to control how the HTML popup will appear.

Menu for non-geographic tables

When you add a non-geographic file to the table of contents, you can right click the file name to see a more limited menu of options than is available for a map layer file.

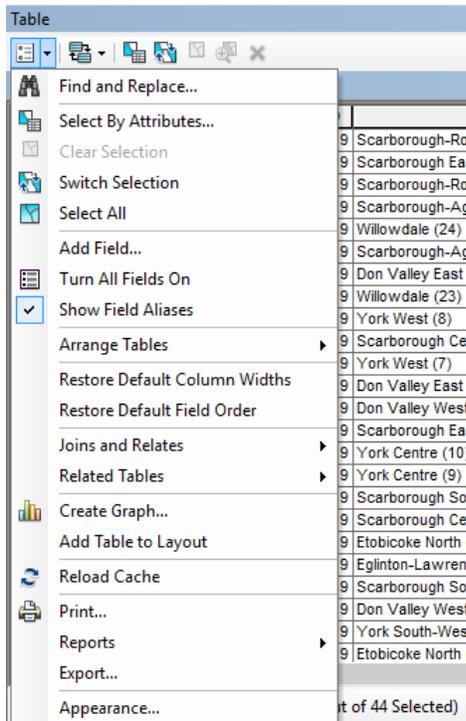


The three most important menu items are **Geocode Addresses**, used to access the geocoding routine for turning non-geographic data, such as addresses, into geographic data for display on the map, **Joins and Relates**, and **Display XY Data**, which is used to display points represented in a non-geographic data file as latitudes and longitudes or as Cartesian coordinates. See Chapter 7 of *The Data Journalist* for a discussion of these concepts. Procedures for geocoding and adding XY data are found in the tutorial **Geocoding in ArcGIS Desktop**.

Working with attribute tables

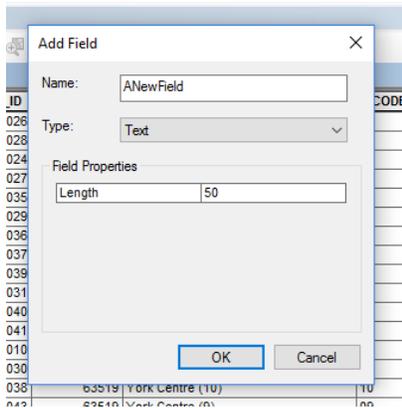
A GIS program is a sophisticated database application, and there are various ways to work with a map layer's attribute table.

The leftmost icon at the top of the table is the **table options** icon. If you click on this icon, you will see a menu of options for working with the table data, as seen here.



As is often the case in ArcMap, there are a great many menu options. We will focus on a few key features. The **Select by Attributes** choice is covered separately in the tutorial **Selecting by Attributes and Location in ArcGIS Desktop**.

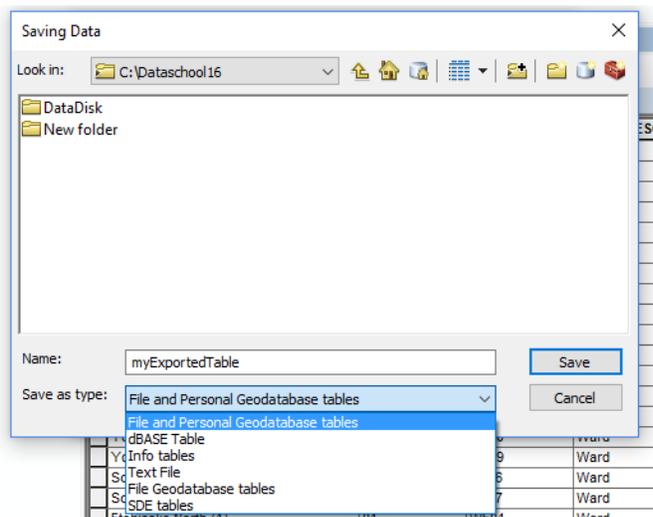
The **Add Field** item enables you to add a field to the table, including the data type and length for the field.



Once you have added the field you can populate it using the Field Calculator (see below).

The functionality of **Joins and Relates** is covered separately in the tutorial **Joining Maps to Other Datasets in ArcGIS**.

