

EXERCISE 1

ArcGIS Pro -Map Series: Feature Index Layers

Introduction

A map series is a collection of pages built from a single layout in which each page shows a particular map extent. Map series pages can have dynamic elements that update for each page, such as scale or the map title, and static elements that are constant across all pages, such as graphics. In this exercise the student will learn how to create Map Series using features to index map pages.

Objectives

- Set-up Map Series
- Work with dynamic text
- Build a Page Definition Query
- Work with labels in Map Series
- Export maps generated by Map Series
- Utilize several tools available within the Map Series toolset
-

Required Data:

- ArcGISProMapSeries.zip downloaded to your workspace and unzipped.

Prerequisites

- Install ArcGIS – Pro 2.9 or greater
- Have completed the GTAC ArcGIS Pro – Quick Start class or have equivalent experience.



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Table of Contents

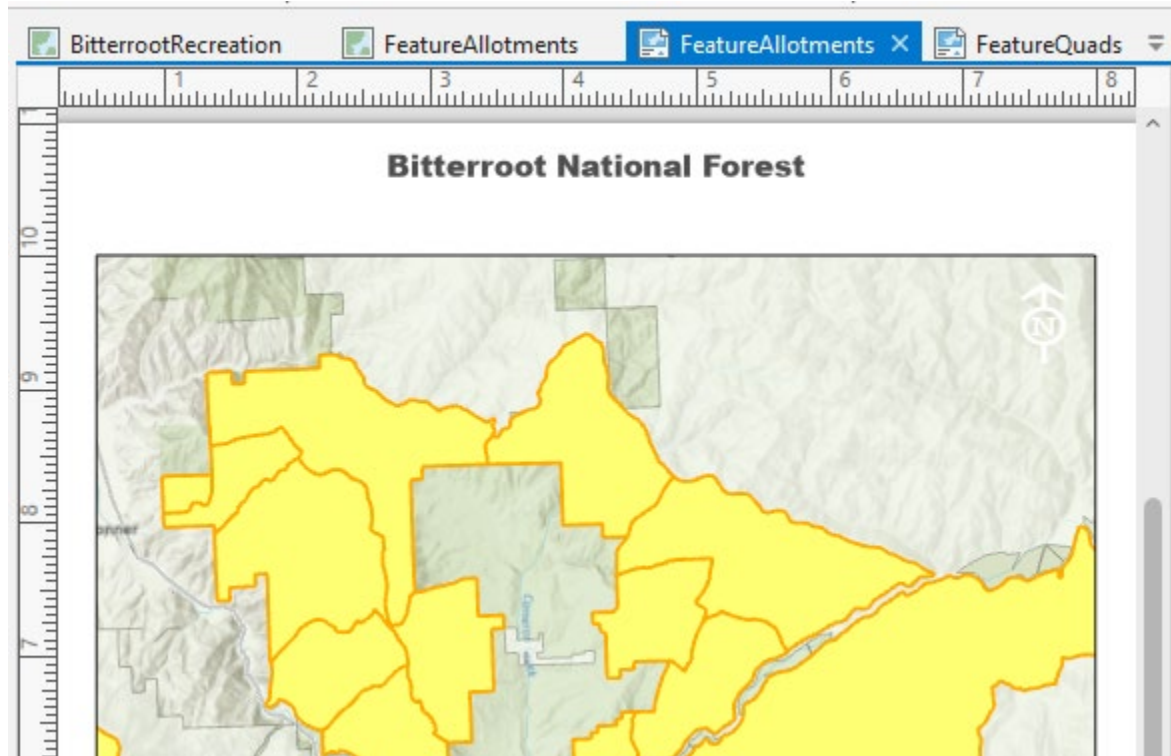
Part 1: Setup Data and Map Layout.....	4
Part 2: Create Map Series	8
Part 3: Add Dynamic Text	9
Part 4: Label Features	15
Part 5: Build a Page Query	16
Part 6: Examine Map Pages	20
Part 7: Export Map Pages	20
Part 8: OPTIONAL - Setup a New Map Series	24
Part 9: OPTIONAL - Calculate UTM Zone Tool	26
Part 10: OPTIONAL - Calculate Grid Convergence Angle Tool	28
Part 11: OPTIONAL - Update the Map Series Setup	29
Part 12: OPTIONAL - Enable a Dynamic Legend	31

Part 1: Setup Data and Map Layout

The Forest Supervisor for the Bitterroot National Forest has asked you to participate in a project mapping various livestock allotments on the Bitterroot NF. Since there are several allotments to be mapped, you will use Map Series to accomplish this goal.

1. Open the project file.
 - a. Open Windows Explorer and navigate into the **ArcGISProMapSeries** course folder that you downloaded then go into **Data\Pro_MapSeriesProject**.
 - b. Open the **Pro_MapSeriesProject.aprx** file.
 - c. Make sure the **FeatureAllotments** map is selected.

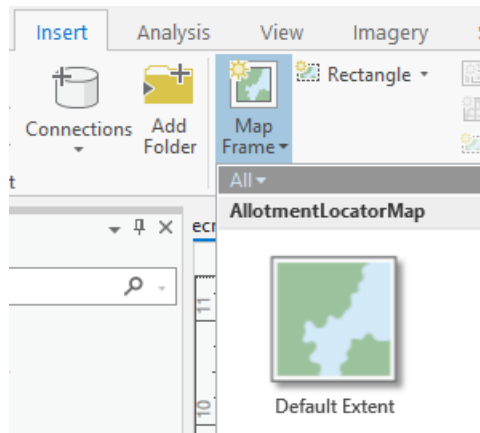
Notice that the project opens in a Layout. The Layout is called FeatureAllotments and has a Map frame that links to a Map called FeatureAllotments. You can tell the difference between the Map and the Layouts by the icons. The Layouts look like a dog-eared piece of paper. You can have many Maps and many Layouts in an ArcGIS Pro project.



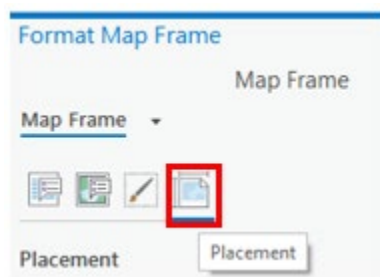
2. Add a Locator Data Frame

Why use a locator map? Locator maps provide a reference to map users when the spatial location of the main focal map might be hard to determine. They can also be used to track where the current page falls within an area.

