

Introduction

This Tutorial will introduce ESRI's ArcGIS software to the user.

System Requirements

The following Software should be installed on your computer in order to complete this tutorial:

- Windows 7 or higher
- ArcGIS 10.1
 - Arc Advanced (*formerly ArcInfo*) License Level

Metadata:

The tutorial will instruct you how to open and find these files:

Map Document: IntroToGIS.mxd
GeoDatabase: IntroToGIS.gdb

Introduction to Using ArcGIS



What is GIS?

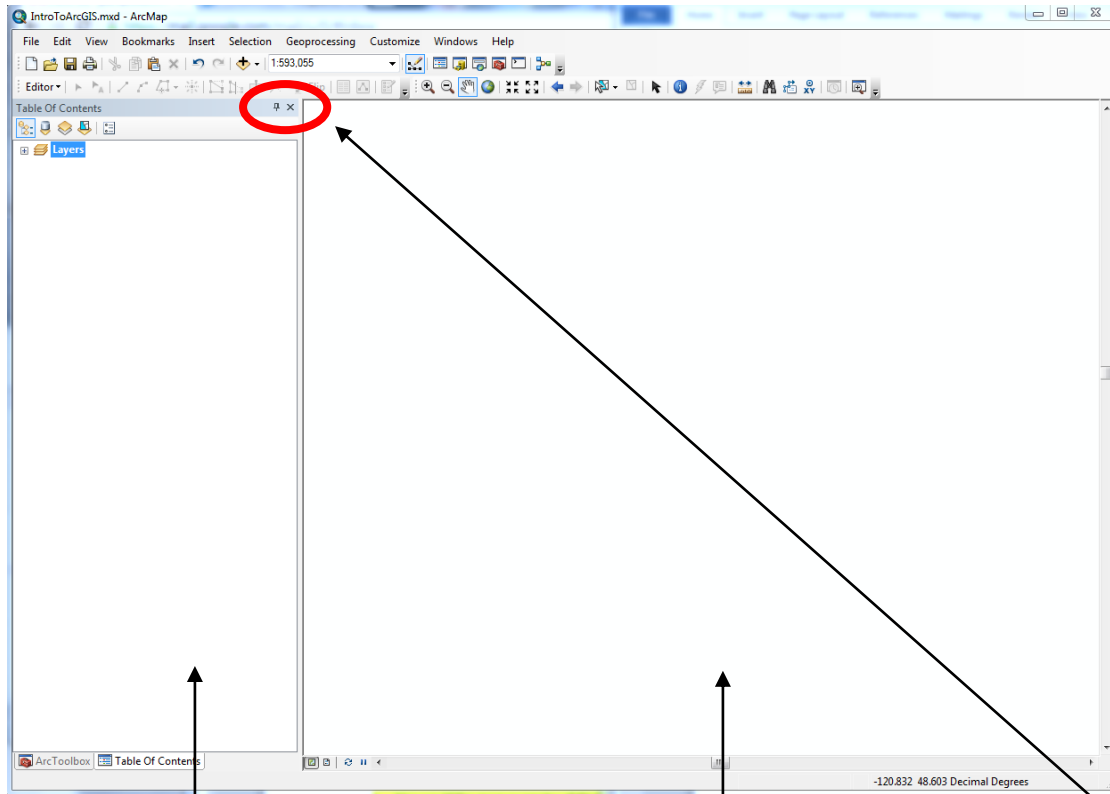
GIS stands for Geographic Information Systems. It is a software package that allows users to create, visualize, and analyze data spatially and to create maps. GIS uses spatial data that comes in two formats. Vector (or feature) data consists of geometric shapes that are in the form of points, lines or polygons. Raster data consist of spatially continuous surfaces that are made up of identically sized cells, where each cell represents a value. For example, in a digital elevation model (DEM), each cell contains a value that represents the elevation in the area of the cell. Both data types contain information about location and may also have descriptive information in an associated Attribute Table. When displayed in a map, both Feature and Raster data are often referred to as layers when shown in the MAP DISPLAY and TABLE OF CONTENTS windows.


