Learning Objectives in this chapter:

* Be familiar with the Identify Tool
* Know how to select and find features.
* Understand how to create layers from selected features

# Querying Data in ArcMap

**5.1 Overview**

There are many ways to retrieve information about features within ArcMap. Once you get started working on a project, there will be times when you will need to find or identify what a feature is. This is one of the great advantages about ArcGIS….having that ability to query your data.

**5.2 Identifying, Selecting and Finding Features**

When you need more information about a feature other than the geospatial aspect, you have many options available in ArcMap to retrieve that information.

***Identify*** features by clicking on them to display their attributes.

***Select*** features by clicking on them, which will highlight them and allow you to then be able to look at their records in the layer’s attribute table.

***Find*** features by using known information about the feature in order to search the map for that particular feature.

**Identifying Features**

**C:\Program Files\ArcGIS\DeveloperKit10.0\Icons\IdentifyTool32.png**

Using the *Identify* tool is the fastest way to find attribute information. To use the *Identify* Tool, you must select it from the Tools toolbar. Within the map, click on the feature of interest in order to view the attribute information for that particular feature.

**1. Click the Identify tool**

**3. View the results**

**2. Select a feature**

*Using the Identify Tool*



**Selecting Features**

*Selection Options*

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Before you begin making selections, it’s a good idea to set your Selection Options by clicking on the Selection button on the Main Toolbar>Selection Options. This dialog box will allow you to set your selection preferences if you wish.

If you want to compare information about several features, select the features on the map and look at their records in the layer attribute table. The easiest way to select multiple features is by using the *Select Features* toolC:\Program Files\ArcGIS\DeveloperKit10.0\Icons\SelectionSelectTool32.png on the Tools toolbar.

In ArcGIS 10, you have the option on how you select your features.

*Select by Options*



To select multiple features, click on the *Select Features* tool icon in the Tools toolbar, choose the option you would like to select by, and begin drawing around the features you want to select. When you are finished, double click in the map and your features will be selected.

If you only want features from a specific layer selected, remember to set your selectable layers by clicking on the ‘*List by Selection’* icon at the top of the Table of Contents.

**List by Selection Icon**

*Table of Contents – List by Selction*



You can choose or view the selectable layers by the icons on the right side of the layer name. If you want a layer to be selectable, simply click on the first icon.

Another way that you can set a layer as being selectable, particularly if you only have one layer that you want to select from, is by right clicking on the layer in the ‘*List by Drawing Order’* view of the Table of Contents, choose *‘Selection’* and then check on *Make this the only selectable layer’*.

*Selectable Layers*

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If you want to view the attributes of the selected features, right click on the layer and click ‘*Open Attribute Table’*. The attribute table will open for that layer. You have the option of displaying the attribute table with all the features, or you can choose to just display the selected features. This view can be chosen by clicking on the two icons at the bottom of the table. In parentheses, you will see how many features are selected out of the total.

*Attribute Table View*



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At any time, you can deselect features by clicking on the *Clear Selected Features* button located on the Tools Toolbar.

You can also deselect by clicking on the *List by Selection* button on the Table of Contents, and clicking on the ‘*Clear Selected Features’* button next to the layer.

**Clear Selected**

**Features Button**

*Clear Selected Features*



**Finding Features**

When you have a piece of information about a feature, but you do not know where that feature is on the map, you can search the map for that feature using the known piece of information.

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You can find a feature, by selecting the *Find* tool on the Tools toolbar. When the find dialog box appears, the *Feature*s tab should be selected. You would then type in the known information in the *Find* box. From the *In Layers* drop down box, the layer that you want to find features in should be selected. In the *Search* options, the user should choose to either search all fields in the attribute table or a specific field. Once all parameters are set, click the *Find* button.

*Find Tool Dialog Box*



As seen in the image below, you may select a feature by right-clicking on the item found in the results window and choosing *Select*. You may also zoom, set bookmarks (discussed later), pan, flash, etc. If you want to identify the feature, click on the *Identify….*option and the Identify dialog box will display.

*Selecting Features Using the Find tool*

**

**Selecting Features by Attributes**

In addition to these ways of locating features, you can select features by attributes by writing a query that automatically selects features that meet a specified criterion. The most basic type of query consists of an attribute such as:‘County Name’, a value such as: ‘Boone’, and a relationship between the two such as: ‘equal to’. A more complex query combines these basic queries using operators like ‘and’, ‘or’. These queries are constructed using Structured Query Language (SQL). ArcMap creates the query automatically in this format.

