

ArcGIS[®] 9

Using ArcCatalog[™]



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Quick-start tutorial

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- **Exercise 3: Managing shapefiles**

ArcCatalog lets you explore and manage your data. After connecting to your data, use the Catalog to explore its contents. When you find the data you want to use, you can add it to a map. Often, when you get data for a project, you can't use it right away; you may need to change its projection or format, modify its attributes, or link geographic features to attributes stored in another table. When the data is finally ready, you should document its contents and the changes you have made. These data management tasks can all be accomplished using tools that are available in the Catalog.

The easiest way to find out what you can do with ArcCatalog is to complete the exercises in this tutorial.

- Exercise 1 shows you how to build your own catalog of geographic data by adding data to and removing data from the Catalog.
- Exercise 2 illustrates how to explore and search for data and how to add it to a map.
- Exercise 3 shows you how to define a data source's coordinate system, modify its contents, join attributes in another table to the data, and symbolize features based on the joined attributes.

This tutorial is designed to let you work at your own pace. You'll need between two and four hours of focused time to complete the tutorial. However, you can also perform the exercises one at a time if you wish.

Exercise 1: Building a catalog of geographic data

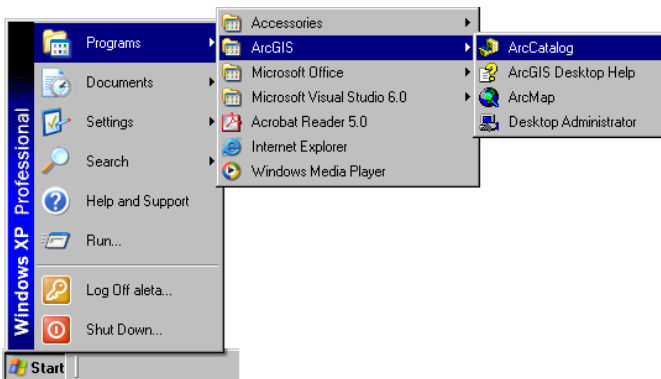
When you build a catalog, you're choosing the data you want to work with. You might use several folders of data to complete your project, while someone else might use data stored in a geodatabase. For this tutorial, you'll be working with data from Yellowstone National Park, which is located in the northwestern part of the United States.

In this exercise, you'll add the folder containing the tutorial data to the Catalog. Because you modify this data in later exercises, you'll create a working copy of the folder, then remove items that you don't need from the Catalog.

Start ArcCatalog

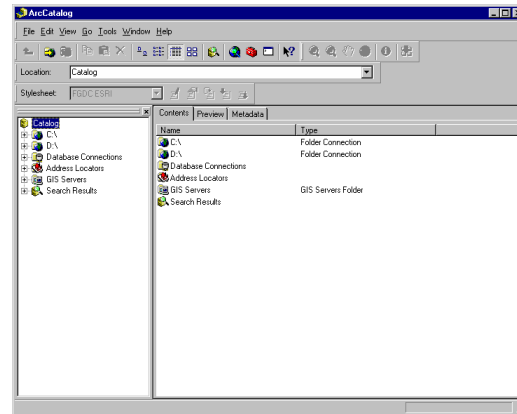
Before you can complete the tasks in this tutorial, you must start ArcCatalog.

1. Click the Start button on the Windows taskbar.
2. Point to Programs.
3. Point to ArcGIS.
4. Click ArcCatalog. The ArcCatalog window appears.

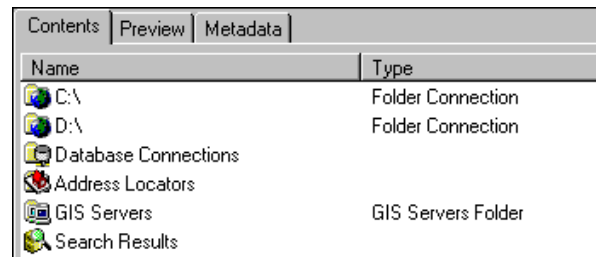


What's in the Catalog?

On the left of the ArcCatalog window, you see the *Catalog tree*; it gives you a bird's-eye view of how your data is organized. On the right are tabs that let you explore the contents of the selected item in the Catalog tree.



The first time you start ArcCatalog, it contains *folder connections* that let you access your computer's hard disks. The Catalog also contains folders that let you create and store connections to databases and GIS servers as well as manage search results.



When you select a connection, you can access the data to which it's linked. Folder connections let you access *folders*, or directories, on local disks or shared folders on the network. Database connections let you access the contents of a database. When you remove folder or database connections from the Catalog, you are only removing the connection, not deleting the data.

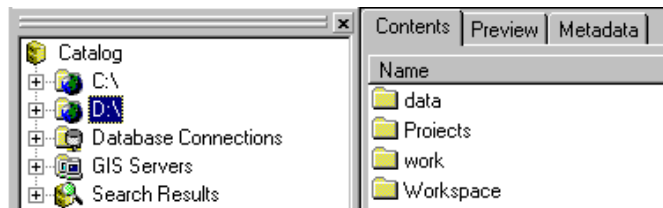
Together, your connections create a catalog of geographic *data sources*. Individual folders and data sources are *items* in that catalog. If you use ArcInfo Workstation, you're accustomed to using the term "item" when referring to a coverage's attributes; in this book, "item" refers only to an element in the Catalog tree.

Look in a folder connection

When you select a folder connection in the Catalog tree, the Contents tab lists the items it contains. Unlike Windows Explorer, the Catalog doesn't list all files stored on disk; a folder might appear empty even though it contains several files. Folders containing geographic data sources have a different icon to make your data easier to find.

Look in a folder connection in your catalog.

1. Click a folder connection in the Catalog tree. The items it contains appear in the Contents tab.



2. Double-click a folder in the Contents list. That folder is selected in the Catalog tree, and the Contents tab lists the folders and geographic data it contains.

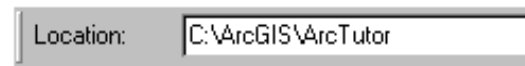
Using this method, you can browse through the contents of disks looking for geographic data.

Locate the tutorial folder

Before you can start exploring the data for this tutorial, you must select the folder where the tutorial data is located. In the Catalog, you can quickly select any folder on your computer or on the network as long as you know its path.

1. Click in the Location text box.
2. Type the path to the ArcGIS\ArcTutor folder on the local drive where you installed the tutorial data; for example, type "C:\ArcGIS\ArcTutor".

If the data was installed by your system administrator in a shared folder on the network, the path to the tutorial folder includes the names of the computer and the shared folder through which the folder is accessed; for example, "\\dataserver\public\ArcGIS\ArcTutor".



3. Press Enter. The folder is selected in the Catalog tree.



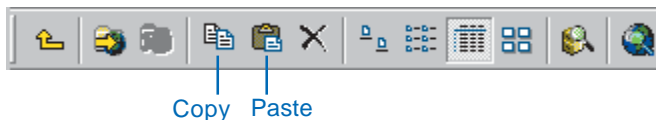
When the Catalog already contains a folder connection that can access the ArcGIS\ArcTutor folder, that connection expands, and the tutorial folder is selected in the Catalog tree. Otherwise, a new folder connection is added to the Catalog that directly accesses the ArcGIS\ArcTutor folder.

The path you typed above is added to the Location list after you press the Enter key. To access the ArcGIS\ArcTutor folder again in the future, you can choose its path from the list by clicking the Location dropdown arrow.

Create a working copy of the tutorial data

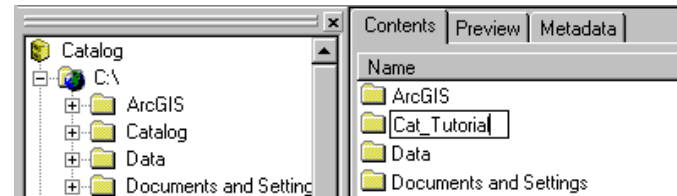
In Exercises 2, 3, and 4, you will create new items and modify the data provided for this tutorial. When processing data, it is best to work on a copy so that your original data will remain unmodified. To prepare for those exercises, use ArcCatalog to copy the ArcTutor\Catalog folder to a location where you have write access. You will need 15 MB of free disk space to store the tutorial data.

1. If the Catalog doesn't have a connection to the place where you want to store the tutorial data, type its name into the Location combo box and press Enter; for example, type "C:\". A new folder connection will be added to the Catalog. Substitute the name of your folder connection for "C:\" in the following steps.
2. Click the ArcGIS\ArcTutor folder or folder connection in the Catalog tree.
3. Click the Catalog folder in the Contents tab.
4. Click the Copy button.



5. Click the C:\ folder connection in the Catalog tree.
6. Click the Paste button. A new folder called Catalog will appear in the Contents list for the C:\ folder connection.
7. Click the new Catalog folder in the Contents tab.
8. Click the File menu and click Rename.
9. Type "Cat_Tutorial" and press Enter.

If you type another name for the folder, that name must have 13 characters or less and cannot use spaces. Because the tutorial data includes coverages, the folder's name must satisfy these requirements for ArcInfo workspaces. For the rest of the tutorial, substitute the name of your folder for "C:\Cat_Tutorial".



Now that you have a working copy of the tutorial data, you can connect directly to it in the Catalog.

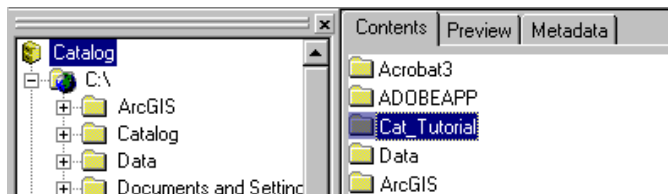
Connect directly to your copy of the tutorial data

Folder connections in the Catalog can access specific folders on disk. You might establish several connections to different folders on the same disk. You don't have to see all the data on your C:\ drive, for example, just because you want to use data in two of the folders it contains.