The **Print** menu item allows you to print out your table, while the **Export** item allows you to export the attribute data in the table to an outside table. You might do the latter if you need to do further calculations on the data in Excel, or upload it for use in another application. You can export to any folder to which you have established a folder connection.

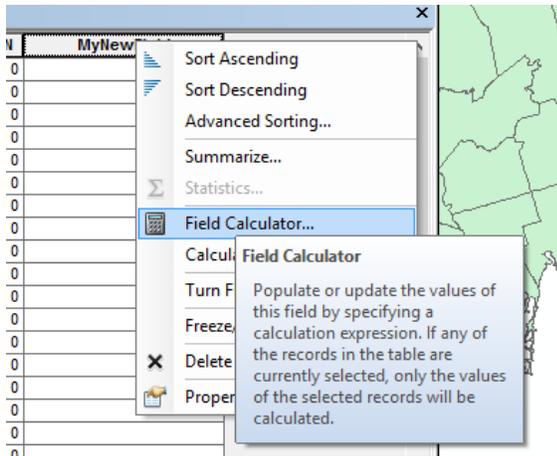


As you can see from the image, there are a number of available export formats, including a table in a file geodatabase, a dbase database format table, and a delimited text file.

The field calculator

If you have added a field to an attribute table, you can populate it manually by opening an editing session for the table, or by using the field calculator to populate the field in bulk.

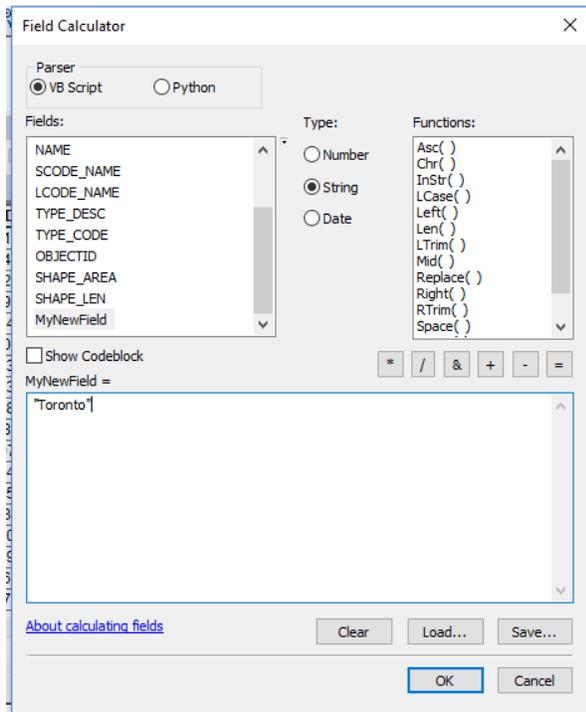
Right click at the top of the field to bring up another submenu. From this menu, choose **Field Calculator**.



ArcMap will ask you if you want to do your calculation outside of an edit session. If you need to be able to undo your actions, click No, then on the Editor toolbar (accessible under Customize>Toolbars), to start an editing session. You can also start an editing session by choosing Edit Features>Start Editing, on the individual table menu. If you are simply adding data to an empty field, you should be able to go ahead outside of an editing session, so click Yes.

The Field Calculator dialogue is extensive and flexible, and again too richly featured to cover in full here. It allows you to populate the field not only with new values, but with values derived by running functions written in Python or VB Script code, such as string functions and date functions, depending on the type of field you have created.

To simply insert a constant text value into the new field, choose the String data type, then type the new value for the field into the box at the bottom of the dialogue, in double quotation marks. In this illustration, we are putting the value “Toronto” into every row of the table, in the new field.



The ArcMap inline documentation explains the field calculator in detail. Click on [About Calculating Fields](#).

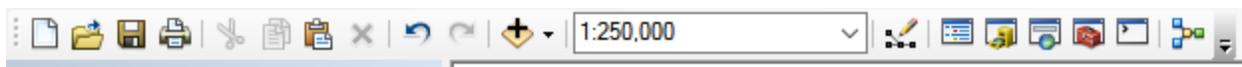
Other ArcMap toolbars and menus for frequently performed tasks

ArcMap has a great many toolbars and menus. Luckily, most of the key features you will use are found in just a few. We'll walk through some of the most important features by taking a tour of these interface elements.

