What You Will Need
- ArcGIS 9 (ArcView, ArcEditor, or ArcInfo license)
- The sample dataset downloaded from the *ArcUser Online* Web site
- An unzipping utility such as WinZip

ArcGIS 9
Enhancements Promote Productivity

ArcGIS 9, the newest major release of ArcGIS, provides new functionality in many areas and extended capabilities for previously existing tools and functions. Numerous enhancements deliver better performance in many key areas.

- ArcGIS 9 integrates raster data in the geodatabase and lets users manage raster data using ArcCatalog.
- The performance and scalability of the geodatabase in a multiuser work flow has improved.
- All or any part of a geodatabase can now be exported to an XML file for importing into another geodatabase or as part of a disconnected editing work flow. The XML specification will be published by ESRI, which will make geodatabases completely open and interoperable.
- Composite address locators can now be defined for geocoding.
- Two new applications, ArcGIS Engine and ArcGIS Server, offer new deployment opportunities. ArcGIS facilitates cross platform application deployments based on core ArcGIS functionality. ArcGIS Server deploys server-based ArcGIS services and applications on Intranets and the Internet.

ArcGIS 9 also includes a completely new environment for geoprocessing. In ArcGIS 9, users can perform geoprocessing operations by using tool dialog boxes; through building and running interactive visual models; by running commands or ARC Macro Language (AML) scripts from the command line; by invoking scripts written in standard scripting languages such as Python, JScript, or VBScript, or by programming ArcObjects in Visual Basic 6, Visual Basic.NET, C#, or C++.

Another article in this issue, "Working With ArcGIS 9: Building a Groundwater Protection Model," walks the reader through an exercise that uses this new geoprocessing functionality and demonstrates ModelBuilder, the ArcGIS 9 visual modeling environment.

About These Exercises

In addition to these new features, significant improvements have been made to the usability of ArcGIS 9. The articles in this section highlight a selection of the most requested usability enhancements that speed common tasks by eliminating multiple menu choices or mouse clicks through employing keyboard shortcuts or by grouping similar functions together. Working through these exercises will introduce the reader to some of the many ways ArcGIS 9 promotes greater productivity and provides users with quicker and more flexible ways to accomplish common tasks such as manipulating data layers, navigating the Table of Contents, making selections, identifying features, and placing labels.

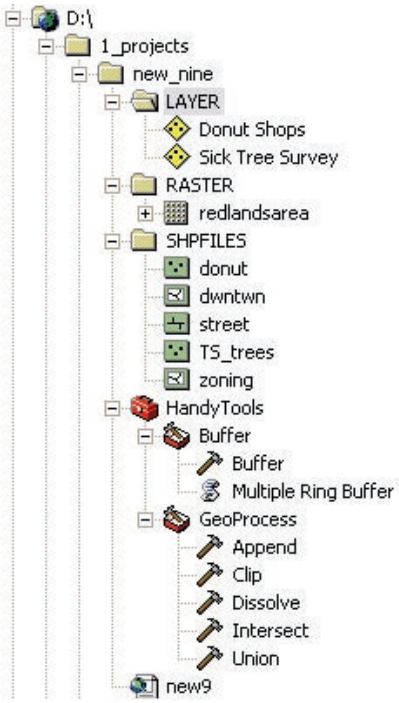


Figure 1: The directory containing the unzipped sample dataset

After downloading the sample dataset from *ArcUser Online* (www.esri.com/arcuser), unzip the file and store it locally. It contains a map document, New9.mxd, and data that will be used for *all* the exercises in this section.