To create a connection that directly accesses a folder, you can use a shortcut provided by the Catalog.

1. Click the Cat_Tutorial folder in the Contents list.

2. Scroll to the top of the Catalog tree.
3. Drag the Cat_Tutorial folder from the Contents tab and drop it on the Catalog at the top of the Catalog tree.



A new folder connection is added to the Catalog.



Creating folder connections using this shortcut is handy when you're browsing through local disks that contain many folders, some of which contain geographic data.

Remove folders that you don't need

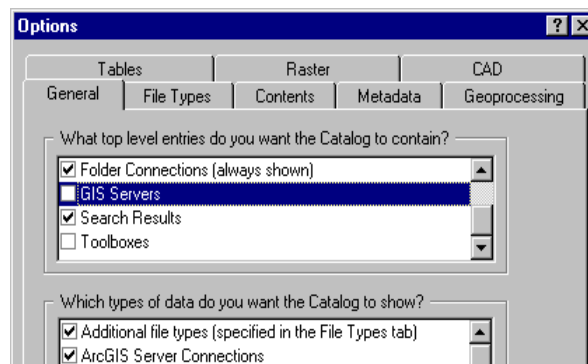
For the remaining tasks in this tutorial, you only need to use the folder connection that accesses your working copy of the tutorial data. You can remove all other folder connections from the Catalog. To hide folders such as Database Connections, you must change the settings in the Catalog's Options dialog box.

1. Click the C:\ folder connection.
2. Click the Disconnect From Folder button. The connection is removed from the Catalog.



Disconnect From Folder

3. Repeat steps 1 and 2, removing each folder connection in turn, except for the C:\Cat_Tutorial folder connection.
4. Click the Tools menu and click Options.
5. Click the General tab.
6. In the top level entries list, uncheck Address Locators, Database Connections, and GIS Servers. Toolboxes and Coordinate Systems and are unchecked by default.



7. Click OK.

Only the C:\Cat_Tutorial folder connection and the Search Results folder remain in the Catalog. Now you can explore the tutorial data without seeing unessential folders and data.

You can continue on to Exercise 2 or stop and complete the tutorial at a later time. If you do not move on to Exercise 2 now, do not delete your working copy of the tutorial data and do not remove the folder connection that accesses the working copy of the tutorial data from the Catalog.

Exercise 2: Exploring data and adding it to a map

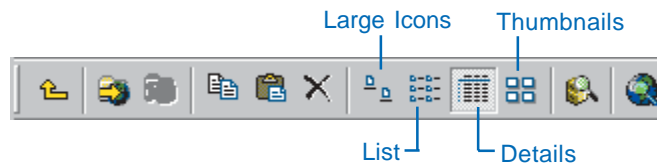
Each of the Catalog's three tabs provides a different way to explore the contents of the selected item in the Catalog tree. Within each tab there are different views that let you change the appearance of the selected item's contents.

The Contents tab lists the items contained by the selected item in the Catalog tree, for example, the items in a folder. When a data source such as a shapefile is selected, the Preview tab lets you see the geographic or attribute data it contains. The Metadata tab lets you see documentation describing the item's contents.

ArcCatalog and ArcMap work together to make it easy to build maps. For your project you are mapping the forest resources in the southeastern corner of Yellowstone National Park. In the Yellowstone folder is a map of the study area; it is incomplete. In this exercise, after exploring the data in the folder, you'll add more data to the map.

The Contents tab

When you select items, such as folders or geodatabases in the Catalog tree, the Contents tab lists the items they contain. To change the appearance of the Contents list, use the appropriate buttons on the Standard toolbar.



The Large Icons view represents each item in the list with a large icon. List view uses small icons. Details view shows

properties of each item in columns; you can sort the list by the property values. Thumbnails view displays a snapshot for each item in the list, providing a quick illustration of the item's geographic data.

Items such as maps, shapefiles, and tables don't contain other items. When you select them in the tree, the Contents tab lists the item's properties and its thumbnail.

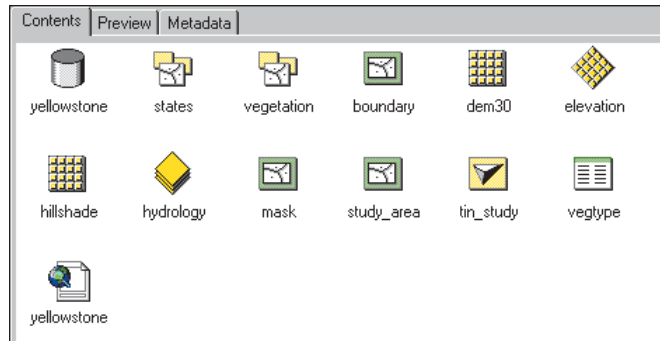
Explore the contents of the Yellowstone folder

Each type of geographic data has its own set of icons in the Catalog. The Yellowstone folder contains a personal geodatabase, coverages, shapefiles, raster datasets, a TIN dataset, a dBASE® table, and an ArcMap map document. Geodatabases let you store spatial data inside a relational database; personal geodatabases can be accessed by only one person at a time. For more information, see Chapter 3, 'Catalog basics'.

The Yellowstone folder also contains two layers. A *layer* includes a shortcut to geographic data and information such as the symbology used to draw geographic data on a map, the query used to select which features the layer represents, and properties defining how those features are labeled.

Use the Contents tab to find out about the data in the Yellowstone folder.

1. Double-click the C:\Cat_Tutorial folder connection in the Catalog tree.
2. Click the Yellowstone folder in the Catalog tree.
3. Click the Large Icons button.



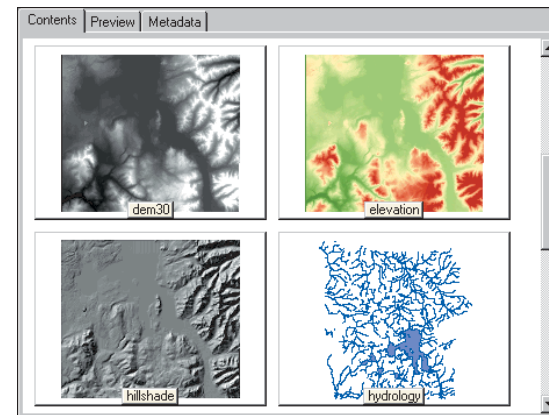
4. Click the List button.
5. Click the Details button. The Type column in Details view will help you learn which icon represents which type of data. You can find more information about data types and their icons in Chapter 4, 'What's in the Catalog'.

Name	Type
yellowstone	Personal Geodatabase
states	Coverage
vegetation	Coverage
boundary	Shapefile
dem30	Raster Dataset
elevation	Layer
hillshade	Raster Dataset
hydrology	Layer
mask	Shapefile
study_area	Shapefile
tin_study	TIN Dataset
vegtype	dBASE File
yellowstone	Map Document

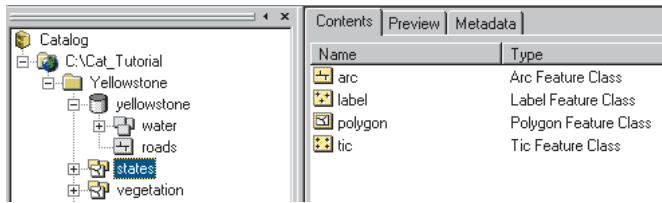
6. Click the heading of the Type column to sort the items by type.
7. Click the heading of the Name column to sort the items by name. When sorted by name, items that contain other

items, such as geodatabases and coverages, always appear at the top of the Contents list. They are grouped by type.

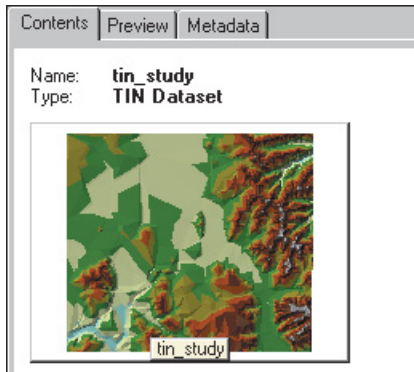
8. Click the Thumbnails button and scroll down through the snapshots. Items that are not geographic data sources, such as the yellowstone geodatabase, can't have thumbnails; their icons appear on a gray background.



9. Click the Details button.
10. Double-click the yellowstone personal geodatabase in the Contents tab. It contains a feature dataset called water and a feature class called roads.
11. Double-click the water feature dataset in the Contents tab. It contains three feature classes: lakes, rivers, and streams.
12. Click the states coverage in the Catalog tree to list the feature classes it contains.



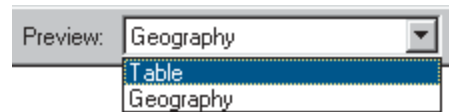
- Click the tin_study TIN dataset in the Catalog tree. This surface represents the terrain of the study area. Because a TIN dataset doesn't contain other items, the Contents tab lists its properties and thumbnail instead.



Thumbnails give you a quick look at an item's geographic data; they're useful when browsing through folders. However, you must often see the data in more detail to determine whether or not you want to use it.

The Preview tab

The Preview tab lets you explore the selected item's data in either Geography or Table view. For items containing both geographic data and tabular attributes, you can toggle between the Geography and Table views using the dropdown list at the bottom of the Preview tab.

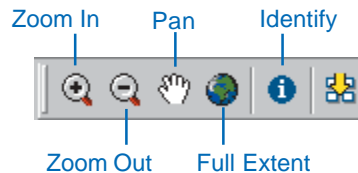


Geography view draws each feature in a vector dataset, each cell in a raster dataset, and each triangle in a TIN dataset. When drawing geographic data, the Catalog uses a default set of symbology. When drawing a layer's contents, the Catalog uses the symbology stored in the layer. You can explore the selected item's geographic data using the buttons on the Geography toolbar.

