

# LESSON 4

## Querying Your Database



# Overview

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- Tools for examining your data
  - Map tips, Identify, Find, Measure, Hyperlink
- Working with the selection tools
  - Available selection tools
  - Selection methods and layers
  - Spatial selection
  - Attribute selection
  - Calculating summary statistics

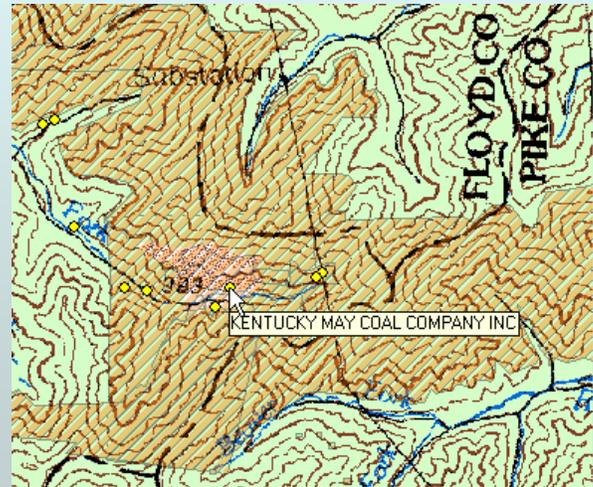
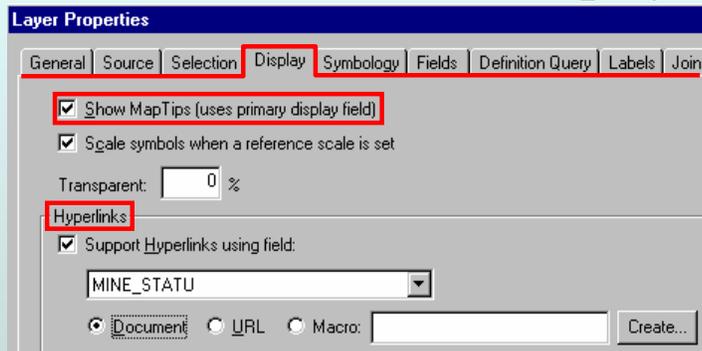


## Overview

The first part of this section deals with examining the different tools available in the ArcMap application for exploring your data.

# Map tips and hyperlinks

- Map tips
  - Pointer location displays specific attribute



- Hyperlinks
  - Document
  - URL
  - Macro



## Map tips and hyperlinks

If you are creating maps that people will access interactively, or if you are creating them for exploring your data before you do the analysis, then map tips and hyperlinks are useful to add to your map.

### Map tips

If map tips were set for a layer, and you move the mouse pointer over a feature in that layer, textual information inside a rectangular box would pop up as descriptive attributes for the feature in question. The attributes are coming from a certain field in the attribute table of that layer. You have to set which field you want attribute values to be reported from when using the map tips.

### How do you set map tips?

Right-click the layer, and click Properties.

In the Properties window, click the Fields tab. For Primary display field, click the attribute field you want. In the Properties window, click the Display tab. Check the Show Map Tips box.

### Hyperlinks

If they were set, you can display documents - such as a text file or image - or Web pages accessed over the Internet. You can dynamically create hyperlinks as you browse your map, or alternatively, you can store hyperlinks with your data in an attribute field.