Toolbars

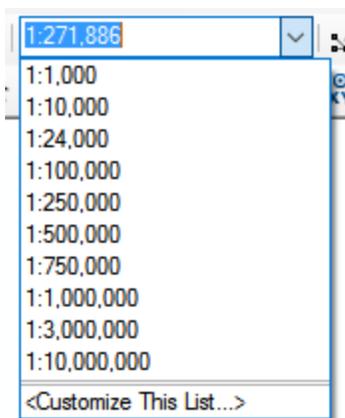
ArcMap has numerous specialized toolbars that you can turn on and off by choosing [Customize>Toolbars](#). The two that are turned on by default and used most often are the **standard** and **tools** toolbars.

This is the standard toolbar.



From left to right, the icons allow you to create a new map document, open an existing map document, save the map document, print the map document, cut a selected map feature, copy a selected map feature, paste the clipboard contents into the map, delete a map feature, undo adding a layer, and redo a previously undone action. Continuing to the right, the icon showing a black plus sign overlaid on a yellow diamond is the Add Data control, which we discussed earlier.

Continuing to the right on the standard toolbar, the next item is the scale control. You use this to set the scale for the map using a ratio rather than by using the zoom controls on the tools menu. In this image, the map is set to a scale by which one metre on the map represents 271,886 metres in the real world.



There are five more icons in the standard menu that you will use often.



From left to right, the editor icon opens the editing toolbar, with which you can edit a map layer, doing such things as removing features, changing the shape or length of features, changing attributes, and removing vertices (the points that define the outside of a polygon). The next icon to the right displays or hides the table of contents, while the icon showing a tiny filing cabinet opens the catalog window, used for a variety of file management tasks. The search icon, next to the right, allows you to search for map layers (if you have “registered” folders for indexing by ArcMap), datasets, address locators used in geocoding, and, especially useful, various ArcMap tools. The latter function can save time because various tools are accessed in different locations and different ways, making the search function a good shortcut when you are not sure where to find the tool you need.

The icon with the red toolbox opens the Arc Toolbox, which contains many tools for manipulating and analyzing your data.

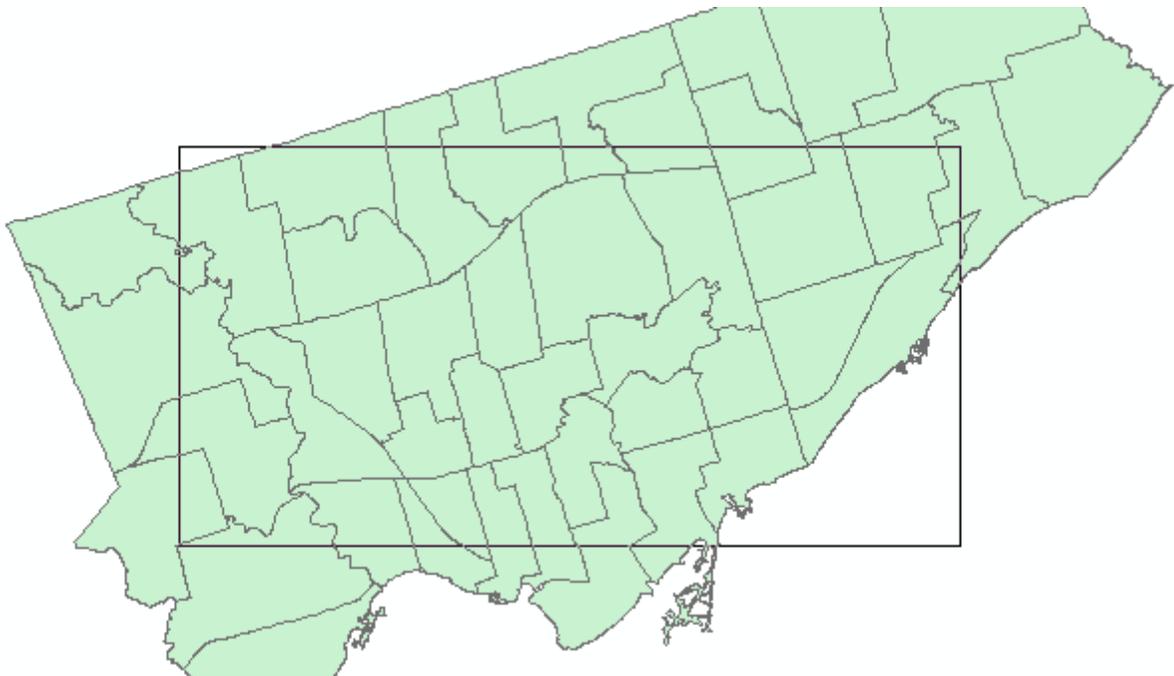
The second toolbar that is opened by default is the Tools toolbar. It looks like this.



