



Chapter 6

Typography in the View

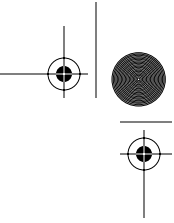
The act of placing lettering on a map remains one of the most challenging tasks facing a cartographer. The art and science of lettering, called typography, has come a long way in the digital age, but placing words on the map can still be a very tedious chore.

Two decades ago, type was placed on a map using press-on lettering or by placing on the map small pieces of wax-backed paper containing whole words produced on a photo typesetter. All of this changed in 1984 with the invention by Adobe Systems of digital type and electronic fonts for use on the computer. The invention of digital type started a renaissance in the discipline of typography, allowing type designers the freedom to create thousands of type styles and the ability to resurrect old classics for use in the computer age.

Text is added to a map for three general purposes: to accurately label map features in the View, to document map themes in the legend, and to populate margin information, such as the map title and source statement. By far the most involved task is that of labeling geographic features on the map itself, which can range from a mere handful of names to thousands of labeled map features. Clearly, this is no task for the faint of heart!

Digital typographic tools have made the cartographer's work much easier, but labeling map features with type has been one of the weakest points of the ArcView software. In fact, you need to





closely consider how much labeling each map product demands. ArcView projects with extensive labeling tend to bloat up to enormous file sizes and become difficult to manage and work with. Maps with thousands of labels are better finished in other graphics software packages, such as Adobe Illustrator or Macromedia Freehand, which have extensive typographic tools and font management options.

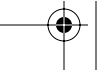
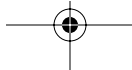
Recent improvements to ArcView have helped, such as the introduction of new labeling tools in ArcView 3.1 and the creation of ArcView extensions that help control the text labeling process. However, before examining these tools, you need to understand some type terminology and general conventions for the use of type on a map.

Type Terminology

More people than ever use word processors, page layout programs, and graphic applications on computers, but few people take the time to master digital typography. Here is an overview of type terminology that will prove helpful when it comes time to put text on a map.

Typography is the science (and art) of creating, managing, and placing type in documents, which today is almost entirely digital (that is, managed on a computer). Lettering is a traditional term used to describe the process of placing letters and words (type) on a map. Feature labeling is the process of lettering map features with the appropriate names. This process takes place in the map display portion of the View within ArcView.

Type consists of characters, typefaces, fonts, and font families. A character is the individual letter of the alphabet, number, or symbol that makes up a typeface. A typeface is the design of the characters that along with several other factors, such as type weight and pitch, make up a font. Common digital typefaces (shown in the following illustration) include Arial, Helvetica, and Times. Typefaces and fonts come in two basic styles, serif typestyles and sans serif typestyles.



cdch06001.epa

Serif Type

Times New Roman 10pt:

Labeling maps is a lot of work

*Labeling maps is a lot of work***Labeling maps is a lot of work*****Labeling maps is a lot of work***

Adobe Garamond 10pt:

Labeling maps is a lot of work

*Labeling maps is a lot of work***Labeling maps is a lot of work*****Labeling maps is a lot of work*****San Serif Type**

Arial 10pt:

Labeling maps is a lot of work

*Labeling maps is a lot of work***Labeling maps is a lot of work*****Labeling maps is a lot of work***

Adobe Helevetica 10pt:

Labeling maps is a lot of work

*Labeling maps is a lot of work***Labeling maps is a lot of work*****Labeling maps is a lot of work***

- Regular -

- Italic-

- Bold-

- Bold Italic-

- Regular -

- Italic-

- Bold-

- Bold Italic-

Type styles.

Serif typestyles have small decorative traces at the tips of their characters. Although this makes the characters more complicated, it also makes them easier to read (less tiring to the eye) when text is placed in large blocks or on entire pages of a book. Serif typestyles such as Times Roman are often used to label hydrographic features, such as rivers and lakes.

Sans serif typestyles consist of simple, clean characters without serifs, which make individual words set in sans serif easier to read at small point sizes (below an 8-pt type size). Conversely, serif typestyles are more difficult to read (and very tiring to the eye) when set in large blocks of type on the printed page. Sans serif typestyles (such as Arial or Helvetica) are commonly used for labeling terrestrial features on maps.

Fonts are the names that appear in the scrollable list in the Symbol Window's Font Palette. Fonts with similar designs are organized into font families. One of the font families available in the Font Palette is the Arial family of fonts, including Arial (regular), Arial Black, and Arial Narrow.

- ✓ **TIP:** *Cartographic designers will choose two, or perhaps three, font families to use throughout a large mapping project. In this manner, a reference map with thousands of pieces of type will appear to have a consistent and easily recognizable design.*



Types of Type

There are three main types of fonts in use on computers today, which reflect developments in digital typography over the last 30 years. The original means of representing type characters on the computer screen used pixels or bitmaps to construct bitmapped fonts. Bitmapped fonts are easy to create and display, but appear stair-stepped (jagged) when enlarged on the computer screen or on paper. Some bitmapped fonts are still found on computers today, but should not be used to produce professional-looking maps.

PostScript fonts use the PostScript page description language developed by Adobe Systems in 1985. PostScript allows the creation of resolution-independent outline fonts that appear the same at any level of enlargement on the computer screen or on paper. PostScript fonts remain the standard within the publishing industry, and cartographers use them for high-quality atlases and map books.

TrueType fonts were invented in 1991 by Apple Computer and Microsoft as a lower-cost alternative to PostScript fonts. Today, TrueType fonts are probably the most widely used fonts, and work well for most in-house mapping purposes. Problems remain with TrueType fonts when sent to high-end image setters in the map publishing process. You can tell which fonts are which type by using a utility such as Adobe Type Manager to load and organize fonts on your computer.



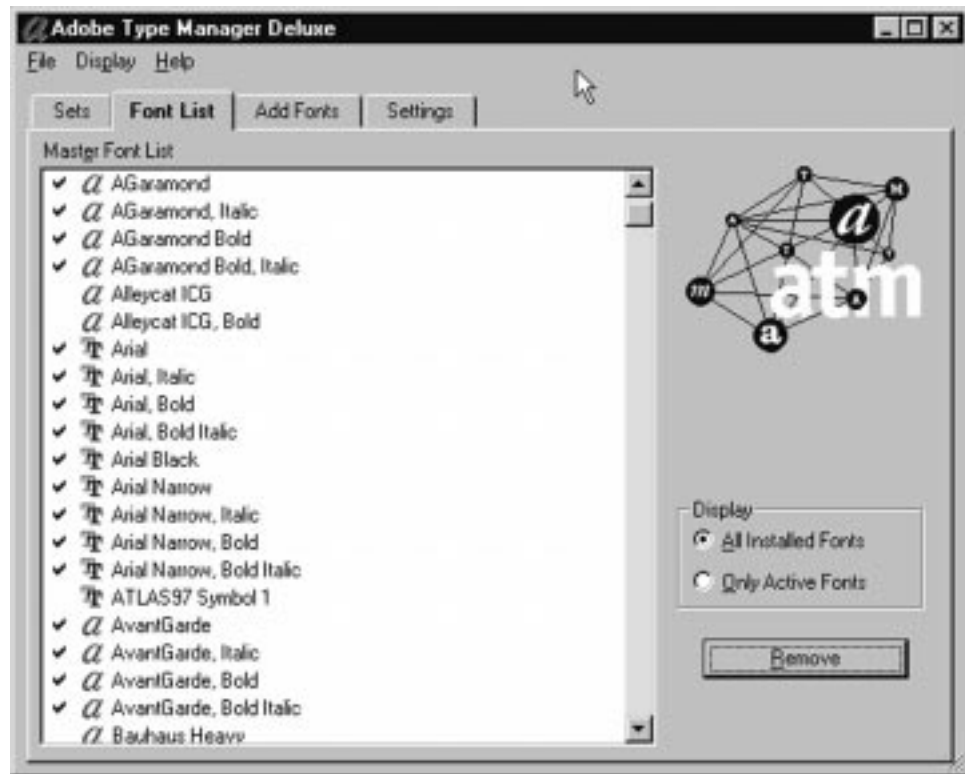
Organizing Fonts with Adobe Type Manager

Adobe Type Manager is available from Adobe Systems of Mountain View, California (<http://www.adobe.com>). Type Manager comes in two forms, basic and deluxe. The basic Type Manager usually ships with any Adobe software, but Type Manager Deluxe must be purchased separately.