- a. On the Insert tab (Map Frames group) select Map Frame then **choose the AllotmentLocatorMap - Default Extent** map.



- c. **Draw the new map frame** in the bottom left corner of the page by left clicking and dragging so that the bottom and left side line up with the .5 inch margins (the temporary map guides are helpful).
- d. If necessary, right click on the new Map Frame and select Properties, the **Format Map Frame** pane will open. Select the **Placement** tab.



- e.
- f. Use the following settings:
- Width = **2 in**
 - Height = **2 in**
 - X position = **0.5 in**

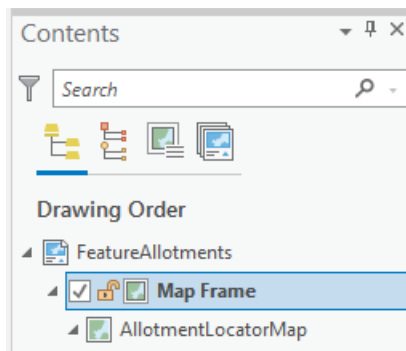
- Y position = 0.5 in



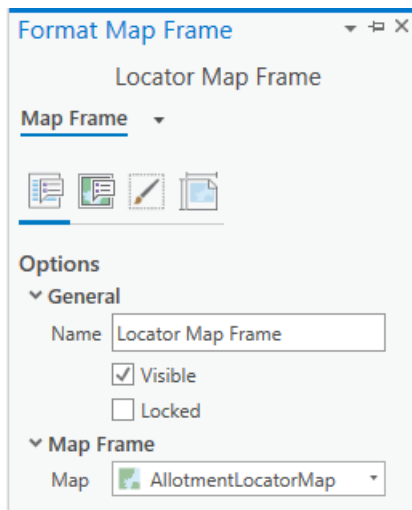
Fo

0 0.5 1

- g. In the Contents pane, double click the **Map Frame** for the **AllotmentLocatorMap**.



- h. In the Format Map Frame that opens, change the name to **Locator Map Frame**.

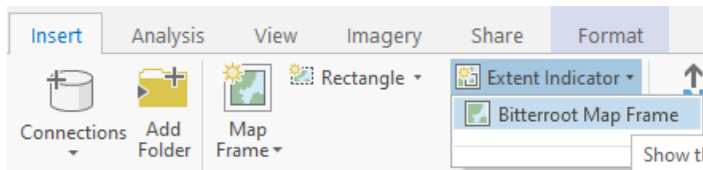


- i. Right click on the **Bitterroot National Forest** and **Zoom to Layer**.

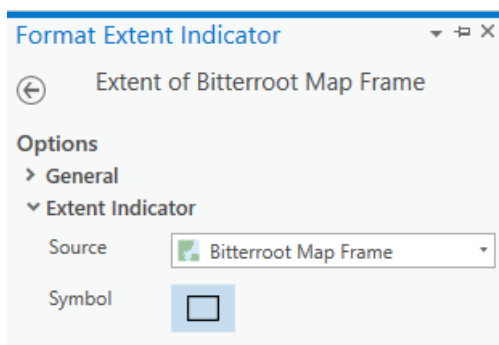
3. Set up Extent Indicators in the Locator Map data frame

The Extent Indicator marks the location of the feature currently shown in the map display. Initially, the extent indicator will be a square, reflecting the position of the data frame.

- In the **Contents** pane, select the **Locator Map Frame**.
- On the **Insert** tab (**Map Frames** group) click the **Extent Indicator** dropdown button then select the **Bitterroot Map Frame**.



- In the Contents pane, double click **Extent of Bitterroot Map Frame** to open the Format Extent Indicator.
- In the **Extent Indicator** section, click the box next to **Symbol** to open the



- In the Symbology tab, **change the outline of the extent indicator to Poinsettia Red** and click Apply.
- Notice the red indicator box in the Locator Map frame.

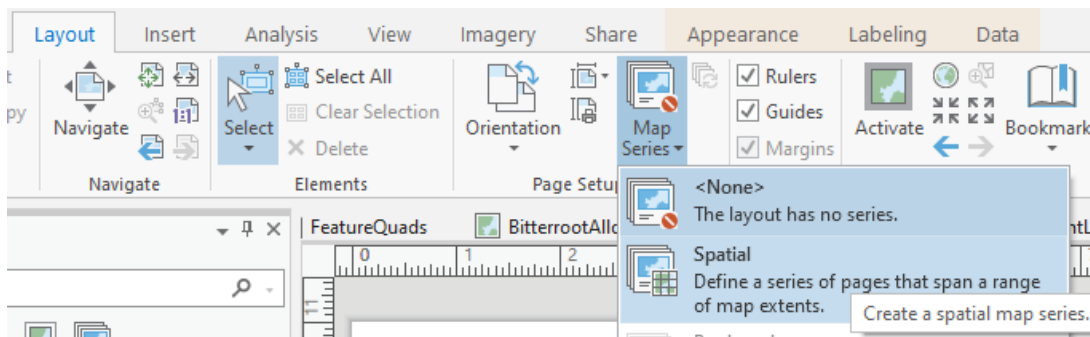


Several of the dynamic text values for Map Series pull information from the index layer. For this reason, you should set up Map Series, which will identify the index layer, prior to adding dynamic text. Some of the dynamic text types can be added before initiating Map Series; however, the appropriate data will not be populated until after creating the Map Series.