Table view draws all rows and columns and the value for each cell in the selected item's table. You can explore the values in the table using the scroll bars, the buttons at the bottom of the table, and the context menus that are available from the column headings.

Look at the Yellowstone data in Geography view

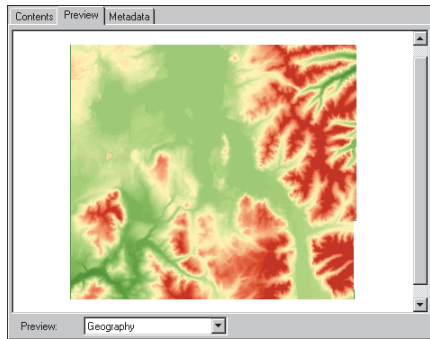
Use Geography view to look at the data contained by the items in the Yellowstone folder. When using Geography view, the Geography toolbar is enabled. You can use the Zoom In, Zoom Out, Pan, Full Extent, and Identify buttons on the toolbar to explore geographic data.



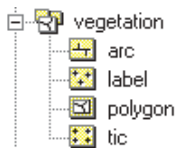
While you look at the Yellowstone data, you may wish to see the geographic features in more detail using these tools.

For more information about how these buttons work, see Chapter 7, ‘Exploring an item’s geography’.

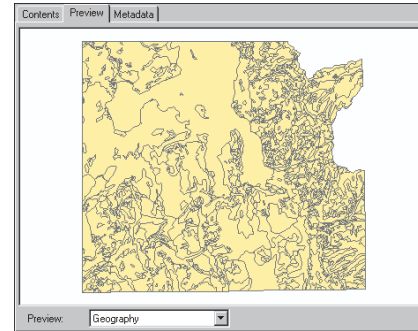
1. Click the dem30 raster dataset in the Catalog tree. This dataset contains elevation information for the study area within the park.
2. Click the Preview tab. The raster draws using the default grayscale color ramp.
3. Click the elevation layer in the Catalog tree. The raster draws using the symbology stored in the layer—a green to red color ramp.



4. Click the study_area shapefile in the Catalog tree. It represents the study area for this project, which lies in the southeastern corner of the park.
5. In the Catalog tree, click the plus sign next to the vegetation coverage. The coverage’s feature classes are listed in the Catalog tree.



6. In the Catalog tree, click each feature class in the vegetation coverage in turn and look at their contents in Geography view. This polygon coverage represents the different types of vegetation within the study area.



7. Click the Preview dropdown arrow at the bottom of the Preview tab and click Table.
8. In the Catalog tree, click each feature class in the vegetation coverage in turn and look at their contents in Table view.

All feature classes in a coverage have FID and Shape columns. They may also have several *pseudo items* whose names begin with a dollar sign (\$), which are maintained by ArcInfo. Because topology only exists for the polygon feature class, it’s the only one that has a feature attribute table and, therefore, additional attributes.

9. Click the Preview dropdown arrow at the bottom of the Preview tab and click Geography.
10. In the Catalog tree, click the minus sign next to the vegetation coverage. The feature classes are hidden and the coverage is selected in the Catalog tree. The

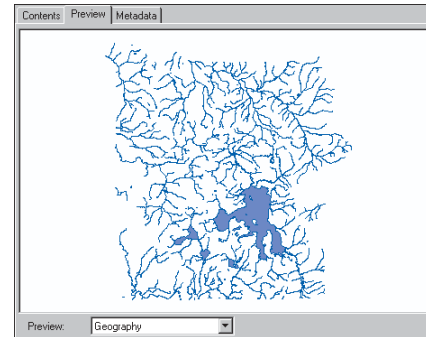
coverage's polygon feature class draws in Geography view.

ArcCatalog draws the first feature class it finds in the dataset with the highest dimension of geometry available. If a coverage contained only line and point feature classes, the first line feature class found would draw in Geography view.

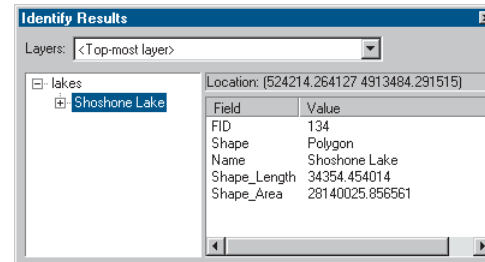
11. In the Catalog tree, click the plus sign next to the water feature dataset in the yellowstone geodatabase. The feature classes it contains appear in the Catalog tree.



12. In the Catalog tree, click each feature class in the water feature dataset in turn and look at their contents in Geography view. This feature dataset groups feature classes that contain different types of water features throughout the park: lakes, rivers, and streams.
13. Click the water feature dataset in the Catalog tree. The lakes feature class draws in Geography view.
14. Click the hydrology layer in the Catalog tree. This group layer presents all features in the lakes, rivers, and streams feature classes using symbology stored in the layer. When added to a map, a group layer maintains its grouping in the table of contents.



15. Click the Identify button on the Geography toolbar and click one of the larger lakes in the Preview tab. Its attributes appear in the Identify Results window. Only the larger lakes in this feature class have names.



All features within three pixels of where you clicked are selected; each feature is listed on the left of the Identify Results window. If a data source has no text attributes, a numeric attribute will be used to identify the features.

16. Click the Close button in the upper right corner of the dialog box to close the Identify Results window.

By exploring a data source's data in Geography view, you can find out if it has the features you need and if those

features have the correct attributes. This information can help you decide whether or not to add the data to a map.

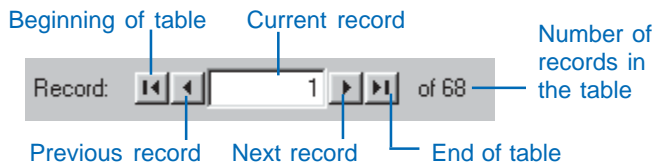
Explore the contents of a table

With the table exploration tools available in the Catalog, you can learn a great deal about a table's contents. You can search for values in the table and sort records according to the values in one or more columns.

The vegetation coverage represents areas with distinct types of vegetation. The vegtype table contains both general information, such as whether or not the area is forested, and detailed information such as which plant species live in each area. Throughout the park, 67 vegetation groups have been defined. Some areas, such as open water or rocky peaks, may not have any vegetation at all.

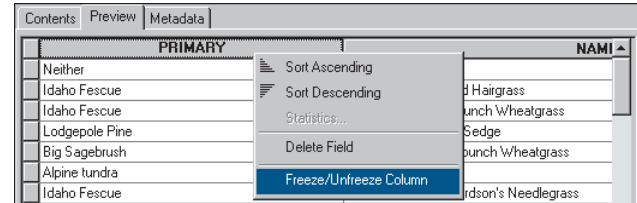
Use the tools available in Table view to explore the contents of the vegtype table.

1. Click the vegtype dBASE table in the Catalog tree.
2. Explore the table's values using the buttons at the bottom of the table. Once you click in the table you can also use the arrow keys on the keyboard.

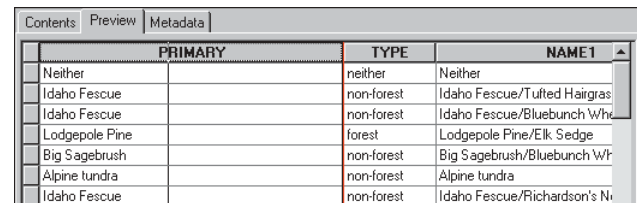


3. Type "10" into the Current record text box and press Enter. The Current record icon appears next to the tenth row in the table. The Object ID value for this record, which is located in the OID column, is nine; the OID values begin at zero.

4. Scroll horizontally through the table until you see the column named Primary.
5. Right-click the heading of the Primary column and click Freeze/Unfreeze Column. The Primary column is frozen in position at the left of the table, and a heavy black line appears to its right.



6. Scroll horizontally through the table. The Primary column stays in place while the other columns scroll normally. Place the Type column to the right of the Primary column.
7. Position the mouse pointer over the right edge of the Primary column's heading. The mouse pointer changes.
8. Click and drag the edge of the Primary column's heading to the left. The red line indicates the edge's original position, while the black line shows its new location. Drop the edge of the column. The column is narrower.



9. Right-click the heading of the Type column and click Freeze/Unfreeze Column. The heavy black line is now to the right of the Type column. Scroll horizontally through the table. Both the Primary and Type columns stay in place while the other columns scroll normally.
10. Click the Type column's heading. The column is highlighted in light blue.
11. Click and drag the Type column's heading to the left of the Primary column. The red line indicates the Type column's new position. Drop the column in the new location.

PRIMARY	TYPE	CODE2	NAME1
Neither	neither		Neither
Idaho Fescue	non-forest		Idaho Fescue/Tufted Hairgrass
Idaho Fescue	non-forest		Idaho Fescue/Bluebunch Wheatgrass
Lodgepole Pine	forest		Lodgepole Pine/Elk Sedge
Big Sagebrush	non-forest		Big Sagebrush/Bluebunch Wheatgrass
Alpine tundra	non-forest		Alpine tundra
Idaho Fescue	non-forest		Idaho Fescue/Richardson's Needlegrass

The Type column now appears to the left of the Primary column, and the heavy black line appears to the right of the Primary column.

12. Hold down the Ctrl key and click the Primary column's heading. Both columns are now selected.
13. Right-click the heading of the Primary column and click Sort Descending.

