

Exercise 2 – Clean Up the Map



Introduction

In this exercise, we are fine-tuning the map created in Exercise 1 that visualized a map of recreation sites and trails in Wayne National Forest.

Objectives

- Explore Cartographic Tools using:
 - Labels
 - Symbolizing Vector Data
 - Layer Files
 - Styles
- Fine-Tune Map using a visual hierarchy and cleaning up the legend.

Required Data

- The training materials can be downloaded from here:
 - **T:\FS\NFS\WOEngineering\GMO-GTAC\Program\TUS\Training\ArcGISProCartographicTools**



Prerequisites

- ArcGIS Pro installed on local pc.
 - Recommended to have the latest release implemented in the Forest Service.
 - ArcGIS Pro is available in the Software Center.
 - Submit a [GIS Service Request](#) if you have any questions.
- Basic understanding of how to use ArcGIS Pro.
- Completion of Exercise 1



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Contents

Part 1: Common Cartographic Tools.....	5
A. Copy and Paste a Layout.....	5
B. Labels	5
C. Symbolizing Vector Data	7
D. Layer Files	8
E. Styles	9
Part 2: Fine-tuning the Map.....	11
A. Visual Hierarchy	11
B. Cleaning up the Legend	12

Part 1: Common Cartographic Tools

A. Copy and Paste a Layout

This exercise walks you through updating the map from Exercise 1. Before we make changes, we should create a new layout to add so that we do not change the original layout.

1. From the **Catalog** pane, expand the **Layouts** folder.
2. Select the **Lake Vesuvius** layout that you created in **Exercise 1**.
3. **Right-click** on the **Layout**, then **select Copy**.
4. **Right-click** on the **Layouts** folder, then **select Paste**. This inserts a new Layout.
5. **Rename** the **Layout** as “**Lake Vesuvius Layout – Exercise 2 – Your Name**.” This helps us keep them organized.

The Copy and Paste process also works for Maps saved in the Maps folder on the Catalog pane.

If you need to share Layout files, you can also right-click, then select Save as Layout file. This saves the Layout to a .pagx file that you can share with others.

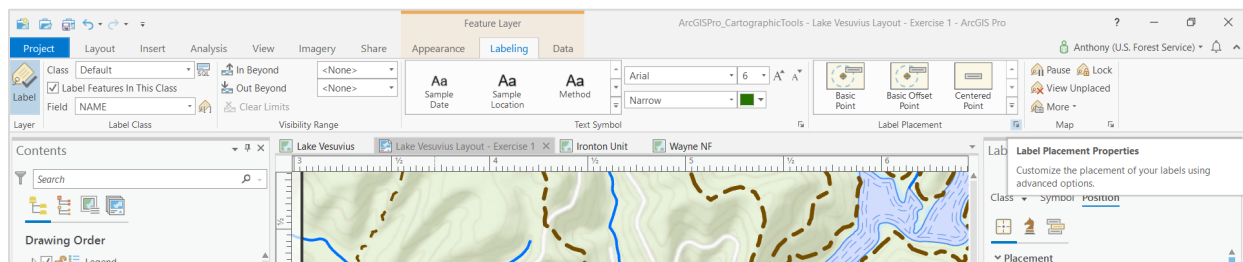
B. Labels

Labels can be very complicated and difficult to use. For basic label editing, ArcGIS Pro makes this much easier than previous desktop GIS applications.

1. With the **Recreation – Site Points** selected on the Contents pane, **add a Label** from the **Labeling** tab.
2. **Check** the box **Label** box on the far left-side of the **Ribbon**.

Notice that the text is already setup with a font type, style, size, and color. This is a layer file (.lyr or .lyrx). We'll work with layer files on Part 2-C in this exercise.

3. **Navigate, zoom in and zoom out** around the **Layout** page.
 - i. Are the labels legible?
 - ii. Are they where you want them?
4. **Notice** that some labels appear anywhere from the top-right to bottom-left of the icon.
5. **Change** the placement options by opening the **Label Placement Properties** by **left-clicking** the small arrow to right of the **Label Placement** group.



