





## Working with Labels

***Objective: To create labels with appropriate priorities, symbology, and scale.***

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### Use of Labels vs. Annotation

Labels	Annotation
Dynamically placed	Static text
Managed as a group	Edited / managed individually
Stored in map document or .lyr file	Stored in map document or geodatabase
Linked to feature	Stored in .mxd or GDB, may or not be linked to feature

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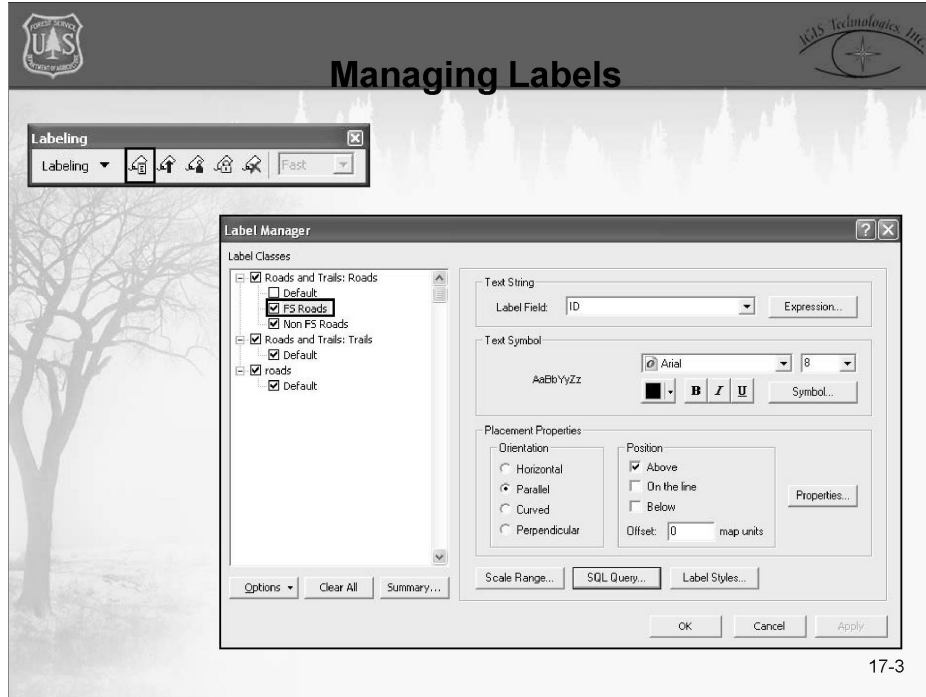
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Both labels and annotation place text on the map in relation to features. However, there are several differences as shown by this table.

Labels are dynamically placed based on scale, location, and placement options. Placement of labels can change as the map's scale changes in efforts to make a more readable product. Although labels can be divided into classes, they are typically managed in groups, which makes labeling a faster method of adding text to your map. Because labels are linked to features, this allows you to change labeling for an entire group of features (such as roads) without having to add text manually to each individual feature (each individual road). Labels are stored in map documents and layer files.

Contrary to labels, annotation is managed and edited individually. The text is static and will not be repositioned according to labeling engine rules. Its size is fixed relative to a reference scale which allows them to scale in size as the map is zoomed in and out just like features. This means that annotation that has been converted from labels won't change size, whether scale is changed or not. Annotation can be stored within the map document, as a feature class in a geodatabase, or as a feature-linked class in a geodatabase.



Although you can always change the properties of a given layer's labels from the Layer Properties dialog box, it is more convenient to have a centralized location from which to manage all your labels, especially when you have multiple labeled layers and multiple label classes. From the Labeling Toolbar, go to the Label Manager. The Label Manager allows you to change labeling properties for all of the layers in the data frame. Here we see the properties of the FS Roads class of the roads group of the Roads and Trails layer file. From this screen, we can control the font, size, and color of the text, (if we so chose) to help differentiate from different type of features. This is opposed to opening and closing properties dialog boxes for several layers.



### Placing Labels

- Priority and weight for label hierarchy
- Buffer for spacing
- Placement options for point, line, and area features

Placement Properties

Placement: Conflict Detection

Line Settings

Orientation

☒ Horizontal

☐ Parallel

☐ Curved

☐ Perpendicular

Position

☐ Above

☒ On the line

☐ Below

Orientation System: Page

Offset: 0 map units

Location

Location along the line: All text

Duplicate Labels

☐ Remove duplicate labels

☐ Place one label per feature

☒ Place one label per feature part

OK

Placement Properties

Placement: Conflict Detection

Label Weight

Label weight: High

This determines whether the labels in this layer can be overlapped by labels from other layers. The higher the weight, the less likely the labels are to be overlapped.

Feature Weight

Feature weight: None

This determines whether the features in this layer can be overlapped by labels from this or any other layer. Labels will only be placed over features with a lower weight.

Tip: For fastest drawing speed use feature weight None.

Buffer

Buffer defined as a ratio of the label's height: 0

This prevents adjacent labels from being placed too close together by defining a buffer around each label within which no other labels will be placed.



Tip: 0 = no label buffer, 1 = label buffer same height as label.

☐ Place overlapping labels

OK Cancel

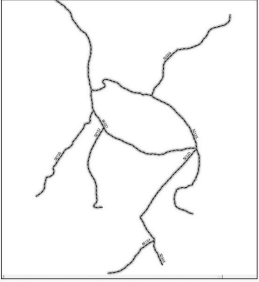
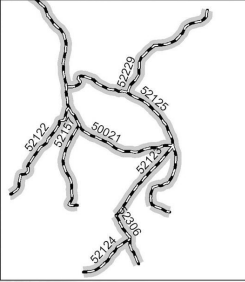
17-4

The label options allow you to change both the appearance of labels as well as the interaction between labels. These options include weight (how important is it not to be overlapped by other labels or features?), priority (which groups of labels have more importance than other groups?), and buffer (how close can another label come to this label before it is removed?). These settings determine label placement priority between layers that conflict. Additionally, options help determine placement for point, line, and area labeling. A common setting for an MVUM will be to place the route labels with a high weight and priority compared to other feature labels so that they do not unexpectedly get displaced.