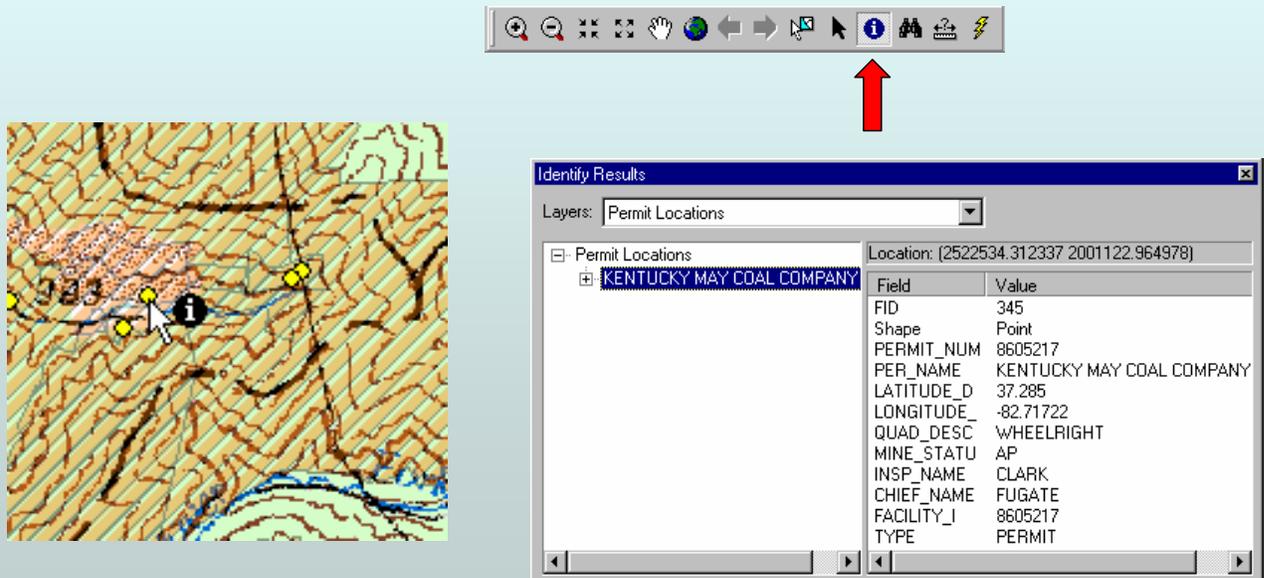
### How do you set hyperlinks?

On the Tools toolbar, click the Identify tool and click on a feature. In the Identify Results dialog, right-click the feature you want to set a hyperlink for and click Add Hyperlink. To link to a document, click Link to a Document and type a pathname to the document on your system. Alternatively, to add a hyperlink to a Web page, click Link to a URL, and type a URL. In the Properties window, click the Display tab. Check the Support Hyperlinks Using Field box, and click the field that has the pathname.

Clicking the macro button specifies that the hyperlinks listed in the selected field are values that will be sent to the named macro. When such a hyperlink is launched with the Hyperlink tool, ArcMap will run the specified macro using the value of the hyperlink field as input. Use this option if you want to customize what hyperlinks do.

# Identifying

- Popup attributes for a specific feature



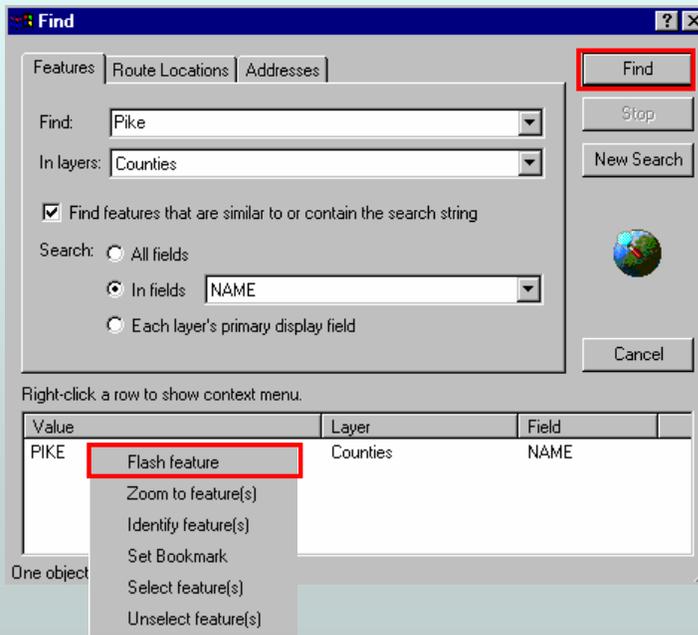
## Identifying

### The Identify Features button

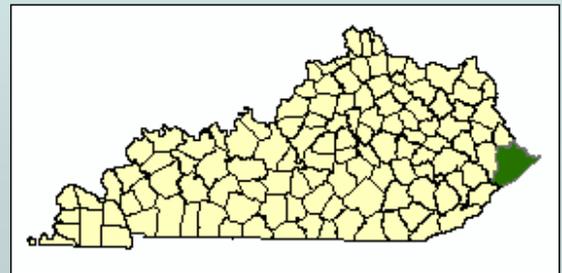
This tool allows you to display the attributes for any feature you click on with your pointer.