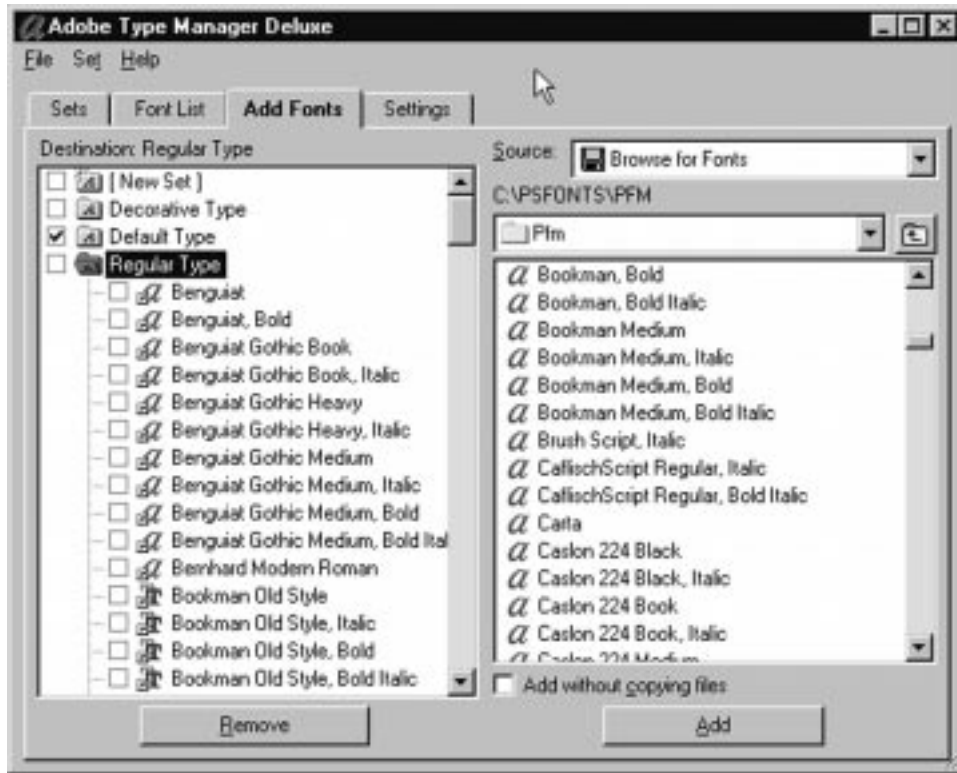
Type Manager allows you to view all fonts on your computer (both PostScript and TrueType), and to print samples of them and organize them into sets for use with particular projects. If your organization has a particular “style sheet” for publications or maps, you can create a set with just those fonts.

cdch06002.tif



The master font list in Adobe Type Manager Deluxe.

odch06003.tif



Organizing fonts in sets in Adobe Type Manager Deluxe.

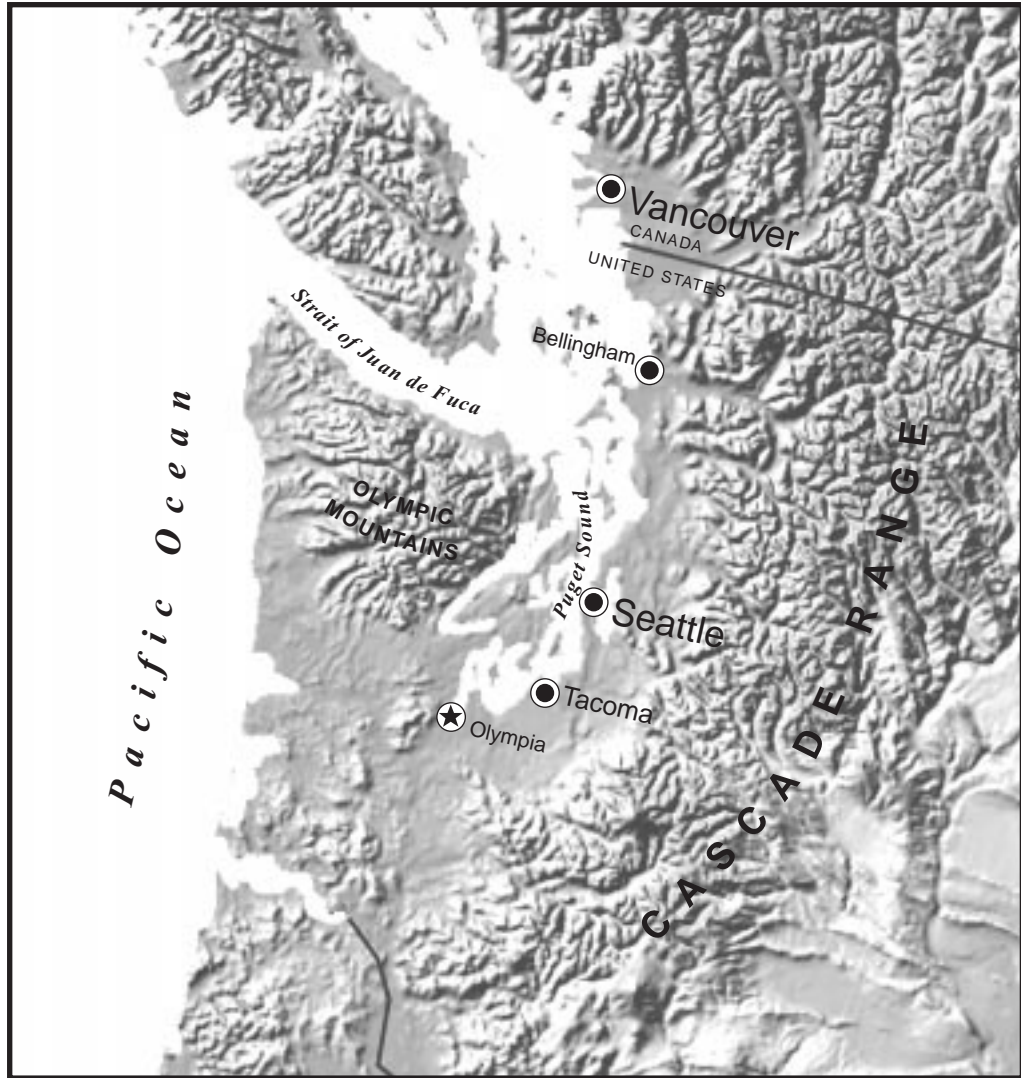
Labeling Map Features – The Uses of Text

Map features should not be labeled haphazardly. There is always a reason to label some map features in one manner and other map features in a different manner. It is good to review the purpose of placing text on maps before beginning the often tedious task of labeling.

Text on a map can be used in four ways: to name a feature, to locate a feature, to indicate a type of feature, and to indicate size. These uses have equivalent names as text labeling systems: literal, locative, nominal, and ordinal. The following illustration shows text labeling systems.

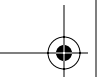
Labeling Map Features - The Uses of Text

cdch06004.tif



Text labeling systems.

Naming a feature is the most obvious use of text. You name the point features that represent cities to indicate, for example, that San Francisco is different from San Jose, and that both are different from Oakland when making a map of the Bay Area in California.



Text can be used as a locative device as well. For example, if you are using polygons to represent cities, rather than points, the words San Francisco can be placed entirely within the polygon representing the city limits. In a similar fashion, when you are labeling mountain ranges on a physical features map, the words Sierra Nevada can be curved and spread to roughly overlay the full extent of the actual mountain range.

Different styles of text can be used to differentiate between different nominal classes of map features. A typical example of this is the use of italic type in labeling hydrographic features such as rivers and lakes. In this case, the italic text is frequently the same blue color as the water body it is associated with, making it easier for the map reader to quickly read and understand the labeling system.

Care must be taken when coloring text. Most type on maps is black because black stands out well when used in small characters on a white background. Black text on white background has good figure-to-ground contrast, and makes type easy to read for the map user. Other colors, including blue, make text more difficult to read, especially if used on a background darker than white.

✓ **TIP:** *To clean up busy maps that contain a lot of text labels, color text that is less important to the map's purpose a shade of gray, rather than black. When showing the location of cities in the western United States, for example, keep the city names in black, but drop back the state names to a medium to light gray.*

✍ **NOTE:** *Terminology is important here. Traditionally, the term overposting was used to refer to one piece of text being placed over another piece of text, or obscuring a map feature. ArcView uses the term overlap to refer to the same situations.*

In order to make this nominal labeling system work, it is important to apply it consistently throughout the map. If you are using the Times Roman Italics typestyle for some river features, you should use it for all river features on the map.

Different sizes of text can also be used to denote different sizes of map features. Cities with larger population sizes will have text with larger point sizes, and cities with smaller populations will have smaller text



labels. Combined with larger symbols for larger cities, the technique of using ordinal text reinforces the city size factor with the map reader.

Labeling Map Features – Text Positioning Guidelines

Once you have identified the map features you want to label, and have considered possible text labeling systems, you are ready to start placing type on the page. Exactly where do you place it? The following are general conventions that can be used as guidelines for text placement. By adhering to these conventions, you make the map easier to read and understand.

Guideline 1: A Label should be on either land or on water, but not on both.

This is an easy convention to adhere to when mapping along an ocean-front, but becomes more difficult to follow when dealing with smaller lakes and rivers. Work to include the name of a lake within the lake's shorelines. If this cannot be done, place the name to the right or left of the lake.

It is important to retain a consistent type size while labeling these features. Use a larger type size for big lakes, and smaller size for the rest of the water bodies. Do not use a different type size for each lake just to fit the name within a lake. An example of hydrographic labeling is shown in the following illustration.



cdch06005.tif



Labeling hydrographic features.

Guideline2: Break a geographic feature behind a piece of type rather than the converse.

This helps readability, but requires more work. There are three methods that help out in this case. The first is to make the geographic data a lighter gray or a lighter color so that the black text will stand out when printed over the top of it. This is only possible if lightening up the geographic data does not detract from the purpose of the map.