### Reference Scale

- Text- Size is fixed relative to other features
- Entire data frame has one reference scale
- Usually done prior to conversion to annotation



Zoomed in with reference scale set      Zoomed in without reference scale set

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Setting the reference scale fixes the size and position of the labels relative to the other features of the map. A single reference scale is set for the entire data frame. Once the scale is set, the current appearance of the labels becomes permanent, similar to locking the labels. Annotation must have a reference scale built in. Because of this, setting a reference scale often precedes converting the labels to annotation.

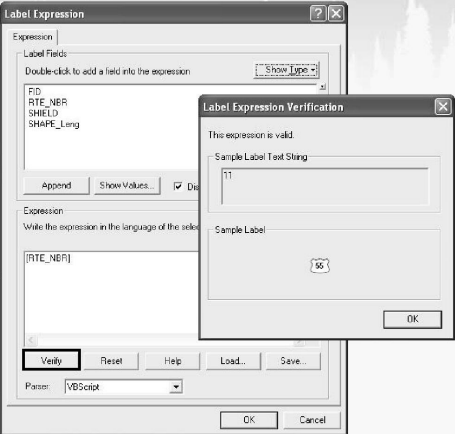


### Creating Label Expressions



Visual basic scripts, Multiple fields

- Text strings can be inserted
- Numbers can be rounded, Changing styles
  - Italics
  - Bold
  - Capitalization



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Although the default setting is for labels to consist of one field, you can also build label expressions to label features with multiple fields, or to label features with different styles of text. Label expressions can be a versatile tool for customizing labels. Expressions might be applied to an MVUM where your reference data tables have listed campground names in sentence case. If you prefer your campgrounds to be in uppercase, then you can generate an expression to reformat your labels on the map.

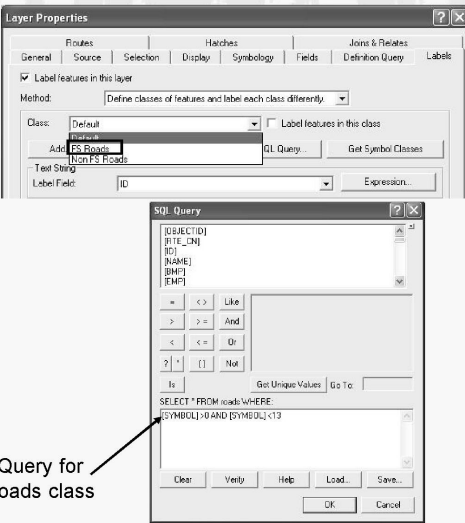


### Label Classes



- Label feature groups the same way
- Larger / different text for larger roads
- Different colors for different road types
- Multiple classes can be created
- SQL expression can define class, or use "Get Symbol Class" button



SQL Query for FS Roads class



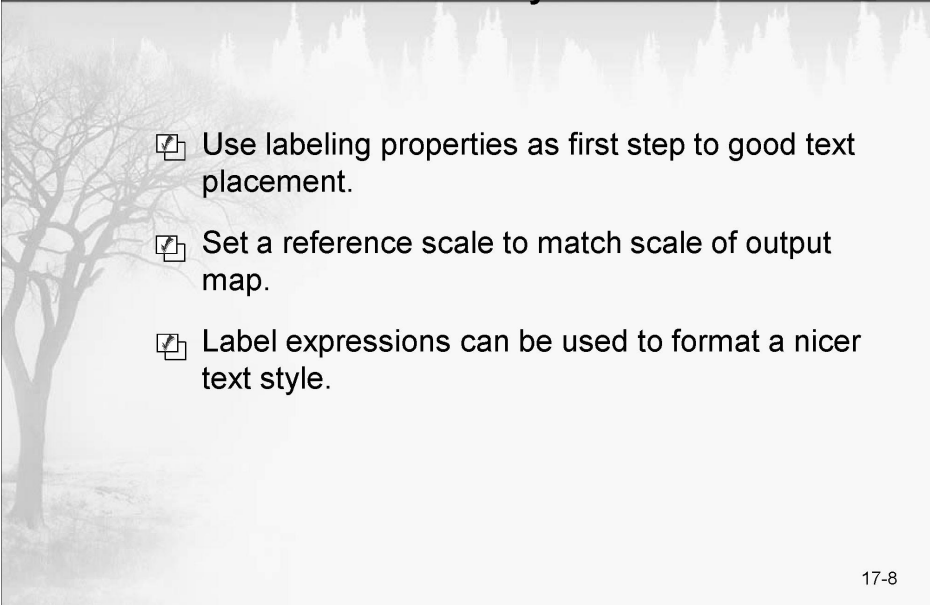
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You can create multiple label classes in order to label features differently. For instance, you could label Forest Service roads using the FS Roads class assigning a specific label to them while the Non FS Roads class uses different parameters for the labels of that road type. This is accomplished by using an SQL expression to define label classes for different classes of roads, or you can select the “Get Symbol Class” button to generate a label class according to your symbology. You can also create label classes through the Layer Properties or the Label Manager.

Here we can see the two classes assigned to the Roads group of the Roads and Trails layer.



Summary



- ☒ Use labeling properties as first step to good text placement.
- ☒ Set a reference scale to match scale of output map.
- ☒ Label expressions can be used to format a nicer text style.

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### Exercise 17: Setting Labeling rules with label classes and label priority



**Exercise goal:** To become familiar with manipulating labels through creating label classes and setting priorities and weights.

Why is this important? Customizing labels and creating label classes are important because it allows the cartographer to specify different labeling properties for features in the same layer. Knowing how to manipulate labels allow you to create the most descriptive, best suited labels for the features on the map.


Upon completion of the exercise, you will be able to ...