# Finding

- Locate a specific feature or attribute



Pike County flashes



## Finding

### The Find button

Clicking this button brings up the Find window on the screen. Click the Features tab and type in the string that you want to search for. Notice that you have the option of searching in all the layers in your map, or in a specific layer. You also have the choice of searching all the fields (attributes), in specific fields, or each layer's primary field for the occurrence of the string you typed earlier.

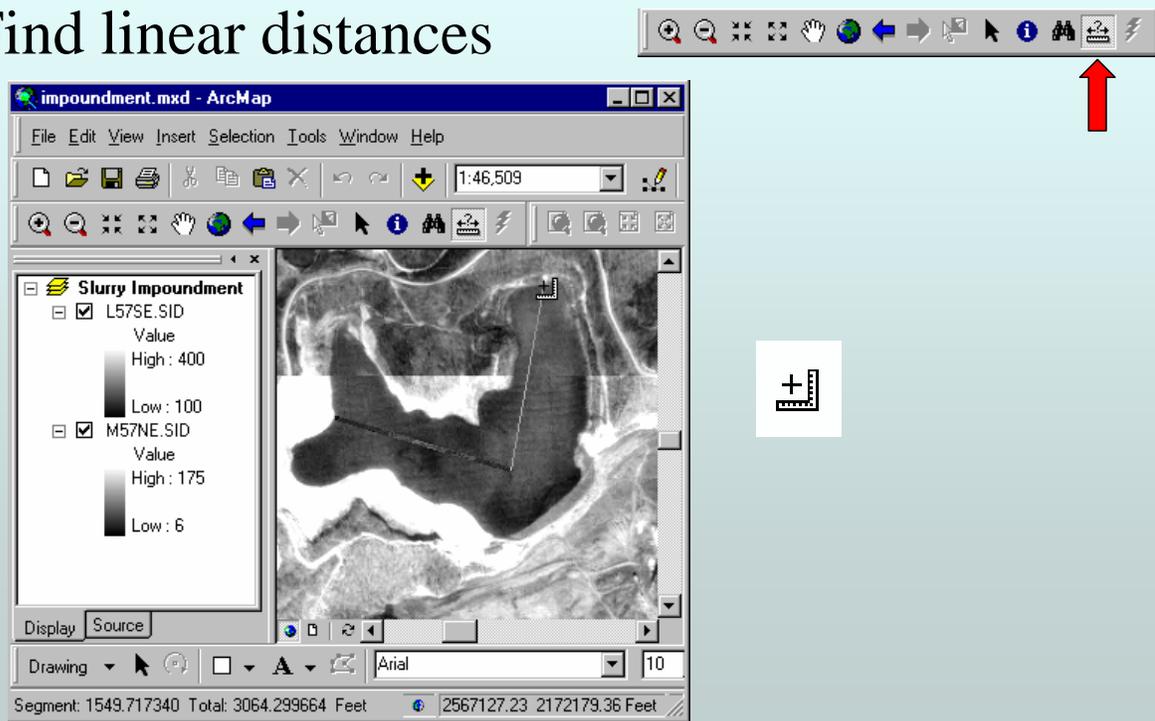
The string can be typed in lowercase, uppercase, or a combination of both.

After the search is over the window extends down to reveal the findings. You will get the layer(s) and the field(s) in which the string was found in the feature attribute table(s). If you right-click the value, a context menu appears where you could perform the following operations:

- Flash feature: The feature, whose attributes contain the string you typed, will flash for a few seconds a default green shade. This helps you identify the location of what you were looking for.
- Zoom to feature(s): ArcMap will zoom to the feature(s) that was (were) found.
- Identify feature(s): Selecting this option brings up the Identify Results window and displays all the attributes for the feature from the feature attribute table.
- Set Bookmark: After setting this found feature as a bookmark, you can use this bookmark later by clicking the View pulldown menu and clicking Bookmarks.
- Select feature(s): If you decide that the searched feature which was found is a feature that you want to actually select, then choosing this Select feature(s) option will make that feature selected and available for whatever action you want to do on it later.
- Unselect feature(s): After finding this feature among a certain selected set, you may want to discard it from the set.

