

Guide to using Upper Colorado River Basin SPARROW digital map

By Susan G. Buto and Terry A. Kenney

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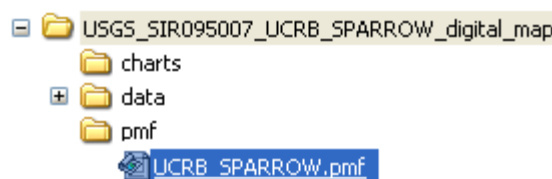
Introduction

The digital map provided with this report is an Environmental Systems Research Institute (ESRI) published map file (.pmf). The map can be viewed using free ArcReader 9.2 or later software from ESRI. Additional information about the predicted dissolved solids load at modeled stream reaches in the Upper Colorado River Basin (UCRB) can be viewed in Microsoft Excel 2007. The Excel workbook contains an interactive chart that displays the percent load contribution from the 11 sources outlined in USGS Scientific Investigations Report 2009–5007. The chart and data can be accessed directly from the digital map interface. This document outlines some key features and tools contained in the interactive map. Additional tutorials for ArcReader can be downloaded from ESRI.

Obtaining the UCRB SPARROW map and ArcReader application

Digital Map and data package

Download the compressed map and data file from <http://pubs.usgs.gov/sir/2009/5007/>. Uncompress the contents of the file onto your computer. The files will unzip into the directory structure shown below



ArcReader Application

1. Download ArcReader from <http://www.esri.com/software/arcgis/arcreader/download.html>. The application is free but users will be required to register with ESRI. There are ArcReader versions for Windows, Linux, and Sun Solaris. The following instructions refer to starting the program using the Windows operating system.
2. Install the application.
3. Click the **Start** button on the Windows taskbar, point to **Programs > ArcGIS** and click **ArcReader**. ArcReader will open an empty map.
4. Click the **Open** button (📁) near the upper left corner of the empty map or choose **file/open** from the menu. Click the **Look in** drop down arrow and navigate to the folder that contains UCRB_SPARROW.pmf. Click on the map name and click **Open**.

Additional applications

Information about the predicted percent dissolved solids load at selected stream gages in the Upper Colorado River Basin (UCRB) can be viewed using an interactive chart in Microsoft Excel 2007. The interactive chart will not update automatically using earlier versions of Excel. The data used to create the chart can be accessed with earlier Excel versions if the Microsoft compatibility pack (<http://office.microsoft.com/downloads/>) is installed.

The data contained in Microsoft Excel format can be viewed using a free Excel viewer. Excel 2003 viewer can be downloaded from Microsoft at <http://www.microsoft.com/downloads/>. The interactive chart is not available for use using Excel viewer.

Map layout and tools

The digital map is composed of three sections: the table of contents, the toolbars, and the map display.