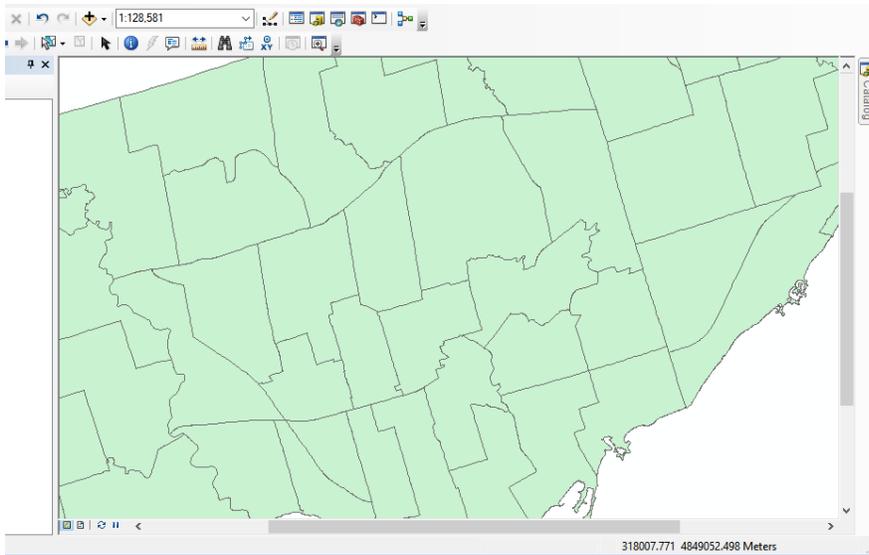
From left to right, the + and – magnifier icons are used to increase or decrease the zoom level (scale) in the data frame.

Once activated, you click somewhere in the data frame, and the map will zoom in or out. You can also use the + icon to draw a rectangle on top of the map layer(s) in the data frame, and the map will zoom in to include the area bounded by the rectangle.

Here, an area has been selected.



Which zooms the frame like this:



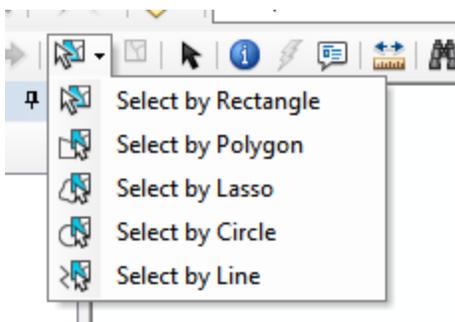
Continuing to the right on the toolbar, the hand symbol allows you to drag the layers in the map frame in any direction, just as you would pan over an online map.

The globe icon is used to zoom the map layers to their full extent, which means the entirety of all layers is visible in the data frame.

The next two icons, with the four arrows pointing inward or outward, zoom in and out from the current centre of the data frame.

The blue arrow icons, pointing left and right, are like the forward and back buttons on a web browser, and allow you to go back and forth between zoom levels selected earlier.

The next icon is the select features tool, and by clicking on the downward-pointing arrow, you can select one of five select tools.