# Measuring

- Find linear distances



## Measuring

### The measure tool

Make sure you use the + part of the measuring tool's pointer when pointing at the start, intermediate, and finish point locations.

As you start clicking at a point location and move your mouse toward the next point, a thick line will appear on the graphics. Click on the next point and notice that the length of the segment represented by the thick gray line will appear in the status bar at the bottom of the ArcMap application window. As you move the pointer towards the end point, the status bar will report the length of the last segment, while the total length will be reported for all the segments in that measurement transaction. To finish measurements, double-click the end point and the gray connecting line will disappear, while the status bar will continue to show the last measurements.

All measurements use a pure Cartesian coordinate system. Thus, use such measurements with caution. You should expect inevitable errors due to many factors (some personal and others induced by projections) when using this tool for small-scale renditions.

# Overview

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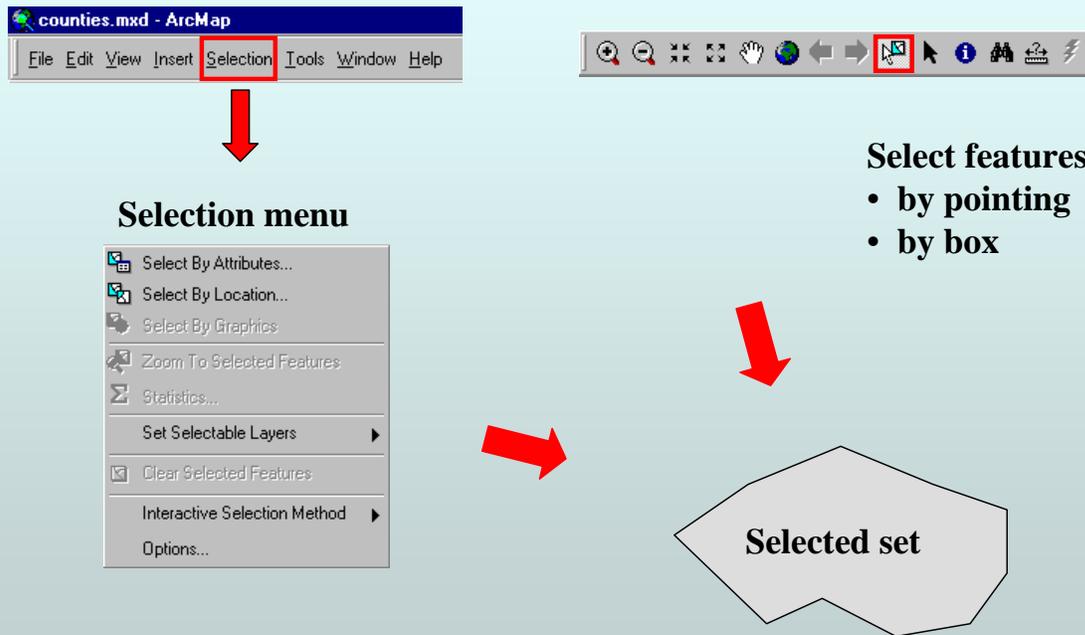
- Tools for examining your data
  - Map tips, Identify, Find, Measure, Hyperlink
- Working with the selection tools
  - Available selection tools
  - Selection methods and layers
  - Spatial selection
  - Attribute selection
  - Calculating summary statistics



## Overview

The second part of this section deals with examining the different selection and statistics tools that are available in ArcMap and can assist you in exploring data.

# Available selection tools



## Available selection tools

### Selection tools in ArcMap

If you want to select features by pointing or by creating a box around some displayed features on your screen, there is a Select Features button available for you on the Tools toolbar.

More elaborate selection tools can be found under the Selection pulldown menu. This selection menu offers the following selection options:

- **Select By Attributes:** With this option you can write a selection statement. The search is done on the records in the feature attribute table based on the selection criteria typed in the selection statement. Because all features are linked to their respective records in the feature attribute table, ArcMap will be able to select the features based on their attributes for you.
- **Select By Location:** Here, features from a certain layer can be selected by features from another. This is considered a spatial query tool.
- **Interactive Selection Method:** This option offers different methods of selections, which include: (a) create a new selection, (b) add to current selection, (c) remove from current selection, and (d) select from current selection. Options offers further refinement to the interactive selection methods, which include: (a) selecting features that are spatially or completely within the box or graphic(s), (b) selecting features that are completely within the box or graphic(s), and (c) selecting features that the box or graphic are completely within.

