

Exercise 1 – Making a Map



Introduction

In this exercise, we are making a map of recreation sites and trails in Wayne National Forest. Wayne NF has three units – Ironton, Marietta, and Athens. You will work with the Layout to add, then edit, the Main Map Elements.

Objectives

- Create a Layout
- Add the Main Map Elements to Layout

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.



USDA Non-Discrimination Statement

In accordance with Federal civil rights law and U.S. Department of Agriculture (USDA) civil rights regulations and policies, the USDA, its Agencies, offices, and employees, and institutions participating in or administering USDA programs are prohibited from discriminating based on race, color, national origin, religion, sex, gender identity (including gender expression), sexual orientation, disability, age, marital status, family/parental status, income derived from a public assistance program, political beliefs, or reprisal or retaliation for prior civil rights activity, in any program or activity conducted or funded by USDA (not all bases apply to all programs). Remedies and complaint filing deadlines vary by program or incident.

Persons with disabilities who require alternative means of communication for program information (e.g., Braille, large print, audiotape, American Sign Language, etc.) should contact the responsible Agency or USDA's TARGET Center at (202) 720-2600 (voice and TTY) or contact USDA through the Federal Relay Service at (800) 877-8339. Additionally, program information may be made available in languages other than English.

To file a program discrimination complaint, complete the USDA Program Discrimination Complaint Form, AD-3027, found online at [How to File a Program Discrimination Complaint](#) and at any USDA office or write a letter addressed to USDA and provide in the letter all of the information requested in the form. To request a copy of the complaint form, call (866) 632-9992. Submit your completed form or letter to USDA by: (1) mail: U.S. Department of Agriculture, Office of the Assistant Secretary for Civil Rights, 1400 Independence Avenue, SW, Washington, D.C. 20250-9410; (2) fax: (202) 690-7442; or (3) email: program.intake@usda.gov.

USDA is an equal opportunity provider, employer, and lender.

Whaley, A.; Martin, L.; 2021. Cartographic Tools using ArcGIS Pro: Exercise 1. GTAC. Salt Lake City, UT: U.S. Department of Agriculture, Forest Service, Geospatial Technology and Applications Center. 13 p.



Contents

Part 1: Create a Map.....	4
A. Start ArcGIS Pro	4
B. Data dump	4
C. Clip Layers in the Map.....	6
Part 2: Create a Layout	7
A. Insert New Layout.....	7
B. Insert New Map Frame	7
Part 3: Add Map Elements	10
A. Author	10
B. Date.....	12
C. Locator Map.....	12
D. Legend	12
E. Scale	13
F. North Arrow	13
G. Credits.....	14
H. Check your Layout!	14

Part 1: Create a Map

A. Start ArcGIS Pro

1. **Start ArcGIS Pro** on your local pc by navigating to **All Programs, ArcGIS, then ArcGIS Pro.**
2. Open the training Project file ArcGISPro_CartographicTools.aprx.
 - i. **Select** “Open another project” in the bottom left of the home page.
 - ii. Navigate to where you have the ArcGISPro_CartographicTools_Student folder saved.
 - iii. Open the ArcGISPro_CartographicTools.aprx file.

ArcGIS Pro uses project files (.aprx). This project file organizes all your Maps, Layouts, Folders, Databases, Toolboxes, and more. This allows your project to utilize several maps and several layouts all within the same project.

Note that map documents (.mxd) that were used in ArcGIS Desktop (ArcMap, ArcCatalog, etc.) are longer in use in ArcGIS Pro. You can import existing map documents as you transition to using ArcGIS Pro, but you can not export map documents from ArcGIS Pro to use in ArcGIS Desktop.

B. Data dump

The “data dump” is the process for gathering all your data that you need on the map. This can include only a few layers for simpler maps or can include many layers for more complex maps. Within the USFS, we have the option of using data from many different sources. Let’s look at the different data sources for some of layers.

1. Open the Lake Vesuvius Map.
 - i. By default this should be the first map to open when opening the project for the first time.
 - ii. If this map does not open, from the **Catalog** pane, expand the **Maps** folder, then **right-click** and select **Open** from the **Context Menu**.
2. USFS AGOL – Wayne NF Lake Vesuvius - AGOL
 - i. Right-click on the layer, then Select Properties.
 - ii. Select Source from the Layer Properties window.

This layer is saved to the USFS AGOL environment as a hosted feature service.

This layer was published as a web layer from Wayne NF Lake Vesuvius – Local Copy.