Basic GIS Definitions

1. ArcMap: Software used to visualize and analyze spatial data and their associated attributes.
2. ArcCatalog: Software used to manage and organize GIS data and files.
3. ArcMap Document (.mxd): File containing all the information used to build a map or analyze spatial data. Map Documents *refer* to the GIS data, but does not *contain* GIS data.
4. Table of Contents (TOC): The window where the layer files and their symbology which are included in project are listed.
5. Symbology: The color, marker type or shading used by ArcMap to visualize differences between the data.
6. Attribute Table: A spreadsheet-like table which contains descriptive information (attributes) about the records in your layer files.
7. Metadata: Descriptive information about the dataset. For example, a file containing the creator's name, the projection, creation date, and the data's spatial extent is metadata about any layer.

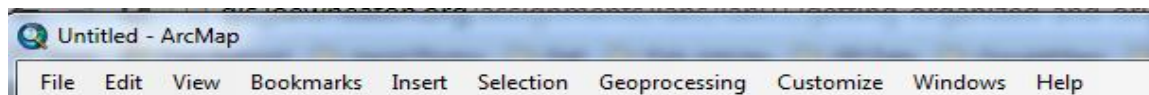
Getting to know ArcMap

1. **LOOK** for the ARCMAP icon  in the START MENU  or on the DESKTOP window.
2. **DOUBLE CLICK** on the “ArcMap” icon to open a new, empty map document.
3. ArcMap Window (new, empty map document shown):



4. You can **DOCK** or **HIDE** panels to the main window using the PUSH PIN icon  , located in the title bar (top) of each window, or by clicking and dragging them. You can practice this in the optional ArcCatalog exercise.

ArcMap Menu

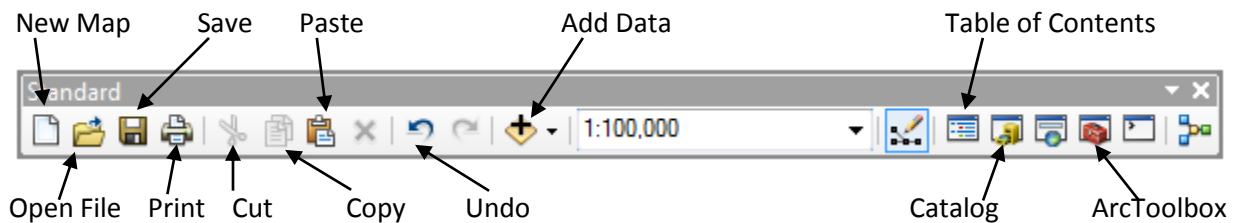


1. **CLICK** on each menu item to see a list of options. Your most commonly used menus will likely be the FILE and CUSTOMIZE menus.
 - a. The FILE menu allows you to do all of the things your STANDARD toolbar will with some additional ones, and these options are similar to what you might see in Word or another program (save, print, copy, paste, etc.).
 - b. The CUSTOMIZE menu is used to add Toolbars and Extensions to your ArcMap window.

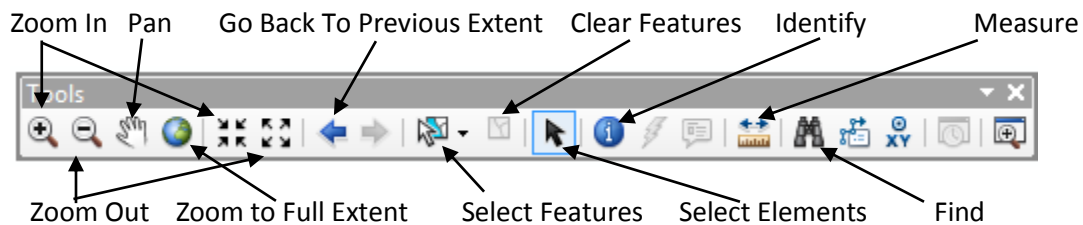
2. CHaMP uses the following toolbars/extensions:
 - a. 3D Analyst (extension)
 - b. Spatial Analyst (extension)
 - c. CHaMP Topo Processing (toolbar)
 - d. TIN Editing (toolbar)
 - e. Spatial Analyst (toolbar)
 - f. 3D Analyst (toolbar)
 - g. Effects (toolbar)
 - h. Editor (toolbar)