Quick Tips at a Glance

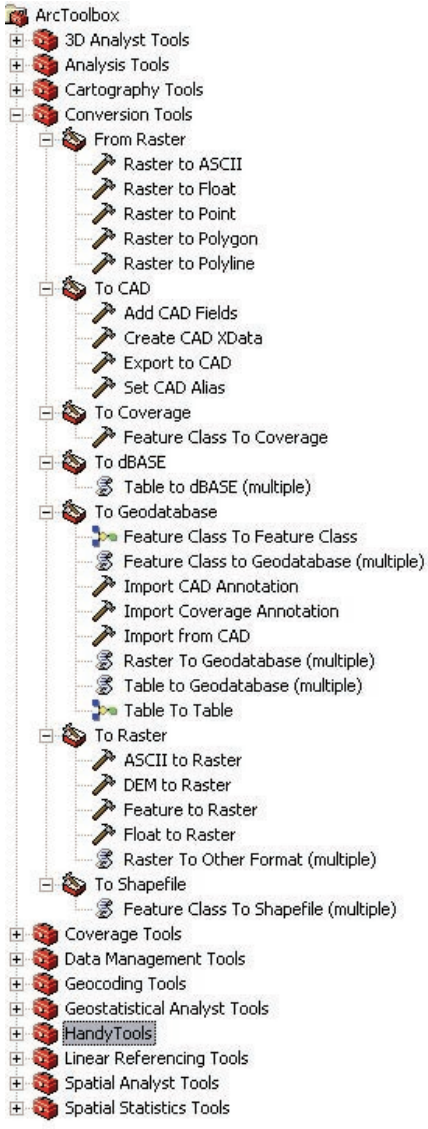
Task	Action
Giving the focus to Table of Contents	Press F3
Return focus to map	Press Esc
Select a layer or Data Frame	Use up and down Arrow or type first letter of layer or Data Frame
Open Properties for layer or Data Frame	Select item and press Enter
Activate a Data Frame	Select item and press F11 or hold Alt key and click the Data Frame
Access context menu for layer or Data Frame	Hold Shift and press F10 or press Application key or right-click
Collapse all layers in Data Frame	Invoke context menu and choose Collapse All Layers or hold Control and click on the +/- box
Turn layers on and off	Select one or more layers and press the Spacebar
Rename layer or Data Frame	Select item and press F2
Move to beginning or end of Table of Contents	Press Home or End keys
Duplicate a layer in a Data Frame	Hold down the Control key and drag and drop the layer
Copy and paste multiple layers in a Data Frame	Select by holding down the Control key and clicking on the layers to select them. Access context menu and choose Copy, then choose Paste.

Exploring ArcCatalog

Before beginning this exercise, start ArcCatalog to inspect the data and explore some of the changes in this application at version 9.

The command for showing and hiding the Catalog Tree window has been moved from the View menu in the standard menu bar to the Window menu where it joins the ArcToolbox and Command Line controls. This centralizes the commands for controlling the ArcCatalog window.

In the Windows menu, click the ArcToolbox choice. At version 9, ArcToolbox has been incorporated into both ArcMap and ArcCatalog so geoprocessing tools are organized and accessible. Tools are organized into toolboxes, which contain subcategories called toolsets. Toolboxes and toolsets can contain scripts and models as well as tools. The number and kinds of tools available depend on the license used (i.e., ArcView, ArcEditor, or ArcInfo) and the extensions available.



The new conversion tools available in ArcGIS 9 supply both import and export capabilities.

Getting Organized With ArcToolbox

The ArcToolbox window can be dragged below the Catalog Tree window to expand the area for viewing filed contents, previews, and metadata. The ArcToolbox window can be reorganized, and custom toolboxes can be created.

Custom toolboxes can store frequently used existing tools, models, and custom scripts and tools. Toolboxes are saved as TBX files. Although the default storage location for custom toolboxes is the user's profile directory in Windows, TBX files can be saved in any folder or in a geodatabase.

Expand the new_nine folder and notice that it contains a toolbox called HandyTools. Click again to expand the HandyTools toolbox. This custom toolbox contains tools for Dissolve, Merge, Clip, Interest, and Union, the five tools that were accessed using the Geoprocessing Wizard in 8.*x*. The Buffer and Multiple Ring Buffer from the Buffer Wizard have also been included in this toolbox.

Right-click the HandyTools toolbox and choose Add to ArcToolbox. Now HandyTools appears in the ArcToolbox window. Right-click on it in the ArcToolbox window and choose Help to see the documentation that was created for this toolbox. Note that the documentation lists where the tools in this toolbox can be found in the ArcGIS 9 default toolboxes.

Custom Help can be created for any new or existing toolbox. Documentation created for toolboxes can contain information on the toolbox's author, any constraints on its use, an abstract, keywords, tool descriptions, illustrations, and links.

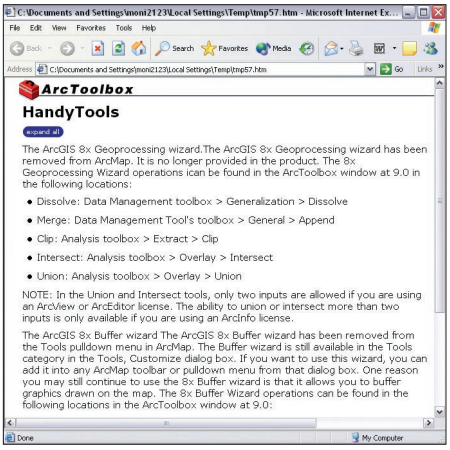
Right-click the toolbox again and choose Edit Documentation. In the ArcToolbox Documentation Editor, click Keywords. On the right side of the dialog box, click the second line and type Geoprocessing Wizard. Click the Finish button to stop editing the documentation.