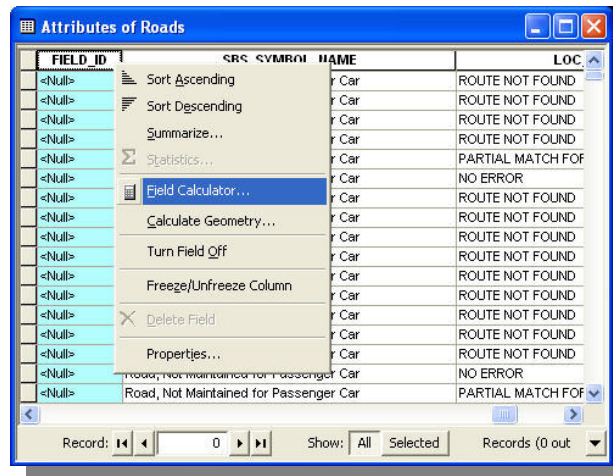
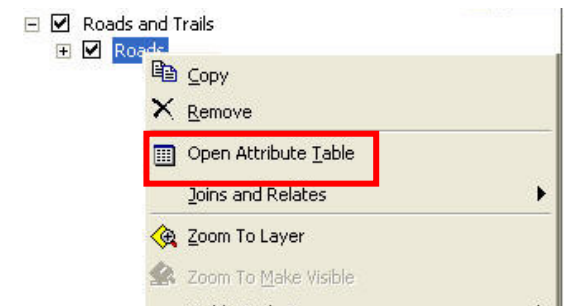
- ✓ Create and customize labels
- ✓ Become familiar with setting the reference scale
- ✓ Manipulate label priorities and weights
- ✓ Create label classes

<b>STEP</b>	<b>DESCRIPTION</b>	<b>PAGE</b>
1	Use Visual Basic Script to populate an attribute field for labels	17 – 10
2	Create uniform labels using MVUM standards	17 – 12
3	Set the reference scale	17 – 13
4	Set label priorities and weight	17 – 14
5	Create a label class	17 – 15
6	Stack text with the Maplex engine	17 – 19

### Step1: Using Visual Basic Script to populate an attribute field for labels

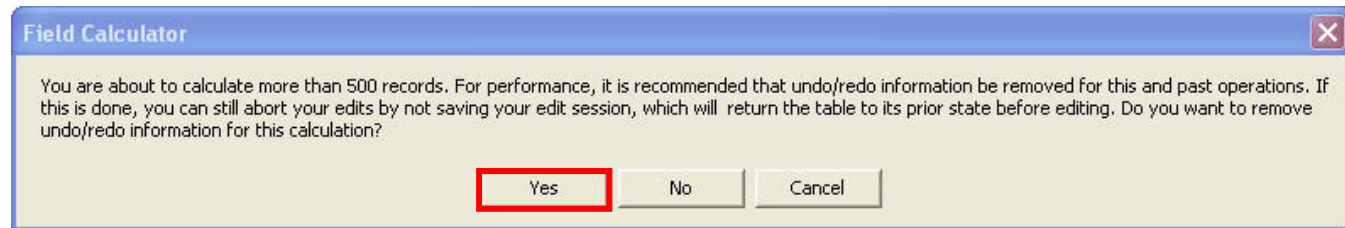
In this step you will populate the FIELD\_ID field with only valid numbers as labels for the forest road features. You will use the data from the ID field and a Visual Basic script trimming the string to the appropriate characters. This step will remove the first number and the second if it is a zero. The final product will populate the FIELD\_ID field with the correct string for label use. The ID field “12345” would be populated in the FIELD\_ID field as “2345” or an ID field of “50445” will be a FIELD\_ID of “445”. This is a common problem for many attributes fields that may have too much information or are formatted in an unpleasing style.

- a. Start an **ArcMap** session. 
- b. Navigate to and open Ex17.mxd.  
**C:/Training/Ex17/Exercise17.mxd**
- c. Start an edit session with **Roads** as the target feature class.
- d. Right-click on the Roads in the table of contents and select **Open Attribute Table** in the drop down.
- e. In the attribute table right-click on the **FIELD\_ID** attribute name and select **Field Calculator**.



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If you are prompted about calculating more than 500 records select Yes for a quicker calculation.



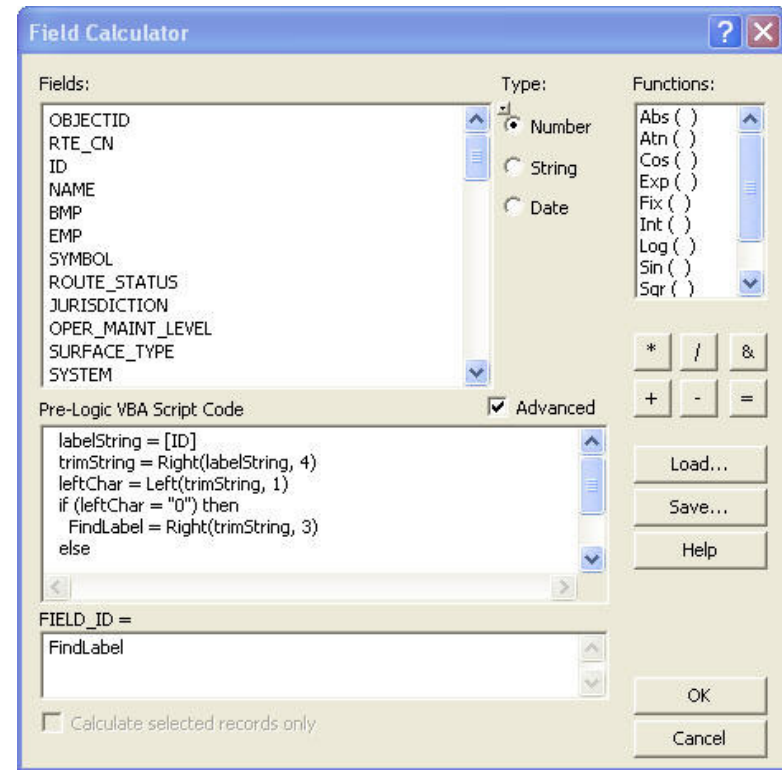
- f. In the Field Calculator window, check the box next to **Advanced** then copy and paste the Visual Basic statement out from the Ex17VBstatement text document in the Ex17 folder into the expression window. In the text box below FIELD\_ID =, enter in **FindLabel** and click **OK**.

The Visual Basic script is as follows.

```
labelString = [ID]
trimString = Right(labelString, 4)
leftChar = Left(trimString, 1)
if (leftChar = "0") then
    FindLabel = Right(trimString, 3)
else
    FindLabel = trimString
end if
```

The expression consists of a Visual Basic function that eliminates the first character of the string and the second if it is a zero. The trimString is the Visual Basic function used to remove the unwanted characters from the ID field. The "IF" statement removes the fourth character of the ID field if it is a zero.