ArcMap Toolbars

3. The STANDARD toolbar contains tools for opening files, saving files and other general tasks.




6. The TOOLS toolbars contains the basic tools for navigating ArcMap.



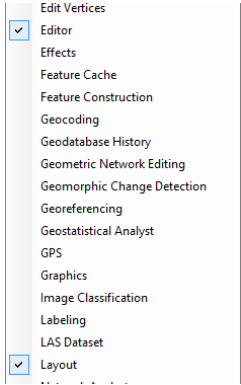

TIP

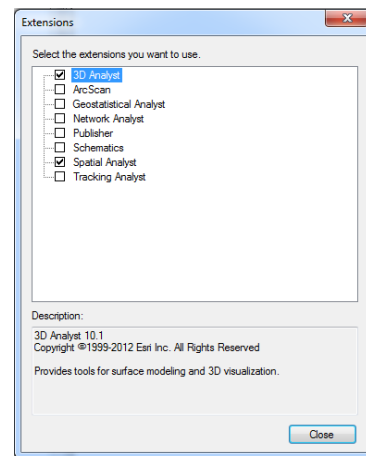
If you hover the cursor over an icon, the name and a description of the tool will appear.

ArcMap Exercises

1. Using the **OPEN FILE** button (), **NAVIGATE** to folder location provided by instructor and **DOUBLE CLICK** on the "IntroToArcGIS.mxd" map document file and ArcGIS will open a new map document.
2. Begin the exercises below.

Exercise 1: Working with Toolbars and Extensions

1. **SINGLE CLICK** on the "CUSTOMIZE" menu.
 - a. **HOVER** your "cursor" over the TOOLBARS menu item to see a list of available toolbars.
 - b. Make sure the EDITOR, LAYOUT, STANDARD and TOOLS toolbars are activated by having a check beside them.
 - i. You will need to scroll down to see all of the available toolbars.
 - ii. If any of the toolbars is not active, **CLICK** to the left of the tool and a check will appear. The toolbar is now active and should appear above your MAP DISPLAY and TABLE OF CONTENTS windows.
 - c. **TURN ON** the "DRAW" toolbar
 - d. Practice moving it around the window and dock it in a location you find useful by dragging the toolbar and dropping it next to other toolbars.
 - e. You can organize the toolbars by selecting the  icon and dragging the toolbar to different parts of the screen.
2. **GO BACK** to the CUSTOMIZE Menu.
 - a. **SINGLE CLICK** on the "EXTENSIONS" menu item to see the available extensions in a new window.
 - b. Make sure the 3D ANALYST and SPATIAL ANALYST extensions are checked. If these extensions are not turned on, several of the tools will not function.
3. **CLICK** "Close".





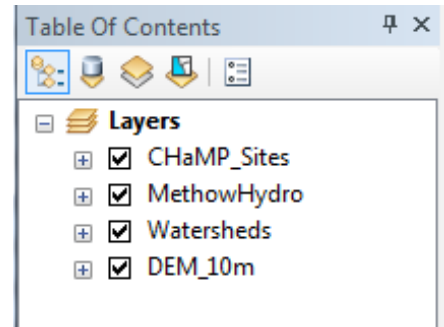
Note

Extensions remain checked when the .mxd document is saved, so you do not need to check these every time you use the map document.

Exercise 2: Working with Layers

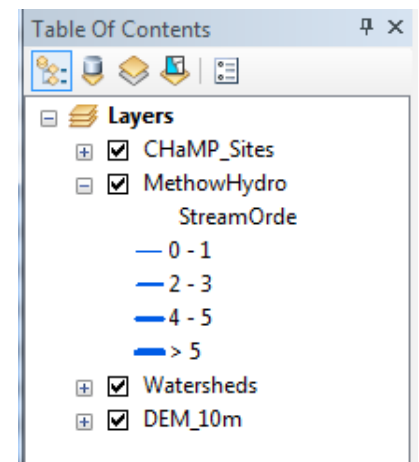
1. Adding Data to a Map Document.

- a. **CLICK** on the “Add Data” tool  and **NAVIGATE** to the “IntroToGIS” folder. Folder location will be provided by the instructor.
 - i. **SELECT** the “CHaMP_Sites” point layer from “IntroToGIS.gdb”.
 - ii. The spatial data should appear in the MAP DISPLAY window and the layer name will appear in the Table of Contents window.
 - iii. If the spatial data does not appear in the MAP DISPLAY window, make sure there is a check in the box to the left of the layer’s name.
 - iv. **CLICK** the  icon to save your map document (.mxd) file.