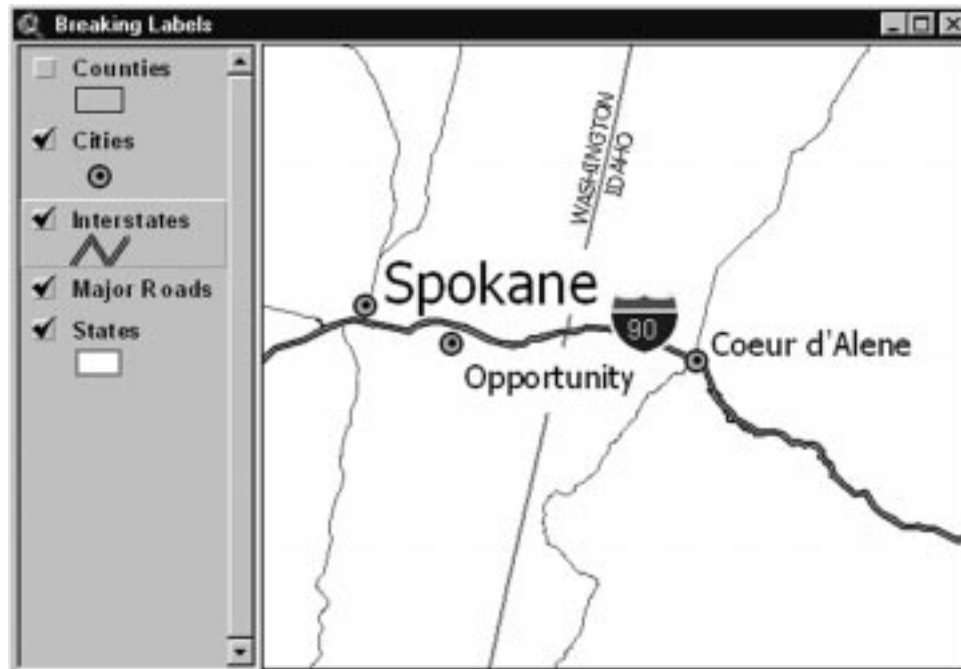
The next method, shown in the following illustration, is to create a separate theme with features or graphics that act as “blockers” or “knock-outs” when placed between the text and the theme containing features

Labeling Map Features – Text Positioning Guidelines

115

the text overprints. The features used as the “knockouts” should be the same color or shade as the map background.

cdch06006.tif



Breaking up map features with type.

Sometimes, neither of these methods is helpful, and you need to actually split map features in a theme to have correct type position. Never split up the original version of a theme, because this process will make the theme unusable for geographic analysis. Instead, make a real copy of the theme and then start editing, using the line or polygon splitting tools in the Draw Tools drop-down palette to split the feature.

✓ **TIP:** *The following are three methods of copying your geographic shapefile data.*

- Use the Convert to Shapefile command in the View's Theme menu.
- Use the Copy command in the Shapefile Manager, found under Manage Data Sources in the View's File menu.



- Outside ArcView, in Windows Explorer, select the .shp, .shx, and .dbf files of a single shapefile and copy and paste.

NOTE: Remember, using Copy Themes in the View's Edit menu only creates another link to a geographic data set and does not actually copy the original data. If you start to edit a theme copied in this manner, you will corrupt the original data.

Guideline 3: Use curved and angled type sparingly.

Anytime type is curved or angled it becomes more difficult to read. Curved or “splined” type is appropriate when applied to the labeling of rivers or mountain ranges, and can add an attractive touch to any map when done carefully. Always use curved text for such situations and not angled text.

Use steeply angled type rarely, mainly to label point symbols you want to stand out in some fashion. When curving or angling a label, never label text upside down. Examples of curved labels are shown in the following illustration.



edch06007.tif



Curved labels.

Guideline 4: Match the orientation of type to the orientation structure of the map.

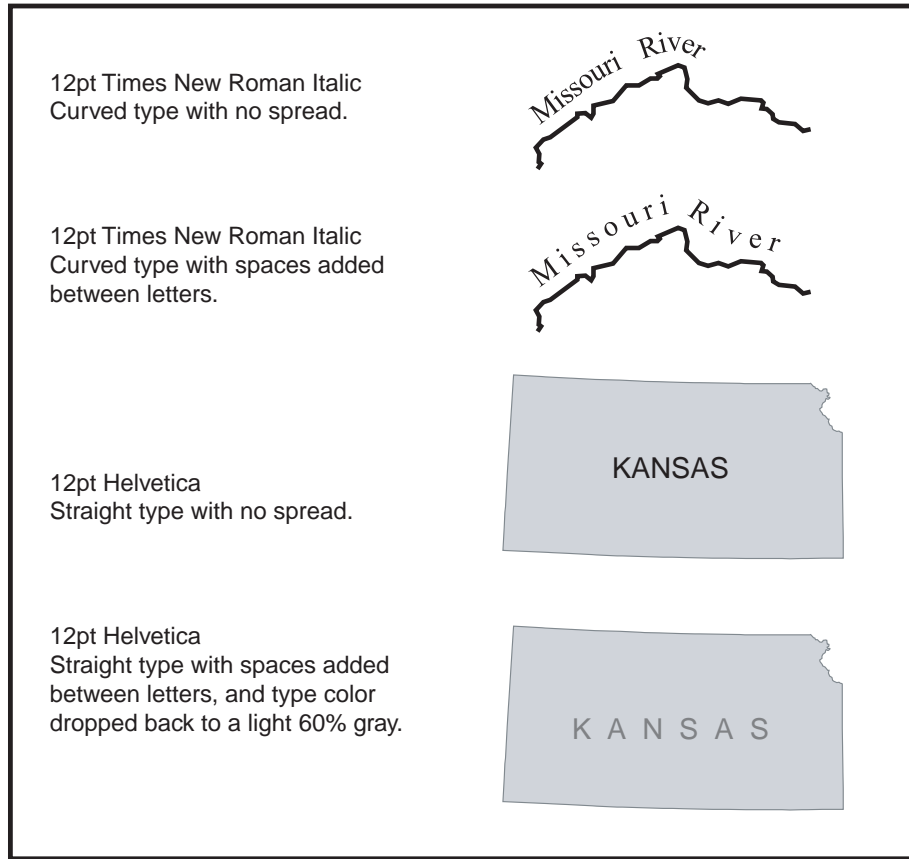
The orientation structure of a map is traditionally associated with its scale. Small-scale maps (1:100,000 scale and up) frequently have latitude and longitude lines that act as a reference grid for map features. Match the orientation of type (by slightly angling the label) to the longitude lines when working with small-scale maps. The precise angle of a piece of type on such a map will depend on where the type is placed in relation to a parallel line of longitude. On large-scale maps (below 1:100,000

scale), orient the type for most map features as horizontal (parallel) to the top and bottom edges of the map page.

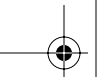
Guideline 5: Spread the characters within a piece of type as little as possible.

Most type used on the map should not be spread at all. Spreading type horizontally (kerning) is a good technique when labeling a large feature that remains in the background, such as a political jurisdiction. When labeling curving features such as rivers, take care not to spread type too much, which makes a label too spread out to be read as one word.

cdch06008.tif



Spreading (or kerning) type.



Setting Type in ArcView

As mentioned previously, text is added to a map for three general purposes: to label map features in the View, to document map themes in the legend, and to populate margin information. These purposes are achieved by using a variety of tools in ArcView's View and Layout documents. In general, the process to follow when adding text to a map is to accurately label the Legend first, identify what map features are important to the map's purpose and label them in the View's map display, and add type for the map title and margin information last. The following illustration serves as a flow chart for this process.

cdch06008a.eps

Flow chart for labeling a map.

ArcView Flow Chart for Labeling the Map

Location & Tool	Task
In your Head	How much labeling is needed to meet your map's purpose? Just a few labels: Use ArcView Text tool More labels: Use ArcView Label tool Hundreds of labels: Use Auto-Label or Multi-Labeler Consider buying AVALabel Thousands of labels: Consider finishing map in a dedicated graphics program
In the View	Use Theme Properties and the Legend Editor to label the TOC Determine which themes need labels Create map title in the View Properties Box
In the Table	Check the attribute field that you wish to use as feature labels If necessary, edit field in the Table with Field Calculator to create labels
In the View	Set a reference scale to label at based on the final map size Chose a tpestyle and a type size for labels Set type style and type size in Text and Label Defaults box Use the Text, Label, or Auto-Label tools to label map features Use curved (splined) text for rivers, mountain ranges, etc. Move labels around to get precise position and avoid overlaps Attach text to individual themes with Attach Graphics
In the Layout	Place map and legend using View and Legend Frame tools Add marginal text, source statement, and title using Text tool If necessary, copy and paste blocks of text from a word processor in the the Text tool dialog box.
On Paper	Print map and check labels for readability, position, and spelling



Creating Text for the Map Legend

Text in a map legend is generated from the Table of Contents in the View. Whatever themes are checked on as visible in the TOC will appear listed in the legend in the Layout. The process for creating the legend text involves the following four primary steps, during which you can change text or type style.

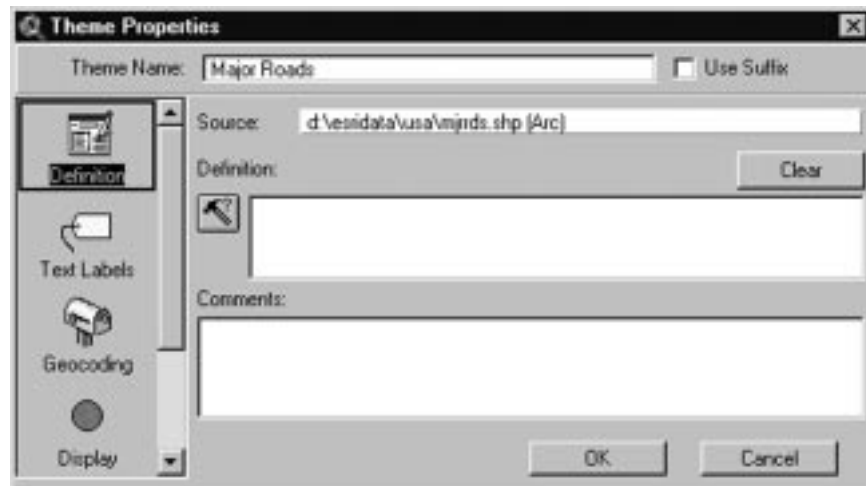
1. Renaming themes on the Theme Names line in the Theme Properties box
2. Naming the Values in a theme's legend in the Label column in the Legend Editor
3. Adjusting type styles in the Table of Contents Style Settings
4. Fine tuning the Legend in the Layout document

Renaming Themes

After adding themes to a View, it is always a good idea to rename them to make them more understandable. (See the sidebar “Problems of the 8.3 Naming Convention in Chapter 3.”) Click on the theme's name in the TOC to make it active, and go to Properties under the Theme menu. The Theme Properties dialog box, shown in the following illustration, appears.

odch06009.tif

Theme Properties dialog box.