To create an attribute query, click the *Selection* pull-down on the Main Menu. The *Select by Attributes* option should be clicked. In the *Select by Attributes* dialog box, click the Layer drop-down arrow and the data layer of interest should be selected.

The fields in the attribute table appear in the *Fields* box on the left of the dialog box. When a particular field is highlighted, sample values display in the *Unique* *Values* list on the right. If you want to see all of the attribute values, click on the *Complete List* button. The buttons in the middle are used to choose operators and to connect queries. To perform a query, double-click an attribute field of interest, in order for it to display in the bottom portion of the *Select by Attributes* dialog box. Then click on the appropriate operator button. A unique value of interest may be double-clicked on within the *Unique* *Values* box, or a value may be directly typed into the query string.

*Select Features by Attribute*



**Selecting Features by Location**

Instead of selecting features by their attribute values, you can select them by their location (their spatial relationship to other features, whether in another layer or in the same layer.) To select features by location, specify a selection method, a selection layer, a spatial relationship, a reference layer, and an optional distance buffer.

To begin selecting features by location, click the selection pull down and click the S*elect by Location* option. The *Select by Location* dialog box opens.

*Select Features By Location*



By default, the selection method is *select features from*. This option should be used when the user wants to create a new selected set. The other options allow you to add to an existing selected set of features.

Within the scrolling list of selection layers, you may select the layer from which you want to select features. The *Source Layer* is the layer that you will be referencing.

There is a list of spatial relationships that can be chosen using the drop down arrow. The following describes the various options that are available.

Once you create your selection you can also create new selections that can add to the currently selected features, remove from the currently selected features, and select from the currently selected features.

*Selection Method*

**

**Spatial Selection Methods**

**Intersect**

Intersect will return any feature that either fully or partially overlaps the source feature(s).

**Are within a distance of**

This operator creates buffers using the buffer distance around the source features and returns all the features intersecting the buffer zones. For example, select cities within 100 meters of a river or railroad.

**Are within**

To be selected, the geometry of the target feature must fall inside the geometry of the source feature. Selected features and source features can have overlapping boundaries.

**Are completely within**

To be selected, all parts of the target features must fall inside the geometry of the source feature(s) and cannot touch the source’s boundaries.

**Completely contain**

To be selected, all parts of the target feature must completely contain the geometries of the source feature. In addition, the source feature cannot touch or overlap the target’s boundaries. The target feature layer must be a polygon.

**Have their centroid in**

A target feature will be selected by this operator if the centroid of its geometry falls into the geometry of the source feature or on its boundaries.

**Share a line segment with**

With this method, the source and target features will be considered as sharing a line segment if their geometries have at least two contiguous vertices in common. The source and target features must be either lines or polygons.

**Touch the boundary of**

A target feature will be selected if the intersection of its geometry with the source feature is non-empty, but the intersection of their interiors is empty.

**Are identical to**

Two features are considered identical if their geometries are strictly equal. The feature types must be the same.

**Are crossed by the outline of**

For this operator, the boundaries of the source and target feature must have at least one edge, vertex, or endpoint in common but must not share a line segment. The source and target features must either be lines or polygons.

**Contain (Clementini)**

This operator will provide the same results as *Contain* unless the source feature is entirely on the boundary of the target feature, with no part of the source feature inside the target feature. In this case, using the *Contain Clementini* operator would not slect the target feature, whereas the *Contain* operator would.

**Are within (Clementini)**

This operator will provide the same results as *Are Within* unless the target feature is entirely on the boundary of the source feature, with no part of the target feature inside the source feature. In this case, using the *Are Within Clementini* operator would not select the target feature, whereas the *Are Within* operator would. Clementini states that a polygon’s boundary is separate from its inside and outside.

If you want to select features within a distance, click the box next to *Apply a search distance*. A distance and a unit of measure should be chosen.

*Select By Location*

**

Once all parameters are set, click the *Apply* button. The results will be selected in the map display. In the image below, all reported chemical sites that are within a distance of 1 mile of the major rivers are selected.

*Select By Locations – Selected Features*



**Creating layers from Selected Features**

Once a feature(s) has been selected, it can be converted into its own layer within ArcMap. Right click on the name of the data layer in the table of contents that contains the selected features of interest. Scroll down to Selection>Create Layer from Selected Features.