Other options present in this selection menu are the abilities to control which layers will be considered in the selection, to zoom to the selected features, and to clear the selection so that you select features from the entire layer(s).

# Attribute selection

- Use an SQL statement to select feature(s)

The screenshot illustrates the process of selecting features based on attributes. A menu on the left shows 'Select By Attributes...' as the active option. The 'Select By Attributes' dialog box is open, showing the 'coalcounties' layer and the 'Create a new selection' method. The 'Fields' list contains 'NAME', and the 'Unique values' list contains 'PIKE'. The SQL statement 'SELECT \* FROM coalcounties WHERE: 'NAME' = 'PIKE'' is entered in the text area. Labels 'Field', 'Operator', and 'Value' point to the respective parts of the SQL statement. A map of coal counties is shown at the bottom left with one county highlighted in yellow and labeled 'Selected feature'.

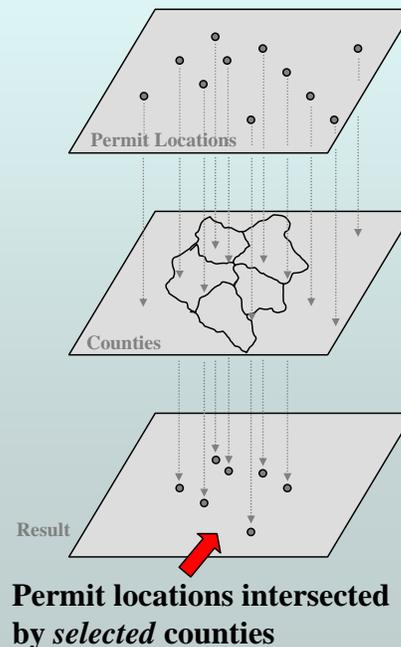
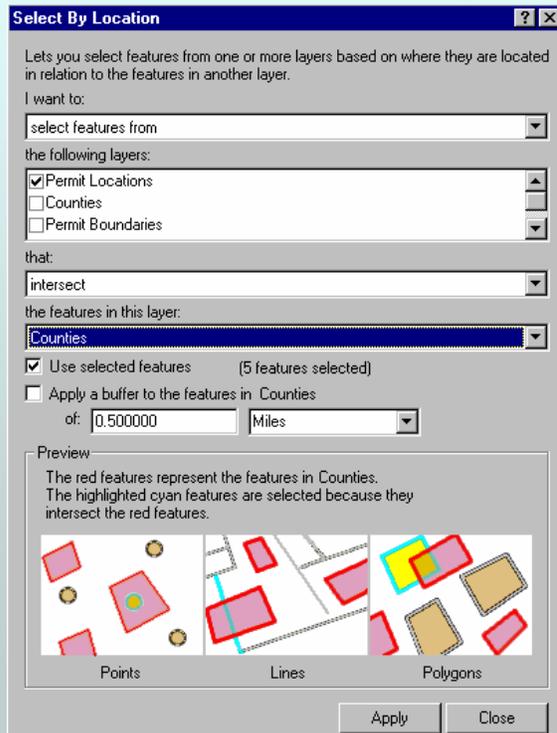
To create an attribute selection, you need to do the following:

1. From the Selection pulldown menu, click Select By Attributes.
2. On the Select By Attributes window, choose the Layer you want to select features from.
3. For Method, choose one of the following options:
  - Create a new selection (the default).
  - Add to current selection.
  - Remove from current selection.
  - Select from current selection.
4. Write a selection statement (otherwise known as an SQL statement). This can be done either by typing it yourself, or you can create it by clicking a field, and an operator button, followed by a value(s). You can also write more complicated expressions using connectors such as And, Or, and so on. Clicking the Verify button helps you make certain the syntax of the expression is correct.
5. When certain, click OK.

Alternatively, the Query Wizard steps you through the process of creating your SQL query.