- g. **Save** edits and **stop** editing.




## Working with Labels

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If an error is found in your statement, recopy and paste it in the statement from the text file. This field can now be used for labeling the road features.

You should notice all of the attributes in the FIELD\_ID field should only have three or four digits.


 **NOTE:** Label expressions help is available through ArcGIS Desktop Help. Here you can find expression examples of proper syntax and script structure. In the main menu navigate to **Help → ArcGIS Desktop Help**. In the Index tab type in the **label expressions, example of** and examples of label expressions will be retrieved for you to review and use. More comprehensive instruction is available in the Microsoft Visual Basic editor Help located at **Tools → Macros → Visual Basic Editor**.

### ***Step 2: Create uniform labels using MVUM standards***

In this step you will review auto labeling, label placement, label symbol properties, and label classes.

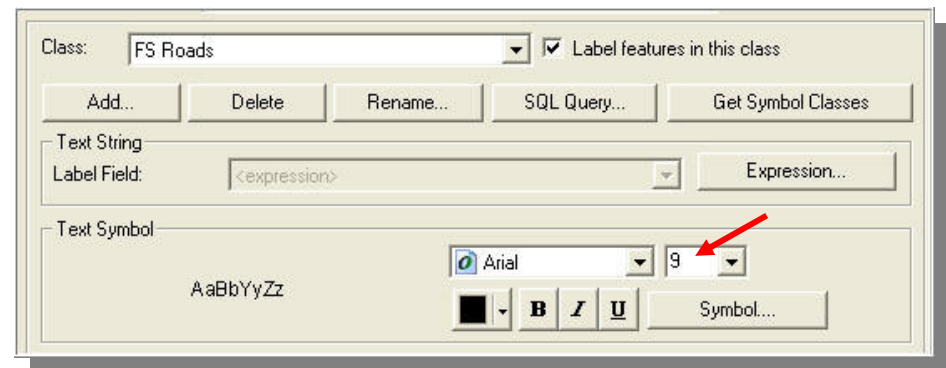
- a. Continuing on from the previous step in the main menu bar select **View → Bookmarks → Bookmark A**.

- b. Turn on the **Maplex** extension and add the label toolbar.

 **NOTE:** Maplex will be required for a later step and should be turned on during the entire labeling session.

- c. Turn the labels on for the Roads layer and view the **label** tab of Roads Layer Properties. Select the **FS Roads** Class. Make the text symbol **Arial** and the size **9**.

- d. Click **OK** to exit out of the Layer Properties window.



## Working with Labels

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- e. Click on the **Unplaced Label tool** in the **Label** toolbar.



This tool shows the labels that are not displayed due to label conflicts.

### Question:

1. What color are the labels that were not placed?

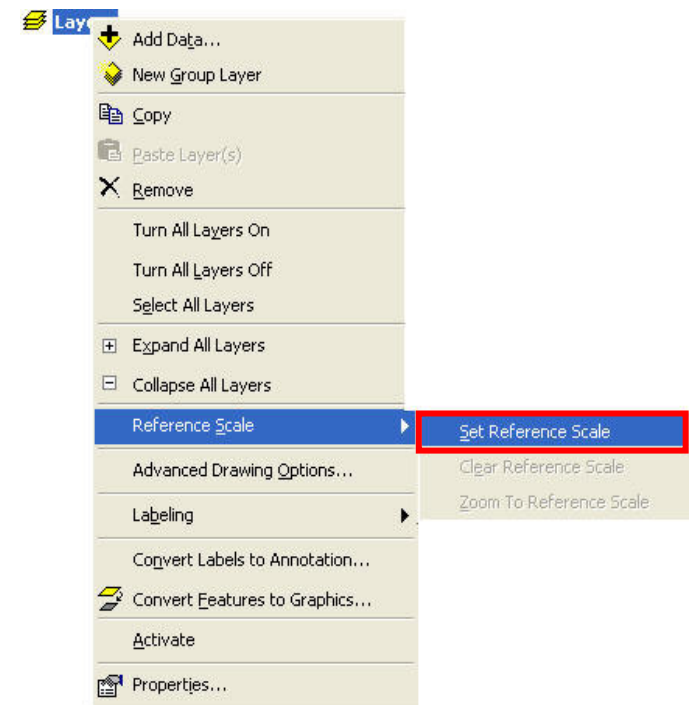
## Step 3: Setting the Reference Scale

In this step you will set the reference scale. Once the reference scale is set, the label size becomes fixed at that scale (Ex. 8pt labels will always be 8pt at 1:63,360 despite zooming). If the user zooms in or out, the labels will rescale in size just like features do.

- a. In the main tool bar, select **View** → **Bookmarks** → **Bookmark A**.
- b. In the table of contents right-click on the **Layers** Data Frame. Select **Reference Scale** and then **Set Reference Scale**.

The reference scale is set at the data frame scale when the Set Reference Scale option was selected.

- c. Right-click the Layers Data Frame and select **Properties** at the bottom of the drop down list. Select the **General** tab.
- d. Change the reference scale to **1:126,720** and click **OK**.



## Working with Labels

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Because this is the scale the map will be printed at, viewing it at this scale will help you understand what alterations are needed for a legible final product.

- e. **Save** the document.

Question:

2. How did the symbology change when the reference scale was changed to 1:126,720?

### Step 4: Setting Label Priorities and Weights

Using functions found in the label toolbar, you can rank labels creating a hierarchy. This allows you to give certain labels a higher priority over others when being displayed. For example, a route number would take precedence over a stream name when competing for the same space.

- a. Continuing on from step 3, click the **Label Priority Ranking** button on the Label Toolbar.
- b. Select the **Roads and Trails - FS Roads** in the Label Priority Ranking window. Use the top up arrow on the right side of the window to move this label class to the top of the list giving it the highest priority.



This selection is the FS Roads label class of the Roads group in the Roads and Trails lyr file. The forest service roads and trails have the highest priority of all MVUM labels.

- c. Click **OK** to exit out the Label Priority Ranking window.
- d. **Save** the document.