Notice that the symbology is the exact same when viewing in ArcGIS Pro. The symbology was applied using the tool Apply Symbology from Layer. We’ll use this tool later in the training. If you view this in the web map viewer, the dashed lines along the shore will be missing. It’s an artifact of how AGOL uses different symbologies.

3. Local PC – Recreation – Site Points, Recreation – Horse Trails, Recreation – Hiking Trails, and Wayne NF – Administrative Boundary.
 - i. **Open** the **Properties** and view the **Source** tab.
 - ii. Each of these layers are available with course materials download folder.
 - iii. They were downloaded from Region 09’s SDE for Wayne NF in spring 2021 and represent a snapshot of the Recreation data available.

4. EDW – [R09 – NHD Flowline](#)

- i. This layer represents the National Hydrography Dataset (NHD) available from the United States Geological Survey (USGS).
- ii. This is published on the internal (ArcN) EDW server available on the FS Network.
- iii. The NHD contains many many features that can cause issues with publishing and drawing. To increase performance, this data published into regional “clips.”

You will notice in your Catalog pane that there is a folder for Servers. These are the servers that are added to this project.

You can add to ArcGIS Servers with their URL by following the [Quick Connection Guide](#) available on GTAC’s website. Navigate to this link, then expand Image Services, and select Quick Connection Guide.

Internally facing servers like the ArcN or GTAC Image Server require a FS Network Connection. You will either need to plugged into the network at a FS office, or connect via the VPN if working elsewhere. If you are not on the FS Network, you will see the red exclamation point indicating a broken data source as you cannot connect to the servers.

5. GTAC Image Server – [NAIP – OH 2019](#)

- i. [NAIP](#) is the National Agriculture Imagery Program.
- ii. Each state is on a ~2 year cycle to collect “leaf on” imagery during the growing season.
- iii. Each image is 1m resolution.
- iv. We are using the imagery from Ohio in 2019.

6. ArcGIS Living Atlas of the World – [USA Current Wildfires](#) and [NOAA Short Term Weather Warnings](#).

- i. The [ArcGIS Living Atlas of the World](#) is Esri’s ongoing project to curate and make available authoritative datasets from around the world.
- ii. Both layers are part of the [Live Feeds](#) publications and represent real time data.
- iii. Because of the dynamic nature of this data, it may or may not display on the day of the training.

When developing a new map, know that there are many sources that are available through Forest Service-specific channels (i.e. Forest, Region, Agency-wide), as well as other federal agencies and Esri.

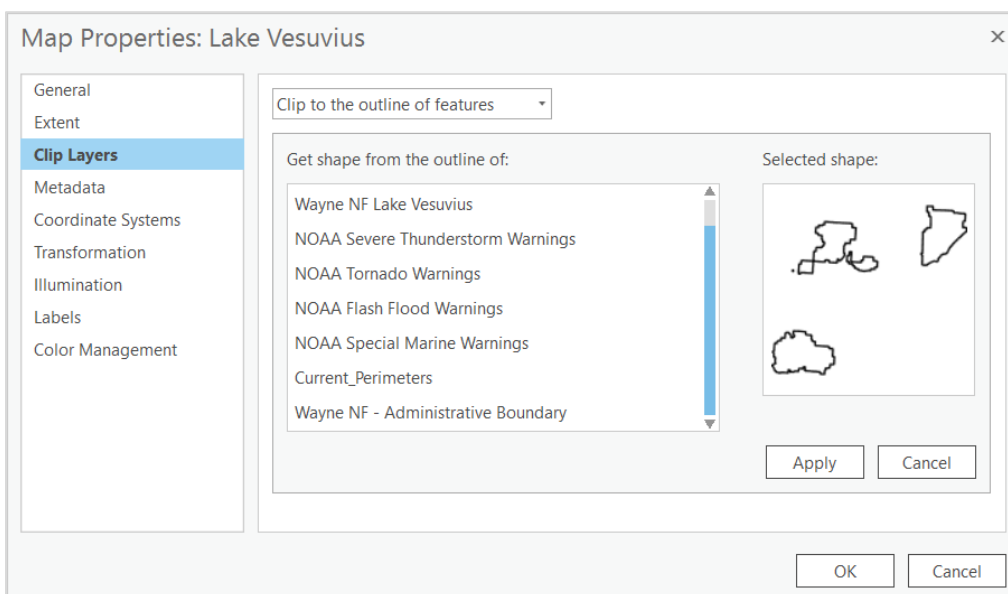
It is recommended to work with your local GIS staff to review the data to decided if the content is appropriate for your forest, program or project.