6. By default, this is set to **Best Position**. **Change the Placement to “Top of Point”**.
 - i. Is this a better placement?
 - ii. Navigate around the map.

iii. Notice the points at the south end of Lake Vesuvius are overlapping. This causes their label to not display. We'll need to update that.

iv. Under the Map group on the Labeling tab, select "View Unplaced."

v. The unplaced labels will display in red.

7. Let's force the unplaced labels to be added.

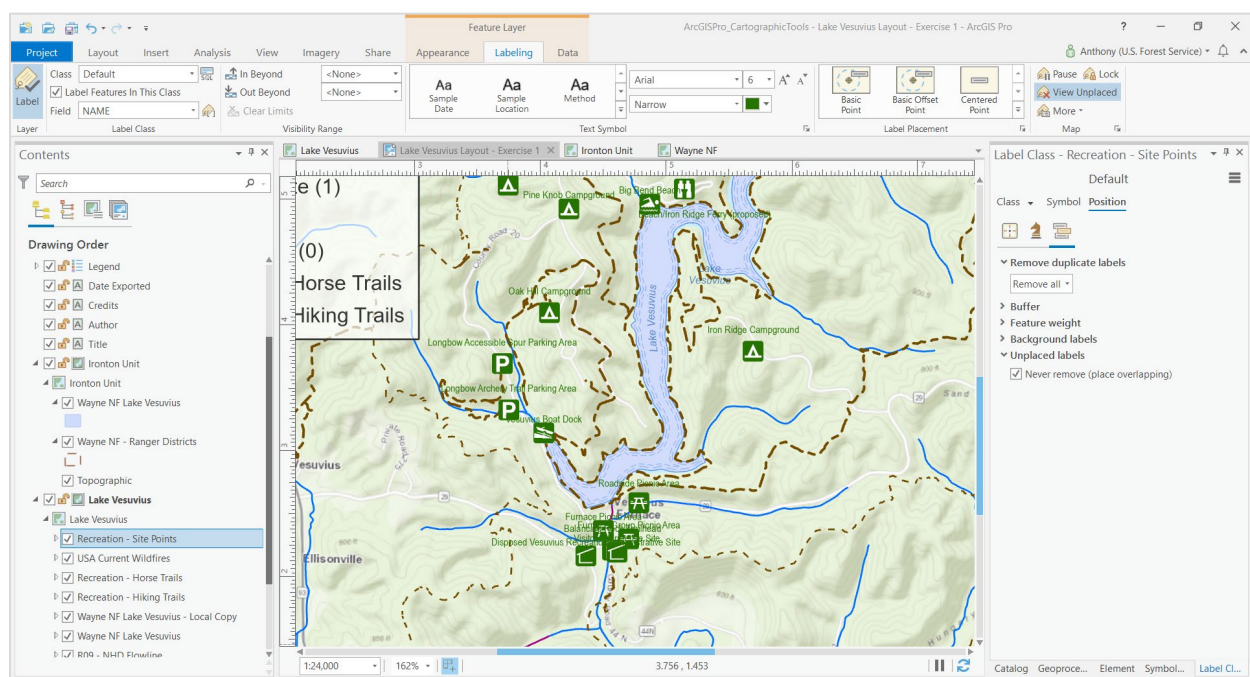
i. Open the Label Class pane, select the Position tab, then Conflict Resolution.

ii. Expand the Unplaced Labels section, check the box to "Never remove (place overlapping)."

iii. This adds the unplace labels to map.

iv. Uncheck the View Unplaced setting on the Map group on the Labeling tab.

If your ArcGIS Pro application starts running slowly when drawing labels, you can Pause label drawing from the Map group on the Labeling tab, select Pause. This freezes the labels so that when you zoom and pan the labels do not need to draw again.



