Lab VIII ENVR 4305 Fall 2019 (18 pts)   Name _____

Editing and Labeling Features

Part I: From the "Getting to Know ArcGIS" book provided in lab, work through the Chapter 7 **Exercises 13a**.

Part II: Go through the attached exercise "Label features using the Standard Label Engine."

The data files for part I should be in the C drive under folder EsriPress/GTKarcGIS/

The data files for part II should be in the C drive under folder EsriTraining/ARC2/

Ask the TA or Instructor for help if you are confused at any time.

Each student should sign their own lab and turn it in at the end of lab.

35 minutes ⏳

Exercise 5 Label features using the Standard Label Engine

For this exercise, you will use the Standard Label Engine to label point, line, and polygon features in a map of the San Juan National Forest in Colorado.

In this exercise, you will:

- Label features.
- Change label symbology.
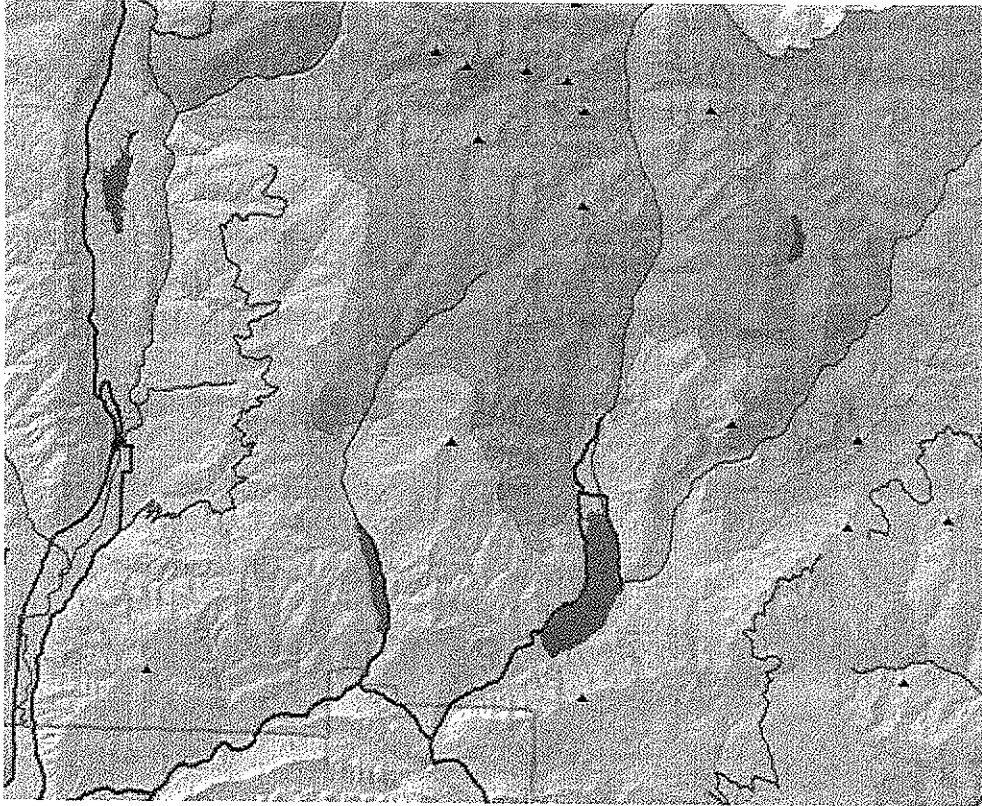- Create label classes.

Dynamic labeling of lakes, roads, streams, and mountain peaks.
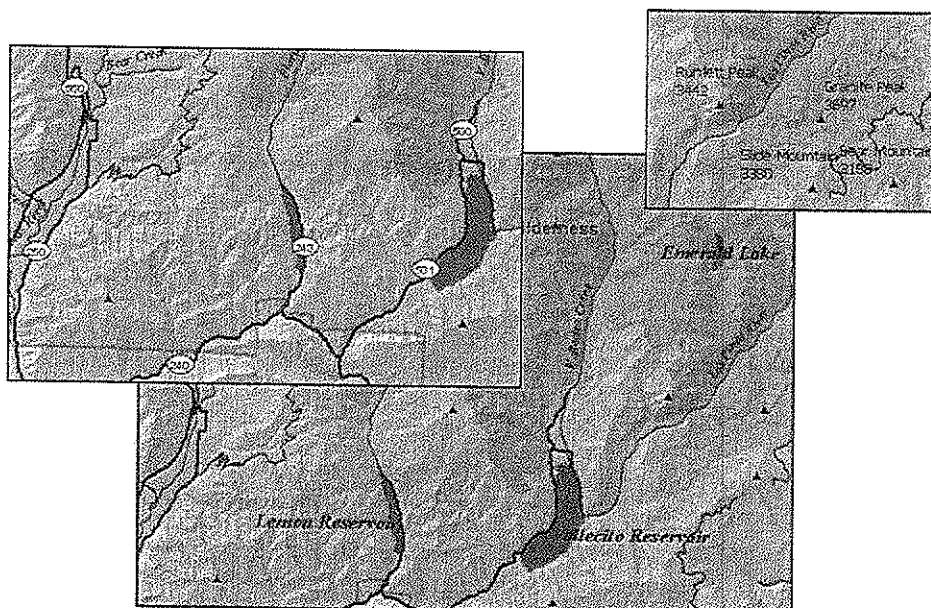
Step 1: Prepare your map for labeling

In this exercise, you will label layers for the San Juan National Forest in Colorado. You will start by preparing your map for labeling.

a Start ArcMap and open ..\ARC2\Labeling\San_Juan_Labels.mxd.