Updating Data Sources

References to file-based data sources for map documents (.mxd files) and published map documents (.pmf files) can be updated or repaired from ArcCatalog. Right-click on New9.mxd and choose Set Data Source(s). In the dialog box, click the drop-down box to the select Diet Hazards Data Frame. Correct the reference for Diet Hazard: Redlands Area MrSID by clicking on it. Click the button to the right of the New Data Source for this layer, and use the Browse for Data dialog box to select the \Redlands\Raster\RedlandArea.sid. Click OK.

New Data Conversion Tools

In ArcToolbox, expand the Conversion toolbox to see the new conversion tools available that supply both import and export capabilities. Like all the tools in the new geoprocessing framework, these tools can be launched individually, run at the command line, used in scripts, or added to models. This flexible approach makes it easy to combine operations and create a complete work flow.



The HandyTools toolbox contains custom help created for this toolbox. Tools in ArcGIS allow creation and editing of documentation.

The new ArcView 8x Tools toolbar provides easy access to the ArcGIS 8.*x* conversion tools typically needed by ArcView users, although it is available at all license levels. Choose View > Toolbars > ArcView 8x Tools to display it. Many tools and wizards from 8.*x* were retained and can be viewed by choosing Tools > Customize from the menu. Make these tools readily available by dragging them to a new or existing toolbar. Note that these tools have been carried over from ArcGIS 8.*x* and do not participate in the new geoprocessing framework.

New Coordinate Systems

The list of available coordinate systems has been significantly augmented in ArcGIS 9. Support has been added for more than 250 additional geographic transformations. More than 300 new geographic coordinate system (i.e., .prj files) and nearly 1,000 projected coordinate systems have been added. These include Fuller, Rectified Skew Orthomorphic (RSO), Cube, Robinson ArcInfo, and an improved version of the ArcInfo Workstation LOCAL projection called Local Cartesian.

In ArcToolbox, expand Data Management Tools > Projections and Transformations > Feature and click Project to access the Project dialog box. Click the Browse button next to the Output Coordinate field. In the Spatial Reference Properties dialog box, click Select and drill down through the Geographic Coordinate Systems or Projected Coordinate Systems folder to inspect the available coordinate systems.

Learn More About ArcCatalog

When finished exploring ArcCatalog, close all the dialog boxes. Click Help in the standard menu bar. This menu includes a link to the online GIS Dictionary at the ESRI Support Center. At the site, browse or query for a term. To learn more about new functionality in ArcGIS 9, access the ArcGIS Desktop Help and choose the topic "What's New in ArcGIS Desktop 9." Exit ArcCatalog before going on to the next section of this exercise.

Working Quickly and Easily in **ArcMap**

ArcGIS 9 adds new capabilities and extends existing functionality. This tutorial concentrates on usability and productivity enhancements relating to navigating and manipulating the Table of Contents, layers, group layers, and Data Frames; labeling features; and selecting and identifying features. ArcGIS 9 provides options for accomplishing common tasks from the keyboard rather than the mouse and eliminates drilling down through menus to execute common functions.

Navigating Through the Table of Contents

This exercise will use the sample dataset and map document, new9.mxd, from the previous exercise.

1. Start an ArcMap session and open new9.mxd. Save the file as new9_finish.mxd to the same directory. The keyboard can be used to move the application focus between the Table of Contents and the map. Click F3 to give the focus to the Table of Contents so keyboard strokes will go to it and allow the use of keyboard shortcuts. Press Esc to give the focus back to the map.

2. Use the up and down arrows to select Data Frames or individual layers. Use the down arrow to select the Downtown Tree Study. Press F11 to activate it. Alternatively, hold the Alt key and click on the Data Frame name to activate it.

3. Pressing the first letter of any layer or Data Frame will select it. If more than one layer begins with that letter, the selection will move down to the first instance. Press again to move to the next instance until reaching the end of the Table of Contents. It will then move to the top of the Table of Contents. Press the letter Z to select the Zoning Polygons layer. Press the Enter key to open the Layer Properties dialog box. Press Esc to close this dialog box.