TYPE	PRIMARY	CODE2	NAME1
neither	Neither		
non-forest	Idaho Fescue		Fescue/Tufted Hairgrass
non-forest	Idaho Fescue		Fescue/Bluebunch Wheatgrass
forest	Lodgepole Pine		Lodgepole Pine/Elk Sedge
non-forest	Big Sagebrush		Big Sagebrush/Bluebunch Wheatgrass
non-forest	Alpine tundra		Alpine tundra
non-forest	Idaho Fescue		Idaho Fescue/Richardson's Needlegrass

The rows in the table are sorted alphabetically in descending order, first by the values in the Type column, then by the values in the Primary column. In this format, the table presents vegetation information from general to detailed as you look at the columns from left to right.

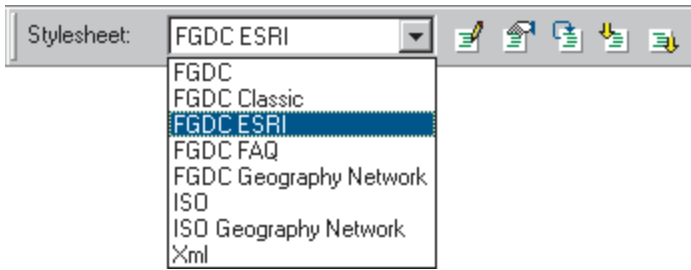
TYPE	PRIMARY	NAME1
wet forest	Subalpine Fir	Subalpine Fir/Grouse Whortleberry-Whitebark Pine Phase
wet forest	Subalpine Fir	Subalpine Fir/Grouse Whortleberry-Grouse Whortleberry Phase
water	Water	Water
non-forest	Willow	Willow/Sedge
non-forest	Tufted Hairgrass	Tufted Hairgrass/Sedge
non-forest	Tufted Hairgrass	Tufted Hairgrass/Sedge
non-forest	Talus	Talus

After exploring the contents of the vegtype table, you have a better idea about the forest resources that are available in the study area. However, you may not know what some column names in the table mean. For that information, you must look at the table's metadata.

The Metadata tab

The Metadata tab shows descriptive information about the selected item in the Catalog tree. Metadata includes properties and documentation. Properties are derived from the data source, while documentation is information provided by a person.

Metadata is stored as *extensible markup language (XML)* data in a file with the data or in a geodatabase. The Catalog uses *XSL Transformations (XSLT)* stylesheets to transform the XML data into a *hypertext markup language (HTML)* page. You can change the metadata's appearance by changing the current stylesheet using the dropdown list on the Metadata toolbar.

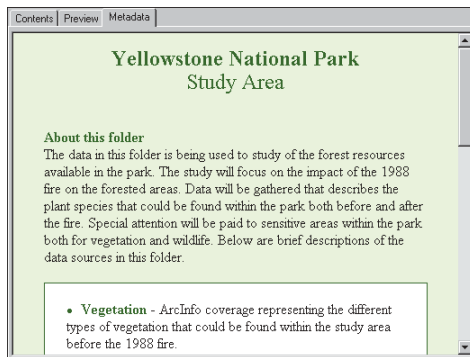


You can browse through the available metadata just as you would browse through any Web page in a browser.

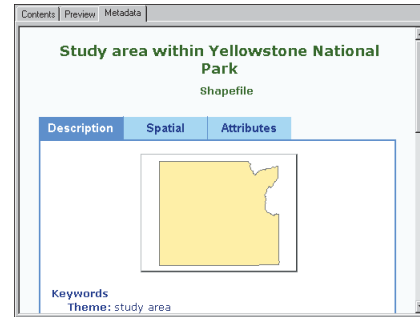
Explore metadata for the tutorial data

The metadata for the Yellowstone folder provides an overview of the data it contains. By looking at metadata for the study_area shapefile and vegetation coverage, you can find out when and why the data was created and look at the data's properties.

1. Click the Yellowstone folder in the Catalog tree.
2. Click the Metadata tab. A metadata HTML page describing the contents of the Yellowstone folder appears.

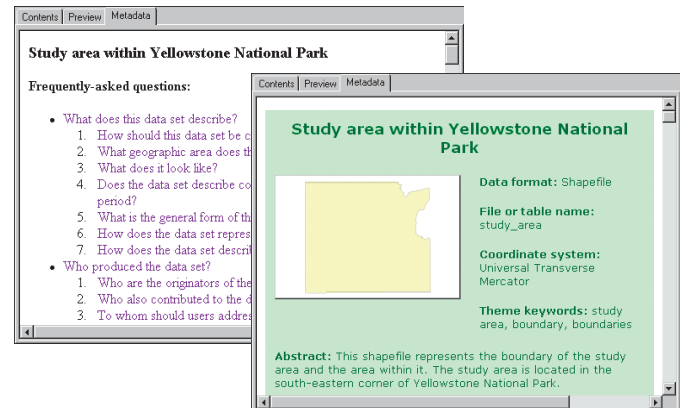


3. Click the study_area shapefile in the Catalog tree. Metadata is presented with the FGDC ESRI stylesheet by default.

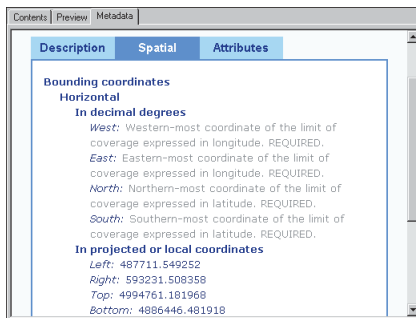


The Catalog automatically adds the item's current property values to the metadata when you view it in the Metadata tab.

4. Click the Stylesheet dropdown arrow on the Metadata toolbar and click FGDC FAQ. Click the Stylesheet dropdown arrow again and click FGDC. Different stylesheets present the same body of metadata in different ways.



- Click the Stylesheet dropdown arrow on the Metadata toolbar and click FGDC ESRI.
- Click the Spatial tab in the metadata.
- Underneath the name of the coordinate system used by the data, click Details. The coordinate system's properties appear. Click Details again to hide the information.
- Scroll down to see the shapefile's extent. Its bounding coordinates are presented both in the actual coordinates of the data and in decimal degrees.
- Click the boundary shapefile in the Catalog tree.
- Click the Spatial tab in the metadata. No coordinate system information is available because the shapefile's projection hasn't yet been defined. Scroll down to see the data's extent in projected coordinates.

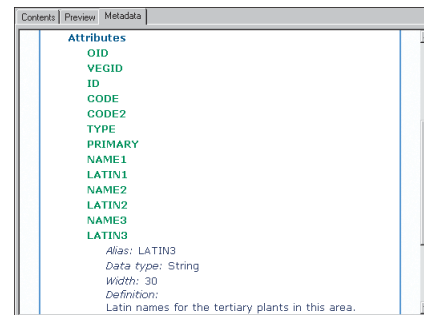


Because there is no coordinate system information, the Catalog can't calculate the data's extent in decimal degrees. You'll define the shapefile's coordinate system in Exercise 3.

In ArcCatalog, metadata isn't required to meet any standard. By default, when you look at metadata in the Metadata tab, ArcCatalog automatically records the

item's properties following both the Federal Geographic Data Committee's (FGDC) *Content Standard for Digital Geospatial Metadata* and the International Organization for Standardization's (ISO) standard 19115 *Geographic Information—Metadata*. The hints you see in gray text with some stylesheets indicate the documentation that must be completed to meet the standard's minimum requirements.

- Click the vegtype table in the Catalog tree.
- Click the Spatial tab in the metadata. The table doesn't contain spatial information. But, because the information it contains only applies to Yellowstone National Park, the extent of the Park has been provided manually. Therefore, the table can be found by a spatial search.
- Click the Attributes tab in the metadata. All columns in the table are listed.
- Click the LATIN3 column in the list. You can see a description of its data type and values.



- Click the Contents tab in the ArcCatalog window.

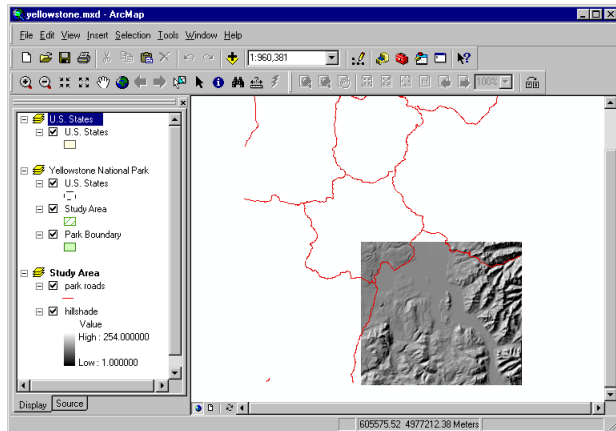
Now that you've familiarized yourself with the data, you can create a map describing the study area within Yellowstone National Park.

Add a layer to a map

The Yellowstone folder contains a map document. The map already has data from the roads feature class and the hillshade raster dataset. You must still add the water features in the park to the map.

Adding data to a map is easy—all you have to do is drag data from the Catalog and drop it on the map. When you drop a layer onto a map, a copy of the layer is created and stored inside the map document. In this way, you can create a layer once and use it in many different maps. Before you can add more data to the Yellowstone map, you must open the map document in ArcMap.

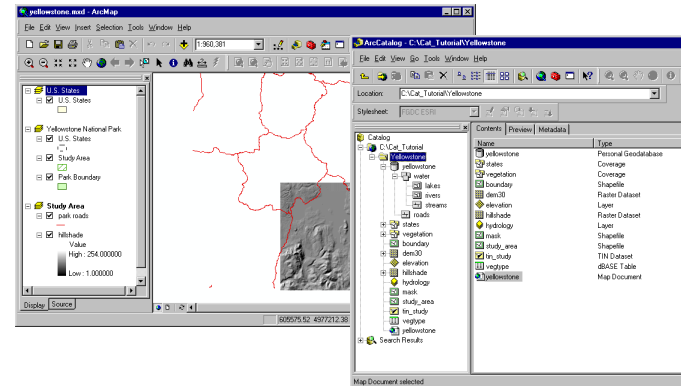
1. Click the Yellowstone folder in the Catalog tree.
2. Double-click the yellowstone map document in the Catalog; it opens in ArcMap.