C. Clip Layers in the Map

There are many datasets from disparate data sources on this map. Some of these data have national or regional extents. This can cause drawing errors or slow performance.

We are only interested in the data that falls within Wayne National Forest, which is where the Lake Vesuvius Recreation Area is, so we will clip all our layers in the map to the administrative boundary.

1. **Right-click** on the map's name – **Lake Vesuvius** – from the **Contents** pane.
2. **Select Properties** to open the Map Properties window.
3. **Select Clip Layers** tab from the left side.
4. **Open** the drop-down menu where it says, "No clipping."
5. **Change** this to **Clip to the outline of features**, then scroll down to the layers that fall under **Extent of a layer**.
6. Select Wayne NF – Administrative Boundary.
7. **Select Apply**, then **OK**. This will clip all layers, including the World Topographic Basemap, the boundaries within this layer.



Note that this process does not alter the underlying data in any way. It is simply clipping, or “masking,” the layers visually.

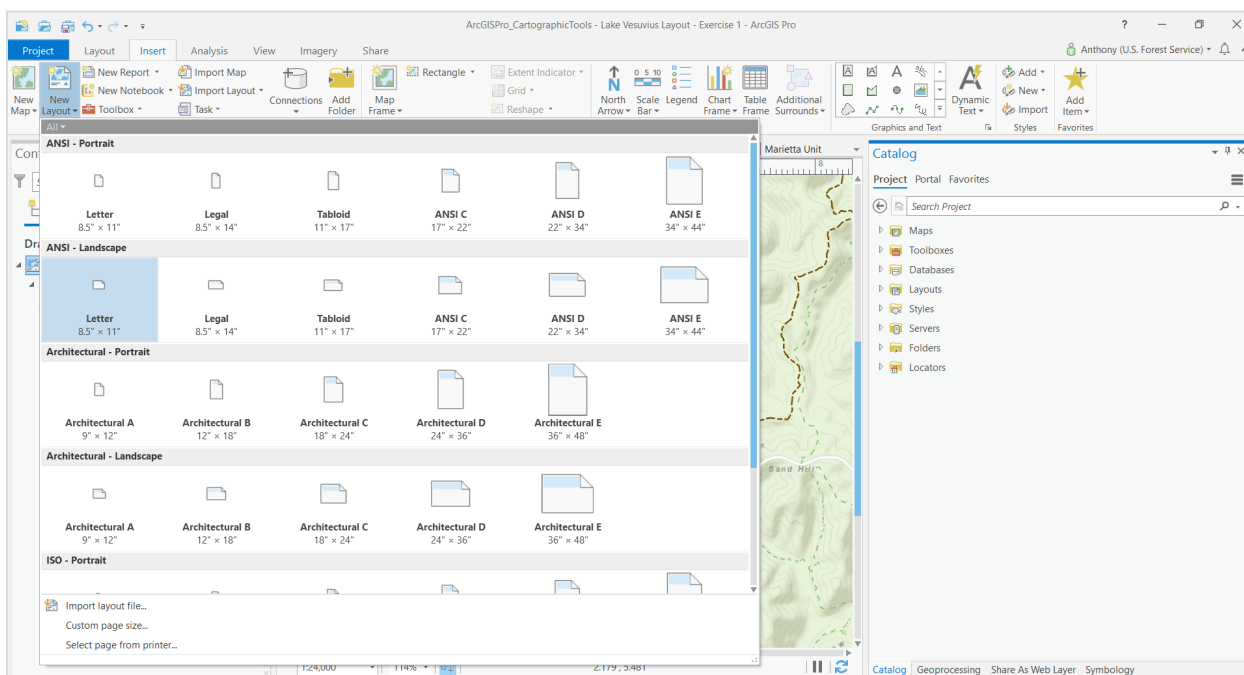
Other options for using the Clip Layers function is by setting a user defined extent or creating a polygon feature as a proxy for your boundary.

Part 2: Create a Layout

The Layout is the page where you design your map before exporting the final product. In the project, there is already a layout created titled **Lake Vesuvius Layout – Exercise 1**. This is for reference; the below instructions will recreate the same layout.