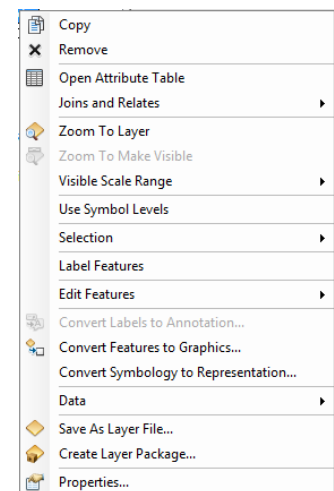


2. Using Layer Properties

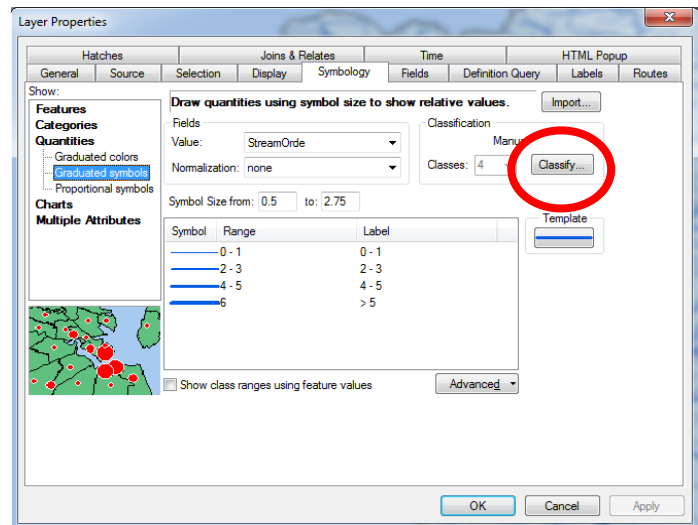
- a. **ZOOM** to the MethowHydro layer in the Map Display window by **RIGHT CLICKING** on the layer and selecting menu option “Zoom to Layer”.
- b. **CLICK** the “Plus” next to the MethowHydro layer to expand the symbology.



- c. **RIGHT CLICK** on the “MethowHydro” layer name to see additional menu items.
- d. **SELECT** “Properties” and a dialog box should appear.



- e. **CLICK** the “Source” tab. This tab shows the directory location where the layer is stored as well as the projection it is in.
What is the projection of the MethowHydro layer?

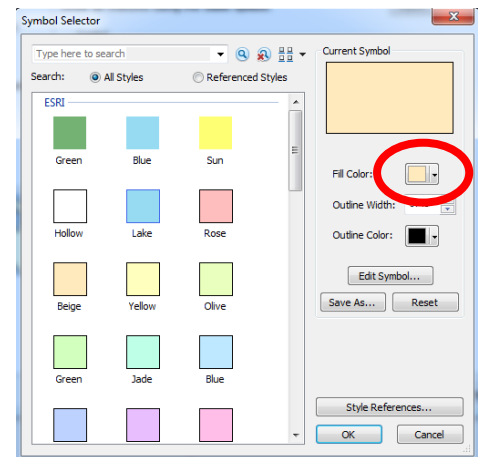


- f. **CLICK** the “Display” tab. This tab is where you can set the Transparency of a layer in the Map Display window, which allows layers below the layer to be visible.
- CHANGE** the “Transparency” to 20%.
 - CLICK** “Apply”.
 - Can you see a difference?**

- g. **CLICK** on the “Symbology” tab. This tab is where you create or update the symbology of the layer.
- CLICK** on the “Blue line” under “Template” on the right side of the Symbology dialog box.
 - CHANGE** the color. The layer will now be a different color in the Map Display window.
- h. **SELECT OK** to “Apply and Close”.

3. Working with Symbology


- DOUBLE CLICK** the “Watersheds” layer.
- CLICK** on the “Symbology” tab.
- CHOOSE** the “Categories” option in the box on the left of the screen.
- If “Unique values” is not currently highlighted, **CLICK** on it.
- Under “Value Field”, **CHOOSE** the “Start Year”.
- CLICK** “Add All Values”.
- CLICK** “Apply”.
- DOUBLE CLICK** on the “Symbol” next to the Value “2011”.
 - The “Symbol Selector” dialog box will appear.
- CLICK** the “Fill Color” box on the right side of the screen and change the color or pick a symbol from the list on the left side of the window.
- CLICK** “OK”.