Part 2: Create Map Series

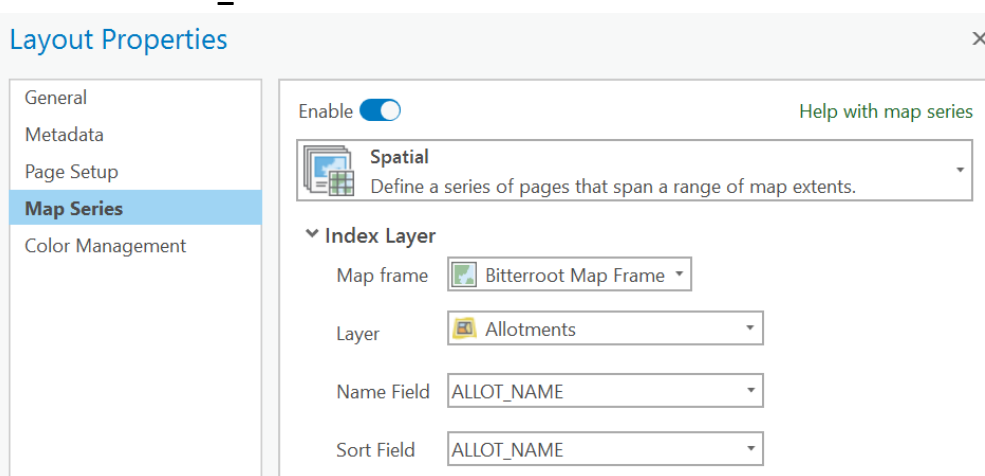
1. Setup Map Series

- In the Contents pane, select **Allotments** in the Bitterroot Map Frame.
- On the **Layout** tab (Page Setup group) click the down arrow on the **Map Series** button then select **Spatial**.

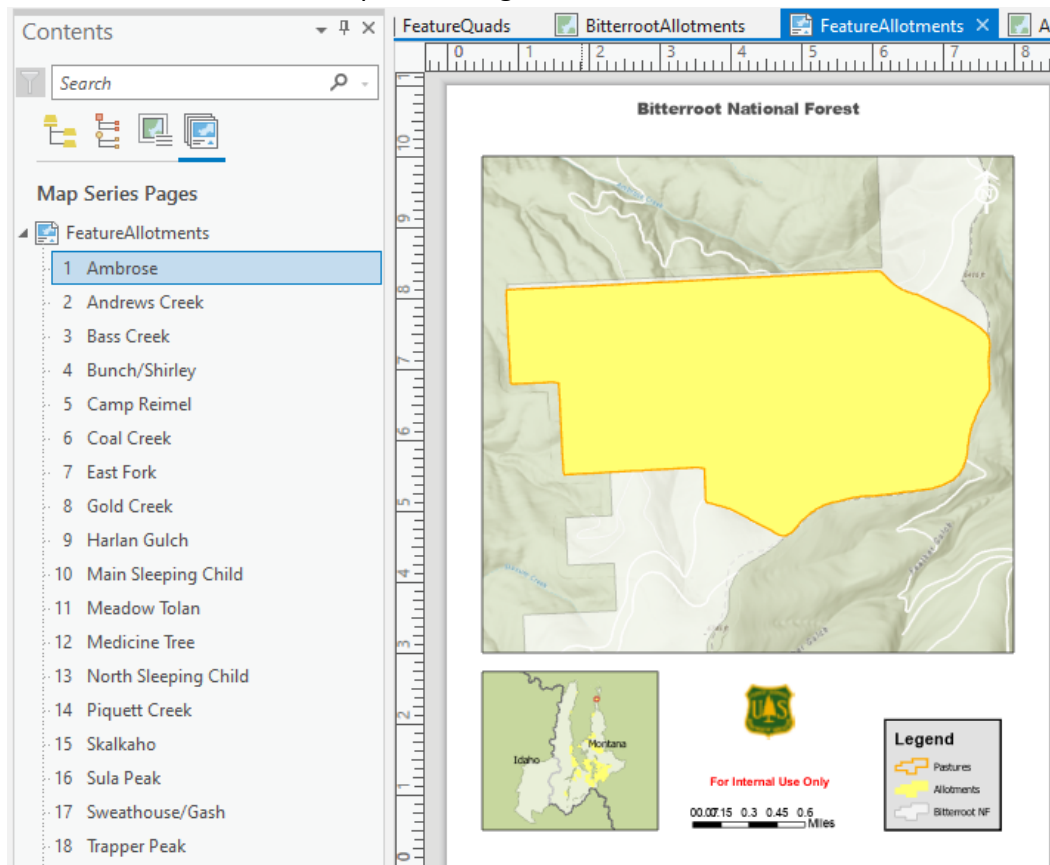


- Enter the following parameters in the **Index Layer** section:

- Map frame: **Bitterroot Map Frame**
- Layer: **Allotments**
- Name Field: **ALLOT_NAME**
- Sort Field: **ALLOT_NAME**



- d. Click **OK**. The Map Series Pages appear in the Contents pane. Notice how the extent indicator in the Locator Map has changed.

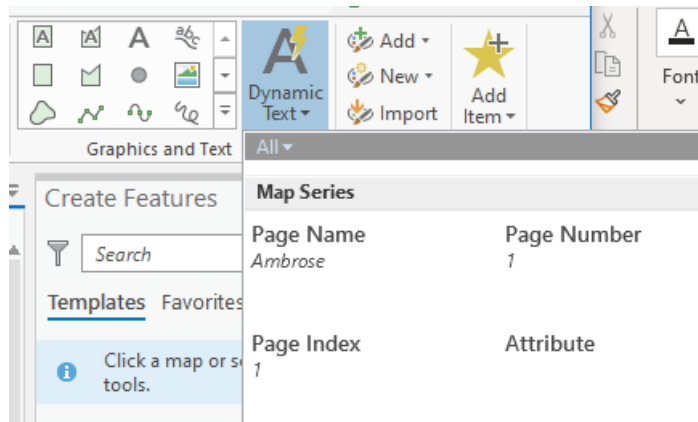


Part 3: Add Dynamic Text

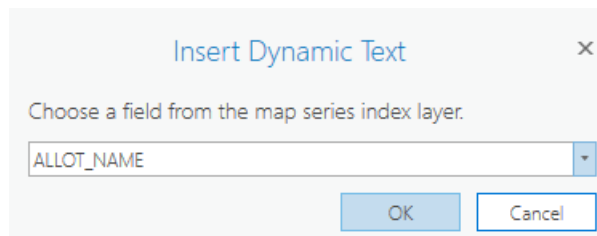
Dynamic text will allow unique values based on the individual index features to be populated within each map page created in the Map Series. You will now set up several dynamic text boxes to finish the map layout.

1. Add Dynamic Text—Allotment Name

- a. On the **Insert** tab (**Graphics and Text** group) click the **Dynamic Text** menu then scroll down to the **Map Series** section and select **Attribute**.