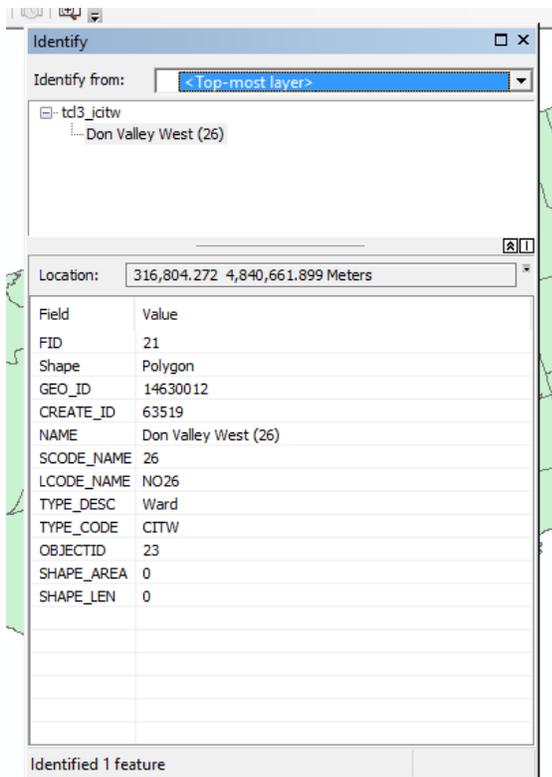


Relatively self-explanatory, these tools allow you to draw different shapes over the layers in the data frame, selecting all features that are fully or partially within the area

you select. The select by rectangle tool also will select any feature by simply clicking on it. You can find out more about selecting features in the tutorial **Selecting by Attributes and Location in ArcGIS Desktop**. The behaviour of these select tools can be modified in the ArcMap options (see below).

The next icon to the left is used to clear all selected features. It is grayed out when no features are selected.

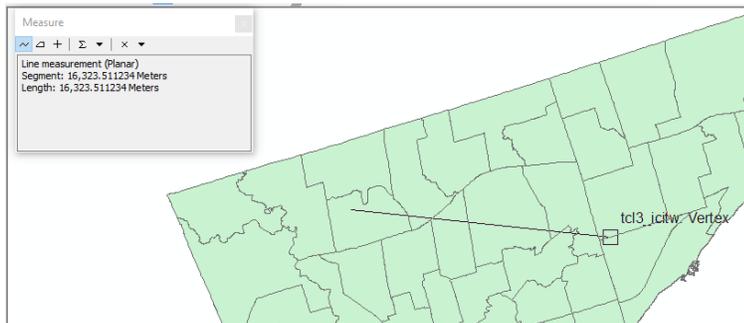
When selected, the blue circle with the letter i contained within it, will cause an information window to pop up when the user clicks on a feature on the map. Here, the user has clicked on one of the Toronto wards to identify it and see the attribute fields associated with that feature.



The icon that looks like a cartoon bubble is used to view the HTML popup for a feature. The HTML popup shows attributes for the feature in a formatted window. How the popup is configured can be changed in the properties for the map layer, which are discussed later in this tutorial.

Don Valley West (26)	
FID	21
GEO_ID	14630012
CREATE_ID	63519
NAME	Don Valley West (26)
SCODE_NAME	26
LCODE_NAME	NO26
TYPE_DESC	Ward
TYPE_CODE	CITW
SHAPE_AREA	0
SHAPE_LEN	0

Clicking the ruler icon turns the cursor into a measuring tape. Click on one point on a layer, then click on a second point, and the distance between them in the units of the map will be displayed.



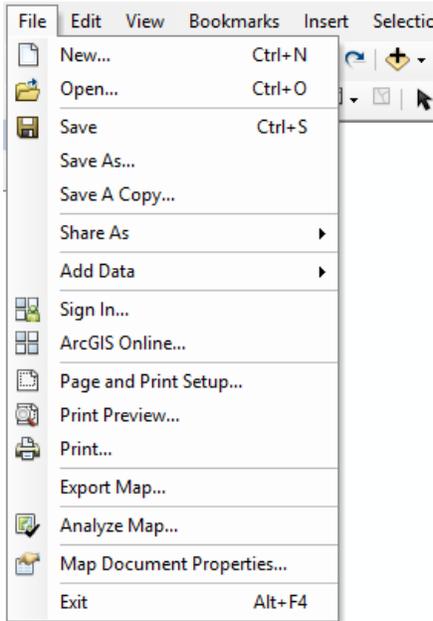
The binoculars icon opens the find dialogue, which allows you to quickly find features on the map using text searches. You can also search for addresses if you have created an address locator (see the geocoding tutorial) or you want to use ArcGIS Online credits, for which there is a charge.