In the ArcMap window, you see the contents of the Study Area data frame in Data view; the name of the active data frame appears in bold in the table of

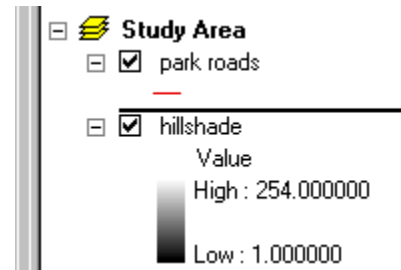
contents. The map has two other data frames as well: Yellowstone National Park and United States.

3. Arrange the ArcMap and ArcCatalog windows so you can see the table of contents in ArcMap and the Catalog tree at the same time.



Water features must be added to the map; they should draw underneath the park roads layer but above the hillshade layer. The map's table of contents reflects the order in which layers are drawn.

4. Click and drag the hydrology layer from the Catalog and drop it in the map's table of contents below park roads in the Study Area data frame's list of layers.



5. In the ArcMap window, click the Save button.

The water features draw underneath the road features and above the hillshade image in the map.

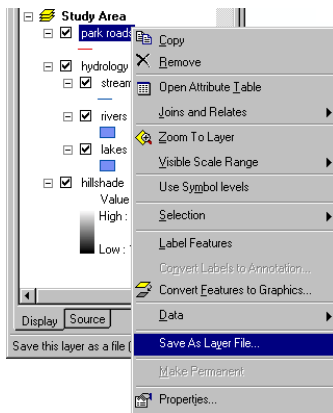
Create layers

The features in the park roads and hydrology layers cover the entire park, but you only want to map the study area. The mask shapefile represents the area outside the study area. You can create a layer from this shapefile in the Catalog and add it to the map to hide features that extend beyond the study area.

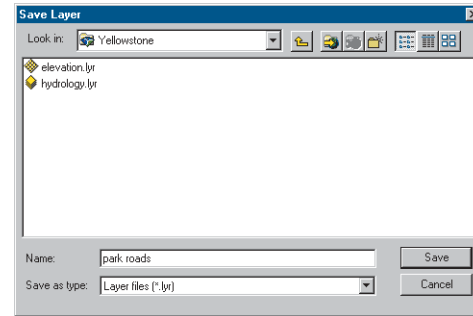
If you add data directly to a map rather than creating a layer first, ArcMap creates a new layer in the map document. After modifying the layer's symbology and other properties, you can save it as a layer file outside the map document so you can reuse it in other maps.

In this task, you will first save the park roads layer to a file, then create a new layer representing the mask shapefile.

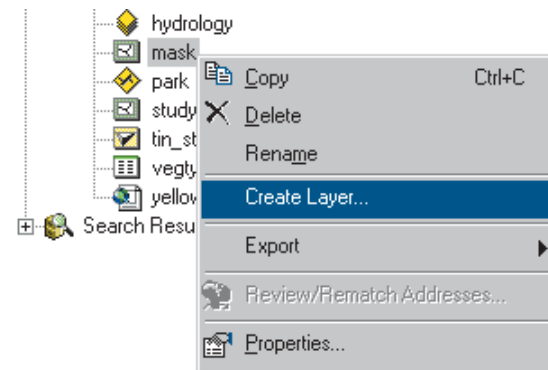
1. Right-click the park roads layer in the map's table of contents and click Save As Layer File.



2. In the Save Layer dialog box, navigate to the Yellowstone folder. Type a name for the new layer, for example, “park roads”, then click Save.



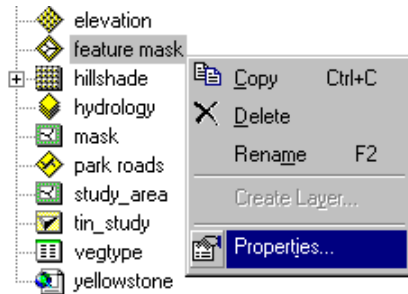
3. In the Catalog tree, click the Yellowstone folder.
4. Click the View menu and click Refresh. The park roads layer now appears in the Contents list.
5. Right-click the mask shapefile and click Create Layer.



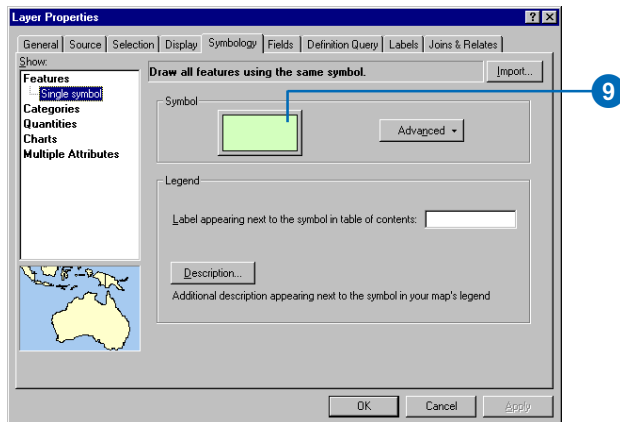
6. Navigate to the Yellowstone folder in the Save Layer As dialog box. Type a name for the new layer, for example,

“feature mask”, then click Save. The layer appears in the Contents list for the Yellowstone folder.

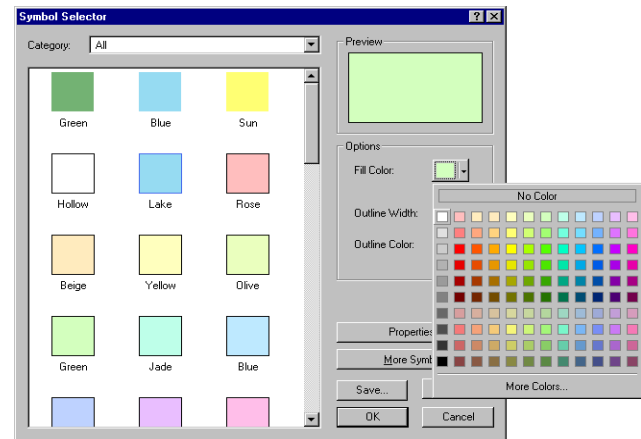
7. Right-click the feature mask layer and click Properties. The Layer Properties dialog box appears.



8. Click the Symbology tab.
9. Click the button showing the current symbol for the layer. A symbol is assigned at random when the layer is created.



10. Click the dropdown arrow next to the Fill Color symbol and click white.



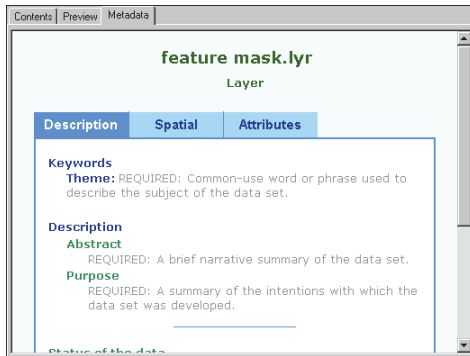
11. Click the dropdown arrow next to the Outline Color symbol and click black.
12. Click OK in the Symbol Selector dialog box and click OK in the Layer Properties dialog box.

Now that you’ve finished creating the feature mask layer, you should document its contents. Before adding it to the map, you can import metadata, which has already been created for the layer.

Import metadata

There is a text file in the Yellowstone folder containing metadata describing the feature mask layer. By importing this metadata it will become part of the layer itself; it will be copied and moved with the data and updated automatically by ArcCatalog. This is useful because when metadata is maintained separately, it is easy to let it get outdated.

1. Click the feature mask layer in the Catalog tree. Notice that the layer's icon appears on a gray background because a thumbnail hasn't yet been created.
2. Click the Metadata tab. By default, ArcCatalog automatically creates metadata for the feature mask layer. Properties such as the name of the layer file will be added automatically along with hints about the type of documentation you should provide.

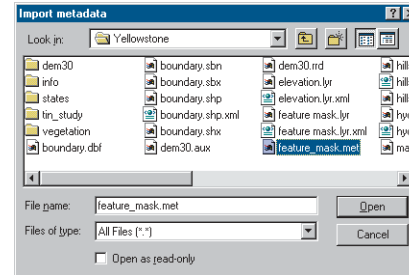


3. Click the Import metadata button on the Metadata toolbar.

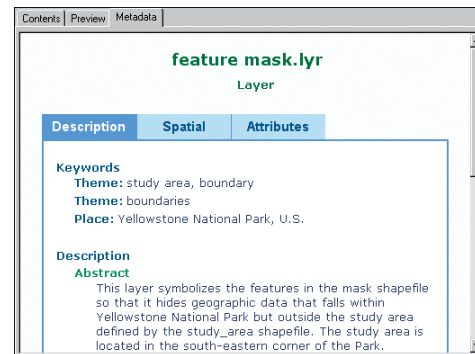


4. Click the Format dropdown list and click FGDC CSDGM (TXT). Metadata in text files can be imported if the information is structured following the format supported by the FGDC's metadata parser, mp.
5. Click Browse and navigate to the Yellowstone folder.

6. Click the Files of type dropdown arrow and click All files (*.*). Click the file "feature_mask.met" and click Open.



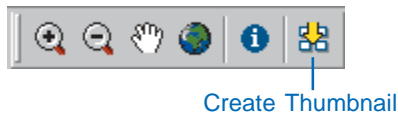
7. Click OK in the Import Metadata dialog box. The information in the feature_mask.met file replaces the metadata generated by ArcCatalog. Then, properties of the layer are automatically added to it.