- a. In the **Insert Dynamic Text** window, select **ALLOT_NAME** and click **OK**.

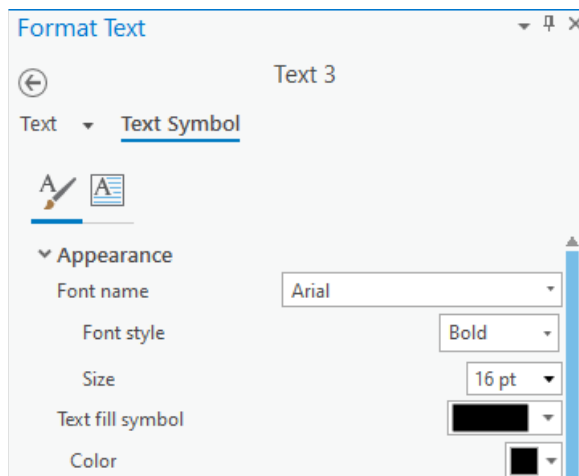


- b. In the Layout, within the main map (**Bitterroot Map Frame**), click and drag the cursor over the allotment polygon to create the dynamic text box.

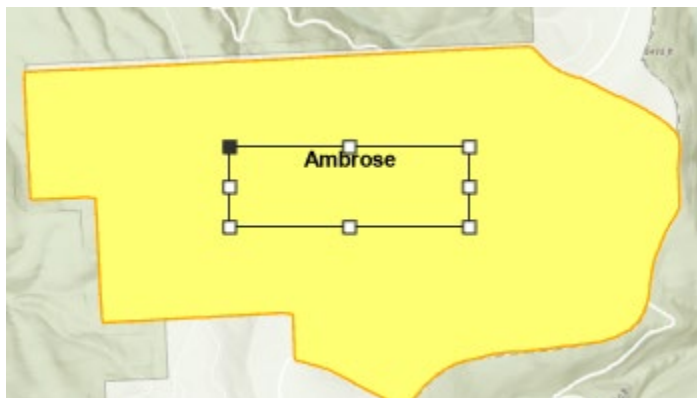


- c. Right click the new Dynamic text box and select Properties to **open the Format Text pane**.
- d. Click **Text Symbol** and expand the **Appearance** menu.
- e. Set the following parameters:

- Font Name: **Arial**
- Font Style: **Bold**
- Font Size: **16**
- Color: **Black**

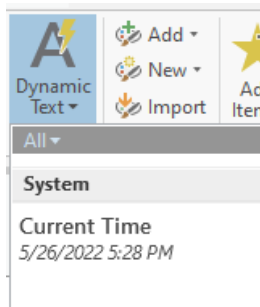


- f. Expand the Position section and set the Horizontal Alignment to **Center Justified** by clicking this icon. Click Apply.

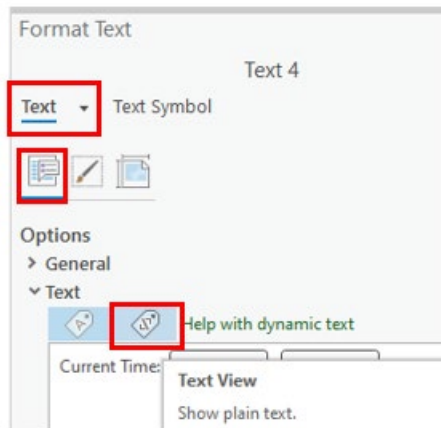


2. Add Dynamic Text—Date

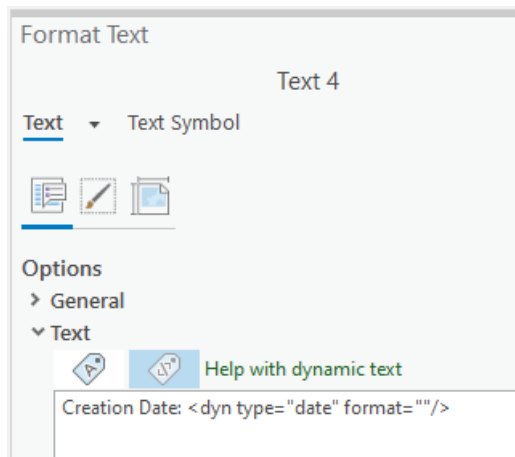
- a. In the **Dynamic Text** menu go to the **System** section and select **Current Time**.



- b. Create the date text box below the USFS logo and above the words “For Internal Use Only”.
- c. The date shown will include the time. To improve the description and remove the time, go to the **Format Text** pane, **Options tab**, **Text section** and click the **Text View** button.



- d. Insert the following code in the field: Creation Date: <dyn type="date" format=""/>



- e. The dynamic date text should now be in the format shown below.



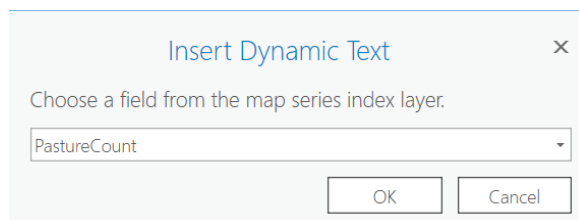
Creation Date: 4/28/2022

For Internal Use Only

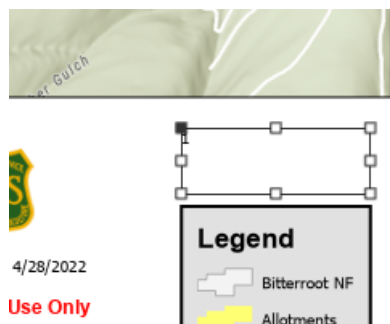
3. Add Dynamic Text—Number of Pastures

You can customize the tag coding of dynamic text to fit the needs of the map page. For instance, in this step you add the static text “Number of Pastures” to the tag code for the pasture count dynamic text box. In fact, any of the dynamic text options can be used for all dynamic text cases. You just change the code to reflect the information you need to portray.

- In the **Dynamic Text** menu go to the **Map Series** section and select **Attribute**.
- In the Insert Dynamic Text window select **PastureCount** then click **OK**.



