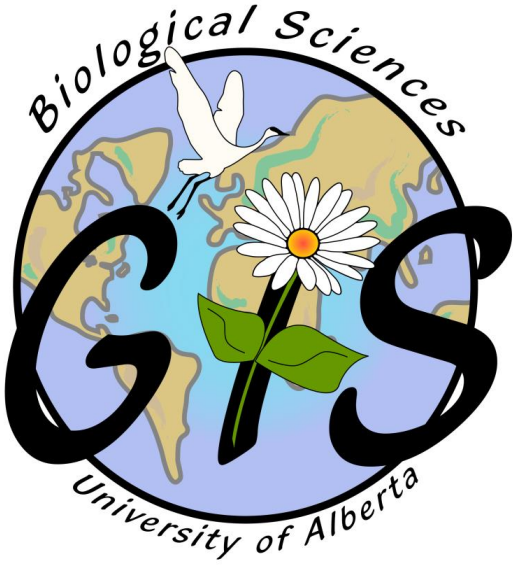
GIS IN ECOLOGY: QUERYING & CREATING MAPS



Department of Biological Sciences

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Contents

This is an applied short course on how to use the software. It involves establishing a map document, displaying layers, editing layer properties, modifying data frame properties, querying, and map presentation. Although the data and examples used here are more general in nature, the tools and techniques that you learn to work with can be applied to your own ecological spatial data layers. Also, this should provide good reference material for when you want to create an all-purpose study area map.

For additional suggested reading on GIS theory, fundamentals, and software see: www.esri.com and www.biology.ualberta.ca/facilities/gis/index.php?Page=338#online

Some excellent ESRI Online Training courses: www.biology.ualberta.ca/facilities/gis/index.php?Page=484#virtualcampus

- Understanding GIS Queries
- The 15-Minute Map: Creating a Basic Map in ArcMap

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www.biology.ualberta.ca/accru

GIS IN ECOLOGY: QUERYING & CREATING MAPS

Introduction

The purpose of this short course is to familiarize you with Esri ArcGIS software and how to use it for querying and creating maps of your ecological data.

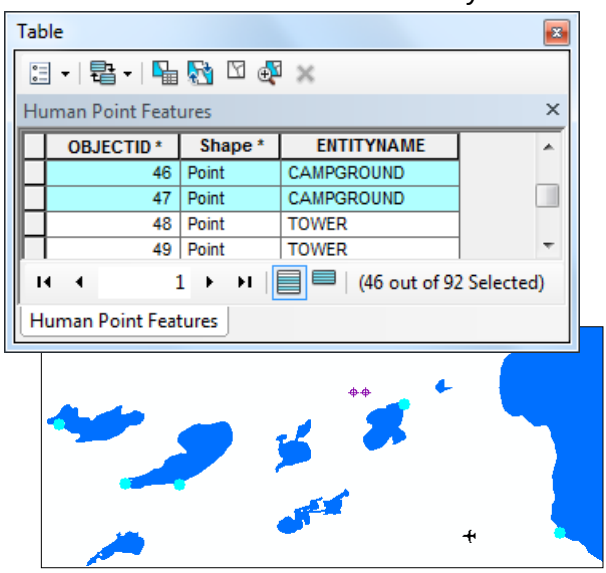
GIS Queries

Often just looking at a map doesn't provide you with all the answers to your GIS problems. You must explore, query, and display data on the map to get the information you need. Besides facilitating some snazzy symbolization of your data, ArcMap allows you to:

- Identify features by pointing at them
- Interactively select features in layer/table
- Find features that have a certain characteristic, attribute, or location
- Select features by attribute or by location
- Define features to display in a query

The *building blocks* of queries:

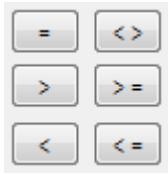
❶ The **SOURCE** table or feature layer



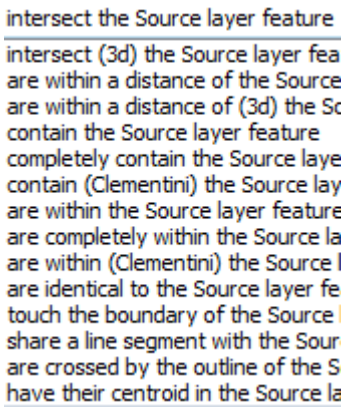
❷ The attribute value or feature **FILTER**

❸ The **RELATIONSHIP** operators

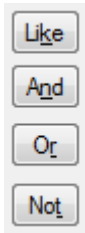
Comparison



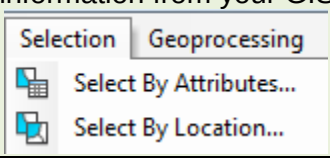
Spatial



Logical



SELECT BY ATTRIBUTE and SELECT BY LOCATION are the powerful tools for requesting information from your GIS database.