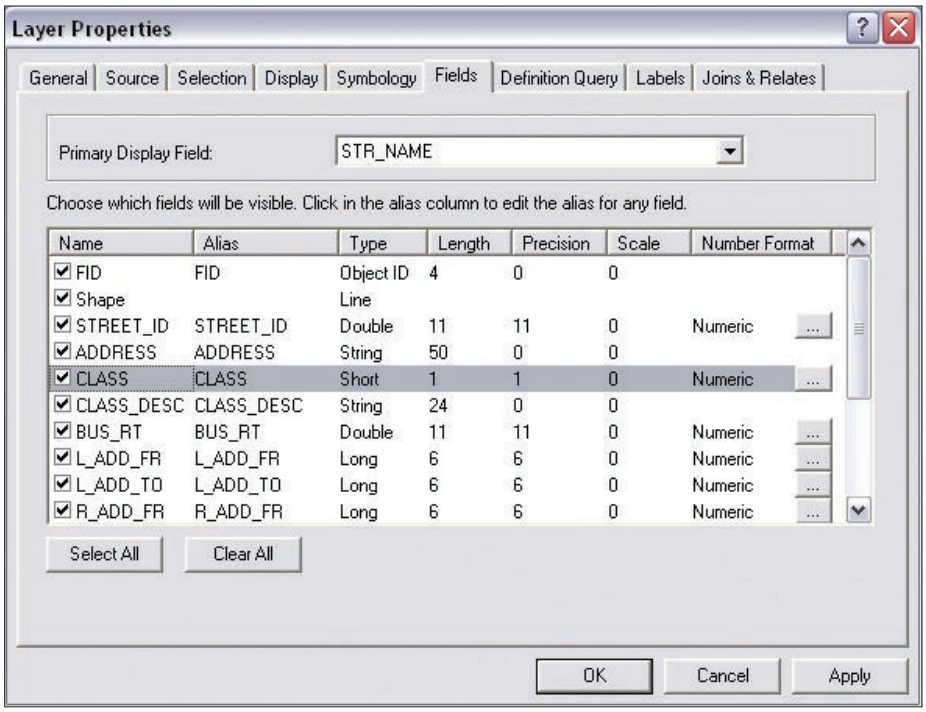
4. Use the Home and End keys to move quickly to the first and last entries in the Table of Contents. Press Home to select the Diet Hazards Data Frame and F11 to activate it.

5. Context menus for any selected Data Frame or layer can now be accessed by holding Shift + F10 or by pressing the Application key on a Microsoft compatible keyboard in addition to using a right mouse click.

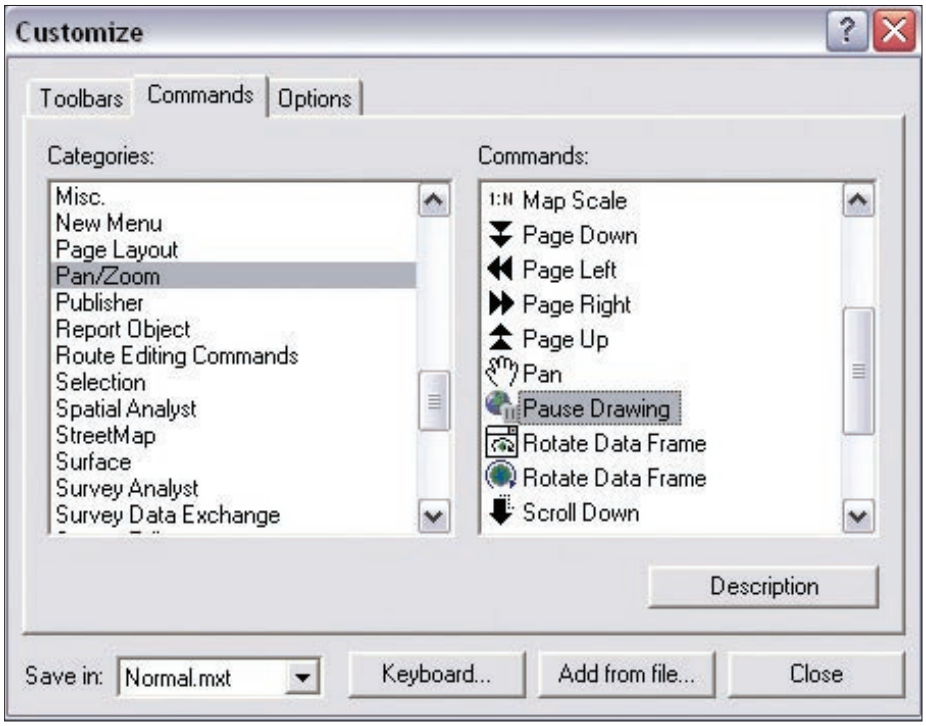
6. Right-click on the Diet Hazard Data Frame and choose Collapse All Layers. Alternatively, hold the Control key and click on the +/- box next to the Data Frame to expand or collapse the layers in the frame.

7. Right-click on the Diet Hazard Data Frame again and choose Turn All Layers Off. This context menu can also be used to turn all the layers on.

8. Select the Donut Shops layer. Hold down the Shift key and arrow down to select the Streets, Downtown Boundary, and Zoning—Polygons layers. Hold down the Control key and press the Spacebar to turn all these selected layers on. Alternatively, hold down the Control key and click on any of the selected layers.