A. Insert New Layout

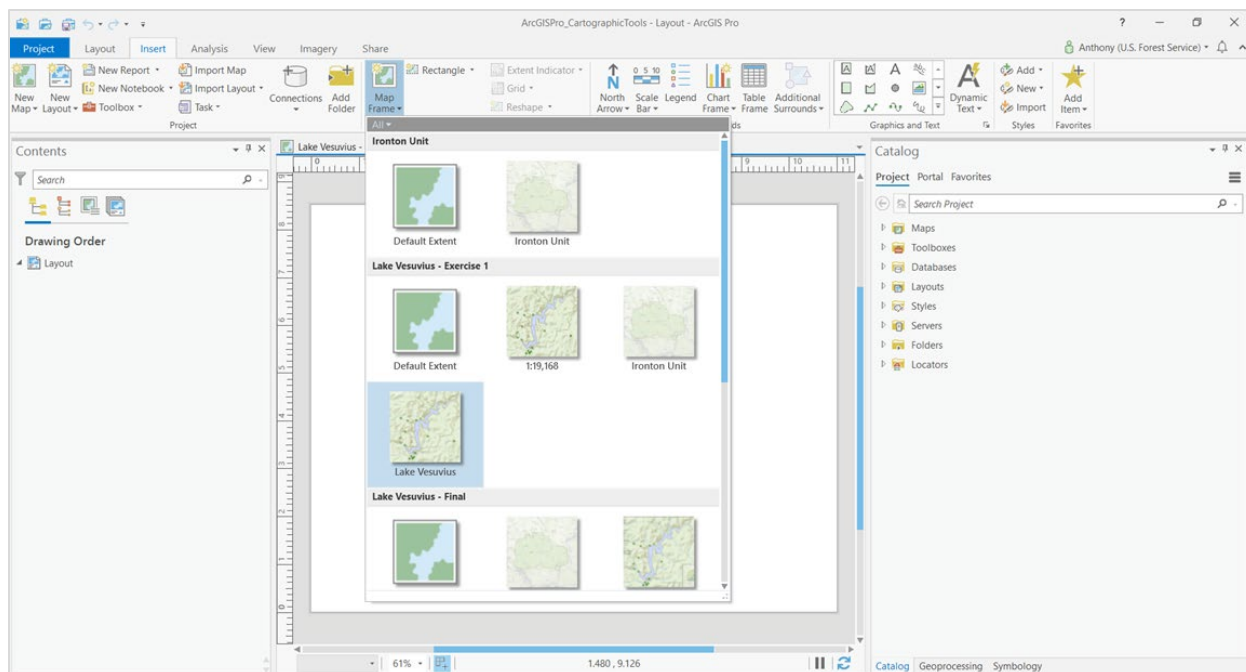
1. On the **Insert** tab on the **Ribbon**, select **New Layout**.
2. Select Letter 8.5" x 11" from the ANSI – Landscape section



3. This opens a blank layout page.

B. Insert New Map Frame

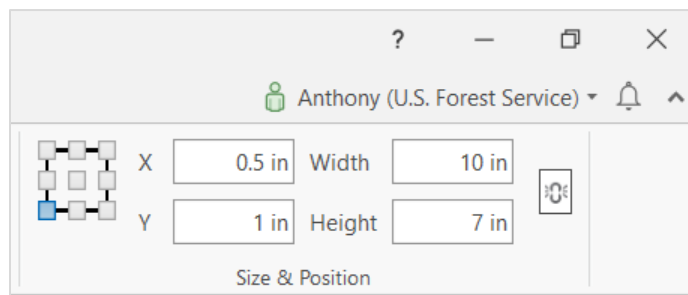
1. From the **Layout** tab, select **Map Frame**, then select **Lake Vesuvius**. This creates a new **Map Frame** from the Bookmark that is saved within the Project.