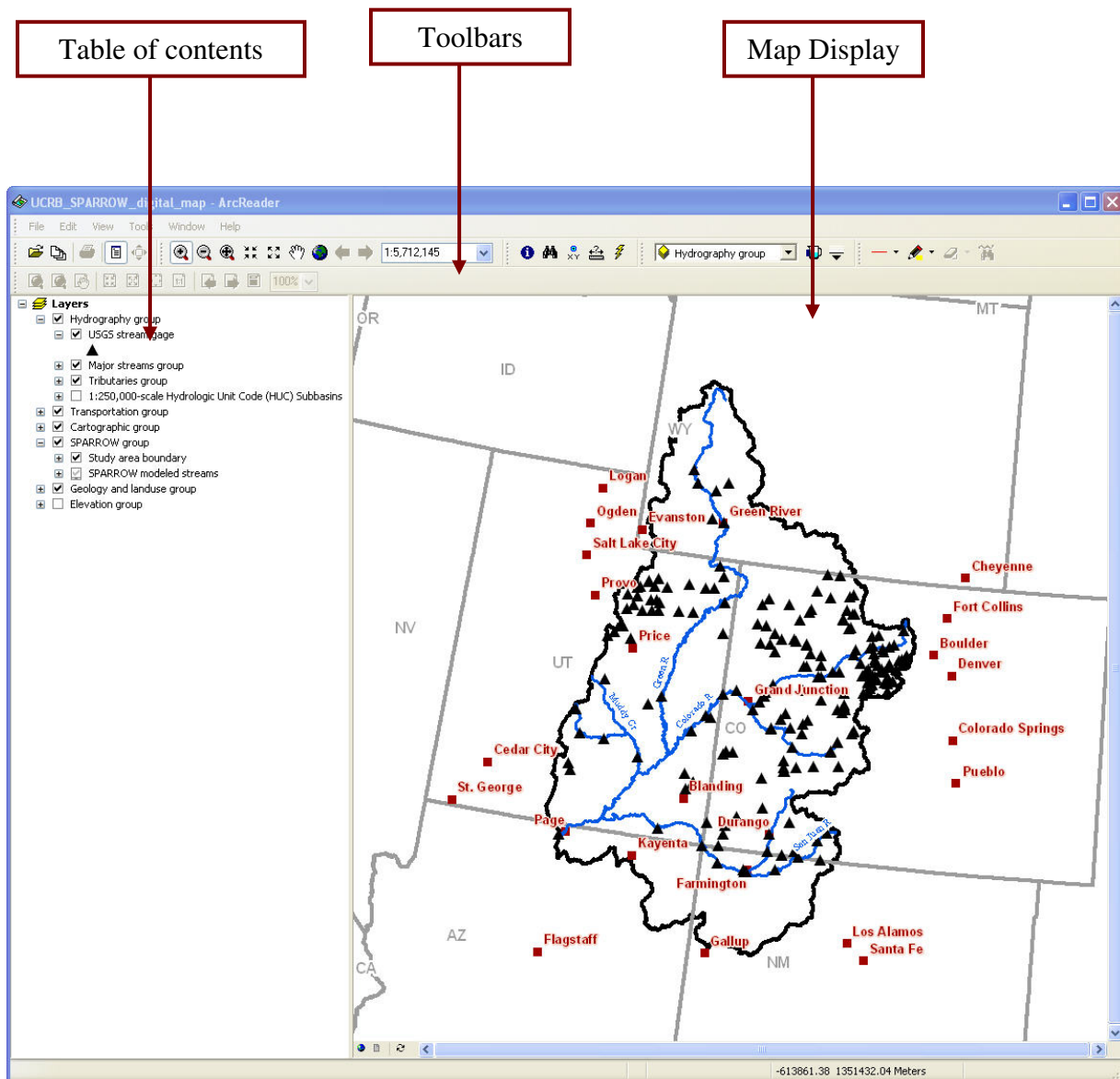
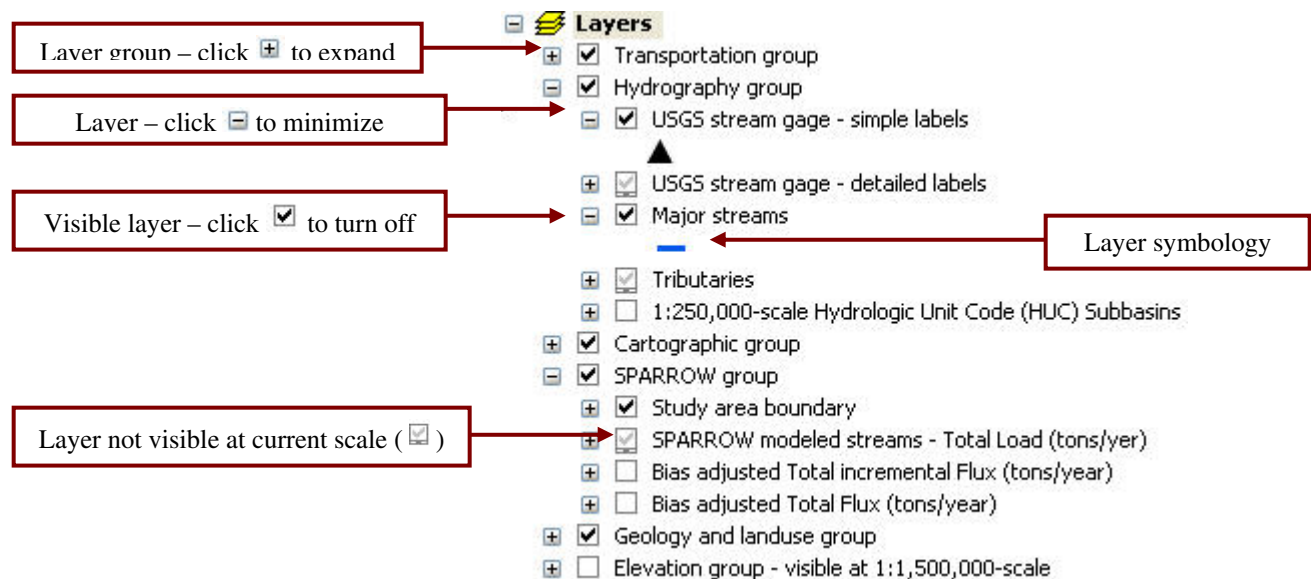


Table of contents and map display

The table of contents shows a list of layers available for display in the map display window. A map layer is a single mapped feature such as roads, county lines, stream gages, or stream reaches. The table of contents frame also works as the map explanation or legend, showing how map layers are symbolized on the map.