### Step 5: Create a Label Class

In this step you will create a label classes for the UtahHwys shape file. You will create a label class for state highways and another for U.S. Routes. You may have to use outside resources or perform a web search to locate suitable highway data with the needed route numbers and highway designation. Statewide data will most likely be the most appropriate source. For this exercise in the Manti La Sal Forest of Utah, data was found on the Utah GIS Portal website (<https://Utah.gis.gov>).

a. From the main tool bar, select **View → Bookmarks → Bookmark B.**

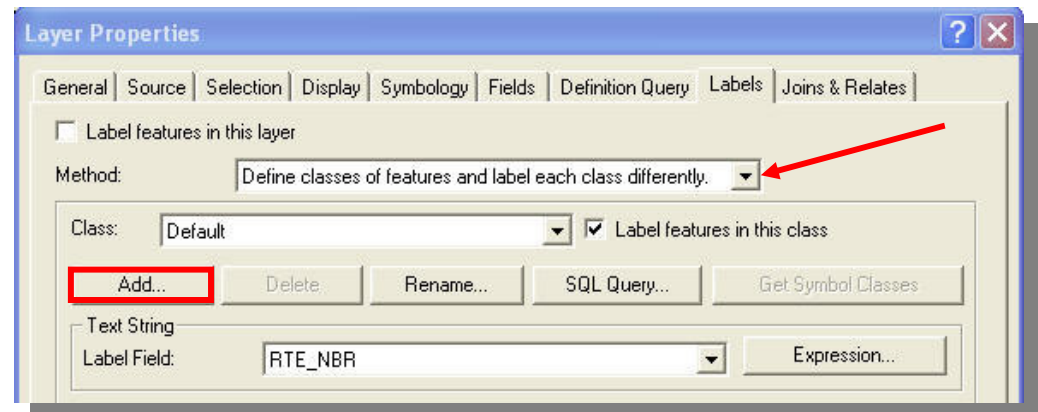


b. Click the **Add Data** button in the standard toolbar. Navigate to the **C:/Training/Exercise17** folder and add the **UtahHwys** shapefile.

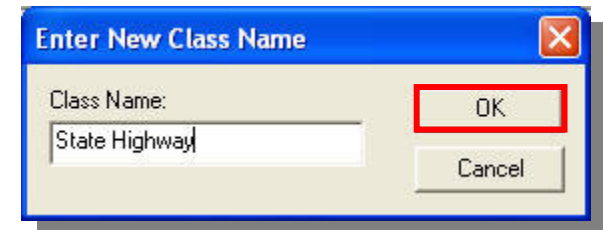
c. In the TOC, right-click on the **UtahHwys** and select **Properties** at the bottom of the drop down list. Select the **Labels** tab.

Now you will create a label class for the state highways features. The class is a subcategory of the feature in the layer that is selected by the SQL Query.

d. In the **Method** drop down list of the Layers Properties window, select **Define classes of features and label each class differently**. Then click the **Add** button. For new class name enter **State Highway** and click **OK**.

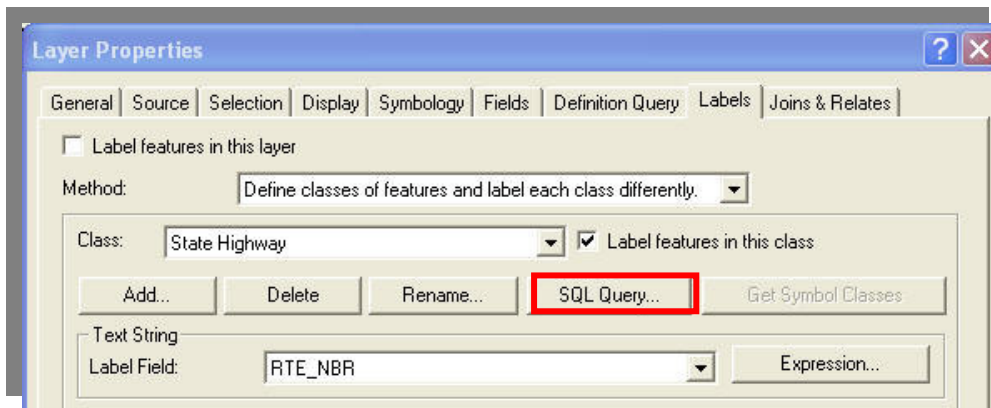


e. With State Highway selected in the class drop down of the Layer Properties window click **SQL Query**.





## Working with Labels

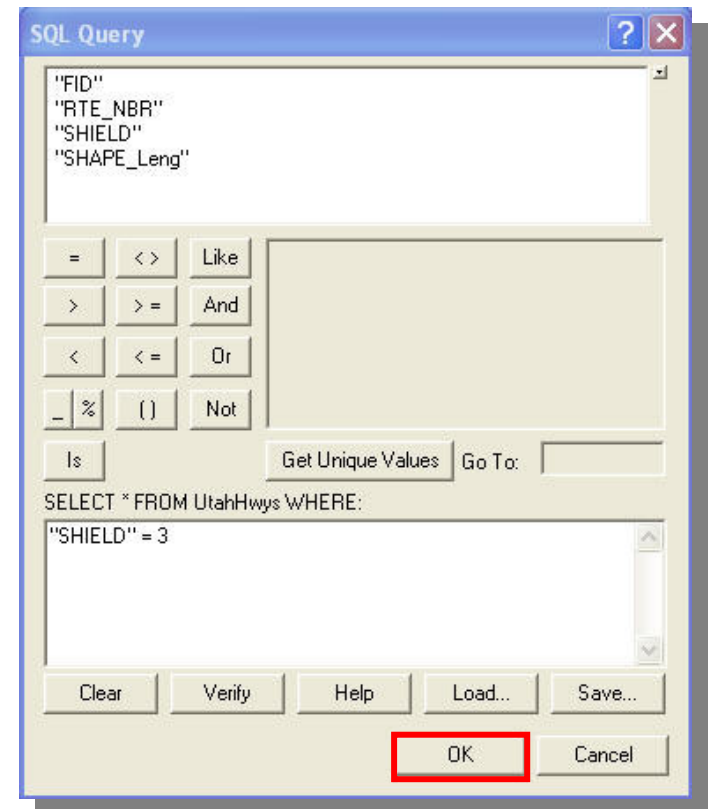
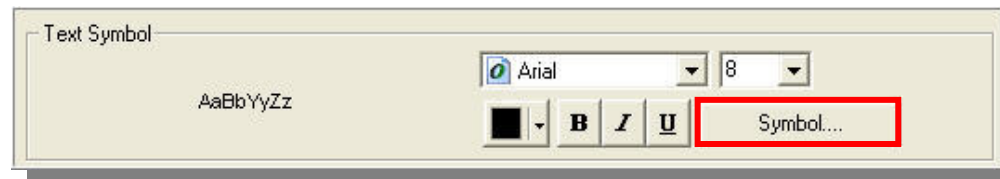