The Theme Name line allows you rename the geographic data in the TOC without changing the original data set's name. Choose a name that is quickly understandable by your intended map audience. The name can be several words long, but it is best to keep it short so that it can all appear on one line in the TOC.

A good example is a point theme representing cities in California, which as a shapefile might appear as `cacities.shp`. If the theme represents just the largest cities in the state, you could rename it "Major Cities" or "Major Cities in California." Frequently, cities will be symbolized by population size; therefore, in this case a good theme name might be "Cities of 1 million people or greater." If the theme is a comprehensive list of all cities in the state, a better name would be "Cities and Towns." Any of these theme names quickly conveys much more information than the default name `cacities.shp` or the overly simple "Cities."

Individual Theme Legend Text

Once a theme has been symbolized in the Legend Editor, shown in the following illustration, a legend description appears beneath the theme's name in the TOC. This description can be hidden by using the Hide/Show Legend option under the Theme menu. The Legend Editor, as a default, creates the legend labels directly from the values (which can be numbers or text) used to classify the theme. These can be changed in the Label column within the Legend Editor.

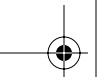
odch06010.tif

Labeling in the Legend Editor.

As with theme names, the legend labels should be easily understandable to the map's intended audience. Often default numeric legends can be confusing to general audiences. A legend showing the amount of a product sold in each city in a state might be meaningful to the marketing department of a company, but appear confusing or useless when shown to the stockholders in an annual report. For a non-technical audience, a legend showing High, Average, and Low sales areas would be much more useful.

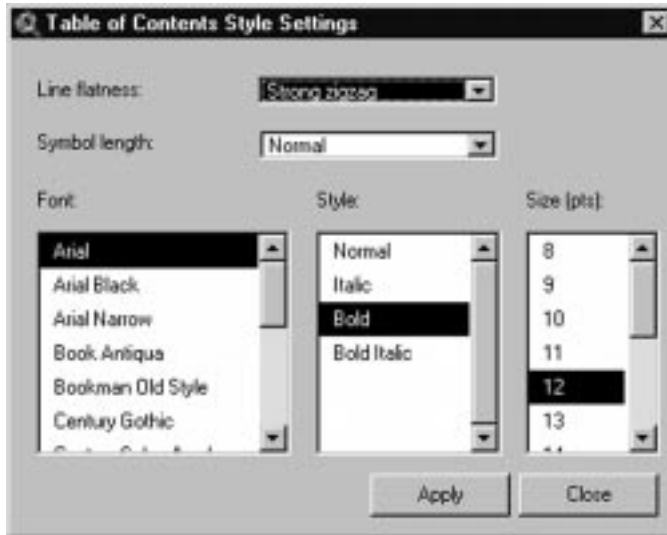
TOC Style

The text in the View's table of contents defaults to a standard Arial 10-pt font on a PC. Starting with ArcView 3.1, this can be changed, along with line symbol styles for the legend, in the TOC dialog available from the View menu. The TOC Style dialog box includes the ability to use any font, font style (bold, italic, and so on) and type size available in your system as a global setting for all themes in the table of contents. Table of Contents style properties are shown in the following illustration.



odch06011.tif

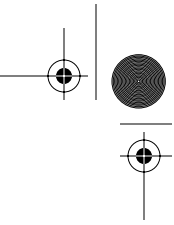
Table of Contents style properties.



The degree of zigzag for line themes, and the length of symbol for line and polygon themes, can be selected in the TOC Style dialog. Zigzag is set with Line Flatness, having the option of strong zigzag, moderate zigzag, or flat lines. The classical zigzag line in the legend has long been a trademark of maps produced in ArcView. Flat lines are a great alternative, and present a much cleaner appearance.

Symbol length can be set as Normal, Short, Long, and Very Long. The longer symbol length gives more of the symbol for the map reader to compare to the map features. Setting a longer symbol length is helpful when using dashed or dotted lines, or when filling polygons with light colors or complex patterns.

A larger symbol size, especially with polygons, can be quite helpful in overcoming a perception problem with legends. When a small area filled with a specific color (in the legend) is compared to the same color in a larger area (in the map), the smaller area's color is perceived as darker by the map reader. If the map has dozens of colors (common with land cover, vegetation, soil, and geologic maps), it can be very difficult to match the legend color to the map feature color. Combine a larger symbol length in the legend with map features labeled with a short piece of text to act as a key to make complex color maps easier to understand.



Options set in TOC Style do not affect type or symbols in the map display of the View window, but only the text and symbols in the table of contents. Settings in TOC Style do carry over to the Legend when that is created from the Legend Frame tool in the ArcView Layout document.

Legends in the ArcView Layout

There is always the option of changing the appearance of your map legend at the last moment in the ArcView Layout document. For more information, read about creating map legends with the Legend Frame tools in Chapter 8.

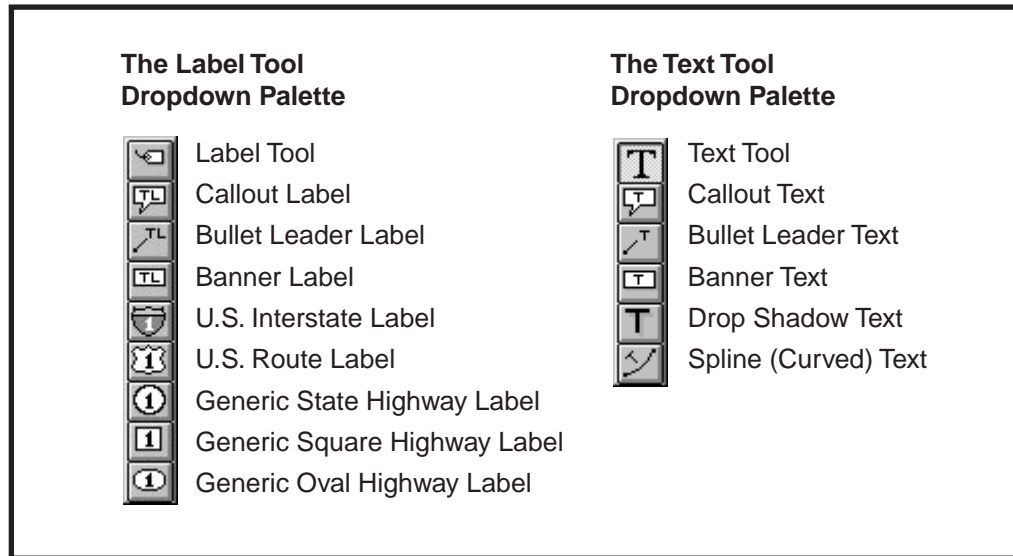
Labeling Map Features

There are three methods of labeling map features in the basic ArcView package: using the Text tool, using the Label tool, and using the Auto-label option. You can use one tool to label the map, or all of the tools in combination, employing each tool's particular strengths. Going beyond basic ArcView, Map Logic Corporation offers a fine AV extension called ArcView Advanced Label (AVALabel 2.3) that refines and automates much of the tedious chore of map feature labeling. In the sections that follow examine all of these tools, starting with the simplest and proceeding to the most involved.

The Label Tool and the Text Tool

The first four tools of the Label and Text Tool drop-down menus (shown in the following illustration) are nearly identical, but have one distinct difference. The Text tool requires that you type in the proper feature name, whereas the Label tool uses type from a field in a theme's attribute table.

cdch06012.tif

*Text and Label drop-down menus.*

The Text tool in the View or in the Layout can be used to quickly label important points in the map, if you know what you want to name. This tool should only be used for small amounts of type. You are responsible for creating the correct names for a map feature because the Text tool does not generate its labels from a theme's attribute table.

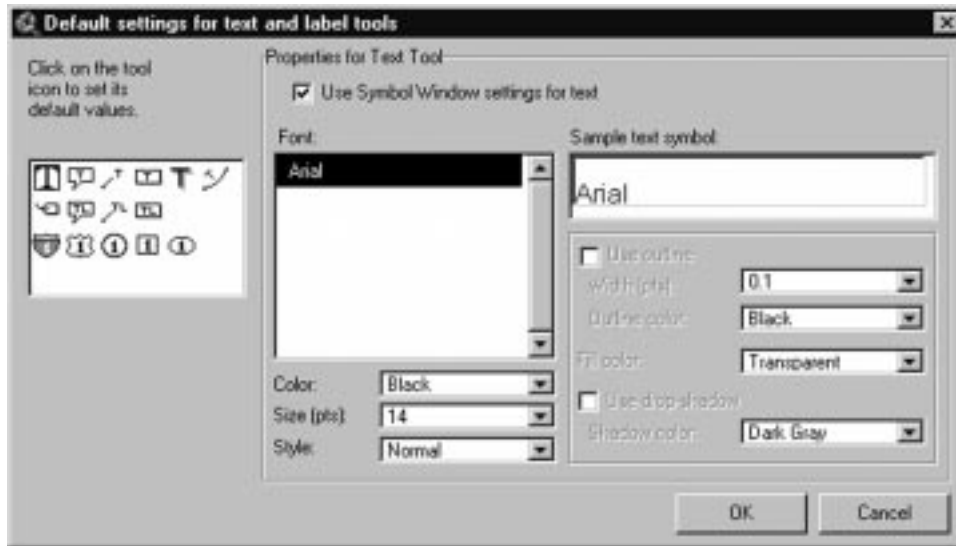
To use the Text tool in the View, first go to the Window menu or to Show Symbol Window, or use the keyboard command <Ctrl+P>. The Fill palette will appear as the default. Click on the Text button to bring up the Font palette. Choose a font and a type size and type style.