- Map layers may stand alone or be grouped into categories. Click the plus (+) or minus (-) sign to the left of the group name to show or hide the layers in a group.
- Click the plus or minus sign to the left of the layer name to show or hide symbology for that layer.
- A black checkmark (☑) in the box next to the layer in the table of contents means the layer is on and visible in the map display. Click on the checkmark to turn layers on and off.
- A grey checkmark (☐) in the box next to the layer in the table of contents means the layer is not available for display at the current map scale. The current map scale is shown in the toolbar area of the map. See table 2 for a list of layer properties including drawing scales.
- Layers in groups are only visible if both the group and layer have a black checkmark next to the name in the table of contents.
- Selected labels are set to draw at specific scales. See table 2 for a list of label properties including drawing scales.



Toolbars


Tools are organized on toolbars and are used to navigate around the map, find features in the map, and get information about layers in the map. Descriptions of the principal ArcReader tools are shown below. A detailed description of each tool is given in the next section. A tool's name can be found by hovering over the tool with the mouse pointer. Detailed help can be accessed by pressing the **F1** key.

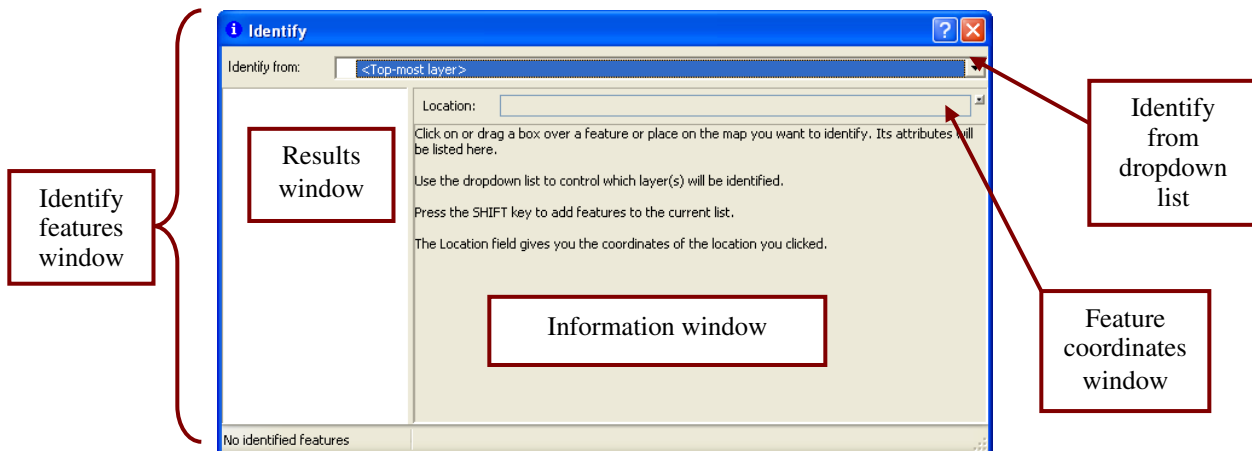
Table 1. List of commonly used tools.

Toolbar Icon	Use
	Identify features
	Find features
	Hyperlink tool – a blue dot will appear on items containing hyperlinks when the tool is clicked
	Zoom in
	Zoom out
	Fixed zoom in
	Fixed zoom out
	Pan
	Zoom to full extent of the map