- f. Double click on **"SHIELD"**, click on **=**, and type in **3** to create the statement. Click **Verify**. You should get an "expression was successfully verified" window. Click **OK**.

If the expression was not verified there is a syntax error. Recreate the statement making sure the correct spacing and characters are used.



- g. Click **Symbol** in the Layer Properties window.

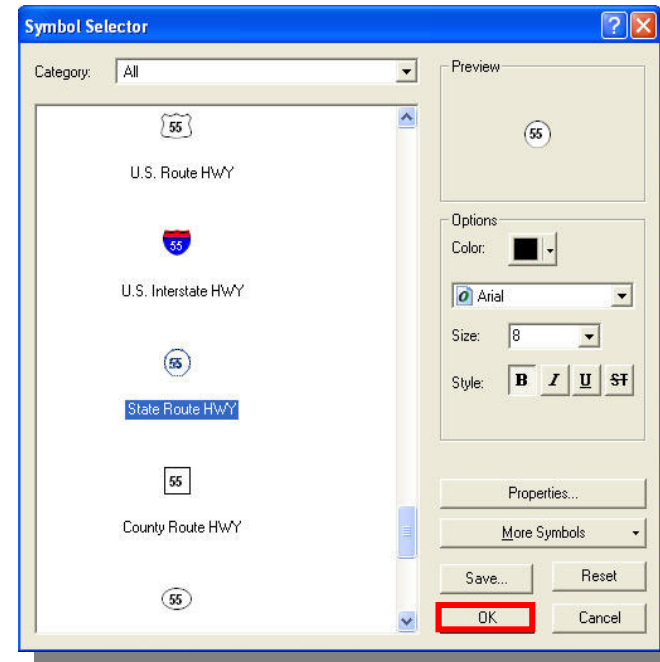




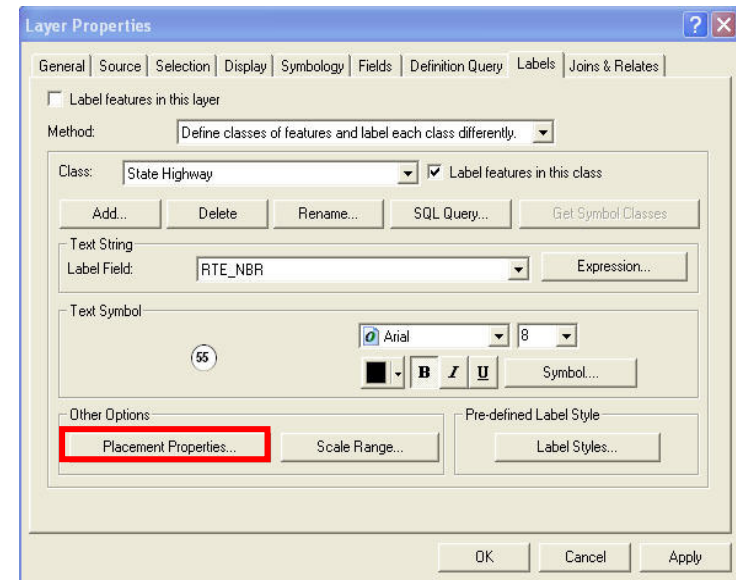
## Working with Labels

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- h. Select **State Route HWY** in the symbol selector and click **OK**.



- i. Next click **Placement Properties** in the Properties window.



## Working with Labels


 NOTE: It is important that the Class field remain State Highway and the Label Field RTE\_NBR.

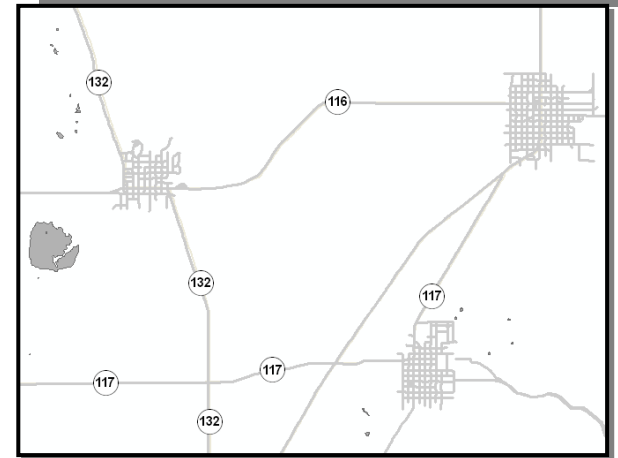
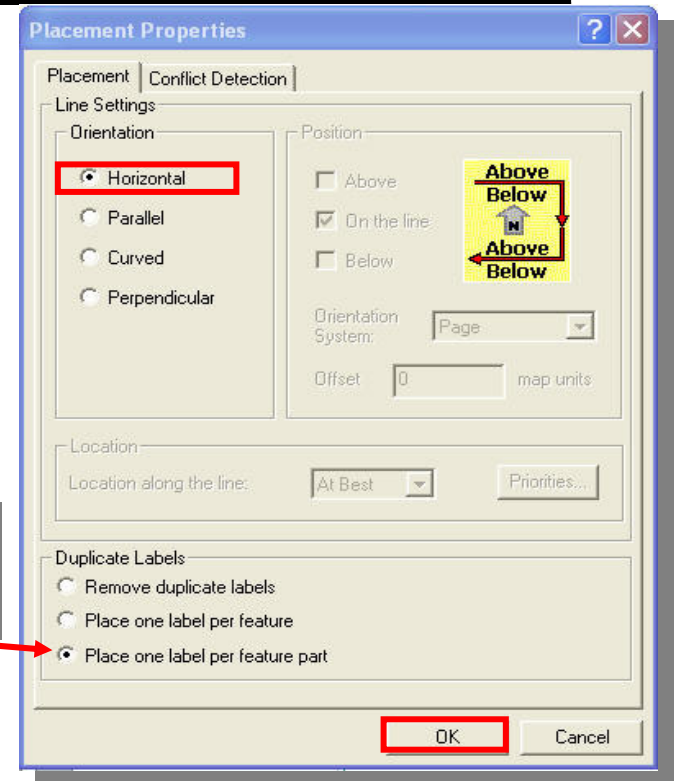
- j. In the Placement Properties window, select **Horizontal** for Orientation, **on the line** for Position and **Place one label per feature part** for Duplicate Labels. Click **OK**.