# Select By Location (spatial queries)

- Use features in one layer to select features in another



## Select By Location (spatial queries)

Select By Location is considered a spatial query, where features from a certain layer can be selected by features from another. There are several selection procedures at the top of this window. They include:

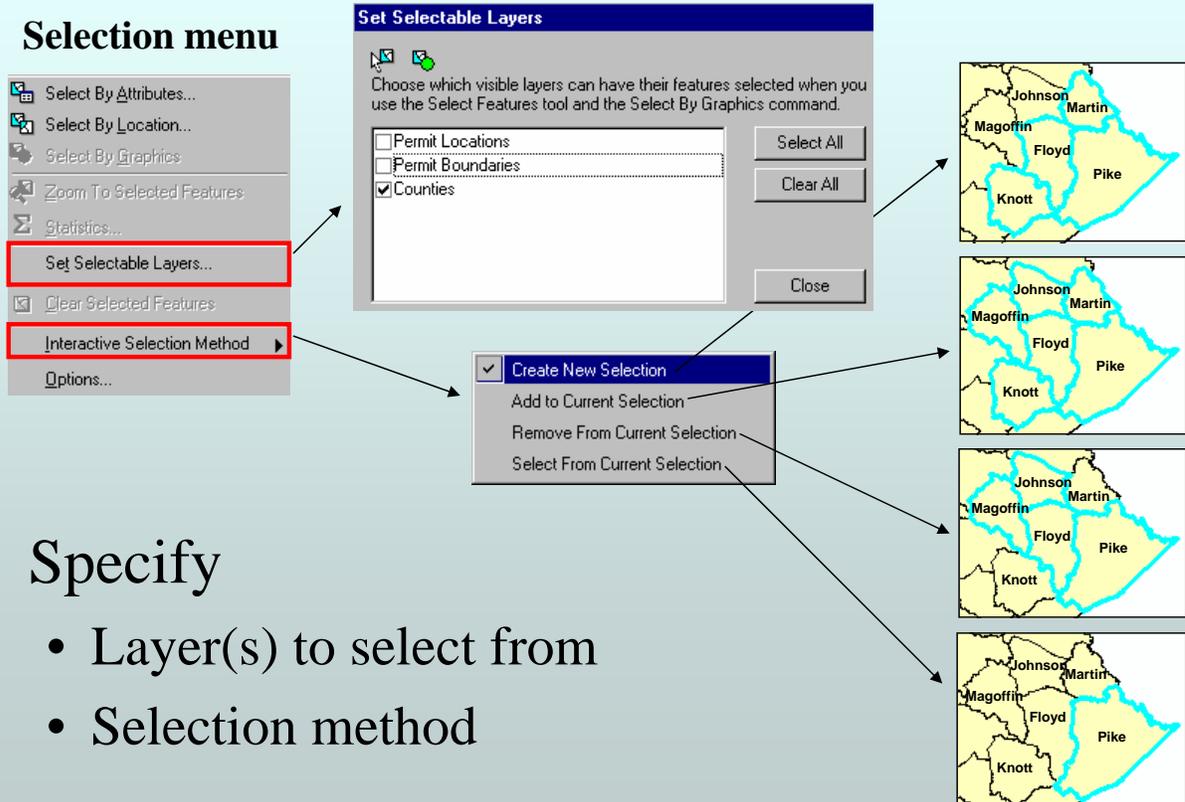
- Select features from
- Add to the current selection in
- Remove from the currently selected features in
- Select from the currently selected features in

The selected features will depend on the mode used. They include:

- Intersect (shown above)
- Are within a distance of
- Completely contain
- Are completely within
- Have their center in
- Share a line segment with
- Touch the boundary of
- Are identical to
- Are crossed by the outline of
- Contain
- Are contained by

Regardless of the mode you use, you have the option of narrowing down your selection to a specific layer(s) by checking off all the layers that you want to exclude. You also have the option of selecting features using a certain buffer distance.