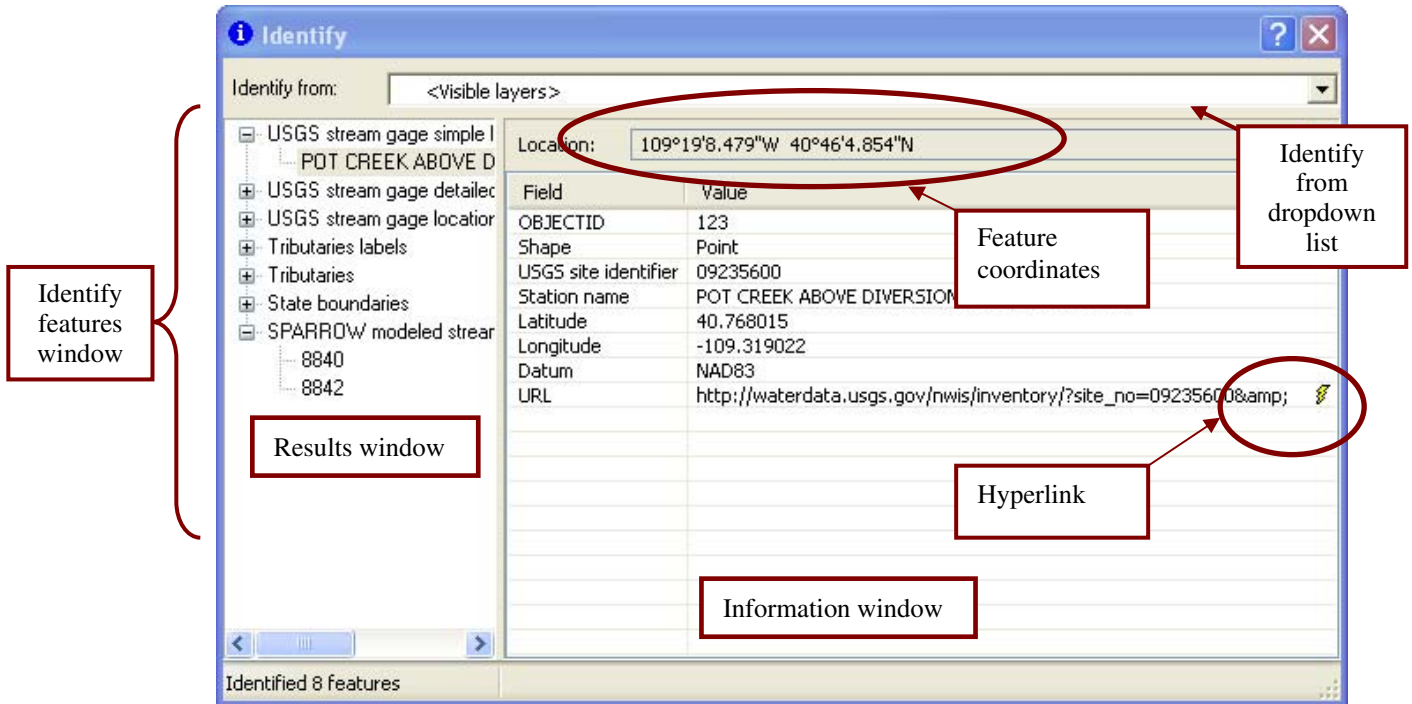
Getting information from the map

Identifying features

The **Identify** tool is used to find specific information about a layer or about several layers in the map. click on the tool () to open the **Identify features window**.

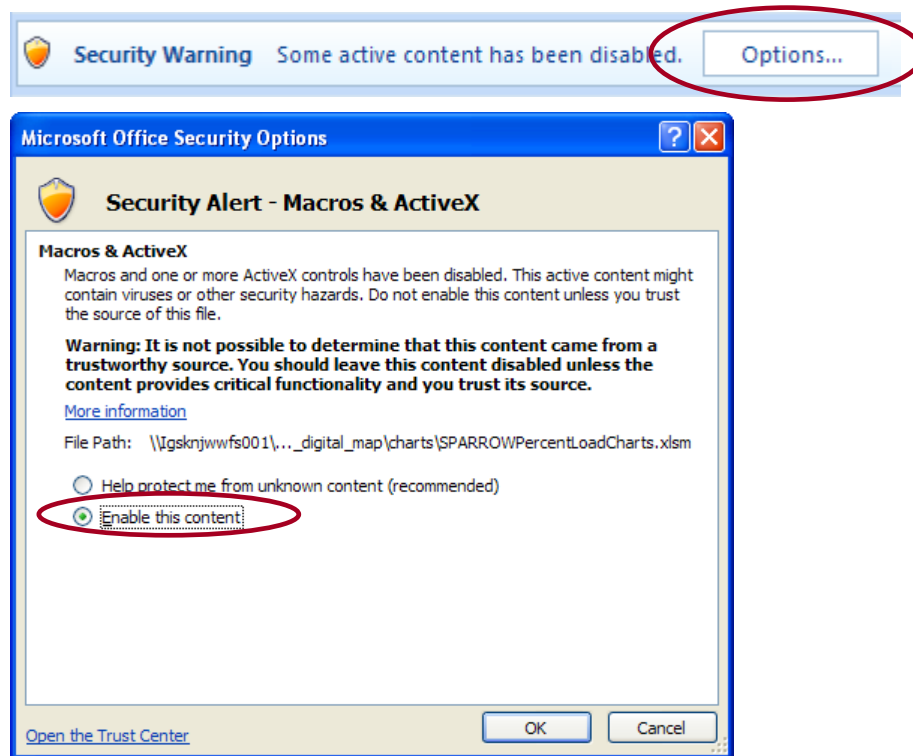


- Choose the features to identify from the **Identify from dropdown list**. The list is set to *<Top-most layer>* by default but can be changed to identify *<Visible layers>*, *<All Layers>*, or a specific layer.
- Click on a point or feature in the map display with the tool. Results are displayed in the **Identify features window**. Feature names are shown on the left in the **Results window**. Feature attributes are shown on the right in the **Information window**.