Your map displays several layers for part of the San Juan National Forest.

b From the Bookmarks menu, choose San Juan.

c Set your map scale to 1:250,000.

**d** From the Customize menu, point to Toolbars and then click Labeling.

Next, you will see how to enable ArcMap to use the Maplex Label Engine.

e On the Labeling toolbar, click the Labeling menu.

f Notice the option to Use Maplex Label Engine (but do not select it).

The Maplex Label Engine extends the placement capabilities of labels based on rules. For this exercise, you will use the Standard Label Engine. The advantage of the Standard Label Engine is speed and efficiency. It is useful for map navigation and query and analysis operations, whereas the Maplex Label Engine provides the extra cartographic capabilities required for map production uses.

g Open the properties for the San Juan data frame.

→ layers.

h Confirm that the General tab is active.
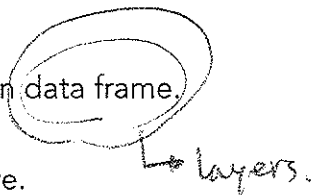
At the bottom of the Data Frame Properties dialog box, notice that the Label Engine is set to use the Standard Label Engine.

Label Engine: | Standard Label Engine ▼

💡 When you open an existing map document, check the data frame properties to confirm which labeling engine it uses.

i Close the Data Frame Properties dialog box.

Step 2: Set the label symbol

You are now ready to start labeling your map. You will begin by labeling the wilderness areas.

a Open the attribute table for the Wilderness layer.

The values in the WILDERNESS attribute store the name of each wilderness area. You will label your map using this attribute.

b Close the attribute table.

**c** On the Labeling toolbar, click the Label Manager button 📇.

The Label Manager allows you to set the label properties for all layers in your data frame. Each layer is listed on the left side of the dialog box. Under each layer name, one or more label classes are displayed. You will use label classes later in this exercise.

📄 You can also access these same properties for an individual layer through the Labels tab in the Layer Properties.

First, you will select a text symbol for the Wilderness layer.

(d) In the Label Classes list, click the Default label class for the Wilderness layer.

```
⊟·☐ Lakes
   └··☑ Default
⊟·☐ Wilderness
   └··☑ Default
⊟·☐ Forest boundary
   └··☑ Default
```
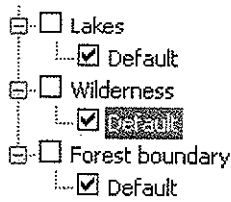
This displays the text symbol and placement properties.

(e) Under Text String, confirm that the Label Field is set to the WILDERNESS attribute.

(f) In the Text Symbol section, confirm that the font is set to Arial.
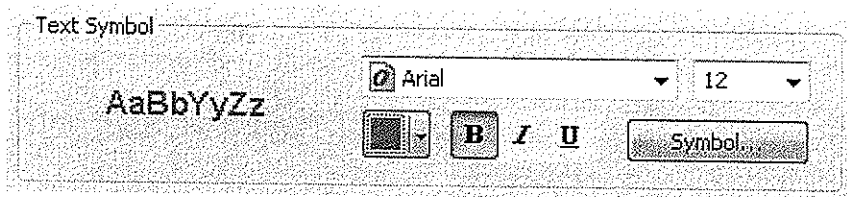
(g) Set the font size to **12.**

Sizes for text symbols are in units of points.

(h) Click the color patch to display the color palette.

(i) Pause your pointer over the different color chips to display the color names.

(j) Choose Lotus Pond Green (bottom row, sixth column from the right).

(k) Click the Bold button **B** .

Text Symbol

AaBbYyZz [Arial] [12]

B *I* U Symbol...

Step 3: Label polygons

Now you are ready to specify how each feature's label will be placed on your map. Several positions that you can use to label your polygons are shown. For your wilderness areas, you want the label placed horizontally inside each polygon.
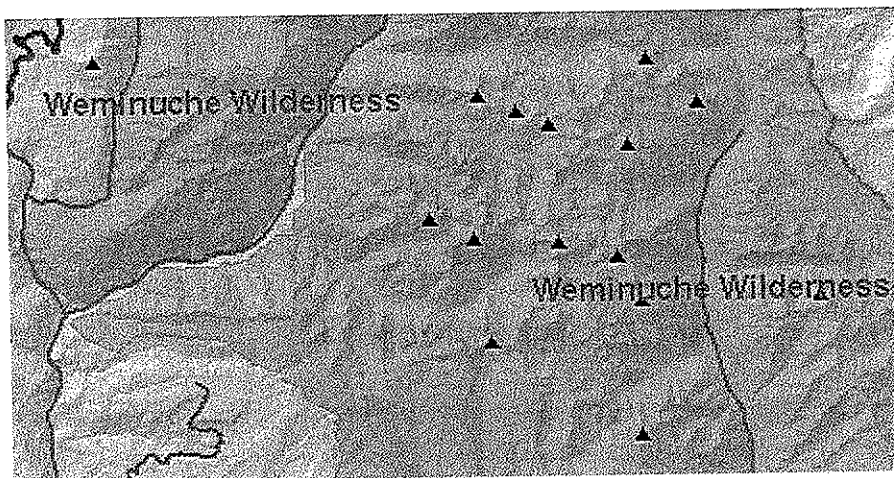
(a) In the Label Manager dialog box, under Placement Properties, verify that the option is set to Always Horizontal.