8. A simple way to remedy most of these issues is to "Stack labels."

i. On the **Label Class** pane, select the **Position** tab, then **Fitting Strategy** (the chess knight icon).

ii. **Check** the box for **Stack label** under the **Stack** section.

iii. You can now see all the labels!

C. Symbolizing Vector Data

There are many ways to symbolize vector data. We will look at a few of the options.

1. Single symbol

- i. This is the symbology of the **Recreation – Hiking Trails** layer. One symbol represents all trails designated as hiking.
- ii. **Open the Symbology** using two methods.
 - (a) **Right-click** on the **layer**, then **select Symbology**. This opens **Primary Symbology** pane with **Single Symbol** already selected.
 - (b) **Expand** the layer on the **Contents** pane, and **double left-click** the **symbol**. This opens directly the **Format Line Symbol** page on the **Gallery** pane.
- iii. **Navigate** to the **Properties** for the **Format Line Symbol**.
- iv. There are three tabs here: **Symbol** (paintbrush), **Layers** (stacked pages), and **Structure** (wrench).
 - (a) Under **Symbol**, you can change the **Color** and **Line Width**.
 - (b) Under **Layers**, you have many options, including the **Dash effect**.
 - (c) Under **Structure**, you can add or remove effects.

Symbol Layers and Structure are new to ArcGIS Pro. The same symbology functions very differently than in ArcGIS Desktop. In some cases, the functionality does not exist in ArcGIS Desktop. You can learn more at [Symbols in ArcGIS Pro](#).

2. Proportional Symbols

- i. This is the symbology of the **Current Incidents** in the **USA Current Wildfires** web layer. As fires increase in total acres burned, the symbol increases in size. There are also unique symbols for the **New (Past 24-hour)**, **Incident Complex**, and **Prescribed Fire**.
- ii. To get a better view of this data at a national extent, let's **Copy** and **Paste** and the **USA Current Wildfires** over to the **Wayne NF** map.
 - (a) From the **Lake Vesuvius – Final** map's **Contents** pane, **right-click** on the **Current Wildfires** layer, then select **Copy**.
 - (b) **Open** the **Wayne NF** map from the **Maps** folder on the **Catalog** pane.
 - (c) **From** the **Contents** pane on the **Wayne NF** map, right-click on **Wayne NF**.
 - (d) **Select Paste**. This copies the **USA Current Wildfires** layer over to this map.
- iii. **Zoom out** until you can see the **Contiguous US**.
- iv. Notice that the map is skewed because the **Wayne NF** map uses the **NAD 1983 UTM 17N** coordinate system, which specific to part of the world where Wayne NF is located. Leave this as is since we are simply investigating the symbology.
- v. **Open the Symbology** of the **Current Incidents**. We'll change the symbology to make the smallest fires have an even smaller symbol and the largest fires have an even larger symbol.
 - (a) On the **Classes** table, **double left-click** **Fire Symbol** for values 300,000 or more.
 - (b) **Increase** the **Size** to **40 pt**.
 - (c) **Click** the **back button** on the **Symbology – Current Incidents** pane.

- (d) **Double left-click Fire Symbol** for values 0-999.
- (e) **Decrease the Size to 5 pt.**
- (f) **Click** the back button on the **Symbology – Current Incidents** pane.
- (g) On the row for values 0-999, **change the Label by double left-clicking** in the cell.
- (h) **Change the Label to “Less than 1,000”. Press Enter.**
- (i) Notice that Contents pane is automatically updated with the new label.