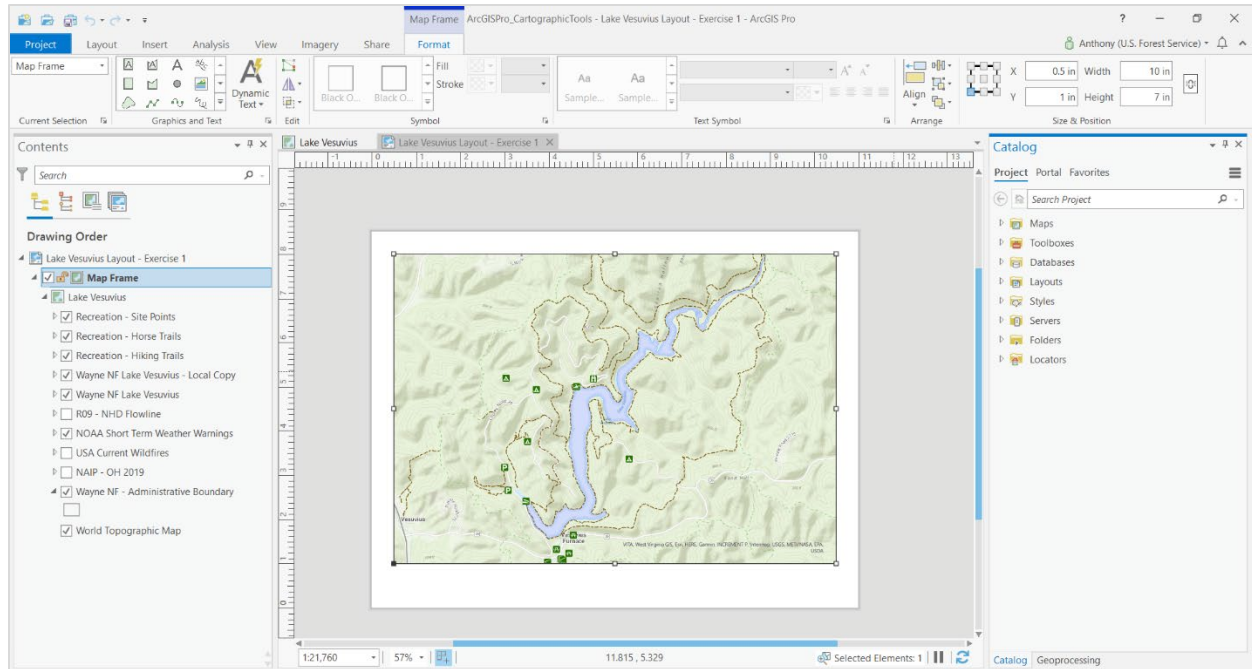
2. Once the **Map Frame** is selected, **draw** the outline of the **Map Frame** on the blank page. You can left-click and hold in the top left corner, then drag the box to the bottom right corner. We will adjust the size and position in the next step.

Bookmarks are specific geographic extents that are saved to the Project that automatically zooms to a specific extent and scale. They are helpful for navigating through complex maps. [Learn more about Bookmarks.](#)

3. With the **Map Frame** selected in the **Contents** pane, open the **Format** tab under the Map Frame section.
4. On the right side of the **Ribbon**, you will see a **size and position** section. Change this to meet the following parameters. This space along the margins provide empty space to insert the Map Elements later in this exercise.



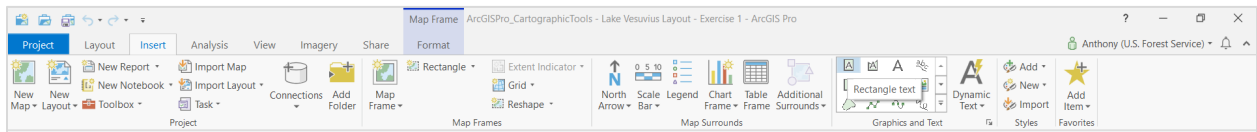
5. The project should look like the below image now.



Part 3: Add Map Elements

A. Title

1. There are several options when inserting text. The below instructions typically mitigate future text formatting issues.
2. On the **Insert** tab, select **Rectangle Text**.