Now you will turn on labeling for the Wilderness layer so its labels draw in the map.

b In the Label Classes list, select the check box next to Wilderness.

- ☐ Lakes
  - ☑ Default
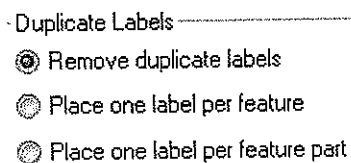- ☑ Wilderness
  - ☑ Default
- ☐ Forest boundary
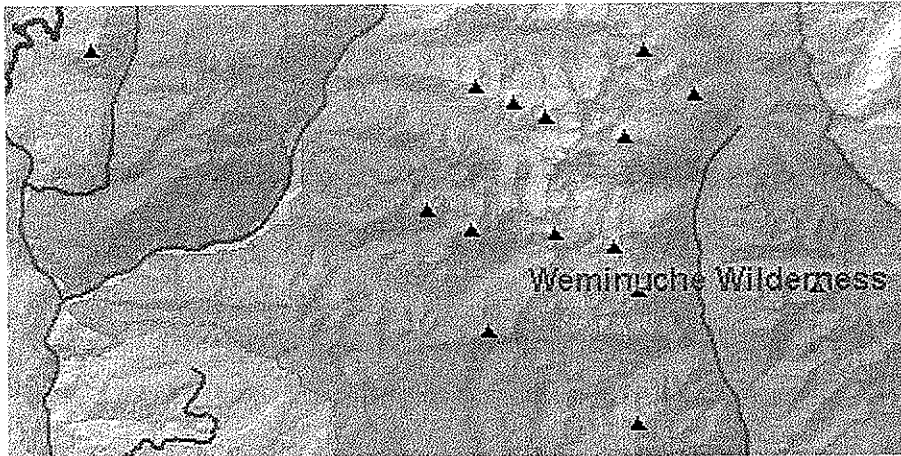 - ☑ Default
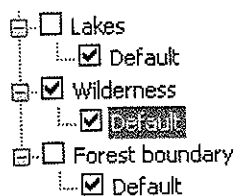
c Click OK.

Two of the polygons of the Weminuche Wilderness are now labeled on your map. (You may need to pan the map to see both labels.) Assume that you want to see only one label for the wilderness area because the areas appear to be nearly contiguous.

d Open the Label Manager again.

e Under Placement Properties, click the Properties button.

f If necessary, click the Placement tab.

g Under Duplicate Labels, select the option to Remove Duplicate Labels.

Duplicate Labels
- ◉ Remove duplicate labels
- ○ Place one label per feature
- ○ Place one label per feature part

h Click OK twice.

The wilderness label appears only once.
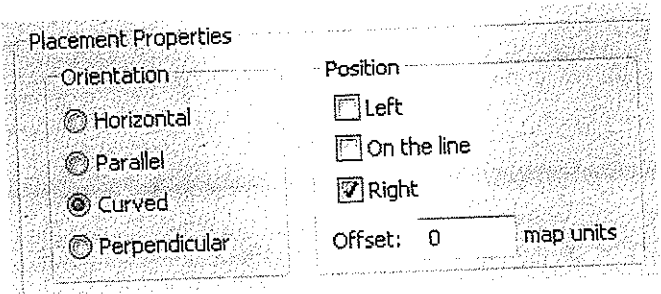
Step 4: Label line features

In this step, you will label the streams. Streams are line features and have different placement rules than polygons or points.

a Open the Label Manager.

b Select the Default label class for the Streams layer.

c For Label Field, confirm that NAME is the selected attribute.

d Set the text symbol based on the following specifications:

- Font: Times New Roman
- Size: 9
- Color: Larkspur Blue (bottom row, fourth column from the right)
- Style: Bold and Italic
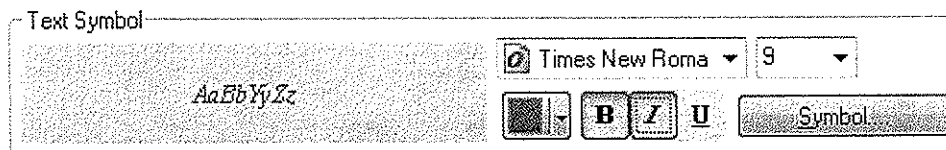
e Under Placement Properties, in the Orientation section, select the Curved option.
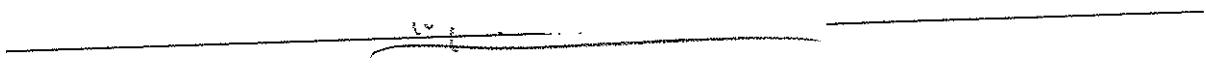
f Under the Position section, select the Right option and clear the On The Line option.

```
Placement Properties
 ┌ Orientation ─────┐   ┌ Position ──────────┐
 ○ Horizontal         □ Left
 ○ Parallel           □ On the line
 ● Curved             ☑ Right
 ○ Perpendicular      Offset:  0     map units
```