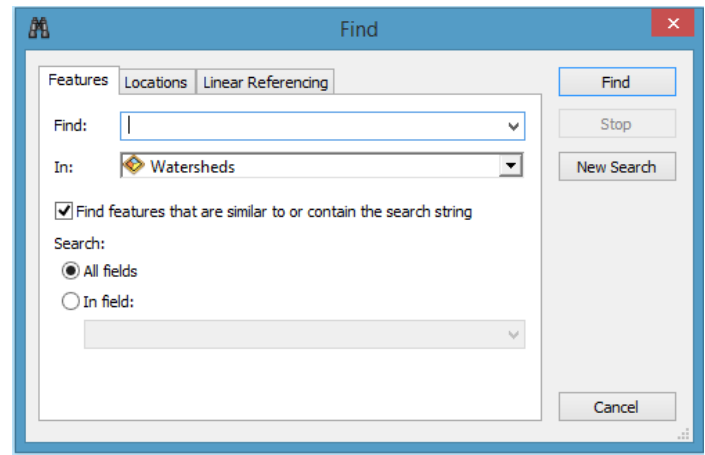


Exercise 3: Navigating the Map and Selecting Data

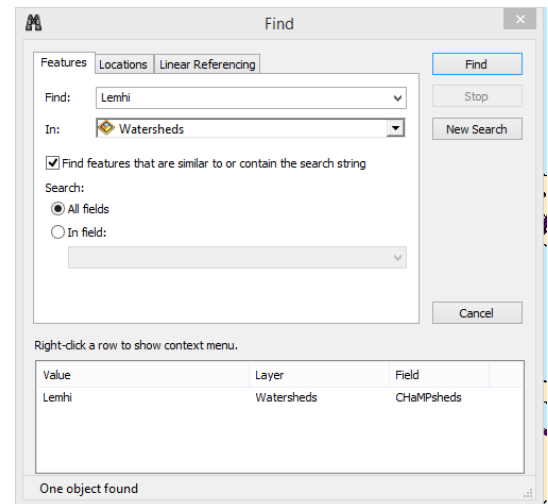


1. Use the TOOLS toolbar (see page 3 for description) to navigate around your map window.
 - a. **PRACTICE** zooming in and out with more than one tool.
 - b. **PRACTICE** panning.
 - c. **PRACTICE** selecting data in the Watersheds layer.
 - i. You can select data by using the “Select Features” icon in the TOOLS toolbar.
 - ii. **CLICK** on “Select Features”.
 - iii. **CLICK** on one of the Watersheds in the MAP DISPLAY window.

2. You can also use the **FIND** () tool to select specific records.
 - a. **CLICK** on the FIND tool and wait a few seconds. A dialog box will open.
 - b. **SELECT** “Watersheds” in the “In” dropdown menu.
 - c. In the “Find” box, **TYPE** “Lemhi”.
 - d. **CLICK** the “Find” button and the dialog box will expand.

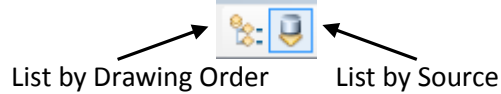


- e. In the bottom of the box you will see “Lemhi” under Value.
- f. **DOUBLE CLICK** on “Lemhi” under Value and a polygon will flash on the screen and highlight in green.
- g. You can also limit the fields that are being searched by clicking the “In field” radio button and choosing the field to search.
- h. This tool is a great way to search for survey point numbers.

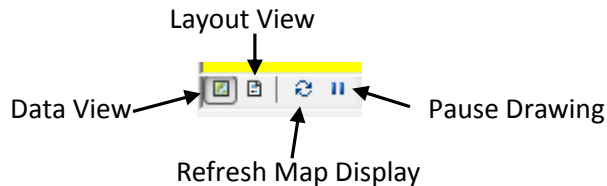


Exercise 4: Working in the Table of Contents

1. In the TOC, **SELECT** each of the icons shown below from the top of the TOC.



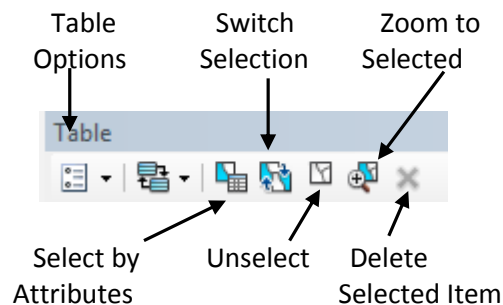
- a. List by Drawing Order: You can shuffle the file order in this view by single clicking the layer and dragging it up the order of layers.
 - b. List by Source: You can see all layers including text files in this view along with each layer's data source; however you cannot reorder layers in this view.
 - c. **ADD** the "North American poly" layer from the IntroToGIS.gdb geodatabase.
 - i. **What happens?**
 - ii. **MOVE** this layer so it is below the other layers.
2. Explore a few more icons: at the bottom of the Map Display Window, you will see 4 icons.