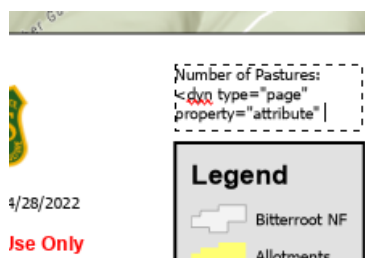
- Create the text box in the space between the Legend and Bitterroot Map Frame.



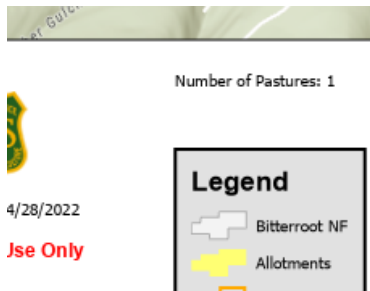
- Copy the following text expression:

```
Number of Pastures: <dyn type="page" property="attribute"
field="PastureCount" domainlookup="true"/>
```

- Double click on the newly created text box in the Layout, **paste the text expression in the text box.**



- f. Click anywhere in the Layout, outside of the text box to see the result.



- g. Right click the text box and select Properties. Within the Format Text window, select the **Text Symbol** tab. In the **Appearance** section set the following parameters:

- Font Name: **Arial**
- Font Style: **Bold**
- Font Size: **12**
- Color: **Black**

- h. In the **Position** menu set the **Horizontal Alignment** to Right Justified by clicking this



- i. Click **Apply**.

4. Add Dynamic Text—Map Series with Count

- In the **Dynamic Text** menu go to the **Map Series** section and select **Page With Count**.
- Create the text box directly beneath the Number of Pastures text box.
- Go to the **Format Text** pane, then **Text Symbol**, **Appearance** menu and set the following parameters:

- Font Name: **Arial**
- Font Style: **Bold**
- Font Size: **12**
- Color: **Black**

- d. In the **Position** menu set the **Horizontal Alignment** to **Right Justified** by clicking this



- e. Click **Apply**.

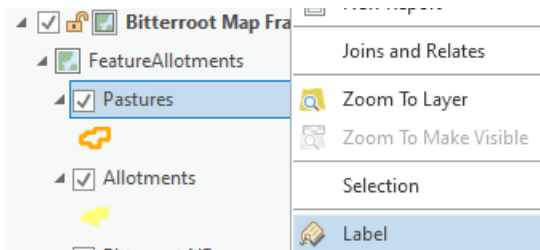
- f. Position the text boxes similar to the example below.



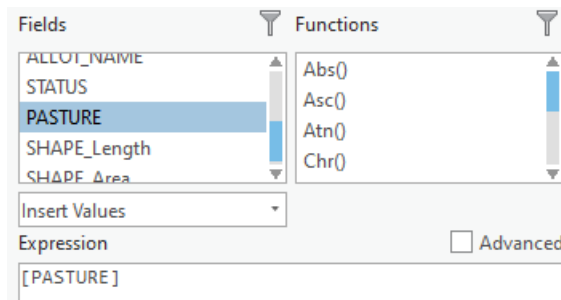
Part 4: Label Features

The pastures associated with the various allotments need to be labeled. You can add standard labels to the pastures layer to accomplish this task.

1. Setup labels in the Pasture layer
 - a. In the Contents Pane, under List by Drawing Order, right click on the **Pastures** layer in the **Bitterroot Map Frame** then select **Label**.



- b. Right click again on the **Pastures** layer then select **Labeling Properties** to open the Label Class – Pastures pane.
 - c. In the **Label Class – Pastures** pane, delete [ALLOT_NAME] and double click Pastures in the Fields box to make sure the **Expression = [PASTURE]**.



- d. Click **Apply**.
- e. Go to the **Symbol** tab and set the following parameters in the **Appearance** section:
 - Font Name: **Arial**
 - Font Style: **Bold**
 - Size: **12 pt**
- f. Click **Apply**.
- g. In the graphic below, the allotment name is the same as the pasture name. You might need to move the allotment text box if it overlaps with a pasture label.



Part 5: Build a Page Query

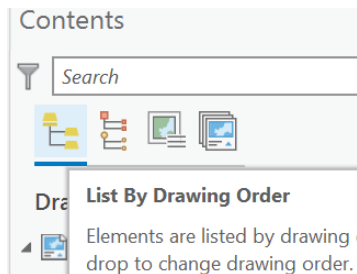
A Page Query allows you to specify which features of a layer show based on an SQL query. In this step, you will set up a Page Query to allow only one allotment to be visible on each map page.

1. Create a copy of the Allotments Layer.

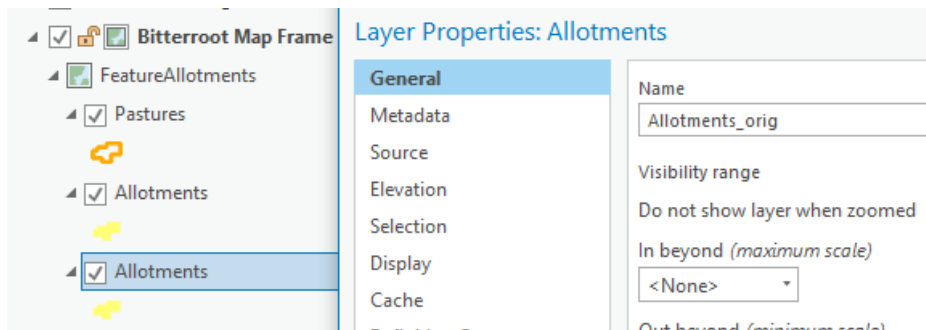
The index layer cannot be used to make a Page Query. We will have to create a duplicate of the Allotment layer in the TOC and use that for the Page Query.

- a. Right click on the **Allotments** layer in the Bitterroot Map Frame and choose **Copy**.
- b. Right click on the **FeatureAllotments** header and choose **Paste**.

- c. **Drag** the copy of the Allotments data to the position directly above the original allotments layer (you need to be in the **List By Drawing Order** tab).




- d. **Double click** on the original Allotments layer to open the layer properties, and activate the **General** tab.
- e. Update the name of the layer to “**Allotments_orig**” to distinguish it from the copied layer.



- f. **Turn off** the original allotments layer.