- ✓ **TIP:** *This process of choosing a type size and type style before using a "type" tool in ArcView ensures that the result will be the text size and style you want, not the Arial 14-pt font that is frequently the ArcView default. Otherwise, you must choose the pieces of text you have already placed with the Selection tool, and then use the Font palette to change type styles.*

To change the default for the Text tool or any other labeling tool, use the Text and Label Defaults dialog box (shown in the following illustration) from the Graphics menu in the View. Here you can change the default

type size, type style, and color for any text object, and set the outline and fill properties for highway shields and callout boxes.

cdch06013.tif



Text and Label Defaults dialog box.

There are six tools available in the Text tool drop-down menu, and each tool places type in the map display in a slightly different manner. The basic Text tool places text horizontally next to the map feature you want to label and brings up the Text Properties dialog box. In the dialog box, you enter text in the text window, making sure to press the <Enter> key when you want to stack the text on another line. You have four other options in the Text Properties box: Horizontal Alignment, Vertical Spacing, Rotation Angle, and Scale Text with View.

Horizontal Alignment allows you to left justify, center, or right justify text. Vertical Spacing controls the amount of space between stacked text based on line height measured from 1.0 to 2.0 (which is related to type size in points). Rotation Angle will rotate a piece of text from 0 to 360 degrees, with the default being 0 degrees or horizontal. The Scale Text with View option, when checked, allows text to get larger in size as you zoom into a View, and get smaller in size as you zoom out. If this option is unchecked, text will remain the same point size no matter how much you zoom in or out of a View.



The second text tool creates Callout Text. After clicking once on the tool, you must click on the map feature you want to label and then drag a small distance away to place the callout box. The Text Properties dialog box appears, prompting you to enter your text. This tool can be very handy when you want to draw the reader's attention to a few features of importance on the map, but has the disadvantage of creating opaque boxes that can cover significant parts of the map.

The default style of the callout box includes the pointer and the box, which is surrounded by a gray drop shadow and filled with a light fill color. To change these colors globally, use the Text and Label Defaults option under the Graphics menu. To change just one callout box, go to the Color palette in the Symbol Window and use the Foreground option to change the box fill, and the Background option to change the color of the drop shadow.

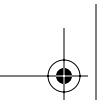
With the callout box selected, use Ungroup in the Graphics menu and the Vertex Edit tool from the View Window's tool bar to change the position of the callout box, the pointer, and the drop shadow. This is helpful when you need precise placement of several callout boxes but do not want to obscure important map features.

The Bullet Leader Text tool is similar to the Callout Text tool, but uses a dot or bullet to mark the location of the map feature, and a line that leads to the text identifying the feature. In the same manner as the Callout Box text tool, the Bullet Leader Text tool allows you to click on a map feature and drag to the location you want for the text placement. There is no box, pointer, or drop shadow to cover underlying parts of the map. However, you may end up with many black leader lines, which can be confusing on a map that has a lot of black line work, such as a road or utility map.

The Banner Text tool creates a box with a drop shadow over the map feature you want to name. Banner Text is great for drawing attention to a few features, but does obscure significant portions of the map. Use this tool sparingly.

The Drop Shadow Text tool places a black piece of text with a dark gray shadow behind, below, and to the right of the text. This is a nice effect





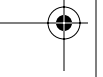
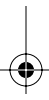
for a few larger text labels, but can prove difficult to read if used for many features.

Much more useful is the Spline Text tool, which places text along a curved line. After choosing the tool from the Text Tool drop-down menu, you begin placing a curved line by single clicking on the map display and double clicking to end the line. The Text Properties dialog box appears, allowing you to name the map feature. When done with care, the Spline Text tool can add a lot of visual value to the text labels on your map.

- ✓ **TIP:** *When labeling curved line features, such as rivers, with the Spline Text tool, always offset the curved text line a short distance from the feature you want to label, in order to increase readability. When labeling curved polygons or relief features, such as mountain ranges, place the curved text line near the center of the feature, and extend the line the full extent of the feature.*

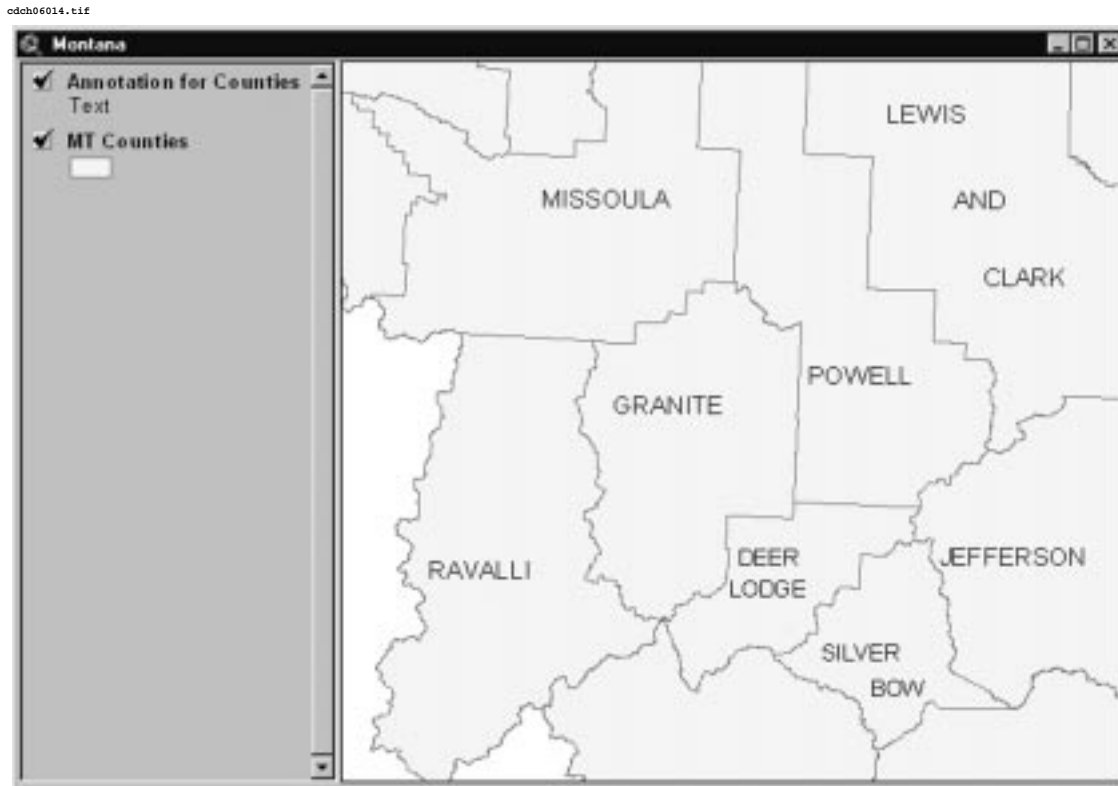
Annotation Themes

You can use already created labels called annotation themes produced in ArcInfo or AutoCAD. Annotation themes, shown in the following illustration, contain just the label for a feature, and not the feature itself, and you are relying on the producer of those themes to label the features you want to present on your ArcView map. The text label cannot be edited in ArcView, but can be changed in its native ArcInfo or AutoCAD. Annotation is added just like any other geographic theme, by using the Add Theme (plus) button in the View's button bar.



Setting Type in ArcView

129



Annotation themes.

Annotation is represented, oddly enough, as a polygon theme with “text blocks” when added to a View. The label inherits certain unchangeable characteristics from ArcInfo. These characteristics include the exact placement of the label in relation to the map feature, the rotation angle (if any) of the label, and the text itself. Although none of these can be changed in ArcView, the type style and color can be changed in the Legend Editor.

Whether you can change the type size in ArcView depends on how the annotation coverage was saved in ArcInfo. If the annotation coverage was saved in page units in ArcInfo, the type size can be changed in ArcView, by using the Legend Editor and the Font palette. If the annotation coverage was saved in map units in ArcInfo, the type size cannot be altered.

Annotation added from CAD themes have the text size “hardwired in” as measured in map units. You can change the text color and type style in the Legend Editor, but not the size of the font. With these limitations, annotation themes are only as useful as their original creators have made them, and are not commonly encountered in the ArcView world.

The Label Tools

The most common means of feature labeling is using text from a field in a theme’s attribute table, as shown in the following illustration. Here you can use the label tools in the View’s toolbar, or one of the two Auto-label features. This process assumes that the text you want is found in the theme’s attribute table, and that the producer of the theme has done a good job of attribution.

cdch06015.tif

Fields used as labels in the Theme Attribute table.

A Poor Label Field in a Theme Attribute Table

The Name field containing County Names is in all caps with underscores between words.