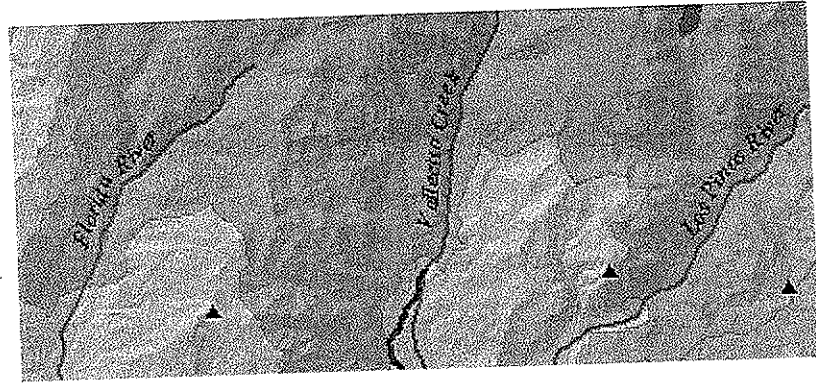This will add space between the stream and the label.

g Click OK.

1. Your streams are not labeled. Why?

_____

You will now use another technique to turn on your labels.

h In the table of contents, right-click the Streams layer and choose Label Features.

Your streams are now labeled in the map.

Step 5: Create label classes

In this step, you will create labels for your roads by adding label classes from symbology categories. With label classes, you can restrict labels to certain features. You will apply different label properties to each of your road types (as shown in the table of contents).

a Open the Label Manager.

You can add label classes in the Label Manager by selecting a layer name in the list of Label Classes.

b In the Label Classes list, click Roads.

```
☐ ☐ Mountain peaks
  └── ☑ Default
☐ ☐ Roads
  └── ☑ Default
```
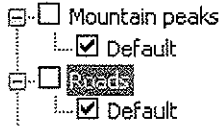
Your roads are already symbolized based on the CLASS attribute. You will create a separate label class for each class type.

You can also create your own label classes using the Add label class field (you would create a SQL query to determine which features should be in each label class). Often, it is easier to use the symbology categories to create your label classes.

c Confirm that the boxes next to the two symbology categories are selected, and then click Add.

d Click Yes to overwrite the existing label classes.

```
☐ ☐ Roads
  ├── ☑ Forest
  └── ☑ Primary
```
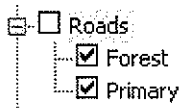
The two label classes now appear in the Label Classes list.

e In the Label Classes list, click the Primary road class.

f For Label Field, select ROUTE_NUMBER from the list of attributes.

g For Text Symbol, click Symbol.

h With the Referenced Styles option selected, type **Route** in the search field and press Enter.

The referenced styles will search only the symbol styles that are currently turned on in ArcMap. ArcMap will take a few moments to index the currently loaded symbol styles.

**i** In the list of symbols, click Other Route HWY.

j Click OK.

The primary roads will be labeled using a highway shield. The ROUTE_NUMBER attribute will be placed inside the highway shield for each primary road.

k Click SQL Query.

Notice that the label class for the road symbology is stored as an SQL query.

l Click Cancel to close the SQL Query window.

m Confirm that the Orientation is set to Horizontal.

n Turn on labeling for the Roads layer.

o Clear the check box next to Forest; you do not want to label these roads.

p Click OK.
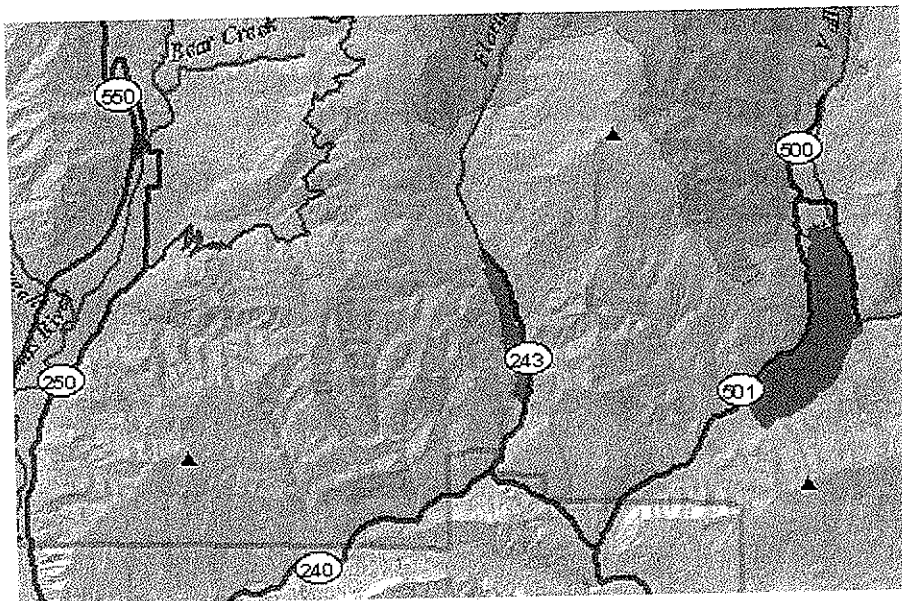
Now the primary roads are labeled in the map with highway shields that contain the ROUTE_NUMBER attribute value.

Step 6: Label features using Python

In this step, you will label the mountain peaks using two attributes—the peak name and elevation. Up to this point, you have used only one attribute value to label your features. You will use the Python scripting language to enhance the look of your labels by displaying two attributes.

(a) Open the Label Manager.