2. Navigate to Page 12 of the Map Series.

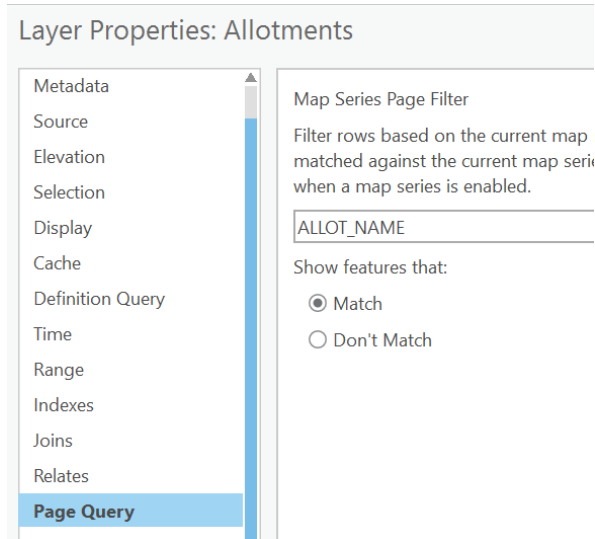
Page 12 in this map series is a good example of multiple allotments appearing on a single map. This can be confusing since the map page is supposed to be specifically portraying the Medicine Tree Allotment.

- a. In the **Contents** pane, click the **List Map Series Pages** tab icon .
- b. In the Map Series Pages menu, double click on **12 Medicine Tree**.

3. Set up Page Query for Allotments layer

- a. In the **Contents** pane, go to the **Drawing Order** tab.
- b. Right click on the **Allotments** layer and open **Properties**.

- c. Click **Page Query**.
- d. In the drop-down menu select **ALLOT_NAME**
- e. Select Show Features that '**Match**'.



- f. Click **OK**.

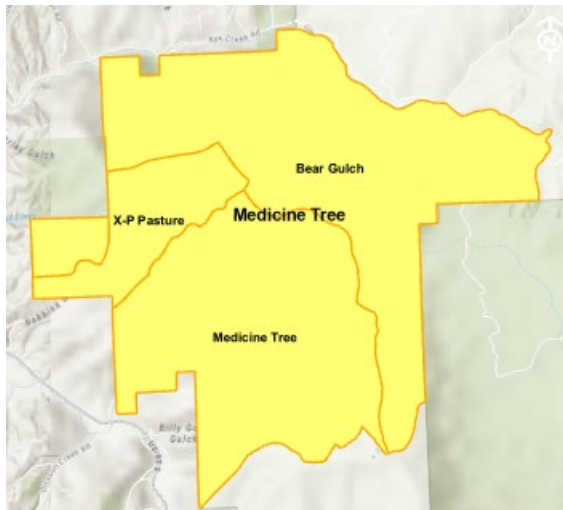
The Page Query, while enabled, only allows the Medicine Tree allotment to be visible. The Page Query will change dynamically with each map page querying for each allotment name.

4. Set up Page Query for Pastures layer

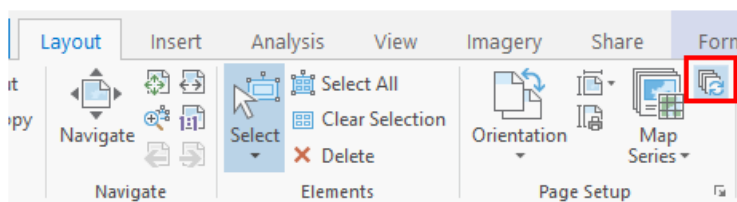
The labels and outlines show for the 4 pastures found within the Medicine Tree Allotment, but so do all the other pastures outside of the Medicine Tree Allotment. You can set up a second Page Query on the Pastures layer to show only the information for pastures included in the current index allotment feature.



- Right click on the **Pastures** layer and open **Properties**.
- Click **Page Query**.
- In the drop-down menu select **ALLOT_NAME**
- Select Show Features that **Match**.
- Click **OK**.
- Verify that only pasture labels associated with the Medicine Tree Allotment are showing.

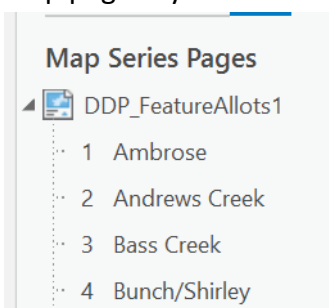


- g. Click the Refresh Map Series button located on the Layout Ribbon, Page Setup section.

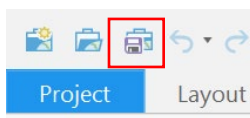


Part 6: Examine Map Pages

1. Look through some of the map pages.
 - a. In the **Contents** pane, go to the **List Map Series Pages** tab and open a few of the map pages by double clicking on the title.



- b. Take notice of the following things:
 - The dynamic text boxes change to reflect information about each featured allotment.
 - The red extent locator in the Locator Map Frame changes to show each allotment location.
 - The scale bar may change depending on the extent of the Bitterroot Map Frame.
 - Only 1 allotment at a time with the associated pastures should show on each map page.
 - c. Save your ArcPro session by clicking the **Save** button in the upper left corner of the window.