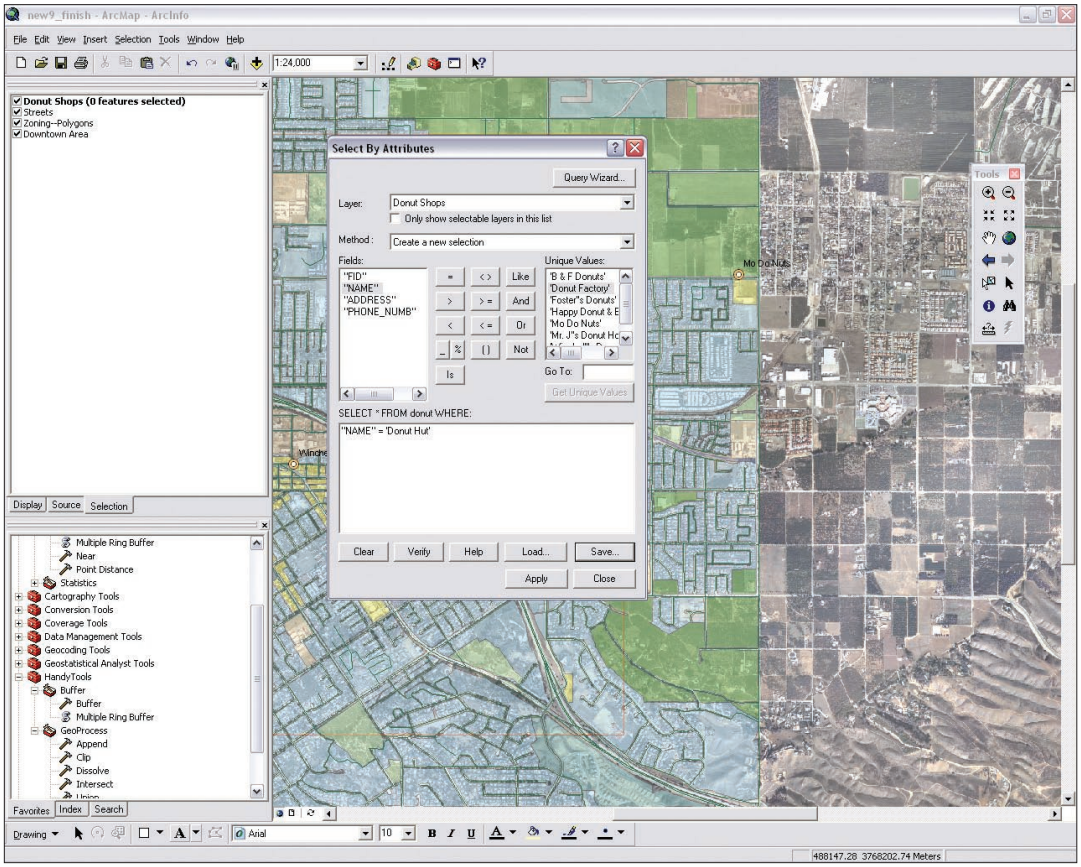


The Layer Properties dialog box features an improved dialog box for Field that makes it easy to see the names, aliases, types, length, precision, scale, and number format of the fields in the attribute table.



Install the Pause Drawing command as a button on the standard toolbar.

9. Move the Diet Hazard Data Frame below the Downtown Tree Study Data Frame by selecting it and dragging it to the new position. A Data Frame can also be copied by holding down the Control key and clicking and dragging the Data Frame to



The selection logic used by ArcMap changed. ArcGIS 9 differentiates between the layer state of 0 features selected and the layer state with no set of selected features.

a new position. It copies when released.

10. Copy the Streets and Zoning—Polygon shapefiles from the Diet Hazards Data Frame to the Downtown Tree Survey Data Frame. Hold down the Control key and click on Streets and Zoning—Polygons, access the context menu, and choose Copy. Select the Downtown Tree Survey Data Frame and press F11 to activate it. Access the context menu and choose Paste Layer(s). Multiple layers can also be dragged and dropped or copied and pasted between two ArcMap sessions.

Working With Layers

Layers can now be more directly manipulated with minimal clicks and choices.

1. With the Streets layer selected, open the Layer Properties dialog box by pressing the Enter key or pressing F12.

2. In the Layer Properties dialog box, click the Fields tab. The improved dialog box makes it easy to see the Primary Display Field and lists the names, alias, type, length, precision, scale, and number format. Click OK or press Esc to close this dialog box.

3. Press F2 and type "Redlands Streets" to rename the layer.

4. Press the Spacebar to turn the layer off. Press it again to turn the layer on again.

The accompanying table "Quick Tips at a Glance" summarizes these shortcuts.

Pause Drawing

The Pause Redrawing command is a great time-saver when building a map document or refining a map. It is not available from the default GUI but can easily be added as a button or a shortcut. This section adds both versions.

1. Choose Tools > Customize. Click on the Commands tab and select Pan/Zoom from the Categories pane. In the Save In drop-down, make sure Normal.mxt is selected so the command will be available in all map documents.

2. Scroll down to Pause Redrawing and select it. Drag this command to a convenient location on the standard toolbar. Click on this button to toggle redrawing off and on.