SQL

You can use Structured Query Language (SQL) statements to more efficiently locate features according to your purpose and criteria, and define a subset of data on which to perform some operation.

See "**Building a query expression**" in ArcGIS Desktop Help for tips on:

- Searching for strings or values
- Keywords and calculations
- Combining expressions

Elements of Cartography

Conveying your message in a geographically meaningful and understandable way makes all your hard work in collecting and processing your spatial data worthwhile. A map is the primary method for displaying the results of your GIS analysis.

In order for your geographic layers to be considered a true map, you must show your audience what they mean, where in the world they are located, and provide clues as to how they should be spatially interpreted. This means providing the following cartographic elements in your map layout:

ELEMENT	DESCRIPTION
Title	Tells the map readers what they are looking at – a good title includes what, where, and when
Scale Bar	Helps the map readers determine distance and size
Legend	Indicates what the symbols mean
North Arrow	Directional information for navigational purposes
Geographic Referencing	A grid or graticule showing map units or lat/long coordinates to provide locational information; also may use a pullout map
Additional Text	i.e. *Dates*, *Data Source*, *Projection Information*, *Author Name* – generally a good idea to provide this additional information so the map readers know when the map data is from, what spatial property has been preserved (distance, area, direction, or shape), and who to give credit to

Tables and charts can also be used depending on the type of information you want focused on.

Map Projections and Coordinate Systems

All the data layers for your map should be in the same map projection and coordinate system. When they differ, the layers will not draw on top of each other or spatially coincide for analysis. This is especially important when you want to query by location! In an established GIS database (like the one for this course), the data layers will generally already be in the same coordinate system and projection.

The **map projection** is the mathematical translation of locations from the spherical earth on to the flat surface of your map.

The **coordinate system** is the specified units and origin point used to locate features on the two-dimensional map.

Search for " **Projection basics for GIS professionals** " in ArcGIS DESKTOP HELP for more information on coordinate systems and projections (or attend the “Spatial Referencing” short course).

Course Data Sources

Free spatial data that can be used for GIS analysis in ecological applications have been obtained from the GeoGratis website http://geogratis.cgdi.gc.ca (Canada Land Inventory, Canadian Soil Information System, and CanVec). The following summarizes the metadata for each geographic layer in the course dataset that has been made available to you on the local server \COURSES\GIS-100\1_QCM:

Name	Description	Feature	Projection / Datum
linear	Linear features: roads, trails, transmission lines, etc.	Line	GCS NAD 83
rivers	Rivers and streams	Line	GCS NAD 83
location	Center point of 073L NTS map sheet	Point	GCS NAD 83
points	Point features: campgrounds, wells, etc.	Point	GCS NAD 83
towns	Towns	Point	GCS NAD 83
lakes	Lakes	Polygon	GCS NAD 83
forestry	CLI forestry capability	Polygon	GCS NAD 83
landuse	CLI land use	Polygon	GCS NAD 83
\WorldData	World countries, lakes, etc.	Various	GCS WGS 84

Tasks

Editing layer properties, modifying data frame properties, performing common GIS queries, and map layout

Copying the Course Dataset

1. Double click on the COURSES shared directory icon on the Desktop
2. Open the "**GIS-100**" folder by double clicking on it
3. Click on the FOLDERS icon along the top menu bar
4. On the left side of the window, click and drag the scroll bar until you can see "My Computer"
5. Expand "**My Computer**" by clicking the "**+**"
6. Expand "**Local Disk (C:)**" by clicking the "**+**"
7. Click and drag (copy and paste) the "**1_QCM**" folder from the right side of the exploring window to the **C:\WorkSpace** directory on the left side
8. Once all the files have copied over, close the exploring window

Establishing the Map Document

1. Click the START MENU
2. Click PROGRAMS >>> ARCGIS >>> ARCMAP
3. Start using ArcMap with a new blank map and click OK

Setting up the ArcMap working environment:

4. Choose CUSTOMIZE >>> CUSTOMIZE MODE
5. In the TOOLBAR tab, make sure there is a check beside the following toolbars:
   - Standard
   - Tools
   - Draw
   - Layout
6. Click OK
7. Click and drag each toolbar so that they are positioned in a configuration you like

Adding layers:

8. Click on the ADD DATA button 
9. In the Add Data dialog, click on the

CONNECT TO FOLDER icon 

10. Navigate to the **C:\WorkSpace\1_QCM** directory
11. Click OK
12. Add the following layer files (hold the CTRL key for multiple selections):
    - Forest Species.lyr
    - Human Linear Features.lyr
    - Human Point Features.lyr
    - Lakes.lyr
    - Landuse.lyr
    - Rivers.lyr
    - Towns.lyr

Setting the layer file data source:

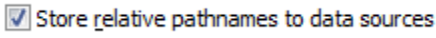
A red exclamation mark and lack of drawing indicates that the data source for the layer requires setting. Repair the broken data link for the Human Linear Features layer by setting the Data Source to the linear feature class.

13. Right click on Human Linear Features, choose PROPERTIES
14. In the SOURCE tab in the layer properties, click on the SET DATA SOURCE button
15. Navigate to C:\WorkSpace\1_QCM\SandRiver.gdb
16. Select the **linear** file and click ADD
17. Click OK
18. Right click on Human Linear Features.lyr and choose SAVE AS LAYER FILE – *replace existing file with the repair*
19. REPEAT for any other broken data link

An alternative way is to right click the layer and choose DATA >>> SET DATA SOURCE, and set the data source there (as shown above). Now save the map document.

Saving your map document:

20. Choose FILE >>> MAP DOCUMENT PROPERTIES
21. Click DATA SOURCE OPTIONS and check to “Store relative pathnames to data”



22. Click OK
23. Choose FILE >>> SAVE AS
24. Navigate to the C:\WorkSpace\GIS-100\1_QCM directory
25. Type a name (e.g. **SandRiver_todaysdate.mxd**) and click SAVE

Data frame properties:

26. In the table of contents, rearrange the **drawing order** of the layers (drag and drop the layer NAME) so it makes geographical and visual sense; e.g. Human Linear Features over Rivers, and Lakes over all other polygon layers, etc.

NOTE: Drawing order can only be adjusted when the Table of Contents is set to 'List by Drawing Order.'

27. Double click on the "Layers" data frame *NAME* to open the data frame properties
    - In the GENERAL tab change the Name to "**Sand River**"
    - In the COORDINATE SYSTEM tab, set PREDEFINED >>> PROJECTED COORDINATE SYSTEM >>> UTM >>> NAD 1983 >>> **NAD_1983_UTM_ZONE_12**
28. Click OK
29. Choose INSERT >>> DATA FRAME
30. Click on the ADD DATA button
31. Navigate to the **C:\WorkSpace\1_QCM \WorldData** folder to add the layers:
    - countries
    - lakes
    - world30
32. Click ADD
33. Adjust the drawing order
34. Click once on the name "New Data Frame"; wait a moment and then click it again
35. Change the name of the data frame to "**World**"
36. SAVE the map document

Switching between data and layout views:

*When in **data view**, you can see only one data frame at a time.*

37. Hold the ALT key and click on the data frame entitled "**Sand River**" to activate it

*To see both data frames at the same time, switch to **layout view**.*

38. Choose VIEW >>> LAYOUT VIEW
39. Click and drag each data frame to position them unobstructed
40. In Layout View, click on the "**Sand River**" data frame to activate it
41. Switch to Data View (click button at lower left corner of display window)

Exploring Your Data

You will now use the Tools and Layout toolbars to explore your data by zooming in and out, panning, and setting the map scale within the data and layout views. You may open additional windows to view your data up close and personal or within the full extent. Finally, when you find the scale view of interest you can bookmark it (similar to web page bookmarks) that you can call on later to quickly get you back to the view.

Zooming, panning, and setting the map scale:

You can view your layers in their entirety or you can examine areas more closely by adjusting the map scale. While in data view, the Tools toolbar controls your view of the scale and position of the data frame. While in layout view the Layout toolbar controls your view of the scale and position of the entire map.