3. Unique Symbol

- i. Unique symbols are represented by a change in Category. The Current Perimeters of the USA Current Wildfires web layer is an example of Unique Values.
- ii. **Open the Symbology of the Current Perimeters layer.**
 - (a) **Notice** that the **Primary Symbology** is set to **Unique Based** on one **Field, Feature Category**.
 - (b) **Right-click** on the **Current Perimeters** layer in the **Contents** pane, select **Zoom to Layer**.
 - (c) **Toggle** the **Current Incidents** layer to off.
 - (d) Do you see any perimeters now? It should be difficult to see at a national extent.
 - (e) Let’s change the outline width of each polygon to find what we are looking for.
 - (f) From the **Symbology** pane, **double left-click** the **Symbol for Wildfire Daily Fire Perimeter**.
 - (g) **Change the outline width** from 0.6375 pt to **5 pt**.
 - (h) **Now** the **Wildfire Daily Fire Perimeters** will display as “dots” at the current national extent.
 - (i) **Click** the back button on the **Symbology – Current Perimeters** pane.
 - (j) **Change the outline width** from 0.6375 pt to **5 pt**.
 - (k) **Now** the **Prescribed Fire** will display as “dots” at the current national extent.

Note that not all published web services will allow you to change their symbology. Some services are “locked” to control how the data is displayed. It also increases the performance and responsiveness of the service.

D. Layer Files

Layer files (.lyr for ArcGIS Desktop or .lyrx for ArcGIS Pro) are standalone vector datasets that save the symbology to the layer itself. Shapefiles (.shp, vector datasets that are saved in a folder) and feature classes (vector datasets saved in a file geodatabase) do not store the symbology information. Instead, the symbology is stored within the Map.

1. Working with layer files

- i. While working on the **Lake Vesuvius** map, **open Databases** from the **Catalog** pane, then add **R09_NHD_Flowline_WayneNF** to the map. This is a feature class because it’s saved in a file geodatabase.
- ii. **Open Folders** from **Catalog** pane, then **open** the home **CartographicTools**, then **open** the folder **LayerFiles**.
- iii. **Add R09_NHD_Flowline_WayneNF.lyrx** to the map.

- iv. Do these two layers look the same? They should not.
 - v. Notice that the .lyrx version carries over a specific symbology with color scheme and legend icon. The feature class version carries a default symbology similar to the EDW version that is still towards the bottom of the **Contents** pane.
 - vi. **Remove** the **EDW** version now. **Right-click** and select **Remove**.
2. Apply Symbology from Layer
- i. We can apply the symbology from the .lyrx version to the feature class.
 - ii. **Open** the **Geoprocessing** pane by navigating to the **Analysis** tab, then **select Tools**.
 - iii. **Search** for [Apply Symbology from Layer](#).
 - (a) Input Layer: **R09_NHD_Flowline_WayneNF** (feature class)
 - (b) Symbology Layer: **R09_NHD_Flowline_WayneNF** (layer file)
 - (c) **Select Run**.
 - (d) This will apply the symbology of the layer file to feature class. This works for all forms of symbology, from simple to complex.
3. Sharing as Group Layer
- i. **Create** a new **Group** on the **Contents** pane by **holding CTRL** and **select** the **Recreation – Site Points**, **Recreation – Horse Trails**, and **Recreation – Hiking Trails**.
 - ii. **Right-click** on one of the **layers**.
 - iii. **Select Group**.
 - iv. **Rename** this new group as **Recreation** by **right-clicking “New group layer,”** then **select Properties**.
 - v. **Change** the name to **Recreation**.
 - vi. This **Recreation** group can be exported as a **group layer file**, so that you can share the single group layer file and still retain the symbology of all three sublayers.
 - (a) **Right-click** on the **Recreation** group.
 - (b) **Select Share As**, then **Layer File**.
 - (c) **Save** this file as **Recreation_YourName.lyrx**.
 - (d) **Add** this group layer back to the map to double-check your work!

Note that layer files only contain a reference back to the original “source” dataset. Therefore, the file size is significantly smaller than a feature class or shapefile.

If you want to package the source data with the layer file, you will need to select Layer Package from the Share As options. This creates a single package that can be shared with collaborators via the web or local disk.

You can also use the same workflow (right-click, Share As Layer file) for exporting individual layer files.