3. Still on the Commands tab, click on the Keyboard button. Click in the box under Press New Shortcut Key. Hold Alt and press S. Click the Assign button. Click Close twice to close the dialog boxes.

Getting Selective

The Selection tab in the Table of Contents now appears by default so selection layers can be set quickly. To learn more about the Selection, Source, or Display tabs, press F3 to give the Table of Contents the focus and press F1. To turn selectability for all layers on and off at once, hold down the Control key and click any check box.

The selection logic used by ArcMap changed. ArcGIS 9 differentiates between the layer state of 0 features selected and the layer state with no set of selected features. ArcGIS 8.*x* made no distinction between these states. In the new geoprocessing framework this distinction becomes important because it affects whether none of the features or all features will be used in the next step of a process.

To illustrate the difference, make sure the Selection tab is displayed. Choose Selection > Select by Attributes, create the expression "NAME" = 'Donut Hut' in the text box, and click Apply. This expression will return no feature because this name does not exist in the attribute table. On the Selection tab the Donut Shops layer will be bold and followed by "(0 features selected)". In ArcGIS 8.*x*, layers were bold only if one or more features were selected.

Selections can still be cleared by using the Clear Selected Features command or by clicking on the map with the Select Features tool. However, note that if all the features in a layer are selected, choosing Switch Selection does ***not*** clear the selected set but does set the number of features selected to 0.

The list of layers from which features are selected can now be restricted to layers currently set as selectable on the Selection tab by checking a box in both the Select By Location and the Select By Attributes dialog boxes.

To improve performance when working with large datasets, the Unique Values list is no longer automatically populated in the Select

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Working Quickly and Easily in **ArcMap**

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By Attributes dialog box. Click the Get Unique Values button if these values are needed.

Queries for attribute selections can now be based on NULL values. NULL values are supported in geodatabases and in the date fields of shapefiles (i.e., in dBASE files) and coverages. The Select By Attributes dialog box now also automatically determines the correct format for date queries based on the type of data being queried. For more information about date fields, search on "SQL reference" in the index for ArcGIS Desktop Help. The improved SQL help contains an expandable list of SQL operators and functions.