1. Turn ON a couple of the layers to view them simultaneously; e.g. Towns, Human Features, and one of the polygon layers
2. Experiment with the ZOOM and PAN tools
3. Switch back and forth between data and layout views to see what happens

Note that the magnifying tools from Tools toolbar, for example, operate differently in each view! The Layout toolbar is only activated when in Layout View.

Tools toolbar (data) 

Layout toolbar (page) 

4. Experiment with the MAP SCALE by entering different values (*choose from the drop-down list or type in the text box*)

5. Switch back and forth between data and layout views to see how the map scale reacts
6. Once you understand how each tool works, click ZOOMTO FULL EXTENT 

The overview and magnifier windows:

While in data view, if you don't want to adjust your map display but want to see more detail or get an overview of an area, open a Magnifier or an Overview window.

7. Choose WINDOWS >>> OVERVIEW – *this shows a small box of the currently displayed area within the entire extent of your data frame*
8. Right-click on the Overview title bar and choose PROPERTIES
9. Set the Reference layer to the same polygon layer you have turned on and click OK
10. Use the PAN and ZOOM tools to interactively choose different areas for overview
11. CLOSE the Overview window
12. Choose WINDOWS >>> MAGNIFIER – *this magnifies a particular area*
13. Click and drag the title bar to move the Magnifier window around the map – *a crosshair appears to show you the targeted area*
14. Release the mouse pointer to view the detail
15. Right-click the Magnifier title bar and choose PROPERTIES to change how you view the data in the window
16. CLOSE the Magnifier window when finished

If you have two monitors, you can place these additional windows on their own!

Spatial bookmarks:

You may identify a particular area to save and refer to again and again, by setting it as a bookmark – particularly handy when you have many study locations to keep track of.

17. Using the pan and/or zoom tools, locate ***Cold Lake*** (largest lake and in the northeast section)
18. Choose BOOKMARKS >>> CREATE
19. Enter the name "**Cold Lake**" and click OK
20. Zoom to the FULL EXTENT
21. PAN and ZOOM into different locations
22. Then choose BOOKMARKS >>> "**Cold Lake**"

Querying (a.k.a. Selecting Data)

Identifying features:

1. Turn ON all the layers
2. Click ZOOM TO FULL EXTENT
3. Click the IDENTIFY tool 
4. Move the mouse pointer over the town of Lac La Biche and click
5. Examine the Identify Results window

The Identify Results window contains a drop-down list so you can choose which layer you want to identify features from.

6. Experiment with different layer settings (i.e. the 'Identify from:' list box) and point at different features to learn more about how the IDENTIFY tool works
7. CLOSE the Identify window when done

Interactively selecting features on a map:

Simply by pointing and clicking with the SELECTION tool, you can interactively highlight any feature(s) of interest.

8. Click the SELECT FEATURES tool 
9. Click on the largest lake to select it

A blue outline appears to indicate it is the selected feature. You may also click and drag the tool to encompass multiple features.

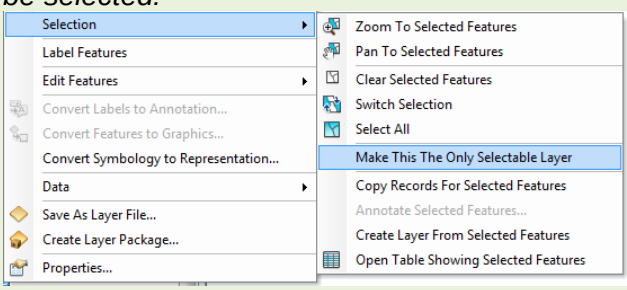
10. Holding the SHIFT key, click on another major lake

Open the attribute table to view the names of the lakes.

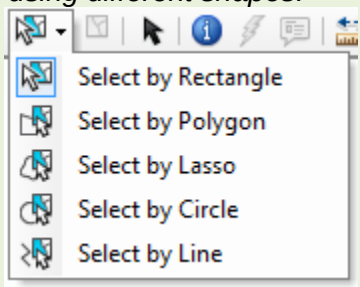
11. Right click on **Lakes** and choose OPEN ATTRIBUTE TABLE
12. Click the SHOW SELECTED button 
13. Highlight Cold Lake by clicking on the button to the left

Selected records are shown in blue, while highlighted records within a selection are yellow. More information on selection options and functionality is available in the ARCGIS DESKTOP HELP.