Attributes of County.shp	
Shape	Name
Polygon	GOLDEN_VALLEY
Polygon	GRANITE
Polygon	HILL
Polygon	JEFFERSON
Polygon	JUDITH_BASIN
Polygon	LAKE
Polygon	LEWIS_CLARK
Polygon	LIBERTY
Polygon	LINCOLN
Polygon	MADISON
Polygon	MCCONE
Polygon	MEAGHER
Polygon	MINERAL
Polygon	MISSOULA
Polygon	MUSSELSHELL
Polygon	PARK
Polygon	PETROLEUM
Polygon	PHILLIPS
Polygon	PONDERA
Polygon	POWDER_RIVER
Polygon	POWELL
Polygon	PRAIRIE

A Better Label Field in a Theme Attribute Table

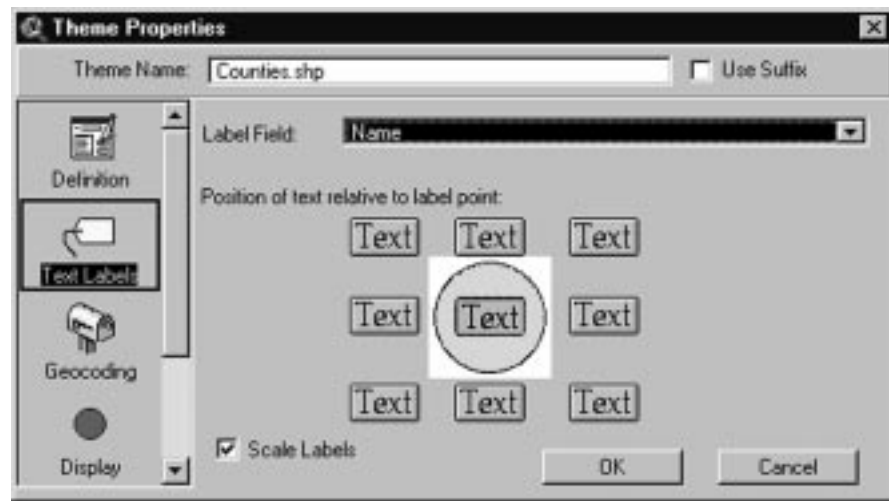
The Name field containing County Names is in upper and lower case with spaces between words.

Attributes of Counties.shp	
Shape	Name
Polygon	Golden Valley
Polygon	Granite
Polygon	Hill
Polygon	Jefferson
Polygon	Judith Basin
Polygon	Lake
Polygon	Lewis and Clark
Polygon	Liberty
Polygon	Lincoln
Polygon	Madison
Polygon	McCone
Polygon	Meagher
Polygon	Mineral
Polygon	Missoula
Polygon	Musselshell
Polygon	Park
Polygon	Petroleum
Polygon	Phillips
Polygon	Pondera
Polygon	Powder River
Polygon	Powell
Polygon	Prairie

Before any of the eight Label tools can be used, you must choose what field to use from the theme's attribute table. To do this, with your selected theme active in the TOC, go to Properties in the Theme menu, and choose Text Labels. On the Label Field line in the Text Labels properties box, choose a field from the theme's attribute table. Next, choose a text position, relative to the map feature. An example of text label properties and positions is shown in the following illustration.

odch06016.tif

Text label
properties and
positions.



- ✓ **TIP:** A quick reference for text position: For most point features, choose right or left. For line features such as rivers, choose above. For line features such as roads, choose center. For polygon features, use the center position as well. After the text is placed, you can always move it using the Pointer tool from the View toolbar.

At the bottom left corner of the Text Labels properties box is the Scale Labels check box. The default selection is Scale Labels checked on, which means that text appears larger as you zoom in and smaller as you zoom out of a View window. This raises an important question when labeling a theme: At what scale should you begin labeling? A good choice is at the scale (the actual size) your map will be read by the map user.



x WARNING: Choose your map reference scale carefully and stick with it! If you zoom in or out of the reference scale and continue to set type at the same type size, all of your labels will appear as different sizes when the map is printed!

In regard to the previous Warning, this happens because ArcView maintains a default type size for labeling map features (usually 14 pt if you do not change it), no matter what scale you have zoomed in or out to. For example, say you are creating a letter-size map of major tourist attractions in Florida for a travel agency. You begin labeling, zoomed out to the entire state in the View (including Disney World and Everglades National Park), with the Label tool with 10-pt type. Then you zoom in to label a few sites in the Miami area.

When you zoom out to the state again, the 10-pt type for tourist sites around Miami will appear microscopic, and probably unreadable. In this case, however, if you label all map features while zoomed out to the entire state of Florida, your labels will all be readable when the map is printed at letter size.

NOTE: This serious problem can be avoided by using the Fixed Scale labeling tools within the AVALabel extension.

Frequently, all of the information you need to label a feature may not be available in one attribute field, such as labeling cities with elevations above sea level. In this case, you may want to label the same theme twice by using “City Name” in the Label Field in the Theme Properties dialog box, labeling the cities, and then switching the Label Field to “Elevation” and labeling the cities a second time. This results in two separate pieces of text per city, rather than “Elevation” appearing in the same text block as “City Name.”

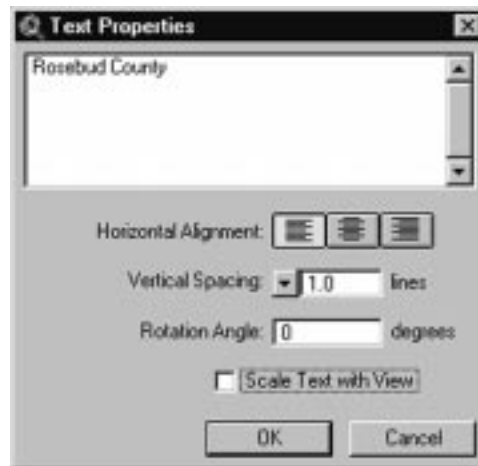
It is smart to label everything you want on one theme in one work session, and then go on to the next theme that needs labels. After you have finished labeling a single theme, turn off all other themes in the View, and with the theme still active, go to Select All Graphics under the Edit menu. All of the text blocks you have placed will be selected with their

black graphic handles visible at the four corners of each graphic block. Then use the Attach Graphics option under the Graphics menu to associate the text graphics with the original theme. In this manner, you can maintain a visual hierarchy of labels associated with each theme that will appear or disappear in the View if that theme is turned on or off.

If the Attach Graphics option is not used, text tends to “float” in the View and may not be turned off when themes are turned off. This can lead to confusion and poor label organization, especially when several themes have been labeled with dozens of pieces of text.

Once a label has been placed with any of the Label tools, the piece of text becomes a graphic object in the View. You can select the graphic text object with the Pointer tool by single clicking on the text and dragging it for more precise placement. Double clicking on the graphic object allows you to edit the text piece by bringing up the Text Properties dialog box, shown in the following illustration.

cdch06017.tif

Text Properties dialog box.

In addition, once the label has been placed with any of the Label tools, the resulting graphic text object is no longer live-linked to the theme’s attribute table. For example, say you are placing labels for many city names on a map with the Label tool, and you notice several misspellings. Because you might use the city theme again, you edit the “city name” field in the theme’s attribute table and correct the misspellings. The labels



you have already placed in the View will not automatically change to the corrected spellings, but have to be deleted and re-labeled.

When using names from a theme's attribute table, you should first review the name field and make sure that names are entered the way you want to portray them on the map. In many older GIS databases, the name "San Francisco" may be entered as "San_Francisco" or "SAN_FRANCISCO." Underscores between words are never used and words in all caps are infrequently seen on maps.

- ✓ **TIP:** *If you need to change text from all caps or remove underscores between words in a field in an attribute table, use the Field Calculator in the Tables document. This powerful tool can save you the enormous amounts of time it would take to retype text as upper- and lower-case characters.*

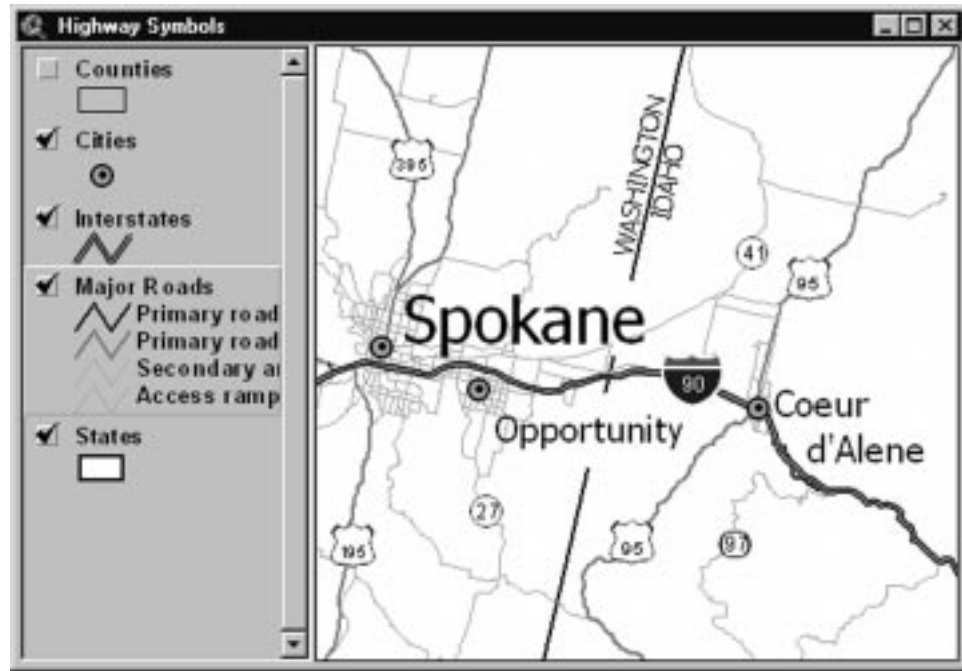
Start editing the table, create a new text string field from the Edit menu, and use the Avenue requests in the Field Calculator to populate the new field with text the way you want it to appear on the map in the View. See "Calculating a field's values" and "Performing operations on string fields" in the ArcView Help files for more complete information on how to accomplish these tasks.