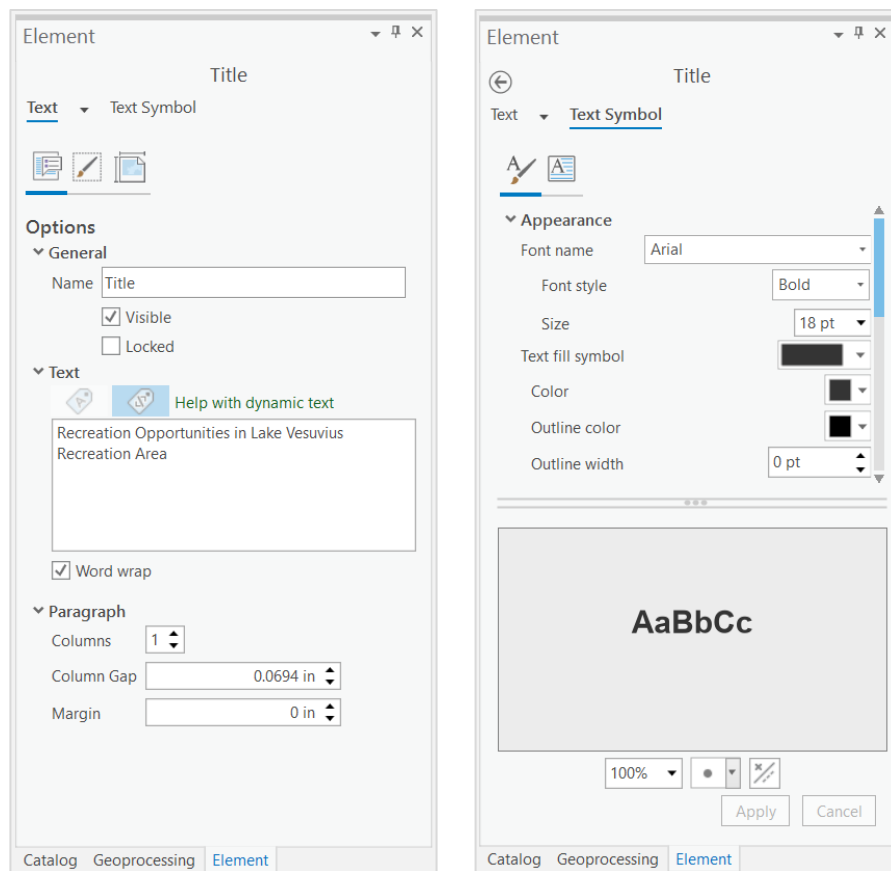


3. Like when inserting the **Map Frame**, the **text box** needs to be **drawn**. **Left-click** towards the top-center of the **Layout**, then **draw** the **text box**. This inserts a new text box.
4. **Notice** that this added and automatically selected a new **Layout Element** on the **Contents** pane called **"Text."**

A [Layout Element](#) is an item (or "element") that is added to the Layout page. These include map frames, titles, legends, north arrows, scale bars, graphics, charts, static text, and dynamic text.

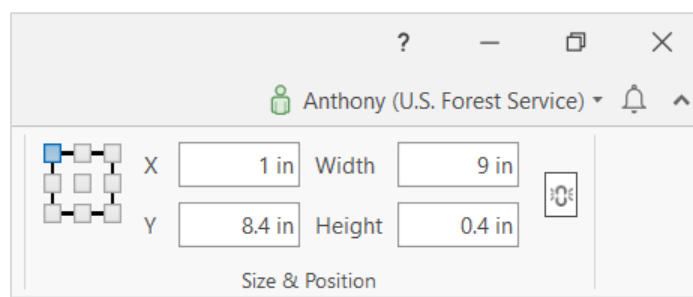
Similar to a layer in the Map View, we can toggle visibility on or off for Layout Elements with the check box on the Contents Pane.

5. **Rename** this **Layout Element** to **Title** by right-clicking on the **"Text"** on the **Contents** pane, then selecting **Properties**. This opens a new pane on the right side of the interface.
6. Under **General**, change the name to **Title**. This updates the **Contents** pane.
7. Under **Text**, change the box to **"Recreation Opportunities in Lake Vesuvius Recreation Area."** See image on the left below.
8. Select **Text Symbol** tab on the **Elements** pane, expand the **Appearance** section.
9. Change the **Font Name** to **Arial**, **Font Style** to **Bold**, **Size** to **18 pt**, and the **Color** to **Gray (80%)**. The Gray (80%) color is the first gray option below black.



Using dark or light grays is a visual alternative to using black or white. Black and white have such high contrast, they can become “visually heavier.” This takes the focus away from your map or data. Instead the map viewer focuses on the map elements with the highest contrast.

- Adjust the size and position of the text box by opening the **Format** tab under the **Text** group, then changing the **Size & Position** parameters to match the below image.



B. Author

- Insert another **Rectangle Text** box from the **Insert** tab.
- Type your name, then position the text box in the bottom right corner of the Layout Page.
- Rename the **Layout Element** as “**Author**” on the **Contents** pane. This helps us stay organized with as we add additional Layout Elements.

4. Change the Font Name to Arial, Font Style to Regular, Size to 12 pt, and the Color to Gray (80%).

C. Date

Both the Title and the Author Layout Elements were “static” text boxes meaning that you would need to manually update their text.

“Dynamic” text allows for information to be automatically updated when a changes occur. Examples of dynamic text include credits, spatial reference, scale, dates, file paths, and statistics.

1. Add Dynamic Text to the Layout Page.
2. **Open** the Insert tab, then select Dynamic Text.
3. **Scroll** down, then select **Date Exported**. When the Layout is exported as a pdf or image, this date will automatically populate.
4. **Position** the **Date Exported** text box below the **Author** text box.
5. Update the Layout Element on the Contents pane to display “Date Exported.”