TIP: You can set specific layers that may only be selected:



NOTE: You can refine your interactive selections using different shapes:



Interactively selecting records in a table:

You can interactively and efficiently select features to view in the attribute table.

14. While the **Lakes** attribute table is still open, click on SHOW ALL 
15. Click on the OPTIONS button
16. Click CLEAR SELECTION 
17. Right-click on the NAME field header
18. Select DESCENDING
19. Highlight ***Touchwood Lake*** by clicking on the button to the left

You can also hold either the SHIFT or CTRL key to select multiple records.

20. Move the table so you can see the map and the location of this feature
21. Choose SELECTION >>> ZOOM TO SELECTED to view this particular feature up close ***(also accessible by right-clicking the 'button' to the left of the selected record for a context menu)*** 
22. Click on the PREVIOUS EXTENT button to return to the last view 
23. CLOSE the table
24. Click CLEAR SELECTED FEATURES

Note: You may CLEAR SELECTED FEATURES via the table OPTIONS button while viewing the attribute table, and via the SELECTION pull-down menu. 

TIP: It's good practice to always set  *as the active tool; otherwise you may accidentally select a feature without knowing it, which will be applied in any future analysis.*

Selecting features based on attributes:

You can select features in a layer by using Structured Query Language (SQL) statements.

25. Choose SELECTION >>> SELECT BY ATTRIBUTES
26. Select the **Rivers** layer
27. Set method "Create a new selection"
28. Double click the field **"NAME"**
29. Click "**LIKE**"
30. Type **'%Creek'** (more generic)
31. Click APPLY

All linear features with 'Creek' in the NAME field are now selected. You may need to turn ON this layer to view it (and turn off other layers). Refer to CLI Land Use - On-Line Mapping HTML document in the _documentation folder for information on Landuse codes.

32. In the SELECT BY ATTRIBUTES dialog:
    - Set the layer to: **Landuse**
    - Double click the field **"USE_A"**
    - Click on "**=**"
    - Click GET UNIQUE VALUES
    - Click on **'M'**
33. Click APPLY and then CLOSE the window

*The query: SELECT * FROM Landuse WHERE: **"USE_A" = 'M'** selects all marsh/bog polygons.*

*Want more info on Structures Query Language operators and syntax? Click the HELP button and also search ArcGIS DESKTOP HELP for '**SQL reference**.'*

Selecting features based on location:

You can also select features of layers based on their spatial relationship with other layers – a classic locational query is to select features that are within a certain distance of others. For example, to determine which Human Point Features are within 500 meters of Lakes:

34. Choose SELECTION >>> SELECT BY LOCATION
    - Select features from
    - Target layer(s): **Human Point Features**
    - Source layer: **Lakes**
    - Method: **are within a distance of**
    - ✓Apply a search distance: **500 Meters**
35. Click APPLY

This next example combines queries! To isolate the segments of Rivers that are found within marsh/bog areas then you can select features from Rivers that intersect previously selected features of Landuse.

36. Repeat the SELECT BY LOCATION
37. Use the dropdown lists to select features from **Rivers** layer that **intersect** the ✓*Use selected features* of **Landuse** layer
38. Click APPLY

All the Rivers that intersect marsh/bog polygons are now selected. Keep in mind that these features do not represent the exact lengths of rivers passing through marsh/bog areas – a geoprocessing overlay is required for that.

Viewing selected features:

After applying selection queries you can open attribute tables to get at the various data values and view quick descriptive statistics. You may also zoom in to interactively view features. But the big power of selection sets is that when it comes time to performing analyses, the geoprocessing tools will only perform the

operations on the selected data. So handy sometimes – no need to separate features into their own datasets! Below are some tips for viewing the selected features:

39. In the Table of Contents, click the LIST BY SELECTION button to view which layers have selections
40. In the Table of Contents, right-click the layer name to OPEN ATTRIBUTE TABLE
41. Right-click on each layer name and choose SELECTION >>> ZOOM TO SELECTED FEATURES (*and try the other useful options*)

Clearing selected features:

*It is good practice to **clear all selected features routinely**, so that you don't accidentally apply future operations to subsets of data. (Geoprocessing tools honour selection sets.)*

42. Choose SELECTION >>> CLEAR SELECTED FEATURES to clear all layers

Note: To clear the selected features of a specific layer, right-click on it in the table of contents and then choose SELECTION >>> CLEAR SELECTED FEATURES.