- k. In the Layers Properties window select **Default** for the class drop down and click **Delete**.



- l. In the Layer Properties Window **check** the **Label features in this layer box** and click **OK** to close it. The state highways should all be labeled with a round state highway shield and their route number.

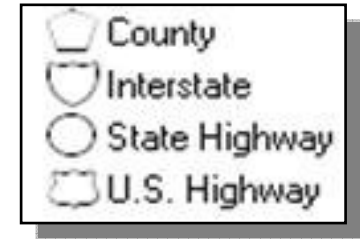
 NOTE: If you cannot see the road labels, clear the reference scale by right-clicking on layer in the table of contents and selecting **Reference Scale** → **Clear Reference Scale**.




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The procedure outlined in step 5 should be repeated to create a US highways, County and Interstate highway classes. The appropriate highway shield symbol and name should be assigned to each class. The shield value for an interstate highway is 1 and for a U.S highway is 2.



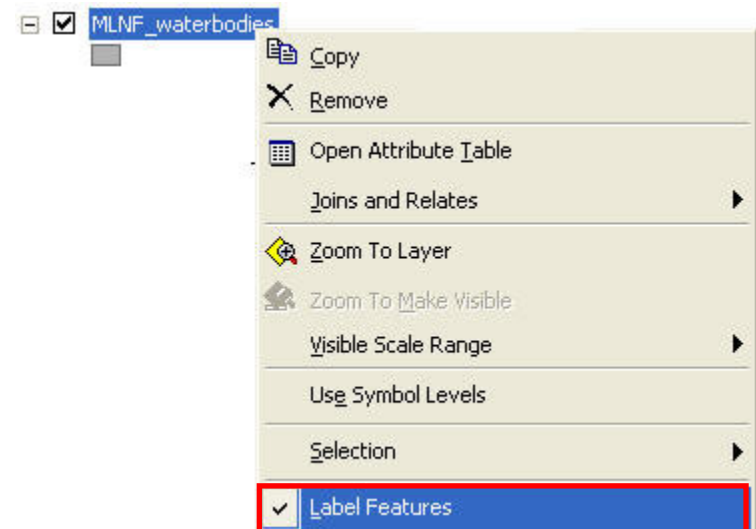
No interstate highways occur within the extent of bookmark B.

 NOTE: See the MVUM style file for the correct highway symbols.

### ***Step 6: Stacking text with the Maplex engine***

In this step you will use the Maplex engine to stack labels for the lakes and other water bodies plotted on the MVUM. Stacking the labels often makes a map easier to read.

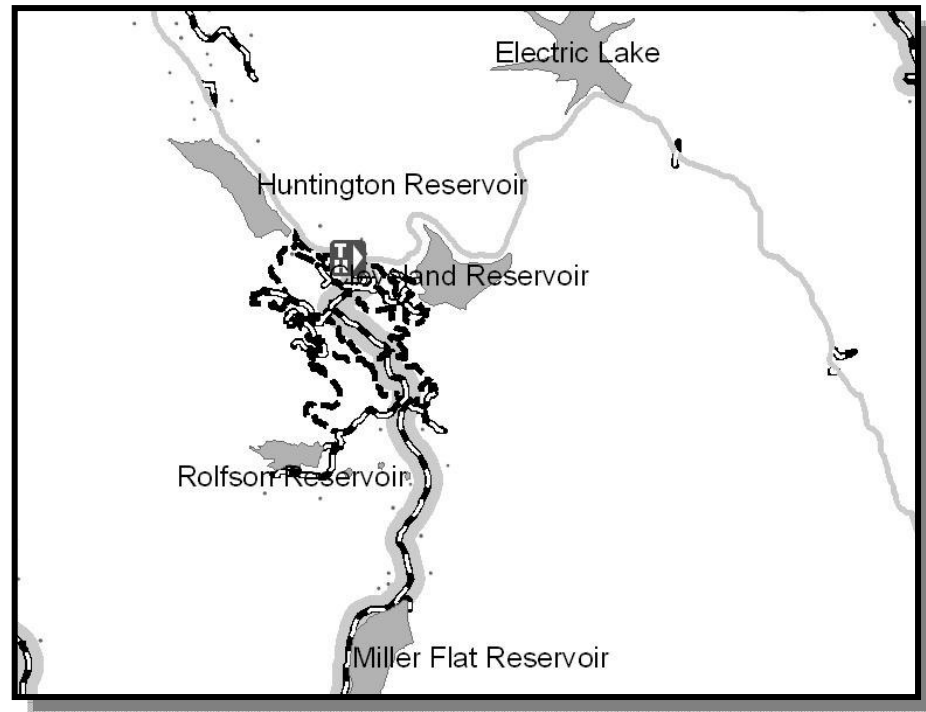
- From the main tool bar, select **View → Bookmarks → Maplex** and turn off the UtahHwys labels.
- In the table of contents turn on the **MLNF\_waterbodies** layer.
- Right-click on the MLNF\_waterbodies layer and select **Label Features**.
- Add the Labeling toolbar if it is not present.
- Turn on the ArcMap Maplex extension.