E. Styles

[ArcGIS Pro Styles](#) are saved as .stylx files and contain symbols, colors, layout items and other cartographic elements. Styles in ArcGIS Desktop are saved as .style files.

1. Apply a Style

- i. On the **Catalog** pane, expand the **Cartographic Tools** folder, then expand the **Styles** folder. There are several styles saved here. Each was download from the [Esri Style Gallery](#).
- ii. **Right-click** on the **Forestry_en** style.
- iii. **Select Add Style**. The project then saves a reference, or link, from the .stylx file.
- iv. To use the newly added style, open the **Symbology** for the **R09_NHD_Flowline_WayneNF**.
- v. On the **Format Line Symbol** page, **select** the **Gallery** tab. You will now see **Forestry_en** as a style within the **Gallery** of the **Project**.
- vi. **Change** the **Symbology** of **R09_NHD_Flowline_WayneNF** to **T24 Perennial Stream**.

2. Save a Style

- i. You may have noticed that the polygon for Lake Vesuvius has a unique symbology with dashes near the shore to show shallower areas.
- ii. If you want to use this same Symbology again, you could certainly Save as a Layer File, then use Apply Symbology from Layer. However, that can become cumbersome as you would need to keep the data source for that layer available.
- iii. Instead, let's [save the symbology to a style](#).
 - (a) First, **create** a new **Style**.
 - (b) From the **Catalog** pane, **right-click** on the **Styles** folder, then **select New**, then **New Style**.
 - (c) **Save** this file as **Lake_YourName** in the **Styles** folder in the **CartographicTools** folder.
 - (d) Now, **open** the **Symbology** for the **Wayne NF Lake Vesuvius – Local Copy**.
 - (e) In the upper right-hand corner of the **Symbology** pane, **select** the **context menu** (three horizontal, parallel lines).
 - (f) **Select Save symbol to style**.
 1. **Name** this Style as **Lake**.
 2. Set the **Category** to **Water**.
 3. **Select OK**.
 - (g) This style now displays in the **Gallery** for your **Symbology**!

You can also save this as a Web Style. A Web Style is a style that is published to ArcGIS Online then shared with others. You can then use it across all of your ArcGIS Pro Projects. Learn more at [Sharing Web Styles](#).