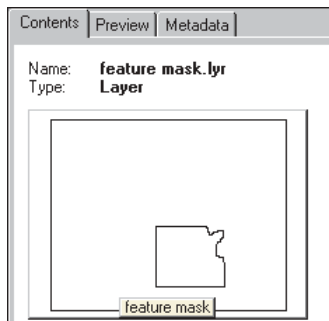
Now there is just one thing missing from the layer's metadata—a thumbnail describing how the layer will appear when added to a map. Creating thumbnails for data sources and layers is a manual process.

8. Click the Preview tab.

- Click the Create Thumbnail button on the Geography toolbar.



- Click the Contents tab. You can see the thumbnail both here and in the layer's metadata.



After adding or removing features from a data source or changing a layer's symbology, you may wish to update the item's thumbnail.

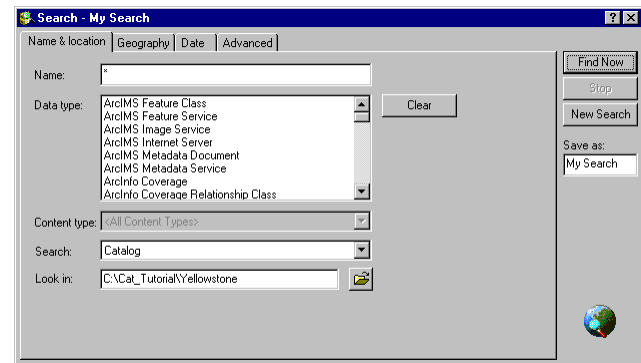
Search for items

You've explored the contents of the Yellowstone folder and created the new feature mask layer, and soon you'll add it to your map. However, often you know what data you need to use but not where it's located. The Catalog lets you search for data by its name, type, and geographic location. You can also search for data using dates and keywords that reside in the data's metadata. When metadata exists, its

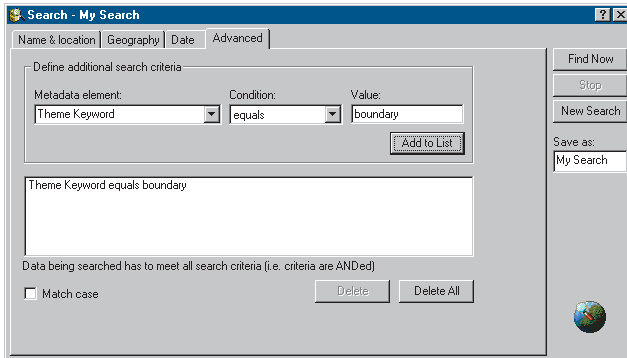
name, type, and geographic location are derived from the metadata as well.

Suppose you didn't know the feature mask layer existed. You need to add a data source to the Yellowstone map that shows the boundary of the study area within the park.

- Right-click the Yellowstone folder in the Catalog tree and click Search. The Search dialog box appears, and the location in which the search will begin looking is automatically set to the Yellowstone folder.



- Click the Advanced tab.
- Click the Metadata element dropdown arrow, scroll down, and click Theme Keyword in the list.
- Click the Condition dropdown arrow and click equals.
- Click in the Value text box and type "boundary".
- Click Add to List.

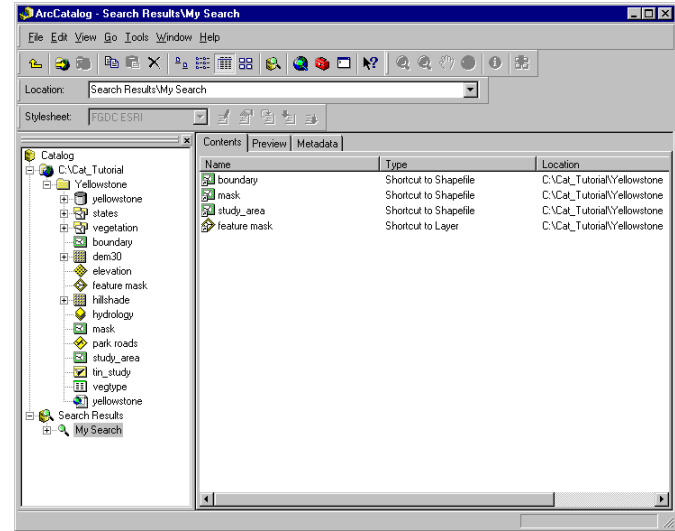


With this search, ArcCatalog will look in the Yellowstone folder for items whose metadata includes the theme keyword boundary.

7. Click Find Now.

The search is saved in the Search Results folder and is selected in the Catalog tree. As the items are found that satisfy the search criteria, shortcuts to those items are added to the search's list of results. When a Search is complete, the message "Catalog search finished" appears in the status bar of the ArcCatalog window and the Stop button becomes unavailable in the Search dialog box.

8. Click the Close button in the upper-right corner of the Search dialog box.



The Catalog has found four items in the Yellowstone folder that satisfy the search criteria: three shapefiles and the feature mask layer. Shortcuts to these items appear in the Contents tab. In the Catalog, you can work with shortcuts the same way you would work with the items themselves.

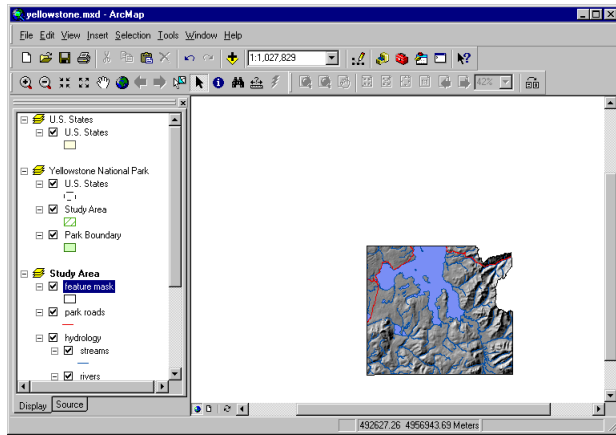
9. Click the shortcut to the feature mask layer in the Contents tab.

10. Click the Preview tab to draw the layer.

11. Click the Metadata tab to see the layer's metadata.

This is the data you want to add to your map.

12. Click and drag the shortcut to the feature mask layer from the Catalog and drop it in the map's table of contents above park roads in the Study Area data frame's list of layers. Now you only see features inside the study area on the map.



13. Click the Save button.

The Yellowstone map now contains all the basic data needed to represent the study area. Now all you need to do is add a few finishing touches to the map's layout.

Complete the map

The purpose of the Yellowstone map is to illustrate the different types of vegetation within the study area. Currently, the Study Area data frame shows most of the park. You need to zoom in on the study area; do this in layout view to make sure you're zoomed in as far as possible but still able to see the entire study area in the layout. When you switch to layout view, you'll see the Yellowstone National Park and United States data frames as well.

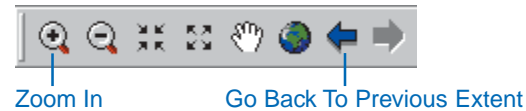
1. Click the View menu and click Layout view. You can see all the data frames and the map's title and scalebar in the layout.

In the Yellowstone National Park data frame, there is an orange rectangle representing the area that you can see

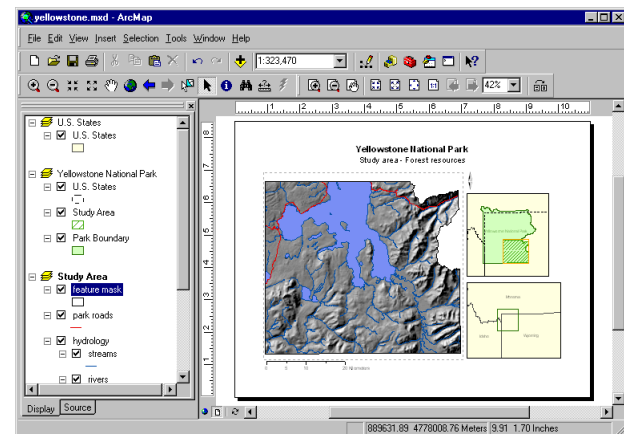
within the Study Area data frame. Similarly, in the United States data frame, there is a green rectangle representing the area that you can see within the Yellowstone National Park data frame.

When you zoom farther in to the features in the Study Area data frame, the extent rectangle on the Yellowstone National Park data frame decreases in size and the scalebar increases in size.

2. In ArcMap, click the Zoom In button on the Tools toolbar and draw a rectangle around the study area in the Study Area data frame.



If you zoom in too close, you can return to your previous extent by clicking the Go Back To Previous Extent button.



3. When the study area fills the Study Area data frame, click the Save button.
4. Click the File menu and click Exit to stop ArcMap.

In this exercise, you saw how to explore your data in the Catalog, create layers, import metadata, search for items, and add them to maps. In the next exercise, you'll create a layer illustrating the different types of vegetation that can be found within the study area. This requires changing a data source to a different format and modifying its values.

You can continue on to the next exercise or stop and complete the tutorial at a later time. If you do not move on to the next exercise now, do not delete your working copy of the tutorial data. Also, do not remove the folder connection that accesses the working copy of the tutorial data from the Catalog.

Exercise 3: Managing shapefiles

Assembling data for a project often requires significant data management work. In this exercise, you will create a layer representing the different types of vegetation in the study area and add it to the Yellowstone map. In doing so, you'll learn how to define a shapefile's coordinate system, modify attributes, join a table's attributes to a shapefile, and update metadata using tools that are available in ArcCatalog.