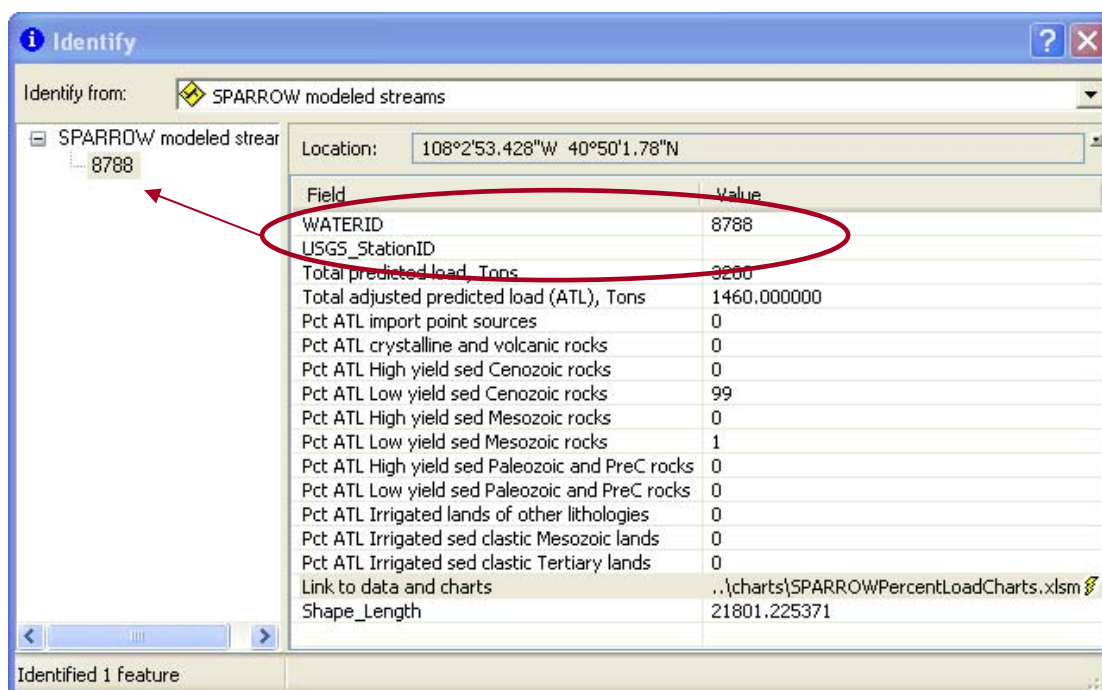


- Click on a layer name in the results window to view information for that layer in the information window. The image above shows information highlighted from the USGS stream gages layer.
- A field that uses hyperlinks to access additional information outside the map will display the hyperlink symbol (🔗) in the information window. Clicking the link will open the hyperlinked item for that feature.
- The USGS stream gage layer contains a hyperlinked field that opens the USGS National Water Information System (NWIS) web page for the gage. The NWIS page contains detailed information about the gage including location, discharge data, and water quality data where available.
- The SPARROW modeled streams layer contains a hyperlinked field that opens a Microsoft Excel 2007 workbook. The workbook contains interactive charts showing the cumulative and incremental loads from the dissolved solids sources described in USGS Scientific Investigations report 2009–5007. Data used to create the charts can be viewed with earlier versions of Microsoft Excel if the Microsoft Office compatibility pack is installed. The compatibility pack is available from <http://www.office.microsoft.com/downloads/>. Interactive charts will not be available in earlier versions of Excel.

- If Excel 2007 is installed on the computer, the program will launch when the hyperlink is clicked. A security warning may appear when the application is launched. Click the **Options** button and **Enable blocked content** when prompted.