D. Locator Map

A Locator Map is an “inset” map frame that provides a broader geographic content to the location of your information.

1. Insert a new Map Frame.
2. Select the Map titled “Ironton Unit.”
3. **Draw** the new map frame so that it fits the bottom right corner of the larger map frame. An approximately 2”x2” box will be a appropriate.
4. The new map frame will display with the administrative boundary of the Ironton Ranger District and with the “*Lake Vesuvius*” label.
5. You will now see two **Map Frames** listed on the **Contents** pane. The frame titled “**Map Frame**” should be renamed to “**Lake Vesuvius**.” The frame titled “**Map Frame 1**” should be renamed “**Ironton Unit**.”

E. Legend

1. Select the Lake Vesuvius Map Frame from the Contents pane.
2. Select Legend from the Insert tab.
3. **Draw** the box in the **upper left corner** of the **Lake Vesuvius Map Frame**. There are many layers in this map frame. **Drag** the **box** so that it shows all the layers.
4. On the **Contents** pane, expand the items displayed in the **Legend** by **left-clicking** the **arrow**.
5. Turn off all layers, except Recreation – Site Points, Recreation – Horse Trails, and Recreation – Hiking Trails.
6. **Select** the **Recreation – Site Points** under **Legend** on the **Contents** pane. The **Format Legend Item** pane should open. By default, this should open on the right side of your interface.
7. **Notice** that there are many options here for organizing your **Legend** under the **Show, Arrangements, Sizing, Feature Display Options**, and **Indents** sections. Take a few minutes to toggle these options on/off to see the changes.

8. Before leaving, **check** the box for “**Show feature counts**” under the **Feature Display Options**. This **adds** the **number of features** that are within the dataset to the **Layer Name** on the **Legend**.
9. **Uncheck** the **Layer name** and **Headings** under the “**Show**” section. This cleans up the **Legend**.
10. Change the font of the **Legend** to match the **Title** by **selecting Legend** on the **Contents** pane, then opening the **Format** tab under **Legend**. **Update** the **Font Name** to **Arial**, **Font Style** to **Regular**, **Size** to **12 pt**, and the **Color** to **Gray (80%)**.

F. Scale

1. **Add** both an **absolute** and **relative** scales to the map.
2. With the **Layout** selected, open the **Insert** tab, then select **Scale Bar**. This is the **relative scale**.
3. **Choose** your **preferred scale bar**. For this exercise, the **Scale Line 1** is recommended.
4. **Draw** the **box** in the **bottom center** of the **Layout**. **Drag** the **width** of the box so that the **largest value** is **1 mile**.
5. Rename this Scale Bar as “Scale Bar – Miles” on the Contents pane.
6. Insert another Scale Bar by selecting the Scale Bar – Miles Layout Element in the Contents pane, then select Copy. Right-click any Layout Element in the Contents pane, and select Paste. This inserts a copy of the Scale Bar – Miles into the Layout.
7. Rename this new scale bar as “Scale Bar – Kilometers.”
8. With the Scale Bar – Kilometers selected, right-click and select Properties. This opens the Format Scale Bar pane.
9. Under the Map Units section, change the Map Units and Label Text to Kilometers.
10. Change the width of Scale Bar – Kilometers so that the largest value is 1 kilometer.
11. **By default, both absolute scale bars will use Arial 10 pt as the font. Update** the color to **Dark Gray (80%)** to match the **Title** and **Legend**. This can be found on the **Ribbon** under **Scale Bar Format**. Note that one of the scale bars will need to be selected on the **Contents** pane.
12. **Insert** a **Dynamic Text** and **select Scale**. This is the **absolute scale**. **Draw** the box just above both **relative scales** and ensure that it is centered on the Layout page.
13. **Rename** this Dynamic text as **Absolute Scale** on the **Contents** pane.
14. Change the Font Name to Arial, Font Style to Regular, Size to 12 pt, and the Color to Gray (80%).

G. North Arrow

1. On the **Insert** tab, select **North Arrow**.
2. **Select** your **preferred North Arrow**. For this exercise, **ArcGIS North 1** is recommended.
3. (Hint: if you hover over each North Arrows, a name will display).
4. Draw the box for the North Arrow on the bottom-left corner.
5. On the **Format North Arrow** pane, check out the **North Arrow** section. Here you can change which **Map Frame** the **North Arrow** is linked to and the **Type** of **North Arrow**. **Lake Vesuvius** should be the **Map Frame**. **Magnetic North** should be the **Type**.
6. **Notice** that when **Magnetic North** is **selected**, the **North Arrow** assumes a slight tilt to the northwest.
7. Update the North Arrow’s color by selecting the Symbol. Change the Color to Dark Gray (80%).