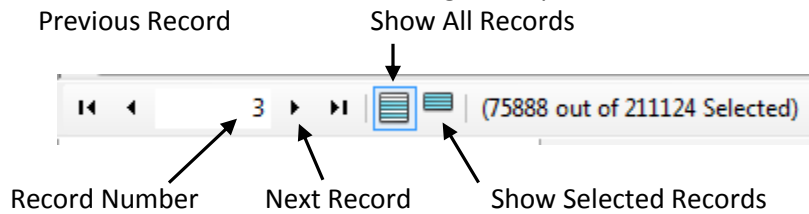
- a. **CLICK** these icons to see what they do.
 - i. DATA VIEW is your primary working window.
 - ii. LAYOUT VIEW shows what the final map will look like if you printed or exported it.

Exercise 5: Working with Tables

1. Attribute tables have description information such as data type and location coordinates for objects in the file.
2. **RIGHT CLICK** on the "Watersheds" layer.
3. **SELECT** "Open Attribute Table".
 - a. The attribute table will open and you will see the TABLE menu at the top of the window.



- b. At the bottom of the window are navigation options.



- c. **SELECT** the “Entiat” watershed by **CLICKING** on the gray box to the left of the row containing Entiat.

Table					
Watersheds					
	OBJECTID *	Shape *	Shape_Le_1	Shape_Ar_1	CHa
	1	Polygon	678029.51373	5409686956.2	Big-Navarro-
	2	Polygon	238531.610807	2463783518.74	Asotin
	3	Polygon	295059.430815	2405381759.12	Entiat
	4	Polygon	748442.49791	8578613913.82	Upper Granc
	5	Polygon	1453177.66383	40811178301.300003	John Day

- i. **What happens in the Attribute Table?**

- c. In the MAP DISPLAY window, all the records you selected will appear highlighted in bright blue.

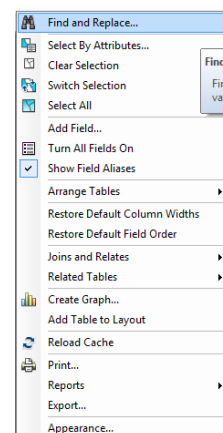
- d. **CLICK** “Zoom to Selected Features” .



- i. **What happens?**

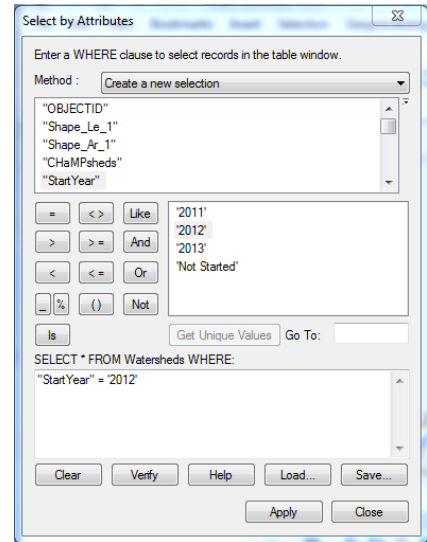
- e. You can select more than one record by selecting a record, then scroll down to another record, hold the “Ctrl” key and select the additional record.
- f. You can select a list of records by selecting one record, scrolling down, then hold the “Shift” key and select a second record.
- g. **SCROLL** to the right to see more fields in the Attribute Table.

4. **SELECT** the “Table Options” icon  and review the menu options.

5. **CLICK** on the table again to “Close” the TABLE OPTIONS menu.

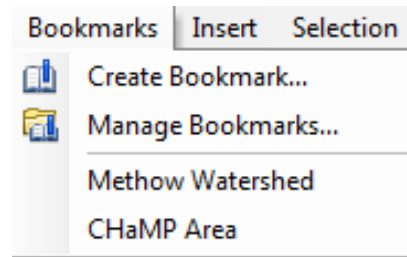


6. On the STANDARD menu bar, **CLICK** the SELECTION menu.
7. **CLICK** the “SELECT BY ATTRIBUTES” menu item and choose the “Watersheds” layer in the Layer dropdown menu.
 - a. A dialog box will appear.
 - b. **SCROLL** through the “Attribute Field” list and **DOUBLE CLICK** on “StartYear”.
 - c. **CLICK** the “equals (=)” sign.
 - d. **SELECT** “Get Unique Values” with “StartYear” highlighted.
 - i. You will see a list of values found in the “StartYear” field.
 - ii. **SELECT** the “2012” value and **DOUBLE CLICK**.
 - e. **CLICK** “Apply”.
 - f. **TOGGLE** between “Show all records” and “Show selected records” .
 - g. “Unselect” the records by **CLICKING** the “Unselect” icon. .
 - h. **CLOSE** the “Attribute Table” by **CLICKING** on the “X” in the top right hand corner of the table window.