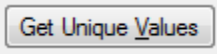
Definition query:

If you wish to physically display a subset of features in a layer then define them in a query within the layer properties dialog window. For example, there are a lot of rivers in the River layer, and only the major ones are named in the attribute table. Use this field to display only the major rivers.TIP: Open up the attribute tables to examine possible values that can be used for querying each layer.

43. CLOSE all dialog boxes and CLEAR SELECTED FEATURES
44. Double click on **Rivers** to show the Layer Properties
45. Click on the DEFINITION QUERY tab
46. Click the QUERY BUILDER button
47. Click or type to build the SQL query: **"NAME" <> ' '**

TIP: In the Query Builder dialog the 'calculator' may be used as follows:

- *double click the field name*
- *single click the operator button*
- *click the GET UNIQUE VALUES button*



- *double click the value from the list*

48. Click OK twice
49. Build the same query for the **Lakes** layer
50. Turn the **Human Linear Features** layer ON
51. Build a query that displays only the major ROADS: **"ENTITYNAME" = 'ROAD' AND "FIR_ROADNO" <> ' '**
52. Symbolize using a single symbol
53. Rename this layer to "**Roads**"
54. Build a query that displays only the major **Towns** as a single symbol (*Hint: In the attribute field MAJOR, 0=smaller towns, 1=larger towns*)

TIP: Remember to SAVE  *your map document regularly!!!*

The Map Layout

Setting the appropriate layers:

1. Turn OFF all layers in the "**Sand River**" data frame
2. Turn ON only the following layers:
   - Towns
   - Roads
   - Rivers
   - Lakes
   - CLI layer of your choice (e.g. Landuse or Forest)
3. Symbolize all layers as desired

Labeling attributes:

4. Right click anywhere it's blank on the MAIN MENU bar
5. Click to show the LABELING toolbar
6. Click on the LABEL MANAGER button 
7. Check on **Towns** and highlight the <Default> class
8. Specify the "**NAME**" field
9. Modify the Text symbol to **Bold** and size **10**
10. Check on **Rivers** and highlight the <Default> class
11. Specify the "**NAME**" field
12. Modify the Text symbol to a **dark blue**, ***Italics***, and size **10**
13. Choose **Curved** as the Orientation
14. Click OK

Towns and Rivers are automatically labeled according to the values in their "NAME" fields. This is just a small taste of what the LABELING toolbar can do. It provides sophisticated tools and options for managing labels for specific

*layers in the active data frame. See more "**About displaying labels**" in ArcGIS Desktop Help. **TIP:** The MAPLEX extension enables advanced label placement and conflict detection improve the quality of the labels on your map.*

Scaling within layout view:

15. Switch to Layout View
16. In the Tools Toolbar, click ZOOM TO WHOLE PAGE
17. Choose FILE >>> PAGE AND PRINT SETUP
18. Change the Paper Orientation to **Landscape**
19. Click OK
20. Resize and reposition the "**Sand River**" and "**World**" data frames so that "**Sand River**" takes up most of the map layout page (click and drag the corner or side drag handles)
21. Set the scales so that the layers in *both* data frames are at their FULL EXTENT

Objects in Layout View behave very much like in Power Point: move, resize, modify.

Modifying the data frame:

Within Data Frame Properties, you may modify the frame, add a grid, change the coordinate system, etc. Experiment with different properties to see what they do.

22. Double click on the "**Sand River**" data frame to open its PROPERTIES
23. Click on the FRAME tab
    - Optionally, choose a border, background, and drop shadow, then click OK
24. Click on the COORDINATE SYSTEM tab
    - Make sure it is set to **NAD 1983 UTM Zone 12N** and click OK
25. Click on the GRIDS tab
    - Click NEW GRID
    - Choose a **Measured Grid** and click NEXT
    - Choose **Labels only** for the Appearance
    - Type **50000** in both X and Y axes Intervals
    - Click NEXT twice and then FINISH
    - Highlight **Measured Grid** and click PROPERTIES
    - In the LABELS tab:
      a. Modify the Font size, etc.
      b. Format as **Formatted**

   c. Label Orientation for Vertical Labels: Check **Right** and **Left**
   d. Click ADDITIONAL PROPERTIES and in Rounding, set to **Number of decimal places: 0**
   e. Click OK
- In the INTERVALS tab, choose to Define your own origin and type in **0** for both X and Y
- Click OK