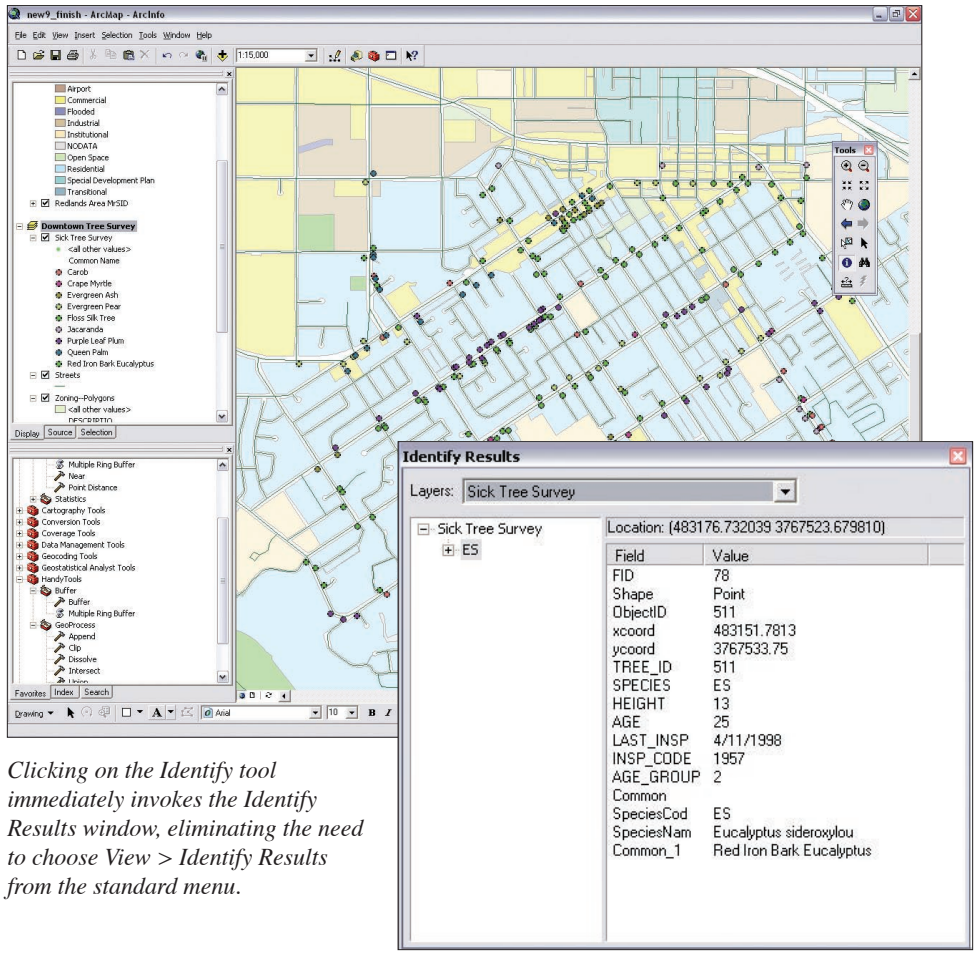
Simplified Identify Tool

The enhancements to the Identify tool were driven by user suggestions. Clicking on the Identify tool immediately invokes the Identify Results window, eliminating the need to choose View > Identify Results from the standard menu. With the Identify Results window, the layer to identify from can be selected and this window can be moved so it will not obscure the area of interest on the map. The <Top Most Layer> is still the layer selected by default, but it has been moved to the top of the drop-down list so it is easily identified.

1. Activate the Downtown Tree Survey Data Frame.

2. Click the Identify tool. The Identify Results window appears. Click the Layers drop-down and select Sick Tree Survey.

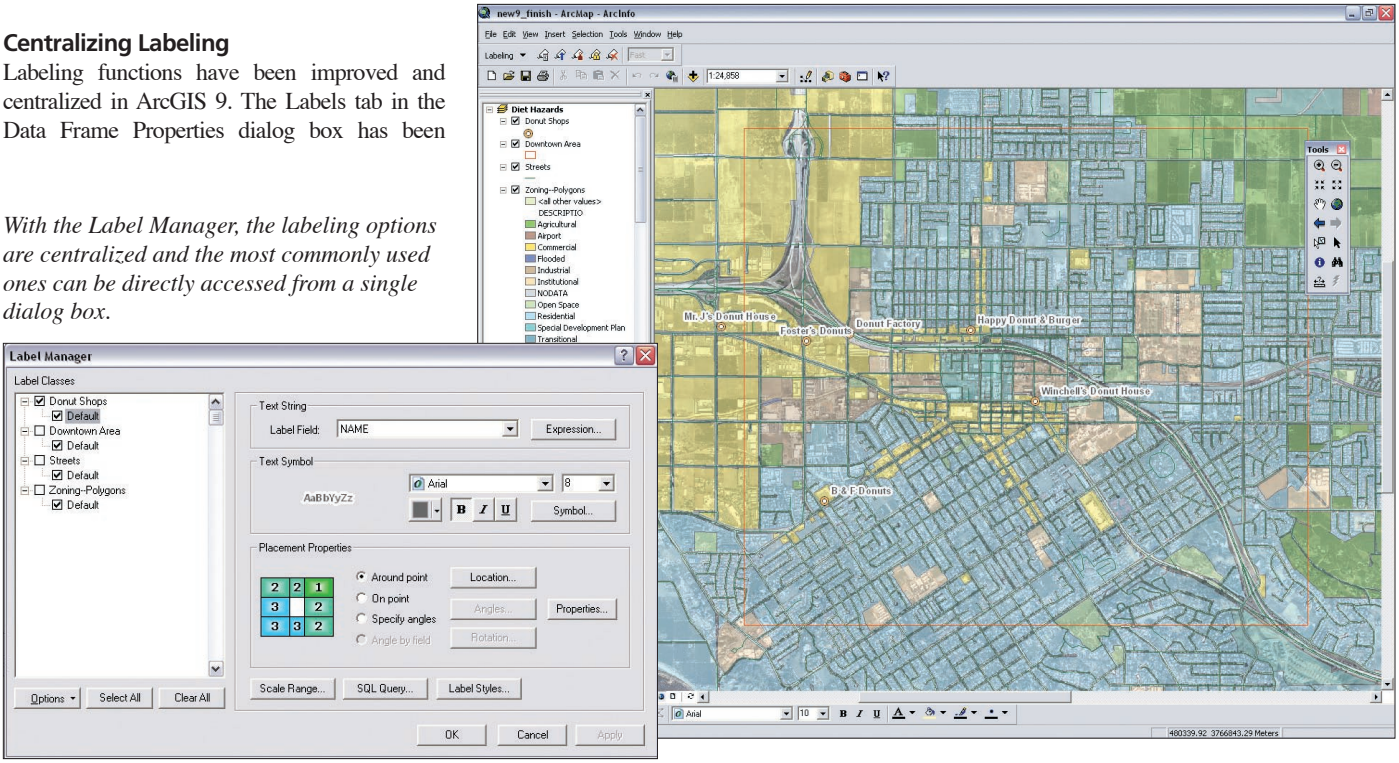
3. Click on one of the trees to bring up the information for this feature.



Clicking on the Identify tool immediately invokes the Identify Results window, eliminating the need to choose View > Identify Results from the standard menu.