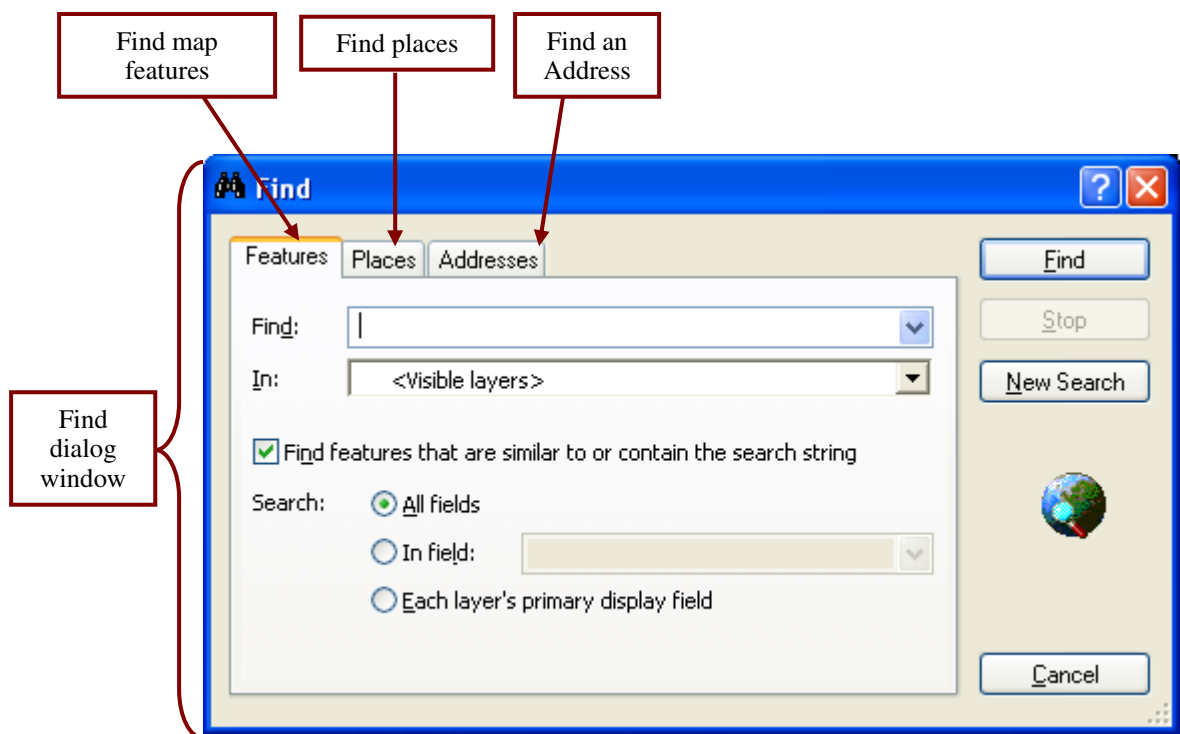
- Each SPARROW stream reach is identified by a unique number called the WaterID as shown below.



- Find the WaterID of the stream reach of interest in the worksheet. If Excel 2007 is installed, the chart will automatically update to show the estimated dissolved solids source contributions on that reach. Data used to construct the charts can be viewed using Microsoft Excel 2003 or Excel Viewer 2003. The charts will not automatically update in these applications.