(b) Click the Default label class under Mountain Peaks.

(c) Under Text String, click Expression.

Using the Label Expression dialog box, you will load a Python script to label the mountain peaks.

For additional information about creating label expressions, you can click the Help button on this dialog box or refer to the ArcGIS Help: *Building label expressions*.

(d) At the bottom of the dialog box, change the Parser to Python, and then click Load.

(e) In the Open dialog box:

- Click the Home button . (Recall that this browses to the location of your current map document.)
- Select Mountain_Peaks.lxp.
- Click Open.

You have loaded a label expression that was written in Python.
```
[NAME] + '\n' + [ELEVATION]
```

This expression will display values from the NAME and ELEVATION attribute fields. After the NAME is displayed, a new line will be added, noted by the \n characters. The ELEVATION attribute will be displayed on the new line, under the NAME.

(f) Click Verify.

If your expression is written correctly, you will see a sample of how your labels will be displayed in the map.

g Click OK to close the Expression Verification dialog box.

h On the Label Expression dialog box, click OK to apply your label expression.

i Set your text symbol to the following specifications:

- Font: Tahoma
- Size: **10** point

j Under Placement Properties, confirm that the Around Point option is selected.

k Click Location.

With point features, you can place labels at several positions around the point.

l Scroll down and click Prefer Upper Right, Then Top Then Right.
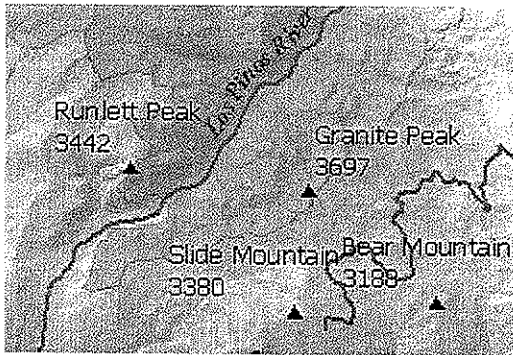

Prefer Upper Right, then
Top then Right

m Click OK.

> When labeling point features, the cartographic standard is to place the label to the upper right of the point. If this position is not available, then other positions around the point may be used.

n Turn on labels for Mountain Peaks.
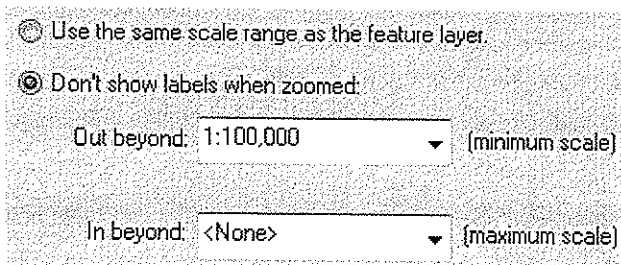
⊙ Click OK to see the changes in your map.

Notice that the labels include the peak name and its elevation value (stacked from using the Python script). Also note how most of the peaks, such as Granite Peak, appear in the first preferred position (upper-right). However, a few of the peaks are labeled in a different position, such as Runlett Peak (center top, a secondary preferred location).

Step 7: Apply a label scale range

Notice that some labels are hard to associate with their peak symbol. Other features are not labeled at the current map scale. You will create a label scale range so that your peaks turn on when you zoom in to a larger scale.

ⓐ Open the Label Manager.

ⓑ Confirm that the Default label class for the Mountain Peaks layer is selected.

ⓒ At the bottom of the Label Manager dialog box, click Scale Range.

ⓓ Complete the Scale Range dialog box to include the following parameters:

- Don't Show Labels When Zoomed:
    - Out Beyond: 1:100,000
    - In Beyond: <None>

ⓔ Click OK in all open dialog boxes to see the changes in your map.

Notice that Mountain Peaks are not labeled because the display scale is less than 1:100,000.

f Zoom to the Mountain Labels bookmark.

g Set your map scale to 1:100,000.
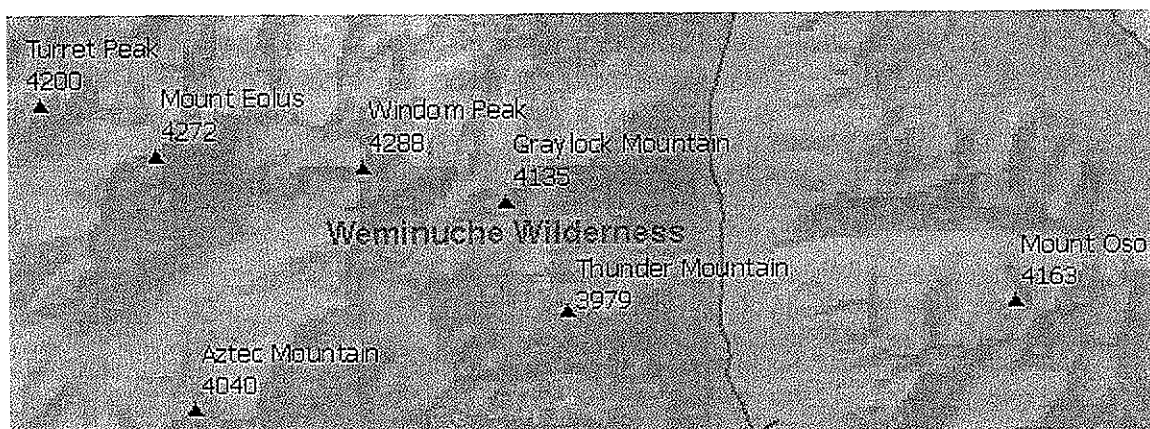
Now the map displays your labels. Also, notice how the Wilderness label has been repositioned to appear within your current map extent.

h Use the Pan tool 🖐 to move your map display.