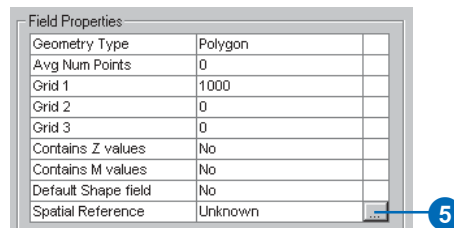
Define a shapefile's coordinate system

In the previous exercise, when you looked at metadata for the boundary shapefile, you found that its coordinate system was not defined. The features in the shapefile are projected, but the Catalog doesn't know which map projection was used. Without that information, the Catalog can't determine where on the earth's surface the features are located.

A shapefile's Properties dialog box lets you modify its attributes, create spatial and attribute indexes, and define its projection.

1. In ArcCatalog, click the Contents tab and click the Yellowstone folder in the Catalog tree.
2. In the Contents list, right-click the boundary shapefile and click Properties.
3. Click the Fields tab.
4. Under Field Name, click Shape. This column contains the feature geometry. The shapefile's spatial properties appear in the Field Properties list below.

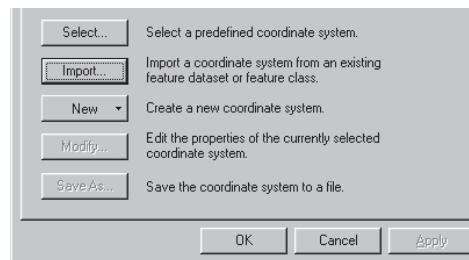
At the bottom of the list is the Spatial Reference property. The shapefile's coordinate system is unknown.



5. Click the ellipses (...) button to the right of the Spatial Reference property.

All data sources in the Yellowstone folder except for the states coverage use the same projection. You can copy coordinate system information from any data source in the folder except states to this shapefile.

6. Click Import in the Spatial Reference Properties dialog box.



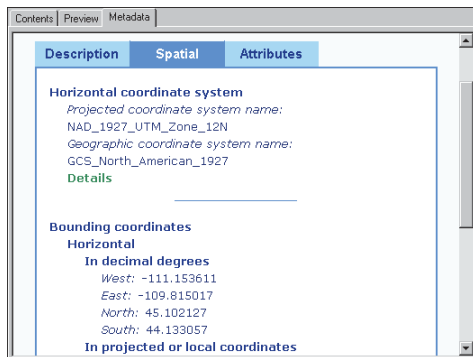
7. Navigate to the Yellowstone folder, click the dem30 raster dataset, then click Add. The projection parameters from the dem30 raster dataset appear in the Spatial Reference Properties dialog box.
8. Click OK. The shapefile's coordinate system appears in the Shape column's Spatial Reference property.

9. Click OK.

A shapefile's coordinate system information is stored in a .prj file with the data—for example, boundary.prj. Now you can update the shapefile's metadata with the new coordinate system information. By default, every time you look at metadata in the Metadata tab, the Catalog automatically updates the metadata with the data source's current properties.

10. Click the Metadata tab.

11. Click the Spatial tab in the metadata.



ArcCatalog has updated the coordinate system in the metadata and has calculated the shapefile's extent in decimal degrees.

Modify attributes in dBASE tables

A layer can join or relate attributes in a table of any format to its geographic data source as long as they share a column of values. The only requirement is that the columns have the same data type. Land cover information in the vegtype dBASE table can be joined to the vegetation

coverage's polygon feature class to describe the land cover in each area. You must look at the polygon feature class's attributes and the vegtype table's columns to see if modifications are required before they can be joined together.

Using Table view, you can see that the "CODE" attribute in the vegetation polygon feature class and the "VEGID" column in the vegtype table look like they contain related values and that the vegtype table has two columns that contain no values. Use the polygon feature class's Properties dialog box to check the CODE attribute's data type, then use the table's Properties dialog box to check the VEGID column's data type and modify its columns appropriately.

1. Click the Contents tab in the ArcCatalog window.
2. Click the vegetation coverage in the Catalog tree.
3. Right-click the polygon feature class in the Contents list and click Properties.
4. Click the Items tab. The columns in the feature class's attribute table are listed. You can see that the CODE attribute's data type is Float.

The screenshot shows the Coverage Feature Class Properties dialog box with the 'Items' tab selected. The 'Items' section contains the following table:

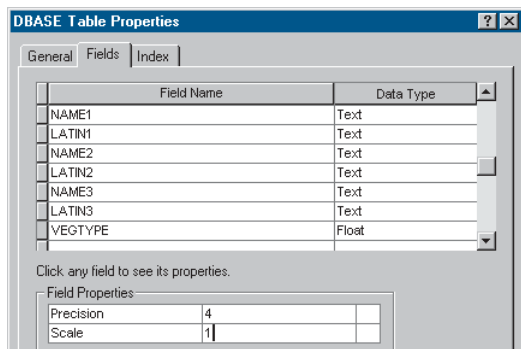
Column	Item Name	Type	Width	Output	N.Dec	Indexed	Alt. Name	Fideli
N/A	FID	OID	4	5	N/A	No		No
N/A	SHAPE	Geome	4	5	N/A	Yes		No
1	AREA	Float	4	12	3	No		No
5	PERIMETER	Float	4	12	3	No		No
9	VEGETATION#	Binary	4	5	N/A	No		No
13	VEGETATION-ID	Binary	4	5	N/A	No		No
17	CODE	Float	8	16	3	No		No

5. Click Cancel.
6. Right-click the vegtype table in the Catalog tree and click Properties.

- Click the Fields tab. The table's columns and their data types are listed. You can see that the VEGID column's data type is Long Integer.

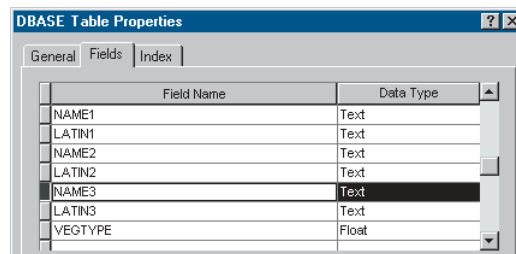
The VEGID column in the dBASE table contains integers, while the CODE column in the polygon feature class contains real numbers. To join the table to the feature class, each item must have a column containing the same values. Both columns must also have the same data type. Therefore, you must add a floating point column to the table.

- Scroll to the bottom of the list of column names. Click in the empty row under the name of the last attribute and type "VEGTYPE".
- Click under Data Type to the right of the new column's name, click the dropdown arrow that appears, then click Float.
- In the Field Properties list below, click to the right of Precision, click again, then replace the zero with "4".
- Click to the right of Scale and replace the zero with "1".



The new attribute has been defined. Now you can remove the empty columns from the table.

- Point at the gray button to the left of the NAME3 column; the mouse pointer changes to an arrow. Click to select the column.



- Press Delete. The column is removed from the list.
- Repeat steps 11 and 12 for the LATIN3 column to delete it from the table.
- Click OK.

Now that the vegetation shapefile has a new integer attribute, you must copy the values in the original VEGID attribute to the new VEGTYPE attribute. To edit the values in a table, you must use ArcMap.

Calculate attribute values in ArcMap

To edit a table's values you must add the table to a map. With the Editor toolbar visible and the table opened, you can start editing its values. Use the field calculator to copy values from the CODE attribute to the VALUE attribute.

- Click the Launch ArcMap button in ArcCatalog.



Launch ArcMap

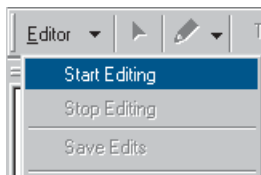
- Click OK to start using ArcMap with a new, empty map.
- Drag the vegtype table from the Catalog and drop it onto the table of contents or the canvas in the ArcMap window. The table appears in the Source tab in the map's table of contents. The table's data is now available within the map.



- Click the Editor Toolbar button; the Editor toolbar appears.

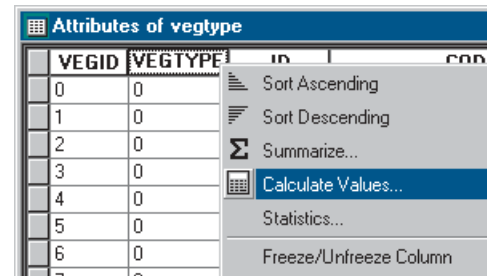


- On the Editor toolbar, click the Editor menu and click Start Editing.

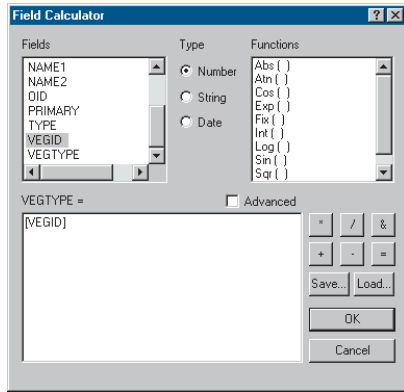


- Right-click the vegtype table and click Open. The table's values appear in a table window. The headings of the columns whose values you can change have a white background.

- Click the heading of the VEGID column to select the column.
- Scroll horizontally in the table until you see the VEGTYPE column.
- Hold the Ctrl key and select the heading of the VEGTYPE column.
- Right-click the heading of the VEGTYPE column and click Freeze/Unfreeze Column. Both VEGID and VEGTYPE are now positioned at the left of the table with a heavy black line to their right.
- Right-click the heading of the VEGTYPE column and click Calculate Values.



- Scroll down and double-click VEGID in the Fields list. [VEGID] appears in the text box below VEGTYPE =. ArcMap reads this as VEGTYPE=[VEGID]. This means for each row in the table, the value in the VEGTYPE column will be set equal to the value stored in the VEGID column.



13. Click OK.

As ArcMap calculates the new values in each record, you can see how many records have been completed at the bottom of the Field Calculation dialog box.