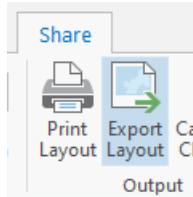


Part 7: Export Map Pages

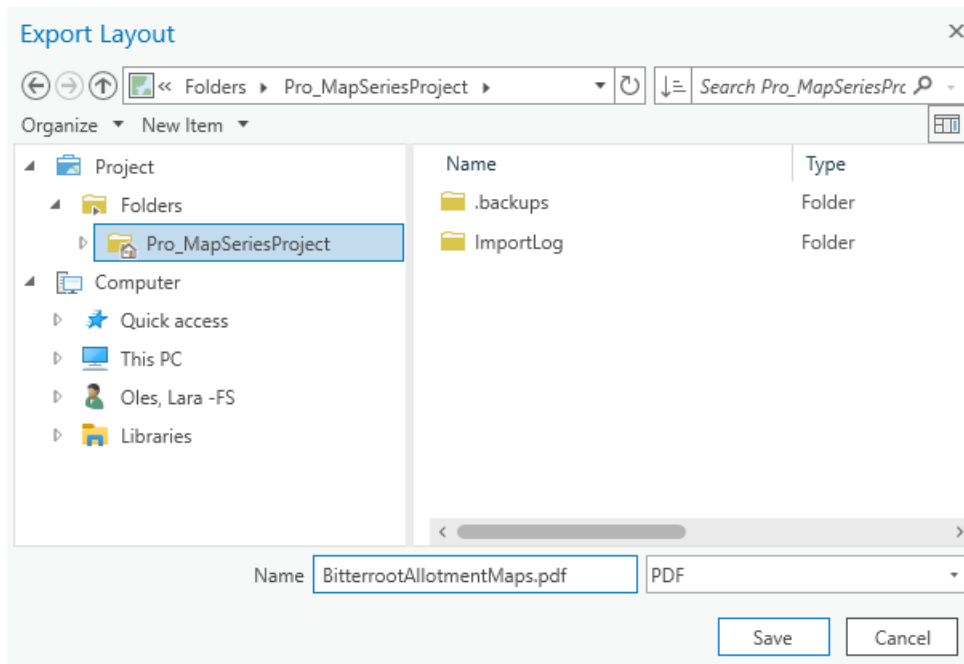
You have been asked to not only provide a complete set of the map series, but also individual maps of four specific allotments of interest.

1. Export All Map Pages

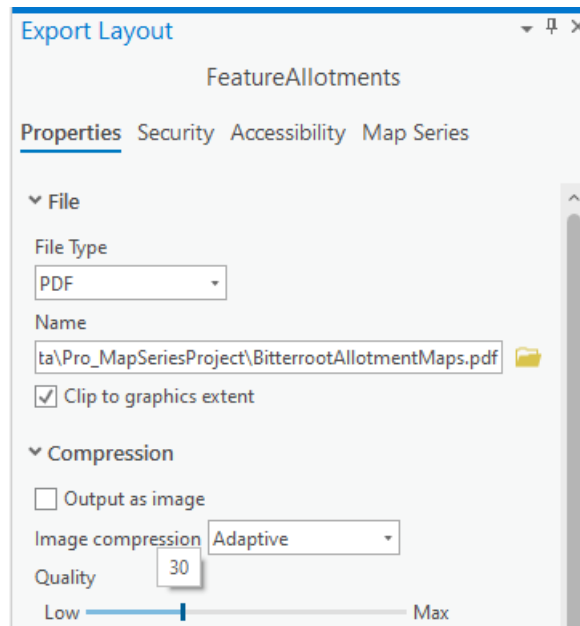
- Go to the **Share** tab (**Output** group) and click the **Export Layout** button.



- In the Export Layout pane, set the File Type to **PDF**.
- Click the yellow folder by the Name field, save it to the default Project folder Pro_MapSeriesProject, and name the file **BitterrootAllotmentMaps.pdf**

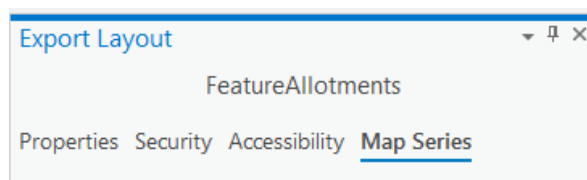


- d. In the Compression section, move the **Quality** slider to **30** (the number will show as you move the slider).



Exporting maps in lower (draft) quality greatly speeds up the exporting process. It is good practice to export a set of maps in draft mode to make sure they meet expectations. Then, you can go back and export the set of maps using a higher quality setting for the final product. When exporting a map series in high resolution settings, the process will take longer.

- e. Click the **Map Series** tab.



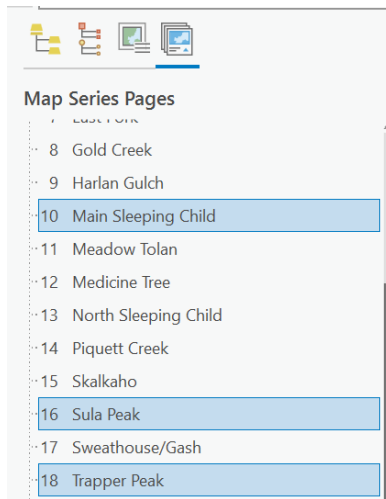
- f. Select **All (20 pages)**.
- g. Set the Files to **Single PDF File**.
- h. Click **Export**.
- i. It may take a minute or two to generate the PDF. When the process completes, click **View exported file** at the bottom of the Export Layout pane.



- j. Look through the pages to see how dynamic text, data frame extent, and page definition works.

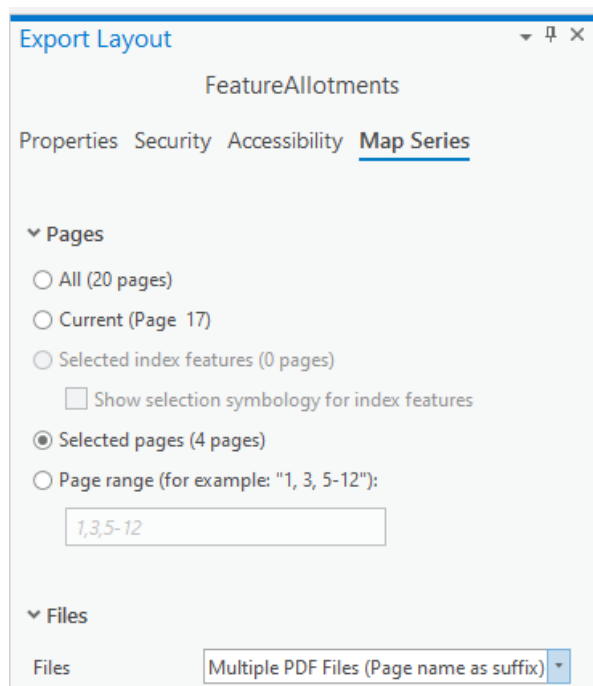
2. Select Allotments of Interest.

- a. Click the **List Map Series Pages** tab.
- b. While holding down the **<ctrl>** key, click on the following names to select them:
Ambrose, Main Sleeping Child, Sula Peak, and Trapper Peak.