Notice how your labels continually reposition themselves as your map extent changes (particularly the wilderness label).

i Zoom to the San Juan bookmark.

j Set the scale to 1:250,000.

The labels no longer display due to the scale being past the scale range.

Step 8: Label another polygon layer

In this step, you will label the lakes. The lakes are much smaller in size than the wilderness polygons that you labeled earlier, which will preclude the labels from being contained within the feature polygons.

📑 If you want to place lake labels entirely outside the polygons, you would use the Maplex Label Engine.

a Open the Label Manager.

💡 You will set up the label parameters manually for lakes. However, if you know that many of the parameters are the same as another label class you have already established, you can simply copy and paste the parameters between feature classes. To use this method:

1. Right-click the Default label class from the source layer (such as Streams) and choose Copy Parameters.
2. Right-click the Default label class from the target layer (such as Lakes) and choose Paste Parameters.
3. Modify any remaining parameters before applying the labels in the target label class.

ⓑ In the Label Manager, click the default label class for lakes.

ⓒ Set the parameters as follows:

- Confirm Label Field is set to NAME.
- Set Text Symbol font to Times New Roman.
- Set font size to 14.
- Choose the font color labeled Larkspur Blue (bottom row, fourth column from right).
- Choose bold and italic.

ⓓ Turn on the labels for Lakes and click OK to view the changes to the map.
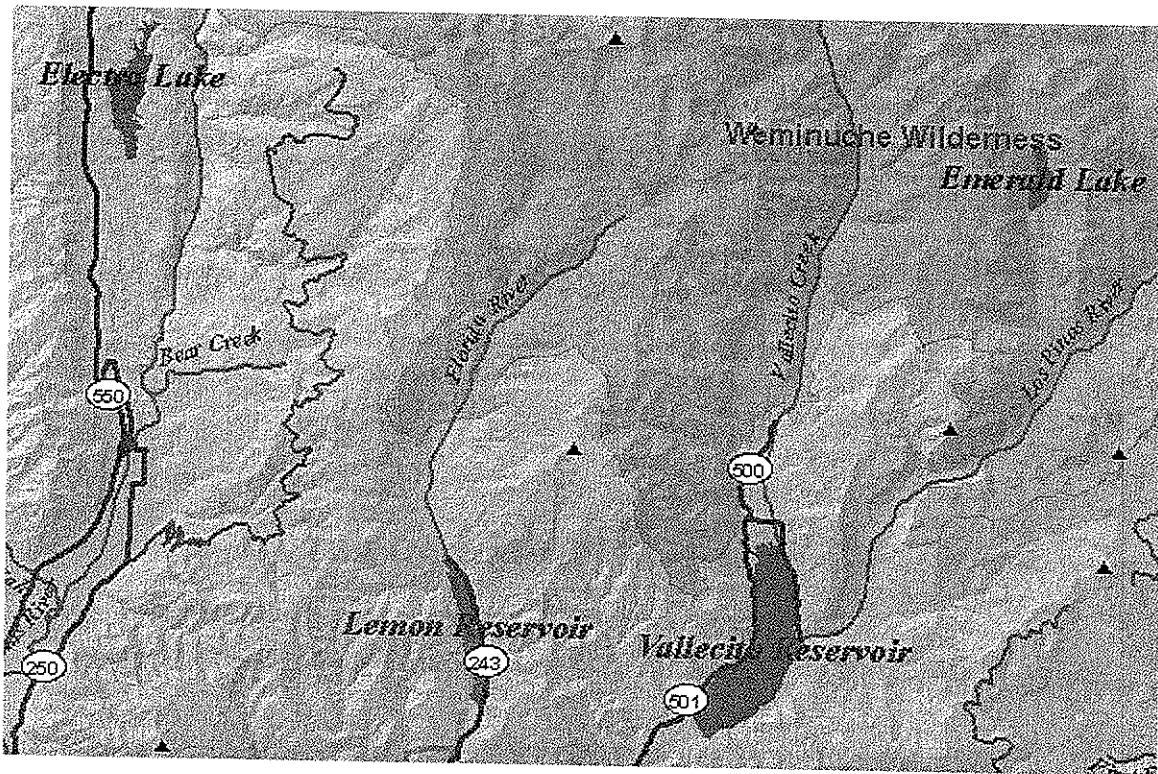
The lakes are now labeled.

After the label properties are set for a layer, you can right-click the layer to turn the labels on and off. This is faster than opening the Label Manager to control the label visibility.

Notice that the labels for the lake features extend beyond the polygons. To stack the labels, you could use a SQL expression (as you did for the mountain peak labels) or use the Maplex Label Engine. Also, notice that the lake labels overlap both roads and stream features, which is not desirable. You will rectify this by setting feature weights for the label classes.

Step 9: Assign feature weights

You can control the placement of labels that draw on top of other features by using feature weights.

a On the Labeling toolbar, identify (but do not click) the Label Weight Ranking button .

Using the Weight Ranking dialog box, you can change the weights of features. Weights determine whether a label from another layer can be placed on top of a feature. Labels are placed only on features of equal or lower rank.