Highway Symbol Label Tools

Last on the Label tool drop-down toolbox are the five highway sign label tools. These tools provide standard signs for U.S. Interstates, U.S. Routes, generic state highways, and generic square and oval highway shields. If a theme has a field in its attribute table with highway identification numbers in it, you can use these label tools to attractively label a road theme. Highway symbols are shown in the following illustration.



cdch06018.tif



Highway symbols.

As with labeling any other theme, you must first set the Label field in the Theme Properties dialog box under Text Labels before choosing a highway symbol label tool. After clicking once on a tool, click once on a highway you want to label in the map display. The highway number automatically fills the highway symbol in the View. This assumes, of course, that you know enough about the data in the theme to correctly label a U.S. Interstate line with the U.S. Interstate Label tool, and not some other highway symbol.

If, as is common with most road databases, different types of roads are all included in one theme and you are unfamiliar with the data, use the Legend Editor to create a unique value legend symbolizing each type of road with a different line symbol. In this manner, you can identify and correctly label each road with the appropriate highway symbol.

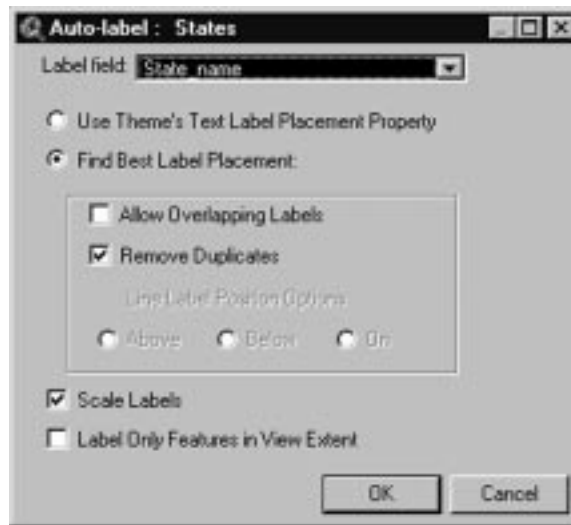
- ✓ **TIP:** You can globally change much of the appearance of the highway symbols by setting the Text and Label defaults under the Graphics menu before you begin to label highways. In the Default Settings, click on the icon for a highway label tool, and set the shield color, type style, type size, and type color.

The Auto-label Option—Auto-labeling One Theme

If you are dealing with dozens of text labels, the process of labeling becomes increasingly tedious and frustrating. Because the discipline of cartography moved onto computers, one major goal has been to avoid having to handle each piece of type individually, and therefore greatly speed up the labeling process. The Auto-label option in ArcView is one such attempt, and actually works fairly well. Auto-label does not perfectly place each piece of type, but when used correctly can greatly speed up labeling. The Auto-label option is shown in the following illustration.

cdch06019.tif

The Auto-label feature.



The Auto-label option is found under the Theme menu and operates on one TOC active theme at a time. Before running Auto-label, make sure to choose a reference scale based on final print size of your map. This will help determine the point size needed for readability of the names of the map features you are about to auto-label. Choose a point size and

type style before running the Auto-label option by opening the Font palette from the Symbol Window under the Window menu.

- ✓ **TIP:** For themes with few features that need labeling you can set text in a larger type size, without crowding the map. For themes with many feature labels, set text in a smaller point size to ensure that text will not overwhelm the map. To label subsets of features within one theme, copy and paste the theme in the TOC and use the Query tool in the Theme Properties dialog to select a subset.

The Auto-label dialog box has a variety of useful options. First, choose the Label field from the Theme's attribute table to base the text label on. Then you are presented with a choice of two different means of labeling the theme. "Use Theme's Text Label Placement Property" defaults to the Text Label preferences set in the Theme Properties dialog box. If this radio button is checked, no other refinements are offered. Example of auto-labeling are shown in the following illustration.

cdch06020.tif

Examples of auto-labeling.



The "Find Best Label Placement" feature uses different positioning guidelines for text labels, depending on the whether the active theme is a point, line, or polygon. With point themes, text placed with "Find Best Label Placement" will not overlap another point symbol or another piece of text, unless the Allow Overlapping Labels option is checked. For



polygon themes, ArcView tries to place the text near the center of the feature, but the type will often extend beyond the polygon's boundaries.

When used with line themes, the best placement feature will prevent a label from crossing its own line or another label, but the label may cross other lines. Line themes activate yet another option box, Remove Duplicates. This option relates to the way GIS keep line attributes in their databases. Lines are rarely continuous features with only one record per line. Instead, lines such as roads or rivers are broken in dozens if not hundreds of segments, with each segment having its own record in the line attribute table, and as a result, its own possible label.

Roads in an urban area are typically broken into segments that extend between each intersection. Rivers may be broken into segments identifying reaches between each tributary or side stream. As a result, if you auto-label an urban road theme without Remove Duplicates checked, you can end up with hundreds of the same name identifying just one road.

Line themes also have the Line Label Position option of "above," "below," or "on" the line feature. For river or road names, use "above" or "below" for positioning. For placing highway symbols, use the "on" option.

x WARNING: *If you do not enable Allow Overlapping Labels, Auto-label may choose not to label several features in a theme. It is almost always best to enable Allow Overlapping Labels, and then physically move the overlapping labels with the Pointer tool afterward. ArcView makes it easy to identify overlapping labels: they always appear in a bizarre color, frequently a lime green. After you have moved the label and still have it selected, use the Text Color option in the Color palette to change the lime green back to a more typical black or gray text color.*

At the bottom of the Auto-label dialog are two more check boxes. The Scale Labels box ensures that text stays the same point size as you zoom in and out in the View, and by default is checked "on." The handy Label Only Features in the View Extent box allows you to zoom to a portion

of the View, and auto-label only the features visible in the window and not the entire theme. The default for this option is “off.”

The Auto-label feature takes some getting use to but is worth experimenting with. Try varying type sizes in the Font palette before using the auto-label feature and then playing with the Use Theme’s Text Label Placement Property versus Find Best Label Placement options. Once you get a feel for how this tool works, you will find yourself using it more often, and realizing significant time savings when it comes to labeling your map.

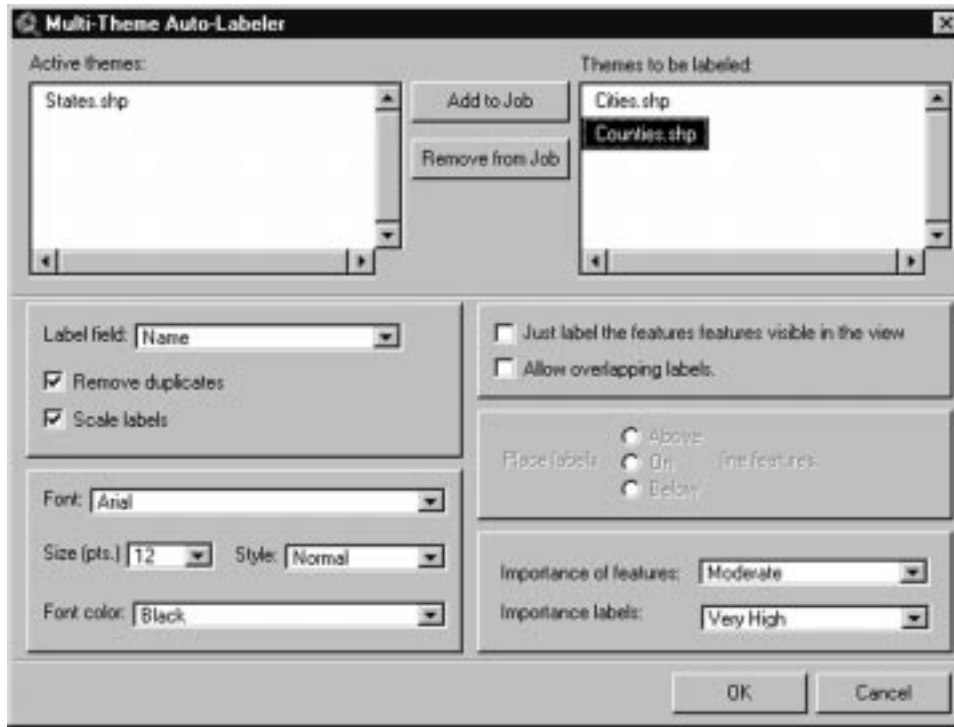
The Multi-theme Auto-label Extension

For the brave user who has mastered the Auto-label feature in basic ArcView, hidden in the ArcView samples directory is the Multi-Theme Auto-Labeler extension, `multlab.avx`. This freeware extension allows you to auto-label several themes at once by setting the importance level of the theme’s features and labels.

With ArcView off, copy the actual extension file, `multlab.avx`, from the samples directory to the Ext32 directory, which is found normally at `c:\esri\av_gis30\arcview\ext32`. Start ArcView and load the Multi-Theme Auto-Labeler in the Extensions dialog box under the File menu. The Multi-Theme Auto-Labeler appears as an option at the bottom of the Theme menu in the View.

Next, determine which themes you want to label, and make all of them active at once by single clicking on their names in the TOC with the <Shift> key held down. Make sure to be zoomed in or out to what you want to use as your reference scale for labeling; that is, the scale you will print your final map from in the Layout. Now you are ready to launch the Multi-Labeler, shown in the following illustration.

cdch06021.tif



Multi-Theme Multi-Labeler extension.

The Multi-Theme Auto-Labeler dialog box has many of the same options of its simpler predecessor, the Auto-Label feature, with a few new and more powerful tools added. At the top of the dialog box is a window list of the active themes in the View, and you are asked which themes to Add to Job, which moves them to the “Themes to be labeled” window. Below these two windows are a series of options, some of which can be applied to all themes that are to be labeled at once and others that need to be applied individually.