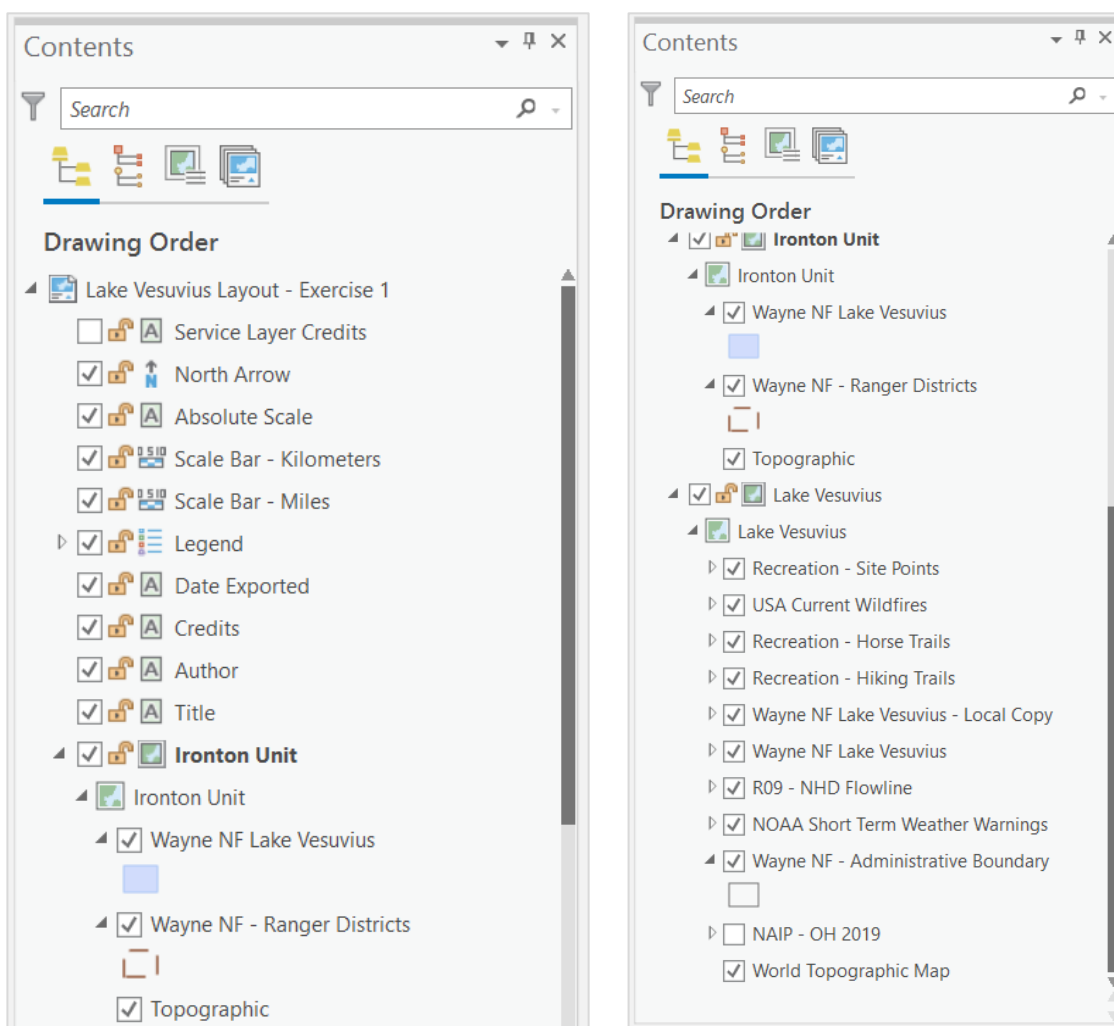
Part 2: Fine-tuning the Map

In Exercise 1, you setup the Layout and added Map Elements. That was a great start! Now it's time to "fine-tune" the Layout's design.