# Selection methods and layers



- Specify
  - Layer(s) to select from
  - Selection method



## Selection methods and layers

### Set Selectable Layers

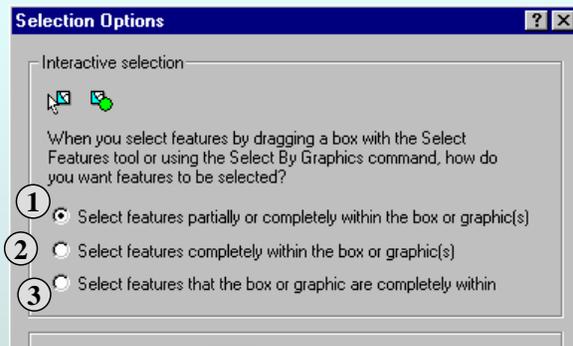
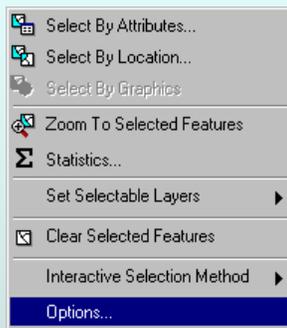
While making spatial selection, you have the option of turning on or off the layers that are going to be involved in the selection operation. This can be done by clicking the Set Selectable Layers from the Selection pulldown menu.

### Interactive selection method

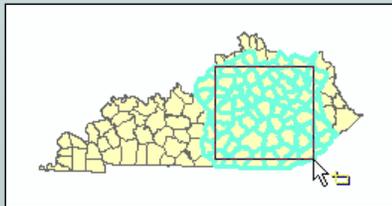
Four methods are available:

- *Create New Selection*: Here, all features are available at the outset, and you select four counties: Pike, Knott, Floyd, and Martin.
- *Add to Current Selection*: Now you want to add more counties to the first four selected. You select Johnson and Magoffin.
- *Remove From Current Selection*: Here, you decide to discard Knott and Martin from the current selection.
- *Select from Current Selection*: This time you decide to select Pike only from the current selection.

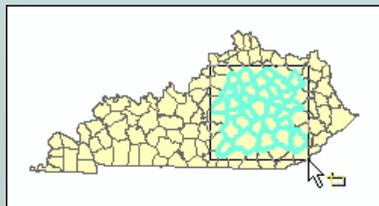
# Spatial selection options



①



②



③

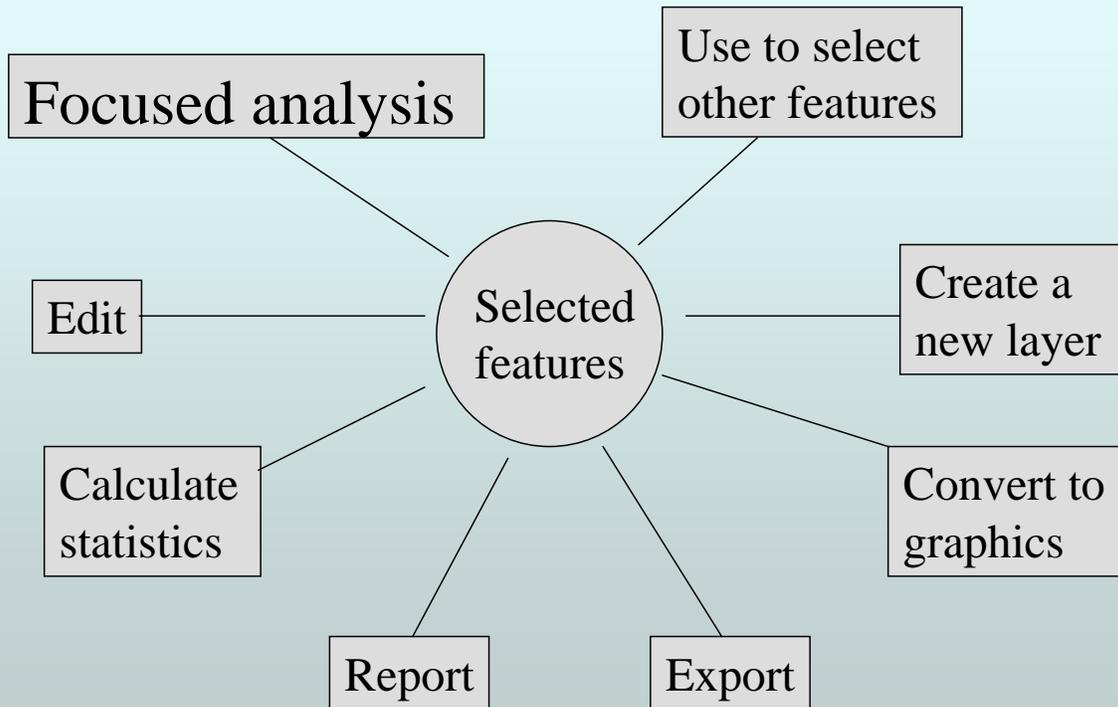


## Other optional selections

The Selection pulldown menu offers three additional selection options depending on how you want the features to be selected when you create a selection box:

- *Select features partially or completely within the box or graphic(s):* Here, complete features are selected whether they fall completely within the selection box or fall partially within the selection box.
- *Select features completely within the box or graphic(s):* Here, complete features are selected only if they fall completely within the selection box.
- *Select features that the box or graphic are completely within:* Here, the selection box must fall completely within the feature to get selected. In example number three above, no feature was selected because the box was simply too big to fit inside any county.

# What to do with your selection?



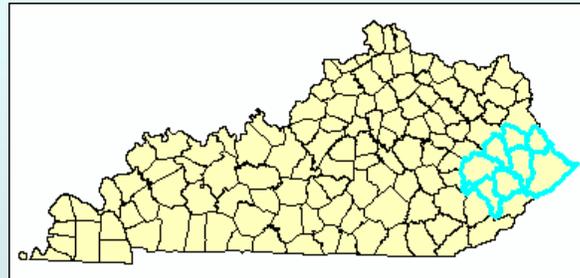
## What to do with your selection

You may have several reasons for making a selection. Among those reasons are:

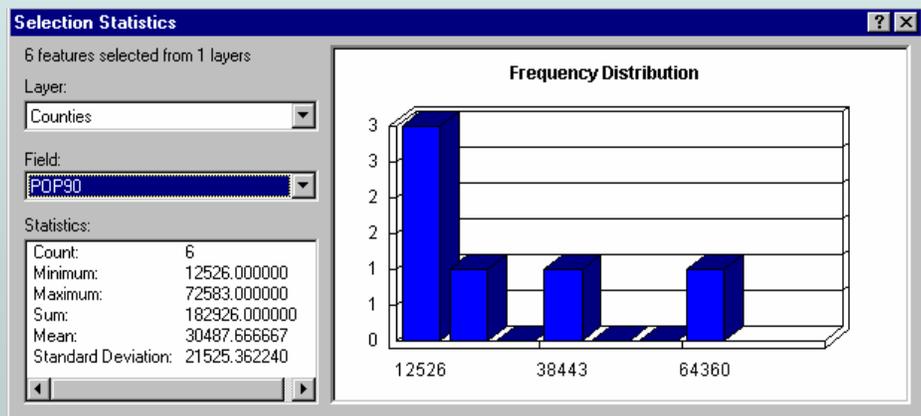
- Using the selected set for further analysis.
- Using it to select other features.
- Editing the selected set.
- Creating a new layer from it. Working with a subset is faster than including the entire set.
- Calculating some statistics for it.
- Creating a report.
- Exporting to others.
- Converting it to another graphic format.

# Calculating summary statistics

- Specify
  - Features



- Layer
- Field



## Calculating summary statistics

After making a spatial or attribute selection, you may want to calculate a simple statistics summary. This can be done by clicking the Statistics option from the Selection pulldown menu. This operation invokes the Selection Statistics window. Here you need to select which layer, as well as which field in the feature attribute table, you want the statistics to be calculated for. Once these are selected, a numeric statistics summary, as well as a frequency distribution chart, appears in that window.

# Exercise 4a

## Querying Your GIS Database

- Adding Map Tips
- Identifying a Feature
- Finding a Specific Feature
- Taking Measurements
- Making a Spatial Query
- Examining Your Selection in the Tables
- Calculating Statistics for Your Selection
- Creating a Selection Layer
- Exploring Other Spatial Selections



# Exercise 4b (optional)

## Creating Reports in ArcMap

- Selecting the Field Headings for Your Report
- Changing the Page Setup for Your Report
- Adding a Title to Your Report
- Changing the Field Characteristics of Your Report