The XY icon permits you to find a location on the map by entering its latitude and longitude, and the viewer icon, the last on the right, enables you to open a new window for viewing your map or a magnifier window that allows you to zoom in on a desired part of the map without having to change the zoom level of the main data frame.

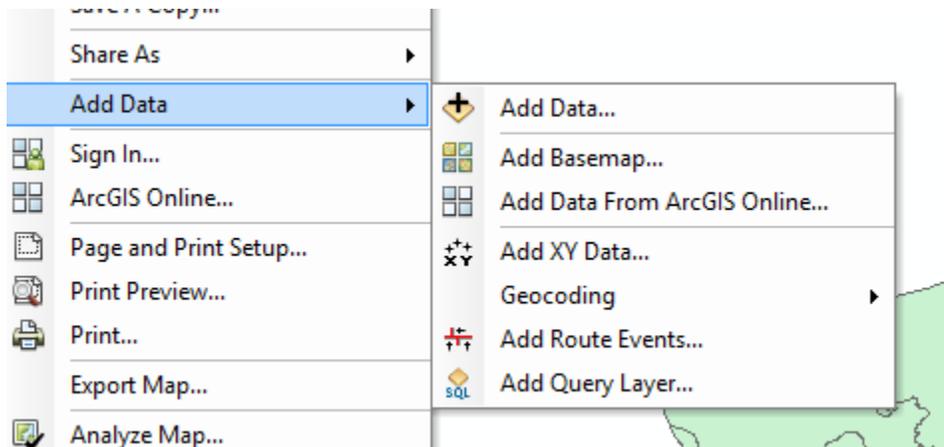
You can change the icons that appear in these toolbars, and see additional toolbars, all through the Customize menu.

Menus

ArcMap has a number of menus beyond those we have already looked at, some of which you will use frequently. The **File** Menu, seen here, is much like the file menu in other applications.



The New, Open, Save, Save As, and Save a Copy menu items are for file operations related to map documents. The Add Data submenu contains commands for adding various types of layers to the map frame.



The top item in this submenu duplicates the Add Data icon, which duplicates the Add Data icon on the standard toolbar. The Add Basemap item allows you to add base layers from the ArcGIS Online service. This also duplicates functionality available

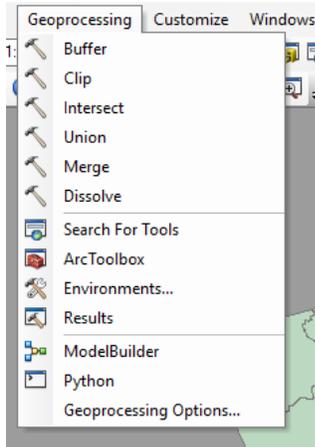
from the Add Data icon. The Add XY Data item allows you to add points to the map contained in a data table that has columns for X and Y coordinates, such as latitudes and longitudes or UTM coordinates. The Geocoding item opens the geocoding process. See the tutorial **Geocoding in ArcGIS Desktop** for details on how to geocode addresses in ArcMap.

Back on the main file menu, the print item allows you to print the map shown in the data frame. The Export Map item allows you to export the map image to a number of formats including PDF, JPG and EPS.

Under the **View** menu you can review the data frame properties, including appearance elements such as the background colour, and the coordinate system being used by the frame. As discussed in chapter 7 of *The Data Journalist*, the projection of the first layer added to the data frame determines the projection used by the data frame, and additional layers are projected on the fly to match the projection of the frame. In the data frame properties dialogue, you can change the projection used by the map frame to any that you choose. As discussed in chapter 7, if the underlying geographic coordinate system used by the map frame is different from the coordinate system of the layer you are adding, a transformation will be required to ensure layers align correctly.

The **Selection** Menu provides functionality to select features on a map by location and by attributes. See the tutorial **Selecting by Attributes and Location in ArcGIS Desktop** for step by step instructions. The menu also allows you to change the behaviour of ArcGIS when you manually select features on the map, such as creating a new selection or adding to an existing selection, and change options for how the select tools work.