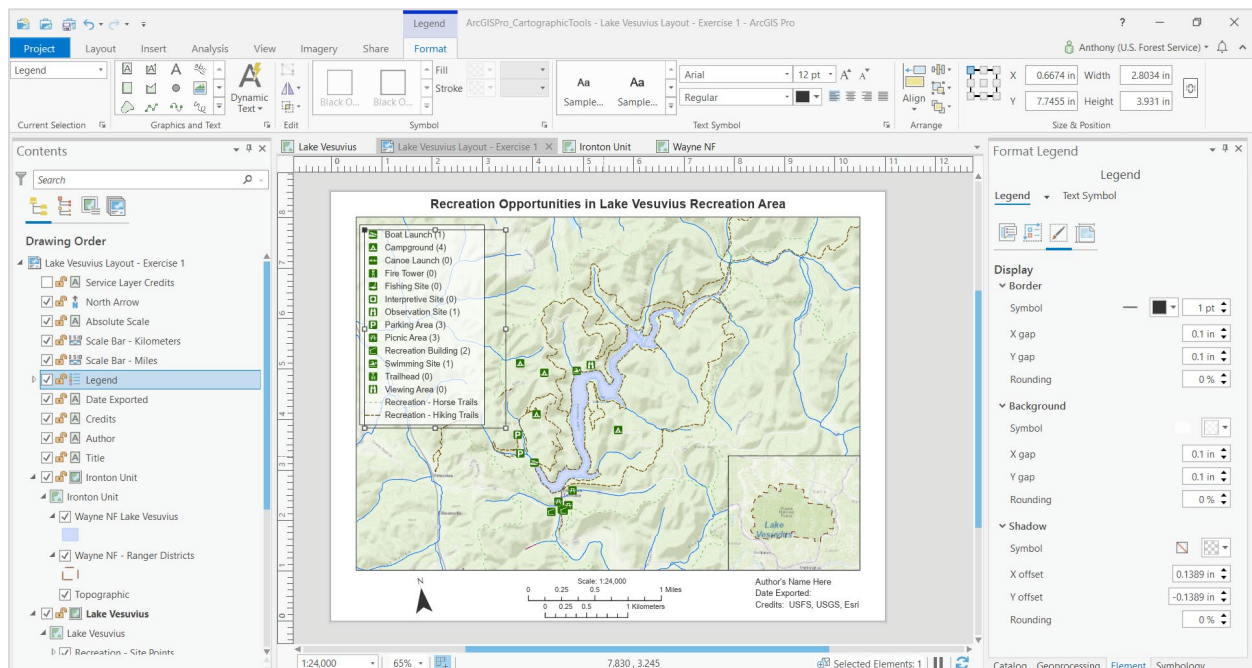
A. Visual Hierarchy

Each Layout should have an intentional visual hierarchy where the map viewers focus first is directed towards the items of most importance. In this case, the Lake Vesuvius Map Frame is the focal point to display trails and recreational opportunities.

1. **Arrange** the **Contents** pane of the **Lake Vesuvius Layout**. Layers containing point datasets should be above layers containing polyline datasets which should be above layers containing polygons. This ensures that the map viewer can see all your data.
2. **Imagery** and **Basemaps** should be on the **bottom** so that are "underneath" all other layers in the drawing order.
3. All **Layout Elements** should be **above** each **Map Frame**.
4. The **Contents** pane should look similar to this:



5. Next, notice that Legend is difficult to read, because the text is too close to the border and there is little contrast between the text and the basemap background color.
6. **Add** a gap in between the **Legend's text** and **border**.
7. **Select** the **Legend** from the **Contents** pane.
8. On the **Format Legend** pane, select the **Display** icon (the paintbrush).
9. **Change** the **X gap** and **Y gap** to be **0.1 in**.
10. **Update** the **Symbol Color** to be **Dark Gray (80%)**.
11. To increase the contrast with the Legend's text, **add** a **transparent white background**.
12. On the **Background** section of the **Format Legend** pane, **change** the **Symbol Color** to **white** (Hex #FFFFFF), **X gap** and **Y gap** should again be **0.1 in**.
13. Open the **Color Properties** of the background color, make this **30% transparent**.
14. **Move** the **Legend** so that you can all four corners over the **Lake Vesuvius Map Frame**.
15. Your project should now look similar to this:



B. Cleaning up the Legend

Throughout this exercise, we've been adding and removing layers from the map. This can cause the Legend on the Layout to become overloaded. Let's check it out.

1. **Navigate** back to your most recent **Layout** that you are working on for **Exercise 2**. Notice that the **Legend** contains duplicate layers that we want to remove.
2. **Expand** the **Legend** from the **Contents** pane.
3. **Uncheck** the top most layer named **Recreation – Site Points**. These duplicates were added when we were working with layer files. The first set, or left-most, items on the legend is what we setup in Exercise 1. We want to keep those.
4. **Right-click** on **Recreation – Site Points** towards the bottom of your **Legend** items on the **Contents** pane, then **select Remove**.
5. **Notice** that this **removes** both **Recreation – Site Point** items from the **Legend**. This is because the layer file simply references the original source data.



6. **Undo** this action by **selecting** the **undo button** in the top-left, just to the right of the **Save** button. As an alternative, you can use **CTRL+Z**.
7. **Simply uncheck** the **second Recreation – Site Points** item in the Legend.
8. **Repeat** the process to **toggle visibility** off for **Recreation – Horse Trails** and **Recreation – Hiking Trails**.

Congratulations! You have successfully completed this exercise. You now know a better understanding of fine-tuning your map and using cartographic tools in ArcGIS Pro.