Exercise 6: Using Bookmarks

1. Bookmarks are an easy way to navigate to a specific location on a map repeatedly. It is especially useful if you accidentally zoom to the wrong place or when you are correcting data and want to mark on the map a location where you find an error.
2. **CLICK** on the BOOKMARKS menu item.
3. **SELECT** “Methow Watershed”.
 - i. **What happens?**
- b. **SELECT** “CHaMP Area”.
 - i. **What happens?**
4. **NAVIGATE** to the Asotin watershed.



Hint:


One way is to select Asotin from the attribute table then use the “Zoom to Selected tool”  to zoom to the selected watershed in the map)

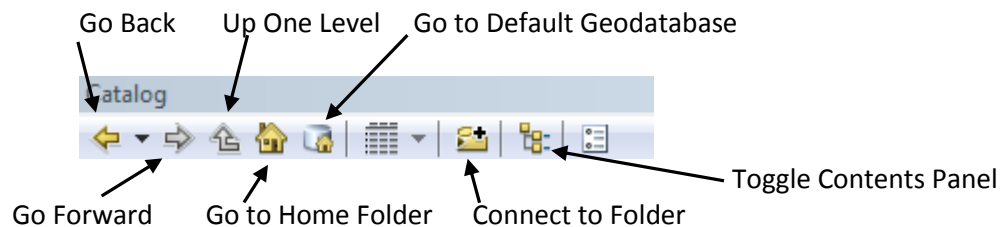
- i. **ZOOM** and PAN in until you are happy with how it fills the screen.
- ii. **CLICK** on the BOOKMARKS menu option.
- iii. **SELECT** “Create Bookmark”.
 - 1) Give the new bookmark a name.
 - 2) **CLICK OK**.
- iv. **NAVIGATE** back to the “Methow”.

Optional Exercises:

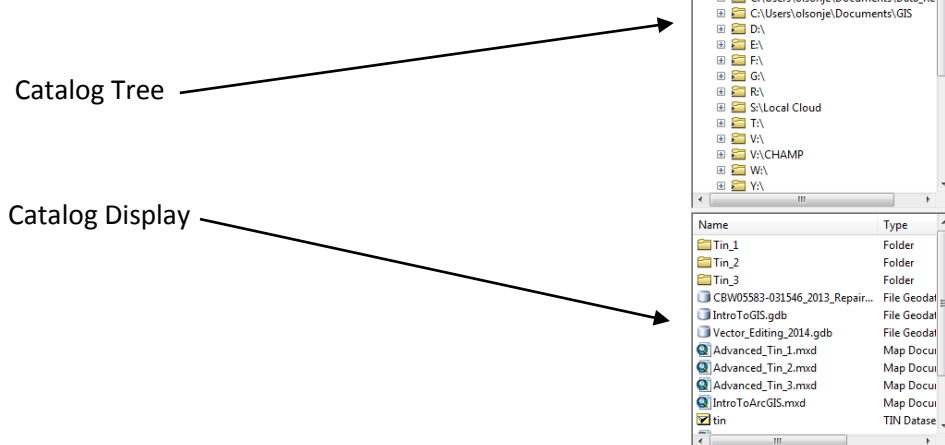
Optional Exercise 1: Getting to know ArcCatalog

ArcCatalog is the program used to manage, preview, and organize the GIS data files used by ArcMap, similar to managing files in Windows Explorer. **FIND** the “Arc Catalog” icon in the ArcMap window and open the program.

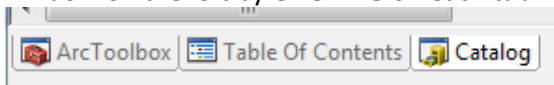
1. **CLICK** on the “Catalog” icon. You can also access the complete “ArcCatalog”  program from your START menu.
2. The CATALOG window will open and you will see the menu below.