26. Click OK to apply and dismiss the data frame properties window

Inserting cartographic elements:

*To make your geographic layers into a true map, you must add the elements of cartography to the data frame in layout view. These are all accessible from the INSERT pull-down menu, while in the **layout view**.*

27. Choose INSERT >>> TITLE
    - Type "**SAND RIVER, ALBERTA**" – *or something more descriptive!*
    - Press ENTER on the keyboard
    - Reposition the title object on the map page
    - Modify the font size/style using the DRAWING toolbar tools
28. Choose INSERT >>> SCALE BAR
    - Highlight your choice of scale bar
    - Click PROPERTIES
    - Click the NUMBERS AND MARKS tab
    - Choose Frequency: **divisions**
    - Click the SCALE AND UNITS tab

    Modify the scale bar parameters so intervals are not lost upon resizing or scaling.
    - Adjust the following scale bar parameters:
       a. Number of divisions = **6**
       b. Number of subdivisions = **2**
       c. Show one division before zero = check it ON
       d. When resizing… **= Adjust width**
       e. Division value = **10**
       f. Division Units = **Kilometers**
       g. Abbreviate to "**km**"
    - Click OK twice
    - Reposition the scale bar object
    - Modify the font using the DRAWING toolbar tools
29. Choose INSERT >>> LEGEND
    - Choose to include legend items from only the **Towns**, **Roads**, **Rivers**, **Lakes**, and your chosen **CLI layer**

- Click NEXT
- Type "**LEGEND**" as the title and center it
- Click NEXT
- Optionally, modify the Legend Frame with border, fill, and shadow settings
- Click NEXT
- Optionally, change the legend patch width/height, and select a new line or area symbol for each item
- Click NEXT
- Keep the default spacing
- Click FINISH
- Reposition the legend object on the map

30. Choose INSERT >>> NORTH ARROW
    - Select a north symbol
    - Click OK
    - Resize and reposition the north arrow object
31. INSERT some additional TEXT with your name, date, and other useful info (e.g. indicate the spatial referencing: NAD 1983 UTM Zone 12N)
32. Use the ALIGN TOOLS in the DRAWING Toolbar to reposition the cartographic objects and data frames on the map layout
33. Right click on any cartographic element and choose PROPERTIES to modify them

A simple inset map of the World:

Use the "World" data frame as an inset map to show the location of your study area.

34. Activate the "**World**" Data Frame
35. In the table of contents, change the **drawing order** of the layers to make sense
36. Change the SYMBOLOGY of the layers so that the water layers (Lakes and World30) are blue, and the Countries are shown as categories; e.g. make CNTRY_NAME "Canada" green and <all other values> grey
37. Modify the FRAME for the "**World**" data frame so that it has NO border, NO background, and NO drop shadow
38. Click OK

Add the locator feature to indicate on the map where in the world Sand River is situated. Note: An EXTENT INDICATOR could be used if the maps were in different scales.

39. Click ADD DATA
40. Select SandRiver.gdb**location** to add to the "**World**" map and click ADD
41. Symbolize as desired; e.g. big red star

Finally, modify the coordinate system to create a globe-shaped map of the world.

42. In "**World**" Data Frame Properties select the COORDINATE SYSTEM tab
43. Choose PREDEFINED >>> PROJECTED COORDINATE SYSTEMS >>> WORLD >>> **The World from Space**
44. Click on MODIFY
    - Change the Longitude Of Center to: **-110.000**
    - Change the Latitude Of Center to: **50.000**
45. Click OK twice
46. Click ZOOM TO FULL EXTENT
47. Save your map document
48. See below if you want to export your map
49. SAVE your map document

Exporting Your Map

You may export your map layout as a **picture file** to insert into other applications, such as MS Word documents or MS Power Point presentations. Once you have a map layout created and designed how you want:

1. Choose FILE >> EXPORT MAP
2. Save as type: select one of EMF, PDF, PNG, TIFF, , etc.
3. Expand on OPTIONS and modify as desired (e.g. resolution, colour or grayscale, etc.)
4. Type in a file name and click SAVE

www.biology.ualberta.ca/facilities/gis/index.php?Page=484#export has advice on the various file formats that can be exported from ArcMap.