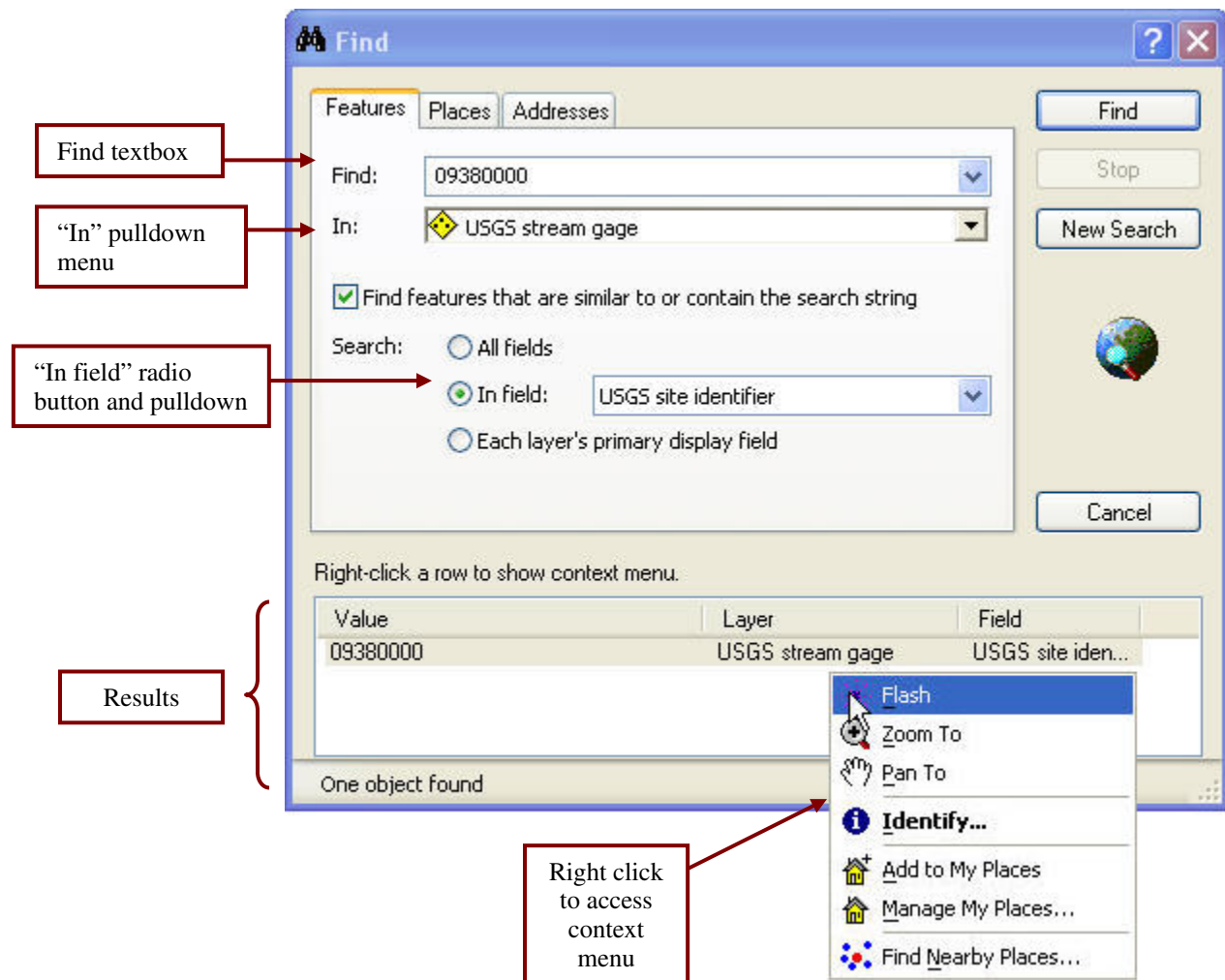
Finding Features

The **Find** tool () can be used to find features in the map. When the **Find** tool is clicked the **Find dialog window** is launched. The window has 3 tabs representing 3 search options: find features contained in the layers present on the map, find places in the geographical area covered by the map using ESRI ArcWeb services, and find addresses in the geographical area covered by the map using an ESRI address service. The map must be open on a computer with an internet connection to use the ESRI services.



To find map features, enter a string or number into the **Find** text box. For example, to find USGS stream gage 09380000, type 09380000 in the **Find** text box, choose the layer USGS stream gages from the **In** pulldown menu, click the **In field** radio button, and choose the field **USGS site identifier**. Click the **Find** button.

All features matching the find criteria will be listed in the **Results** section of the find window and the feature will flash in the map display. Right click on the feature in the **Results** window to access a menu with options for finding out more about the results or navigating to the feature.



Use the same process to find features using the places and addresses tabs.

Navigating in the map display

The navigation tools are simple to use. Draw a box or click with the **Zoom in** (🔍) or **Zoom out** (🔍) tools to zoom in or out to a specific place on the map. To zoom in or out by increments use the **Fixed zoom in** (🔍) and **Fixed zoom out** (🔍) tools. Use the **Pan tool** (👉) to adjust the map display location or to move from place to place on the map. The **Zoom to full extent tool** (🌐) resets the map to the original extent.

Data descriptions and sources

Table 2. Layer properties and sources.