The **Geoprocessing** menu, seen below, contains a number of features for manipulating geographic data.

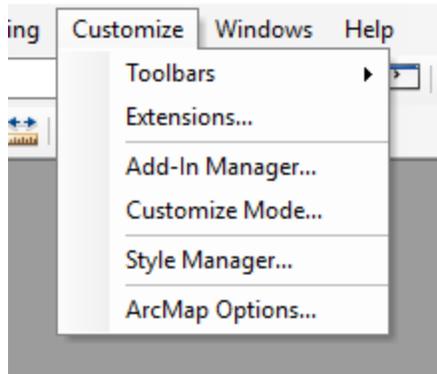


The **buffer** tool allows you to draw buffers around the outside of polygons, around points, and along lines. You can learn about buffer analysis in the tutorial **Buffering in ArcGIS Desktop**.

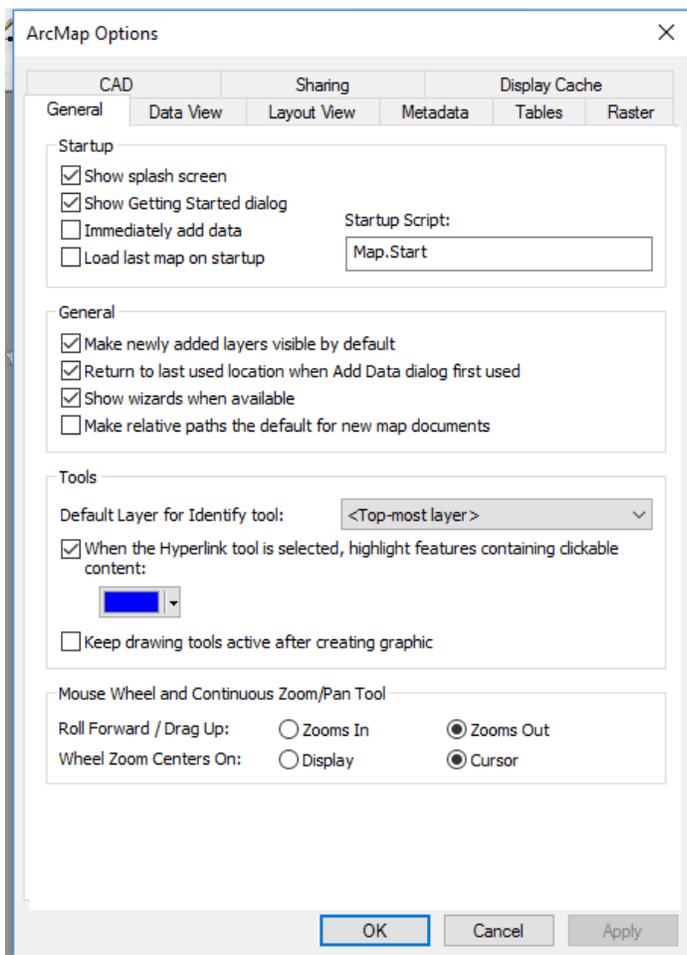
Search for tools allows you to perform a text search for different ArcGIS tools. This is a useful feature because various tools are scattered in different locations in the user interface.

The **Geoprocessing Options** menu item opens the geoprocessing options dialogue. This allows you to control such things as whether the output of operations such as buffering is overwritten when you run the operation again, or simply will not execute, whether the output of geoprocessing operations is displayed on the screen, and whether geoprocessing operations run in the background, allowing you to continue working in ArcMap, or in the foreground. While foreground processing prevents you from doing other work with ArcGIS, it uses fewer system resources and may be desirable for memory-intensive tasks that would otherwise slow your computer to molasses.

The **Customize** menu, seen here, controls which of more than 30 ArcGIS toolbars is displayed, as well as allowing you to set a variety of options for ArcMap itself.



Choosing ArcMap Options brings up this dialogue.



Some of the key choices in the General Tab include:

- **Immediately Add Data:** If checked, the Add Data dialogue will open when ArcMap starts.