## Working with Labels

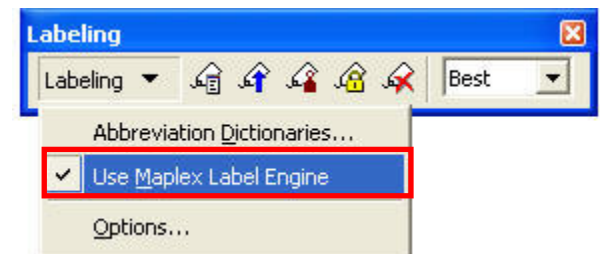
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Your display should look like this.



f. In the labeling toolbar, click **Labeling** → **Use Maplex Engine**.

g. On the right side of the Labeling toolbar select **Best** in the drop down menu.



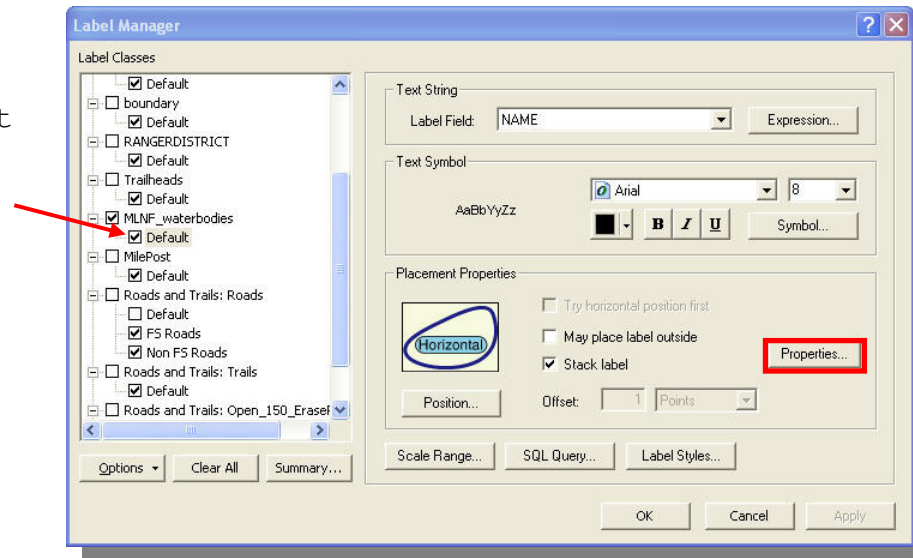
## Working with Labels

The Maplex Best option positions the text to best complement the feature it describes.

h. Click on the **Label Manager** tool on the labeling toolbar.



i. In the Label Manager window click on **Default** under MLNF\_waterbodies to highlight it then click on the **Properties** button.



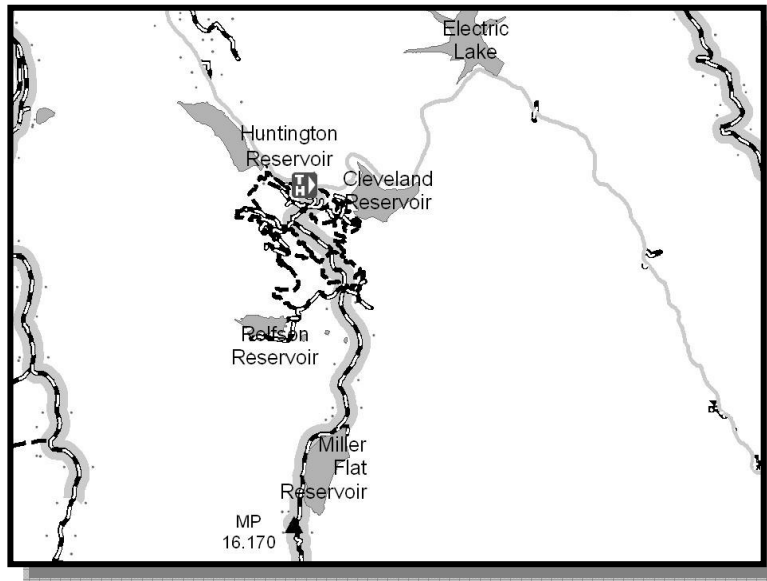
j. In the Placement Properties window click the **Label Fitting Strategy** tab make sure **Stack label** is checked. Click the **Options** button to the right of Stack label.



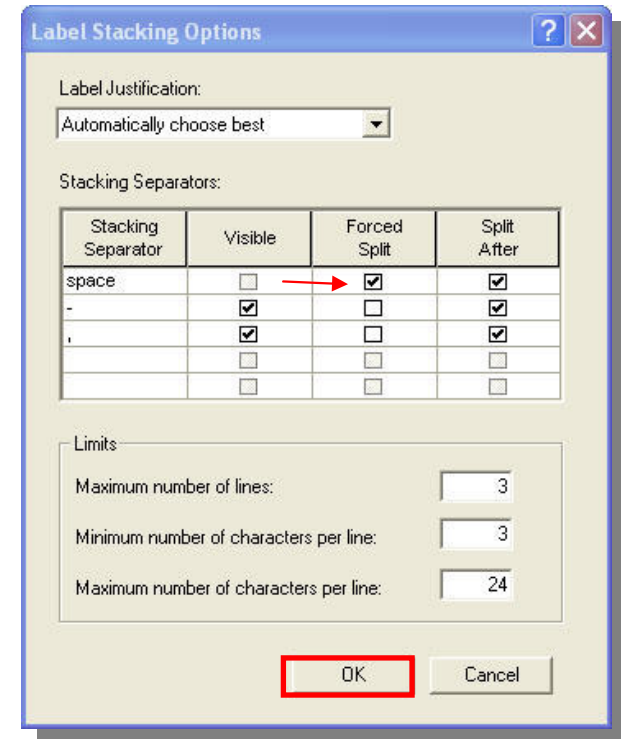
In the Label Stacking Options window you can set the preferences of how the labels will be stacked.

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- k. In the Label Stacking Options window check the first box under **Forced Split** if it is not checked and click **OK**.
- l. Click **OK** to close the remaining open windows.



- m. **Save** and **Close** your map document.



In this exercise you went through the steps involved in creating a custom label expression, label classes, and setting label priorities and weights. Knowing how to apply the proper settings allows you to create effective labels in a timely manner.

**End Exercise.**