*Creating a Layer from Selected Features*



A new layer with the original layer’s name plus the addition of ‘selection’ behind the name will be added to the table of contents. This is the default name, and can be changed by either right clicking on the name, selecting Properties>General >and typing in a new name in the *Layer Name* box….Or by tapping on the name of the layer twice and typing it in.

At this point, the new layer is not permanent. If you want to make the layer available to other maps, you must convert it to a shapefile.

Right click on the layer selection name>Selection>Export Data. You will be prompted to save the shapefile in your preferred location.

*Exporting Selected Data*



***The Chapter 5 exercise will give you a good introduction into querying data for your map projects and will prove to come in handy as a reference once you are back at your desk.***

Overview:

In this exercise you will practice querying data to select and find features, and create layers from the selected features.

**Step 1**

*Open ArcMap* and in your **ArcMap – Getting Started** window *select* **Existing Maps > Recent.** If you *select* the **LakeOzark\_Bypass** map you created in Chapter 4 you will notice the default geodatabase has changed to the one you set up earlier.



Now *open* the **LakeOzark\_Bypass** map.

**Step 2**

Using the Bookmarks you made in chapter 4 and *select* **j5p0347g** to make sure you are zoomed in to your project area.

**Step 3**

The first thing you will do is determine which county contains the DGN and KML linework for your project. To do this you will use the Identify tool.

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*Select* the **Identify tool** from the Tools tool bar. *Left-click* **anywhere in the data** **frame** of the map, this will bring up the Identify dialog box. ArcMap automatically defaults to selecting the topmost layer wherever you click.

From the Identify from dropdown box *select* **COUNTY**, then *Left-click* in the **data frame** again and It will bring up the county information.



Once you have identified the county close the dialog box.

**Step 4**

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You can also use the Find tool to locate and select Camden County. *Open* the **Find tool** located in the tools toolbar

In the **Find** window, *enter* **Camden** for the feature we are finding. *Select* **COUNTY** in the In Layers from the dropdown arrow. *Check* the **Find features that are similar**… box. *Check* the **In Fields** button and *select* **COUNTY\_NAME**. *Select* **Find**.



*Right click* on the **Camden** in the results and choose ***Select***.



*Close* the **Find window**.

**Step 5**

In ArcMap, *right click* on the **COUNTY** layer in the Table of Contents. From the menu choose **Selection > Zoom To Selected Features** to see your county selection.



**Step 6**

Next *right click* on the **COUNTY** layer in the Table of Contents once more and *select* **Properties**. *Select* the **Definition Query** tab in the Layer Properties dialog box.

*Select* the **Query Builder** button and create a query that will only show Camden County. In the top Query Builder box scroll down and *double click* **COUNTY\_NAME**. It should now show up in the lower box.

*Select* the **= button**, it should now show up in the lower box as well.

While COUNTY\_NAME is still highlighted in the upper box *select* the **GET UNIQUE VALUES** button. In the middle box scroll down and *double click* **‘CAMDEN’**.

Your query in the lower box should look like this **COUNTY\_NAME = 'CAMDEN'**.

*Select* **OK** to exit the query builder, then *select* **OK** to in the Layer Properties this will automatically apply the Query.

From the File Menu select **Selection > Clear Selected Features**.

Camden county is now the only county that will be drawn.

Before: After:

 

**Step 7**

The Hazardous Waste Database contains more than 54,000 records. Haz\_waste.dbf is a collection of many databases that are all parts of the hazardous waste related data. Most of the information will not be needed for this project. Two sub-databases need to be queried and selected from the main database, and only Camden county data will be needed.

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*C:\Program Files\ArcGIS\DeveloperKit10.0\Icons\TableShowSelectedRecords32.pngRight click* on **All Hazardous Waste Sites** and *select*  **Open Attribute Table** and dock it to the bottom of your ArcMap Screen. At the bottom of the table select the **Show Selected Records** Button. Right now you should have zero records showing.



Use the Select By Attributes tool by clicking **Selection > Select By Attributes.** You will query the database for tanks.dbf and swipnew.dbf by creating a query statement.



From the Select By Attributes dialog box the Layer should be **All Hazardous Waste Sites**. The method should be **Create a new selection**.