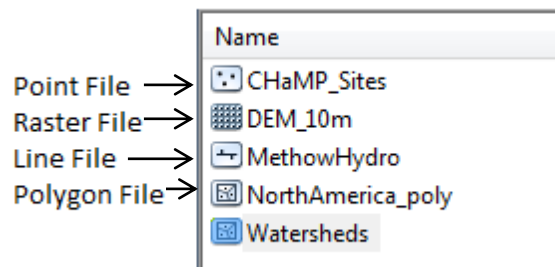
5. ArcCatalog Window



6. ArcCatalog can be 'docked' within the main ArcMap window to be visible all the time.
 - a. We want to dock ArcCatalog with the Table of Contents.
 - b. **CLICK** once and hold on the ArcCatalog title bar. Blue arrows will appear on your screen.
 - c. **DRAG** “ArcCatalog” until the TOC turns blue then release. You should see two tabs at the bottom of the TOC side of the screen.
 - d. **PRACTICE** switching between the Table of Contents and ArcCatalog by using the tabs at the bottom of the window on the left by **CLICKING** on each tab.

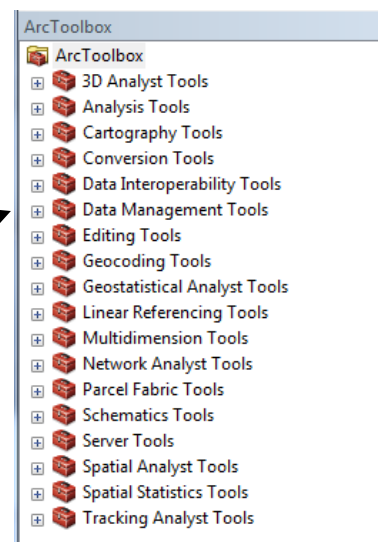
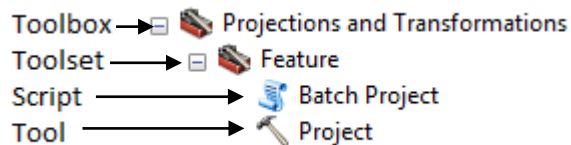


7. **SELECT** the “IntroToGIS.gdb” and click the plus sign (+).
 - a. This is a File Geodatabase and contains all the layer files we are using for the exercises in this Tutorial.
 - b. You should see a list of 5 layers (also known as feature classes) listed below the geodatabase name.
 - c. Please note that each file type has its own symbol.



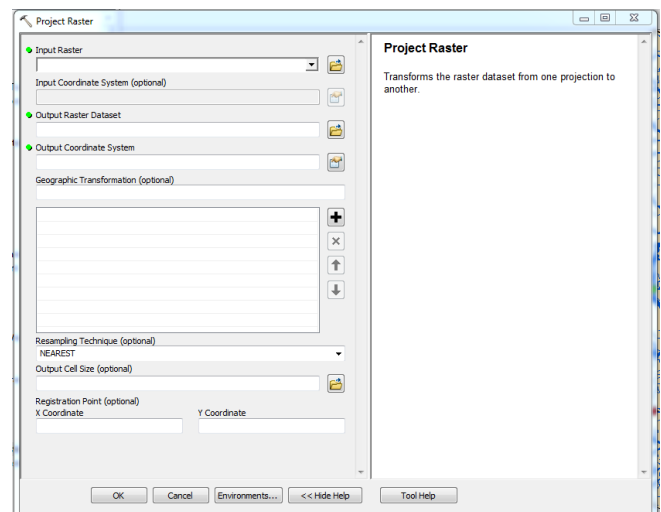
Optional Exercise 2: Getting to know ArcToolbox

1. **ArcToolbox** contains geoprocessing tools usable in ArcGIS.
2. ArcToolbox is organized into Toolboxes, Toolsets, Scripts and Tools.



3. **CLICK** the “plus (+)” sign adjacent to the DATA MANAGEMENT toolbox.

4. **DOUBLE CLICK** the “PROJECTIONS AND TRANSFORMATIONS” toolset.
 - a. **DOUBLE CLICK** on the “PROJECT RASTER” tool and a dialog box will open.
 - b. The Dialog box is how you interact with a tool.
5. **CLOSE** ArcMap and ArcCatalog.



Resources:

ArcGIS 10.1 Help

<http://resources.arcgis.com/en/help/main/10.1>