Select a theme in the “Themes to be labeled” window, and set its Label field on the line to the lower left. If it is a line theme, make sure to check the “Remove duplicates” box. Always check the “Scale labels” box.

Unlike the basic Auto-Label feature, the Multi-Labeler has a handy Font Palette box built in, in the lower left corner. This saves time when setting the type style and the type size, eliminating the need to open the Font

palette from the Symbol Window. Identical with the basic Auto-Label feature are the “Just label features in the View,” “Allow Overlapping Labels,” and “Place labels Above, On or Below for Line” options.

The real power of the Multi-Labeler extension lies in the Importance option found in the lower right corner of the dialog box. Here you can set the importance of features, and the importance of labels at four levels: low, moderate, high, and very high. The importance of features and the importance of labels must be set individually for each of the themes to be labeled. The importance rating for features determines how labels will be placed as to not obscure features on the map, such as the names of towns not overlapping road or river features. An importance rating of Low indicates that ArcView will allow text to overlap map features of active themes added to the Multi-Labeler, while a rating of Very High will prevent text-feature overlap.

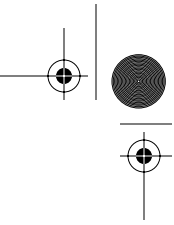
The importance rating for labels works in the same manner, but for pieces of text only. An importance rating of Low for labels will result in many overlapping pieces of text, whereas a rating of Very High will result in no overlapping text. The outcome of a Very High importance rating may be that several features are not labeled at all; therefore, it is a good idea to experiment with a High or Moderate setting.

Remember, the point of using tools such as the Multi-Labeler is not to have every piece of type placed perfectly, but to cut down on the time it takes to place large amounts of type. You will always have to move some pieces of text to make your map labeling readable and understandable.

✓ **TIP:** *If you are finishing the map in another graphics program such as Adobe Illustrator or MacroMedia's Freehand, and need to have editable text, export the file as “Placeable WMF” from the View's File menu. This preserves the text objects as editable text when the Windows metafile is opened in a PostScript drawing program.*

Labeling Margin Information

Naming the features in the map efficiently and creating a useful map legend constitute the real heavy lifting of the map labeling process. However, additional text, referred to as “margin information,” adds real value to your map product. Some margin information can be entered in the



View, whereas other text is appropriately added later in the ArcView Layout document.

An example of such margin information is the Map title. As a default, ArcView uses for a map title the title of the View window the ArcView Layout is based on. Few people will want their final map titled View1 or View2! To change this, in the View, go to Properties under the View menu and type in a map title on the Name line.

Do this early in the map production process, and you will find the choice of a descriptive title to be helpful in focusing the other labeling efforts within the View. After all, a map title such as 1999 Annual Sales Figures in California conveys much more information than View1 or just California Sales. Titles can be replaced or altered by using the Text tool in the Layout.

Frequently, you will want to add other blocks of text, including a source statement, to your map. Larger amounts of text can be added as a graphic block in the Layout using the Text tool, but typing multiple paragraphs directly into the dialog box with this tool can be very clumsy.

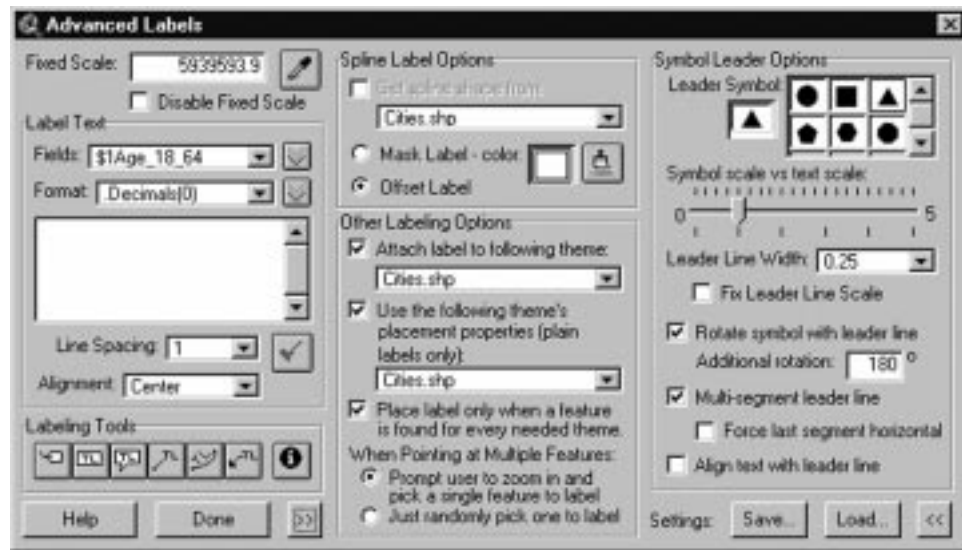
- ✓ **TIP:** *Formatted text can be copied from a word processing program into the Text tool dialog box in ArcView. By using a word processor, you can precisely format entire paragraphs of marginal text for your map, and copy and paste them using keyboard commands (<Ctrl+C> and <Ctrl+V>) into the ArcView Text tool dialog box. This also allows you to save important information, such as your company's address, in the text file in the word processing document for use in other maps.*

Beyond the Basics—Advanced Labeling

When the basic tools in ArcView fail to meet your map's labeling needs, you are faced with a choice: purchase a specialized labeling extension or export the map to a dedicated graphics program. Either choice will cost you money, and is dependent on how many labels you need to place on the map, as well as on what your final map product will be.

If you need to place several hundred labels or just want to speed up labeling tasks, check out an ArcView extension called AVALabel 2.3, the advanced labeling tools of which are shown in the following illustration. If you need to precisely place thousands of text labels for a high-end map product that will be published in an atlas or book, export the View or Layout document to a graphics program such as Adobe Illustrator or Macromedia Freehand, and use an extension to those programs called Map Publisher.

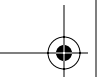
cdch06022.tif



Advanced Label Tools in AVALabel 2.3.

AVALabel, which stands for ArcView Advanced Label, is an outstanding extension to ArcView from MapLogic Corporation, and can be found on the web at <http://www.maplogic.com>. AVALabel fixes many of the shortcomings of the basic ArcView label tools, and provides several time-saving shortcuts for the labeling process. The following material describes these features.

AVALabel solves the vexing label reference scale problem by allowing you to specify a reference scale for the themes in the View, and labeling features at that same scale, whether you have zoomed in or out of the window. This feature alone is worth the price of the extension! In basic ArcView, you are forced to remember the reference



scale or physically write it down on a piece of paper, and return to that zoom level before placing additional text.

AVALabel easily allows the combination of multiple fields from an attribute table to be used in a single piece of text. This can be done in basic ArcView only, using the Avenue commands in the Table's Field Calculator to create a new field. The Fixed Scale Label tools of AVALabel 2.3 are shown in the following illustration.

cdch06023.tif

Fixed Scale Label tools in AVALabel 2.3.



After you have placed a label, AVALabel provides you with a wealth of useful features for manipulating the label. The Nudge tools allow you to move pieces of text by specified increments, such as points or inches, giving a degree of positioning control that is impossible using just ArcView's Pointer tool to drag text around the View.

Like a word processor, AVALabel offers a search and replace function, permitting View-wide searches and editing of feature names. Once you are satisfied with a set of labels, AVALabel will save that set to a file, and allow you to use it again and again in different Projects and Views.

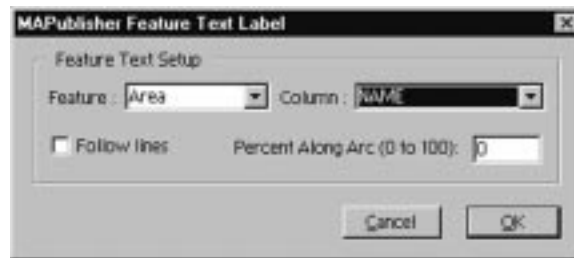
AVALabel is by far one of the most useful ArcView extensions available, and should be part of every cartographer's digital toolbox. However, AVALabel does not solve the problem of "ArcView Project bloat," which creates huge, multi-megabyte project files caused by hundreds or thousands of graphic text objects in the ArcView project. When you reach this stage, or when you need to prepare the map for high-end publishing, it is time to consider moving the map to a dedicated graphics program.

Dedicated graphics programs such as Adobe Illustrator or Macromedia Freehand provide much finer control over type and color than is found in ArcView, and generate bombproof PostScript files, which are the standard file structure for book and magazine publishing.

Moving an ArcView map, exported as an Encapsulated PostScript file (EPS), to a graphics program used to be a cumbersome task. Today, a software program called MaPublisher 3.5 bridges the gap between GIS and CAD programs and graphics programs by functioning as a "mini-ArcView" within the graphics program. MaPublisher 3.5, produced by Avenza, is an extension to Illustrator and Freehand, and imports and manipulates ArcView shapefiles in these two programs. This means that you can label map features within the graphics program from the shapefile's attribute table, and take advantage of the refined typographic control found there. MaPublisher is shown in the following illustration.

odch06024.tif

*Labeling map features in
MaPublisher 3.5*



Of course, the disadvantage of this approach is that you may need to buy and learn yet another software program, in addition to ArcView, which can be a daunting task. However, depending on the amount of



text and type of map product you need, Illustrator or Freehand plus MaPublisher may be the most efficient approach to take. For more information on MaPublisher, visit their web site at <http://www.avenza.com>.

Summary

Labeling map features (placing type on a map) is a complex and time-consuming task. ArcView, including a couple of extensions, provides a variety of tools to speed up the task, but by no means makes the labeling process a trivial exercise. Make sure to consider the amount of labeling your map needs, and then budget the time in the mapmaking process to do it right.