*Double click* on **DATABASE**, it should now show up in the lower box. Select the **Get**

**Unique Values** Button. *Click* once on the **=** sign. Go to the Unique Values window and

*double click* **swipnew.dbf.** *Single click* the **Or** button. *Double click* on **DATABASE**

again, then *click* once on the **=** sign and *double click* on the **tank.dbf**.

This query will only select the Hazardous Waste sites within these two databases.



*Click* on the **Apply** Button.

*Close* the **Select By Attributes** box.

*Note: If you have multiple values to select a query using the* ***In*** *function would be easier*

*to create. Here is an example: "DATABASE" in ( 'Chemcov.dbf', 'Cerclis.dbf', 'Apf.dbf',*

*'Apcp.dbf', 'Afs.dbf', 'Lust.dbf', 'tank.dbf', 'swipnew.dbf')*



**Selected Hazardous Waste Sites**

**Step 8**

Using the selected features you will create a new feature class for Hazardous Waste Sites to use with your project. *Right click* on **All Hazardous Waste Sites** in the Table of Contents and *select* **Data > Export Data**.



In the Export Data window use the drop down menu to *choose* **Selected Features**.

Check the radio button Use the same coordinate system as: **the data frame**. This will add the projection of your map to your new feature class.



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For the Output feature class *select* the **browse** folder , and *navigate* to the **j:\gis\_proj\j5p0347** folder**.**

*Change* theSave as type:to **File and Personal Geodatabase Feature classes**.



*Double click* the **j5p0347\_projectdata.gdb**, and *enter* **Hazwaste\_selection** for the Name. *Click* **Save**, then **OK** in the Export Data dialog box.

After ArcMap has processes your request, you will be asked to add the data to your map. *Select* **Yes**.

**Step 9**

Remove the **All Hazardous Waste Sites** layer by right clicking on the layer in the table of Contents and selecting **Remove**.



*Turn on* the new **Hazwaste\_selection** layer.

**Step 10**

The Wells database contains more than 5,000 records. Again you are only interested in the records relating to our project area. You will be using the **Select Features by Location** tool to create a Wells featureclass that shows only the features in Camden County.



In the Select By Location dialog box for the Selection Method *use* **select features from**.

For the target layer *select* **Wells**.

Next for the Source layer *choose* **COUNTY**, since we already have a definition query in the county layer it will only select features in Camden County.

For the Spatial Selection method, *choose* **Target layer(s) features intersect the Source layer feature**. This will select any feature that is inside or touching the boundary of Camden County.



*Click* on **Apply**, then *Close* the **Select by location Window**.

**Step 11**

*Right click* on **Wells** and *use* the **Data > Export Data** function to create a new feature class from your selected features. *Save* the feature class to the **j:\gis\_proj\j5p0347\** **j5p0347\_projectdata.gdb** *as* **Wells\_selection**. Make sure you **add** the new featureclass to your map.



**Step 12**

Remove the original **Wells** from your map, and turn on **Wells\_selection**.

**Step 13**

In the Table of Contents right click on the **Hazwaste\_Selection** and select Zoom To Layer.



You will see that you have a statewide range of hazardous waste sites based on the criteria from which you created you selection (select by attribute). You have selected wells just within the county you have selected (select by location).



**Step 14**

Another way we can add data is using a TMS Query from the TMS 10 Toolbar.



Click the **TMS Query button**  on the TMS 10 Toolbar and bring up the Query dialog box.



*Select* **Safety** for the Type, **Accident Severity** for Query Name, and Holding down your Control key select the **first 4 types of Accidents** from the Select From: ACC\_SVRTY\_RTNG\_NM.

Next select the **Query by: County** Radio Button and for county select **CAMDEN**.

Before you can run your query enter **From** and **To** Dates in the boxes. *(You will need to enter them in the boxes as* ***yyyymmdd****, it is not real easy to make out in the TMS Query dialog box.)* For From use **Jan 1, 2011,** for To use the **Current Date**. (You will need to enter them in the boxes as **yyyymmdd**, it is not real easy to make out in the TMS Query dialog box.)

Click the **Run Query** button, then select **Close**.

**Step 15**

Using the bookmarks *zoom into* **j5p0347g**.

**Step 16**

Move the **Accident Severity** layer below the Wells\_selection and Hazwaste\_selection.

Turn on **Accident Severity**.

Save your map document by *clicking* **File > Save**.

***End of Chapter 5 Exercise***

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