NA = Not Available

Group	Layer name	Description	Format	Source	Link to source	Date	Scale range		Comment
							Data	Labels	
Hydrology group	USGS stream gages	Location of selected stream gages in the study area	Vector point	U.S. Geological Survey	http://water.usgs.gov/data/	2007	All scales	see comment	Labels are in separate map layers so they can be turned on and off independently. Simple labels showing only the USGS site identifier are visible between 1:1,000,000-scale and 1:500,000-scale. Detailed labels showing the USGS site identifier and the site name are visible at scales larger than 1:500,000.
	Major Springs	Approximate location of selected springs in the study area	Vector point	U.S. Geological Survey Geographic Names Information System	http://geonames.usgs.gov/domestic/download_data.htm	1981	Maximum 1:1,000,000	Maximum 1:2,000,000 Minimum 1:500,000	
	Major Springs Discharge			Determined for this study	NA	NA	Minimum 1:1,000,000	same as data, see comment	Labels are in a separate map layer so they can be turned on and off independently
	Major streams	Selected major streams	Vector line	U.S. Geological Survey Enhanced River Reach file 2.0	http://water.usgs.gov/GIS/metadata/usgswrd/XML/erfl_2.xml	2003	Maximum 1:3,000,000	same as data, see comment	Labels are in a separate map layer so they can be turned on and off independently
	Tributaries	Minor streams	Vector line	U.S. Geological Survey Enhanced River Reach file 2.0	http://water.usgs.gov/GIS/metadata/usgswrd/XML/erfl_2.xml	2003	Minimum 1:3,000,000 Maximum 1:1,000,000	Minimum 1:3,000,000, see comment	Labels are in a separate map layer so they can be turned on and off independently
	HUC boundaries	1:250,000-scale Hydrologic Unit Code boundaries	Vector polygon	U.S. Geological Survey Hydrologic Unit Code boundaries	http://water.usgs.gov/GIS/metadata/usgswrd/XML/huc250k.xml	1994	All scales	Minimum 1:1,500,000	
Transportation group	Interstate roads	1:100,000-scale Interstate Highways	Vector line	U.S. Geological Survey National Map and Bureau of Transportation Statistics	http://seamless.usgs.gov/	2003	Minimum 1:2,500,000	same as data	
	Highways	1:100,000-scale State Highways	Vector line	U.S. Geological Survey National Map and Bureau of Transportation Statistics	http://seamless.usgs.gov/	2003	Minimum 1:1,500,000	same as data	

Group	Layer name	Description	Format	Source	Link to source	Date	Scale range		Comment
							Data	Labels	
	Minor roads	1:100,000-scale surface streets	Vector line	U.S. Geological Survey National Map and Bureau of Transportation Statistics	http://seamless.usgs.gov/	2003	Minimum 1:1,500,000	NA	
Cartographic group	Major cities	1:24,000-scale selected city locations	Vector point	U.S. Geological Survey Geographic Names Information System	http://geonames.usgs.gov/domestic/download_data.htm	1981	Maximum 1:1,500,000	same as data	
	Cities and towns	1:24,000-scale selected city locations	Vector point	U.S. Geological Survey Geographic Names Information System	http://geonames.usgs.gov/domestic/download_data.htm	1981	Minimum 1:1,500,000	same as data	
	State boundaries	1:500,000-scale State and County boundaries	Vector polygon	U.S. Census Bureau Cartographic Boundary Files	http://www.census.gov/geo/www/cob/index.html	2000	All scales	same as data	
SPARROW group	Study area boundary	Study catchment boundary	Vector line	Determined for this study	NA	NA	All scales	same as data	
	SPARROW modeled streams	Study stream network	Vector line	Determined for this study	NA	NA	Minimum 1:3,000,000	NA	
Geology and landuse group	Irrigated Agriculture	1:50,000-scale mapped irrigated agriculture	Vector polygon	U.S. Bureau of Reclamation digital data	NA	NA	All scales	NA	
	Lithologic units	1:500,000-scale State geologic maps	Vector polygon	Arizona map from U.S. Geological Survey	http://geopubs.wr.usgs.gov/open-file/of00-409/	2000	All scales	NA	
				Colorado map from U.S. Geological Survey	http://pubs.usgs.gov/of/1992/of92-0507/	1992	All scales	NA	
				New Mexico map from U.S. Geological Survey	http://pubs.usgs.gov/of/1997/of97-0052/	1997	All scales	NA	
				Utah map from U.S. Geological Survey	http://pubs.usgs.gov/of/2005/1305/	2005	All scales	NA	
				Wyoming map from U.S. Geological Survey	http://pubs.usgs.gov/of/1994/of94-0425/	1994	All scales	NA	
	Geologic sources	1:500,000-scale State geologic maps	Vector polygon	U.S. Geological Survey and Utah Geological Survey	See links above	see dates above	All scales	NA	

Group	Layer name	Description	Format	Source	Link to source	Date	Scale range		Comment
							Data	Labels	
Elevation group	Elevation overlay	30-meter National Elevation Dataset colored elevation overlay	Raster	U.S. Geological Survey	http://seamless.usgs.gov/	1999	Minimum 1:1,500,000 Maximum 1:100,000	NA	
	Hillshade	30-meter National Elevation Dataset hillshade	Raster	U.S. Geological Survey	http://seamless.usgs.gov/	1999	Minimum 1:1,500,000 Maximum 1:100,000	NA	