Centralizing Labeling

Labeling functions have been improved and centralized in ArcGIS 9. The Labels tab in the Data Frame Properties dialog box has been



With the Label Manager, the labeling options are centralized and the most commonly used ones can be directly accessed from a single dialog box.

replaced by the new Label Manager. In the Label Manager, label priority ranking and label weight ranking can be set. Labels can now be locked and unplaced labels viewed. These label functions can be accessed from the Labeling toolbar or the Data Frame context menu.

With the Label Manager, the labeling options are centralized and the most commonly used ones can be directly accessed from a single dialog box. It is no longer necessary to click the Symbol button to change font, size, or color for label text. The label field, placement properties, and label classes can be set directly from this dialog box. Scale range, label styles, and labeling by expression are just a click away.

More fonts are supported by ArcGIS 9. At ArcGIS 8.*x*, only TrueType and TrueType-based Open Type fonts were supported. Now Type 1 fonts, TrueType collection and MultipleMaster fonts, and OpenType fonts (based on TrueType, Type 1, and Type2CFF) are also supported. Icons in the font drop-down indicate the kind of font selected.

1. Make sure the Diet Hazard Data Frame is active. Choose View > Bookmarks > Donut Central to zoom in to the view and trigger the Donut Shop display.

2. Choose View > Toolbars > Labeling to display the Labeling toolbar. Notice that the toolbars list is now alphabetized so toolbars can be quickly located. The toolbar list can be accessed by right-clicking on any toolbar so toolbars can be turned off and on.

3. With the Labeling toolbar open, pass the cursor over each button to identify its function. Click the Label Manager button to open its dialog box.

4. In Label Classes tree on the left side of the Label Manager, highlight Default under Donut Shops.

Under the Text Symbol section, change the font to Arial Narrow, the point size to 8, the style to bold, and the color to Gray 60%.

5. Click the Label Weight Ranking button and set the Feature Weight to Medium and Label Weight to High. These parameters control placement when there are conflicts between labels and features in the active Data Frame.

An optional extension, the Maplex for ArcGIS extension, provides high-quality cartographic label creation and fitting. If this extension is available and loaded, abbreviation dictionaries can be used and many additional labeling parameters set.

Conclusion

These are just a few of the hundreds of enhancements in ArcGIS 9. Additional information on the new features in ArcGIS 9 can be found in the online help. See the accompanying article, "More Ways to Learn About ArcGIS 9," for the online and instructor-led courses available.

More Ways to Learn About **ArcGIS 9**

To learn more about new features in ArcGIS 9, access the ArcGIS Desktop Help and choose the topic "What's New in ArcGIS Desktop 9." It contains subheadings for ArcMap and ArcCatalog and the ArcGIS extensions. For users moving to ArcView 9 from ArcView 3, see the help section "Migrating from ArcView GIS 3 to ArcView 9."

Both instructor-led and online courses are available for users transitioning to ArcGIS 9 as well as those new to GIS. Visit www.esri.com/training for class listings and related information.

Learn About the Latest Enhancements in ArcGIS 9

Instructor-Led Training

The newest capabilities of ArcGIS Desktop are showcased in *What's New in ArcGIS 9*. Learn about the new geoprocessing, command line, and modeling environments; enhancements to the geodatabase; advanced scripting capabilities; labeling and annotation improvements; three-dimensional visualization and analysis with ArcGlobe; and the new functionality in the ArcGIS Publisher and Maplex for ArcGIS extensions.

New Web Course Teaches the Basics of ArcGIS 9

Virtual Campus Web-Based Training

To teach new GIS users who want to learn the major functionality offered by ArcGIS, *Learning ArcGIS 9* guides users through GIS analytical processes provided with a variety of ArcGIS tools to solve realistic problems. This course emphasizes practical GIS skills including how to symbolize data for different types of maps, create and edit geographic data, perform spatial analysis, and design presentation quality maps.

New Web Seminar Highlights ArcGIS 9 Features

Virtual Campus Web-Based Training

Explore the new features in ArcGIS by taking the free *What's New in ArcGIS 9* training seminar. Learn about some of the most important new functionality including data interoperability options, labeling and annotation improvements, geodatabase enhancements, the geoprocessing framework, three-dimensional visualization tools, and new options for developers.

New Web Course Introduces the ArcGIS 9 Geoprocessing Environment

Virtual Campus Web-Based Training

Geoprocessing with ArcGIS 9 (for ArcInfo) is designed for experienced GIS and ArcGIS users who want to learn about the new geoprocessing environment and the geoprocessing tools and techniques for managing and analyzing GIS data. Course exercises show how to set up the geoprocessing environment, choose appropriate geoprocessing tools for a variety of tasks, prepare data for analysis, create models, execute analyses, and automate and refine geoprocesses using scripts.