Use feature weights when you want to control how labels are placed on features from other layers. The Standard Label Engine uses Low, Medium, and High to indicate relative feature weight.

In your map, you do not want labels from other layers to overlap the primary road or stream features. Assigning a higher feature weight to these label classes will force labels for other layers to be positioned away from the Primary roads.

b Verify that you are zoomed in to the San Juan bookmark and that the map scale is set to 1:250,000.

(c) Familiarize yourself with the following lake labels in the map that are overlapping primary roads and stream features.

- Electra Lake
- Emerald Lake
- Lemon Reservoir
- Vallecito Reservoir

(d) On the Labeling toolbar, click the Label Weight Ranking button.

(e) In the Feature Weight column, change the weight to **High** for the Roads - Primary and Streams - Default label classes.

Layer	Feature Weight
<Default>	High
Mountain peaks - Default	None
Roads - Forest	None
Roads - Primary	High
Streams - Default	High
Lakes - Test	None
Wilderness - Default	None
Forest boundary - Default	None

(f) Click OK.
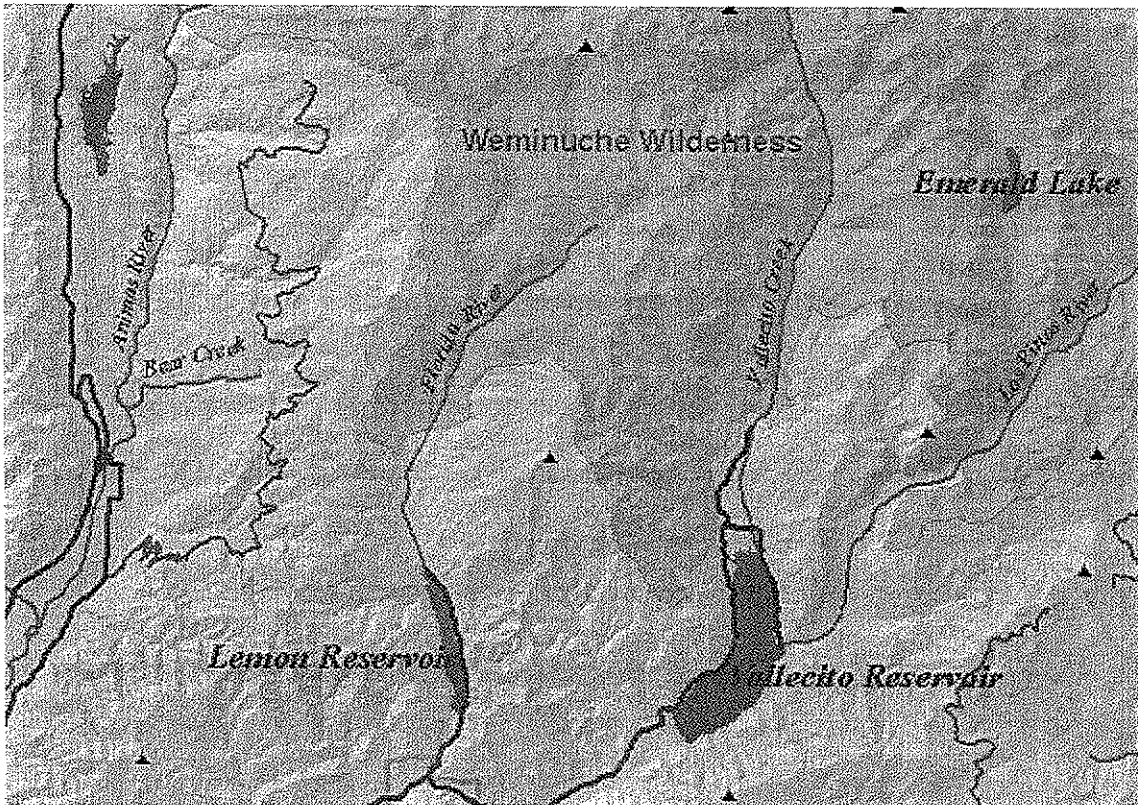
Your label position may be slightly different based on your map extent and scale. Results sometimes vary due to conflicts with other labeling rules, weights, or priorities.

2. Describe what happened and why for each of the following labels.

- Electra Lake
- Emerald Lake
- Lemon Reservoir
- Vallecito Reservoir

_____

_____

_____

_____

Step 10: Apply a reference scale

Now that your map is labeled, you will set a reference scale. A reference scale allows your labels and symbols to appear larger on your screen as you zoom in and smaller as you zoom out.

a Familiarize yourself with the relative size of the labels and symbols at the current map scale.