14. Look at the VEGTYPE column in the table; its contents are the same as the VEGID column.

15. Click the Close button in the top-right corner of the table window.

16. Click the Editor menu on the Editor toolbar and click Stop Editing. Click Yes to save your changes.

17. Click the File menu and click Exit to stop ArcMap. Click No when prompted to save the map.

Update the table's metadata

In the previous two tasks you removed and added columns from and to the vegtype table, then populated the new column with values. Now you should update information about the table's columns in its metadata.

1. Click the Metadata tab.

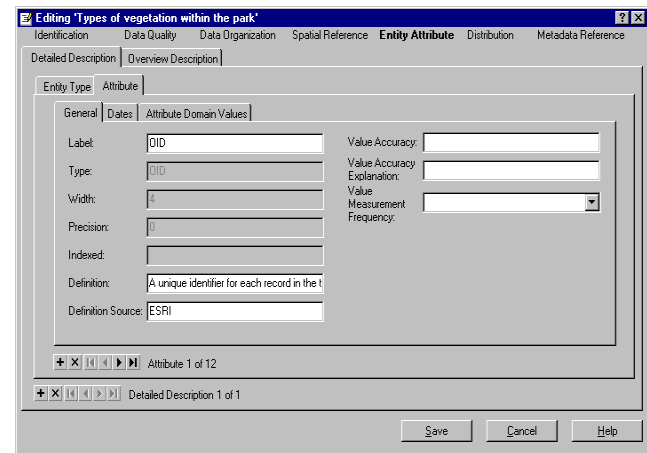
2. Click the Attributes tab in the metadata. ArcCatalog has automatically updated the metadata to remove information about the columns that were deleted from the table.
3. Click VEGTYPE in the list of columns. The data type of this column was added to the metadata automatically.

To describe the data contained in the VEGTYPE column, use the Catalog's FGDC metadata editor.

4. Click the Edit Metadata button on the Metadata toolbar.

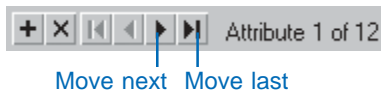


5. Click Entity Attribute at the top of the metadata editor. The editor is currently showing you metadata for the polygon feature class.
6. Within the Detailed Description tab, click the Attribute tab.

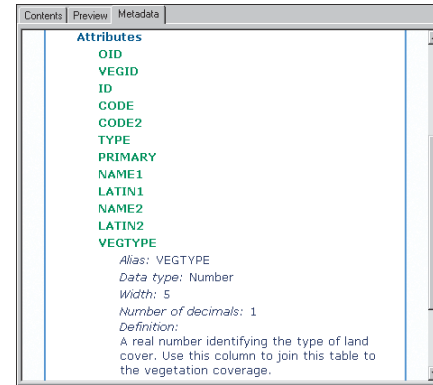


The Attribute tab currently shows metadata for the first column in the vegtype table, the OID column. The Definition text box shows that this column contains a unique value for each record in the table.

7. In the toolbar at the bottom of the Attribute tab, click the Move next button. The column displayed in the Attribute tab advances to the next one listed in the table's metadata—the VEGID column, which contains integers identifying each type of land cover.



8. Click the Move last button to see the VEGTYPE column.
9. Click in the Definition text box and type, “A real number identifying the type of land cover. Use this column to join this table to the vegetation coverage.”
10. Click Save.
11. Click the Attributes tab in the metadata.
12. Click the VEGTYPE column. The description you added appears in the metadata. Anyone who uses this table in the future will be able to find out what data this column contains.

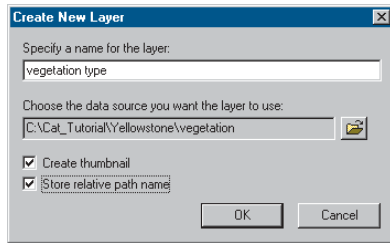


Now that the vegetation coverage and the vegtype table have matching columns, you can create a layer that links the two together.

Create a layer using the related attributes

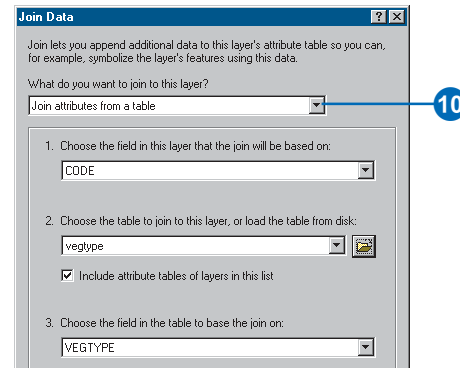
Through a layer you can join the attributes stored in the vegtype table to the vegetation coverage and use the table's values to query, label, and symbolize the coverage's features.

1. Click the Contents tab in the ArcCatalog window.
2. Click the Yellowstone folder in the Catalog tree.
3. Click the File menu, point to New, then click Layer.
4. Type a name for the layer such as “vegetation type”.
5. Click the Browse button, navigate to the Yellowstone folder, click the vegetation coverage, then click Add.
6. Check Store relative path name, then click OK.

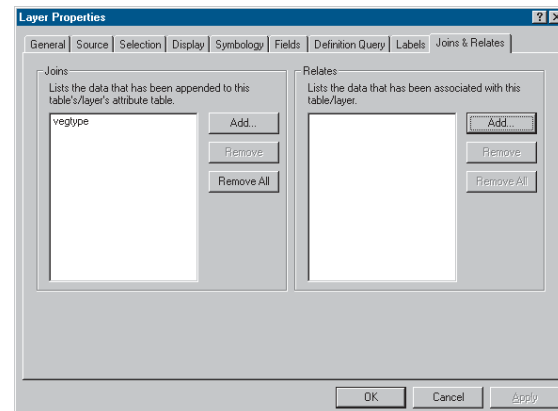


A relative path specifies the location of the data used by the layer relative to the location of the layer file on disk. Since relative paths don't contain drive names, they let you continue using the layer even after moving or renaming the Yellowstone folder, without having to repair the layer.

7. Right-click the vegetation type layer and click Properties.
8. Click the Joins & Relates tab in the Layer Properties dialog box.
9. Click the Add button next to the Joins list.
10. Click the first dropdown arrow to specify what you want to join to this layer, then click Join attributes from a table.
11. Under step 1, click the dropdown arrow and click the CODE attribute.
12. Under step 2, click the Browse button.
13. Navigate to the Yellowstone folder, click the vegtype table, and click Add.
14. Under step 3, click the dropdown arrow and click the VEGTYPE column.

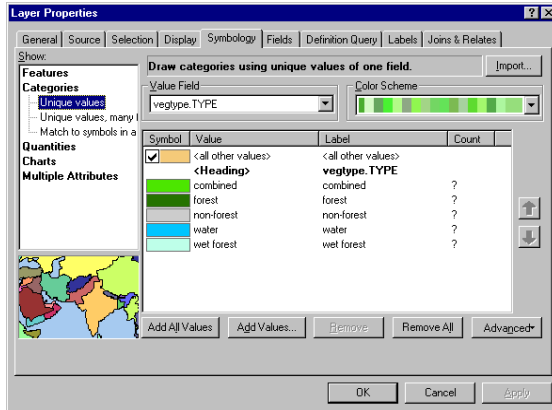


15. Click OK in the Join Data dialog box. The vegtype table is added to the list of tables that have been joined to the coverage.



16. Click the Symbology tab.
17. Click Categories in the Show list.
18. Click the Value Field dropdown arrow and click vegtype.TYPE.

19. Click the Color Scheme dropdown arrow and click a different color palette, if desired.
20. Click Add All Values.



To change the color of individual values, for example, to make the water polygons blue, double-click the patch of color to the left of the value. Set the fill and outline colors in the Symbol Selector dialog box and click OK.

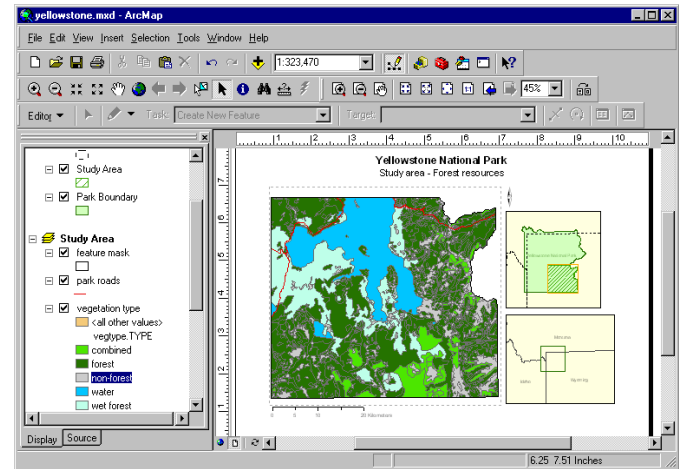
21. Click OK in the Layer Properties dialog box.

The vegetation type layer represents the forest resources in the study area.

Add the vegetation type layer to the map

Now that the vegetation layer has been created, you can add it to the Yellowstone map.

1. Double-click the Yellowstone map in the Catalog.
2. Click and drag the vegetation type layer from the Catalog and drop it in the map's table of contents below park roads and above hydrology in the Study Area data frame's list of layers.



3. Click the Save button in ArcMap.
4. Click the File menu and click Exit to stop ArcMap.

The Yellowstone map is now complete.

You're now finished with the Quick-start tutorial. This exercise showed how to use ArcCatalog to manage shapefiles and dBASE tables including how to define a coordinate system and add and remove attributes.

Overall, this tutorial has introduced you to a wide range of tasks. Whether you are looking for data, building maps, or managing data for your project or an entire organization, ArcCatalog plays a pivotal role in getting the job done. The remaining chapters in this book look in detail at the variety of tasks you can accomplish with ArcCatalog.