H. Credits

Service Layer Credits (sometimes referred to as Esri Basemap Credits) are the attributed credits to the creator of the data that contributed to the basemaps. By default, these are added to the map frame and take the focus away from your content.

1. Service Layer Credits

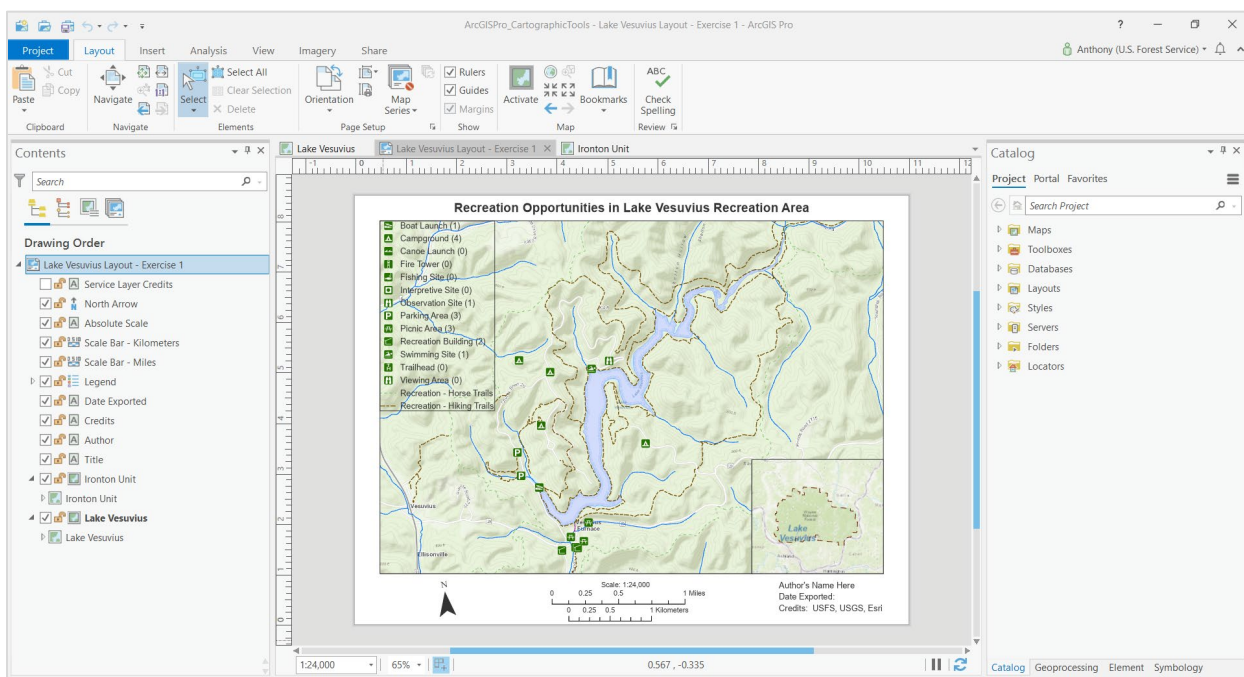
- Remove the Service Layer Credits by first inserting them into the Layout.
- Insert** a new **Dynamic Text** called “**Service Layer Credits.**” This is about halfway down the **Dynamic Text** menu.
- Draw the box anywhere outside the Layout page to insert the Service Layer Credits.
- On the Contents pane, rename the new Text box as “Service Layer Credits.”
- Toggle the visibility off by unchecking the box.

2. Other Credits

- Credit should be given to the creator of the data or information on the map. It is recommended to follow regional, forest, or station-specific guidance from the cartography or GIS office, or equivalent.
- For this exercise, **insert** a new **Rectangle text** in the **bottom-right corner** of the **Layout** page.
- Change** the **name** on the **Contents** pane to “**Credits.**”
- Change the text to “Credits: USFS, USGS, Esri.”
- Change the Font Name to Arial, Font Style to Regular, Size to 12 pt, and the Color to Gray (80%).

I. Check your Layout!

- Your Layout should look similar to (but not exactly like) the below image.





Congratulations! You have successfully completed this exercise. You now know the basics of working with Layouts in ArcGIS Pro.