**b** Verify that you are zoomed to the San Juan bookmark.

c Set the map scale to 1:100,000.
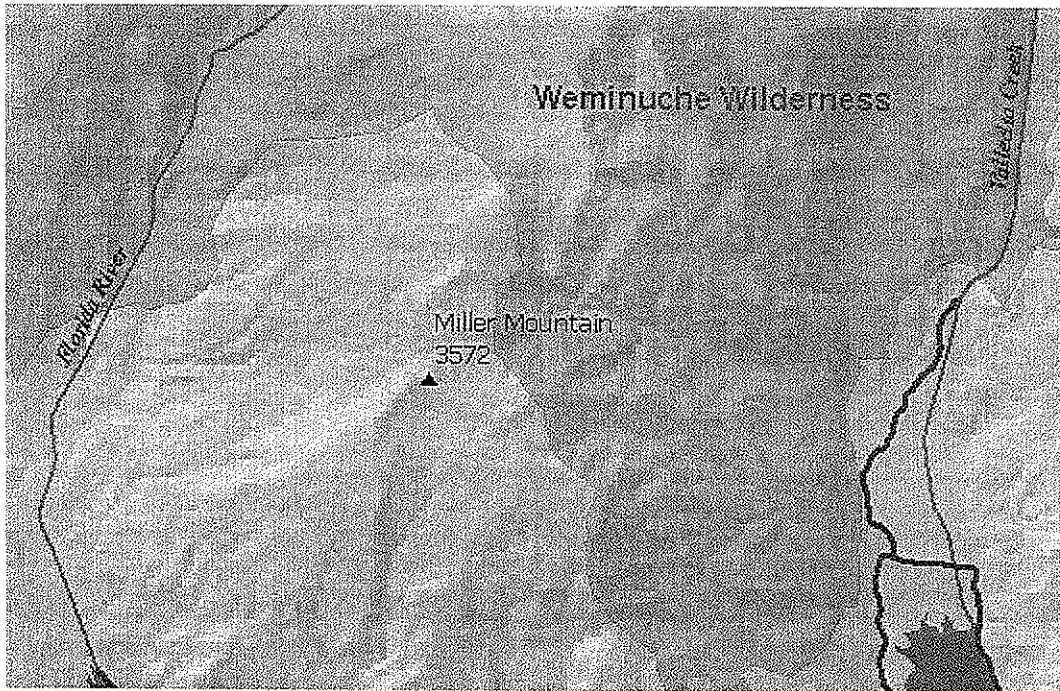
Notice that your labels and point and line symbols are the same size as they were at the previous map extent.

d Set your map scale to 1:250,000.

e Right-click the San Juan data frame, point to Reference Scale, and choose Set Reference Scale.

Set your map scale to 1:100,000 again and notice how the labels and symbol sizes have adjusted according to your map scale.
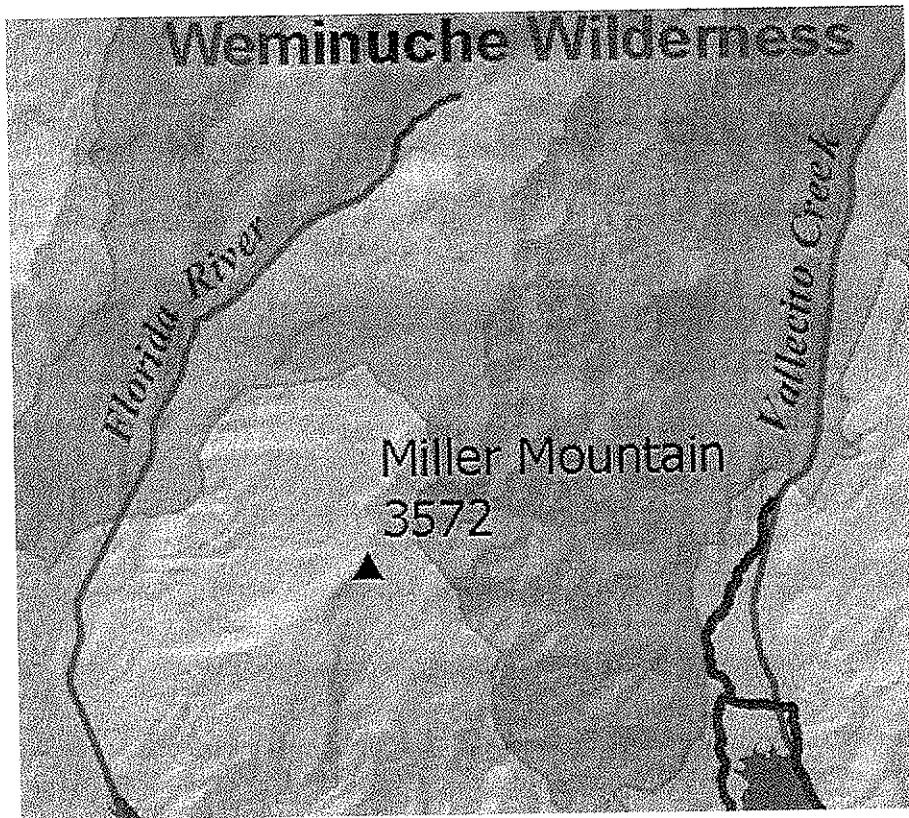
A reference scale locks the size of your symbols and text to the desired, or referenced, map scale. By default, no reference scale is set for your map. Without a reference scale, your symbol and text sizes remain the same in relation to your screen as you zoom in and out.

Set a reference scale to view your labels and symbols on-screen at their true size, and maintain this ratio as you zoom in and out. Apply a reference scale when you want your data frame to look the same on-screen as when you print. This will display your map's symbols and labels on-screen at the relative size at which they will appear when your map is printed.

In most cases, you will design your labels for use at your final publication scale. Setting a reference scale to match your publication scale will allow you to see both your labels and symbology sized proportionally as you zoom in and out while working with your map document.

To undo the behavior of the reference scale, right-click the data frame, point to Reference Scale, and click Clear Reference Scale.

g Save your map document and exit ArcMap.