- **Load Last Map on Startup:** If checked, the map open the last time ArcMap was open will reopen.
- **Make Newly Added Layers Visible by Default:** When checked, newly added layers will be visible in the data frame. If unchecked, you will need to make them visible if you want to see them.
- **Return to Last Used Location when Add Data dialog first used:** As the description suggests, when this checkbox is ticked, the add data dialogue will automatically go to the directory or other location you used the last time when adding data.

File geodatabases

The various analysis methods and tools that produce new map files as their output, including spatial joins, buffering, geocoding, and exporting map tables, can produce new shapefiles. In most cases, this will be perfectly sufficient. However, there may be times, such as when you geocode hundreds of thousands or more points, when the technical limits of a shapefile will be reached. In these cases, you will need to save your output to a file geodatabase. In addition, if you prefer, you can use a file geodatabase as part of your routine workflow.

A file geodatabase is a newer type of storage available in ArcMap that stores layers and data tables in a special type of database, not dissimilar in concept to a database in Microsoft Access or MySQL.

If you wish to create a file geodatabase, you will need to use the Catalog window. Go to Folder Connections, navigate to a folder where you would like to create the file geodatabase, then click New>File Geodatabase. Give the geodatabase a name, and you should be all set to go. The geodatabase will now be available whenever you are creating new map layers, which are known as feature classes when contained in a file geodatabase. Choose File and Personal Geodatabases as the type of file to save to and select the geodatabase you created earlier, when using tools that create new map files. You can add layers contained in file geodatabases to your map document, using the Add Data dialogue discussed earlier.

File geodatabases have effectively limitless capacity, as you will more likely be limited by the file size constraints of your operating system or hard drive than you will by the limitations of the file geodatabase itself. As an example, a single feature class can be up to 1 terabyte in size, and with additional settings, can be a quarter of a petabyte. Few computers being used by journalists will have hard drives of more than a few

terabytes. Solid state drives common on today's laptops rarely exceed 1 TB in size. The article found at <http://www.esri.com/news/arcuser/0309/files/9reasons.pdf> provides useful background on the benefits of using file geodatabases.

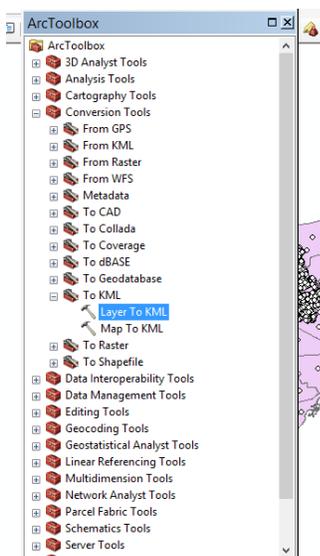
ArcMap also has a database type called a personal geodatabase, but we would recommend using the file geodatabase type.

Converting a map layer to a KML file

You can export the geographic information in a shapefile or feature class in a file geodatabase to the kml format for use in online mapping services such as Google Fusion tables, as long as it is not a very large file. Generally, a polygon file representing an urban area will be small enough to upload to Fusion Tables (as a kml) as will a file of a few hundred points.

To begin this process, make sure the shapefile you wish to export is open in your map document. If you wish, choose the fields you wish to export by selecting fields in the fields tab of the properties dialogue for the map layer, as discussed earlier in this tutorial. You can also choose whether to export the attributes to appear in a bubble by ensuring the “Show content for this layer using the HTML popup tool” checkbox is ticked off in the HTML popup tab of the properties dialogue.

Click on the red toolbox icon to open the ArcToolbox. Navigate to Conversion Tools>To KML>Layer to KML.



A new dialogue will open. Choose the shapefile you wish to convert using the dropdown list. Choose a name for the output kmz file (a zipped kml file). Finally, enter a scale for the output file; 10,000 will work fine. Click OK, and the conversion will proceed.

To convert the kmz file to a kml, go to your windows file explorer or Mac Finder, find the kmz file you just created, and add an extra extension of .zip to the file name. This will trick Windows or OS X/macOS into letting you use the extract function/open function to extract the kml file. Once extracted, rename it to reflect its contents, and it will be available to upload to Fusion Tables. Once uploaded, you can, for example, merge it with another Fusion Table to make a thematic map using buckets.