3. Export Selected Map Pages
 - a. Go to the **Share** tab (**Output** group) and click the **Export Layout** button.
 - b. In the Export pane Properties tab , set the File Type to **PDF**.
 - c. In the Name field, click the yellow folder, then name the file
BitterrootAllotmentMaps2.pdf
 - d. In the Compression section, set the **Quality** slider to **30**.
 - e. Click the **Map Series** tab.
 - f. Choose **Selected Pages (4 pages)**.

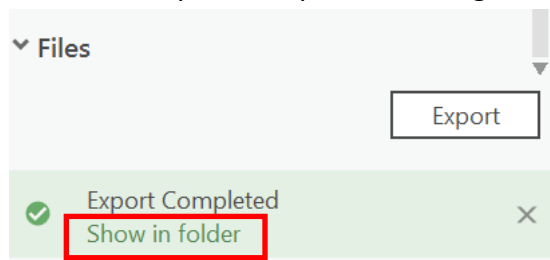
- g. Set the Files to **Multiple PDF Files (Page name as suffix)**.



- h. Click **Export**.

4. Examine your exported map pages

- a. Below the Export Completed message click **Show in folder**.

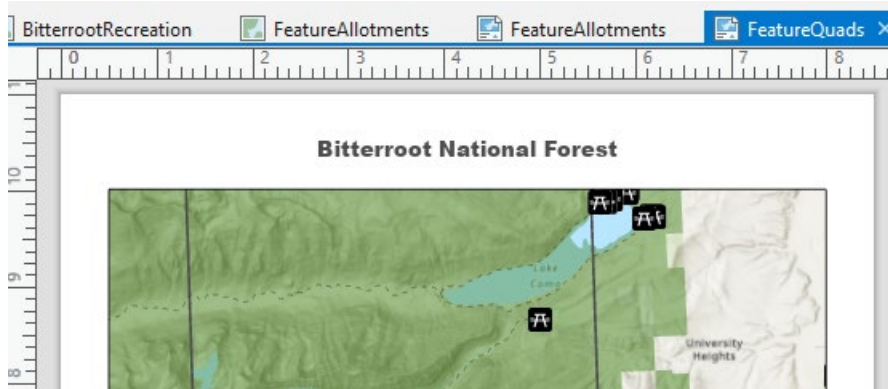


- b. Inspect each of the 4 selected map pdfs.

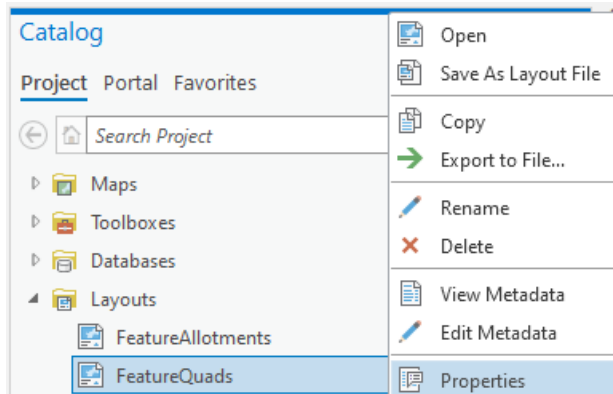
Part 8: Setup a New Map Series

Now that you have completed the allotment maps, another request comes in to create quad maps of the Bitterroot Forest that show both trails and recreation sites.

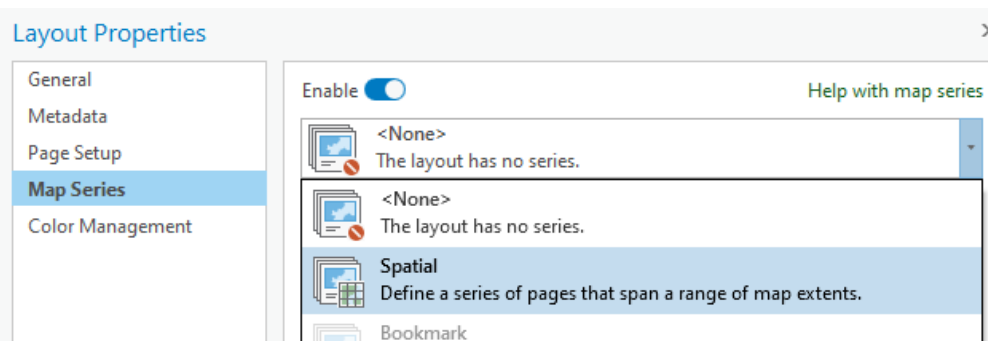
1. Select the **FeatureQuads Layout** from the tab above the page view.



- a. In the **Catalog** pane, click to open the Layouts folder. Right click on the **FeatureQuads** layout and select Properties.



- b. In the Layout Properties window, select **Map Series** then in the dropdown menu select **Spatial**.



- c. Enter the following parameters in the **Index Layer** section:

- Map frame: **Bitterroot Map Frame**
- Layer: **Quads**
- Name Field: **QUAD_NAME**
- Sort Field: **OBJECTID**

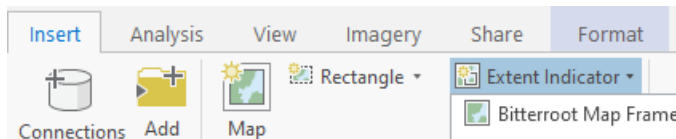
- d. Click **OK**.

Notice a few things:

- The dynamic text box under the title “Bitterroot National Forest” has been populated with the name of the quad.
- The quad of focus in the current map page is not aligned to true north (This will be important in a couple steps.)

1. Set up Extent Indicator

- In the **Contents** pane, open the Drawing Order tab and select the **Locator Quad Map** frame.
- On the **Insert** tab on the top ribbon, in the **Map Frames** group, click the **Extent Indicator** button then select the **Bitterroot Map Frame**.



- In the Contents pane, in the Locator Quad Map Frame, right click **Extent of Bitterroot Map Frame** then click **Properties**.
- In the **Format Extent Indicator** pane that opens, in the **Extent Indicator** section, click the box next to **Symbol**.
- Change the outline of the extent indicator to red** and click Apply.

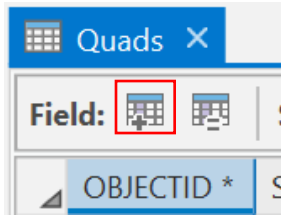


Part 9: Calculate UTM Zone Tool

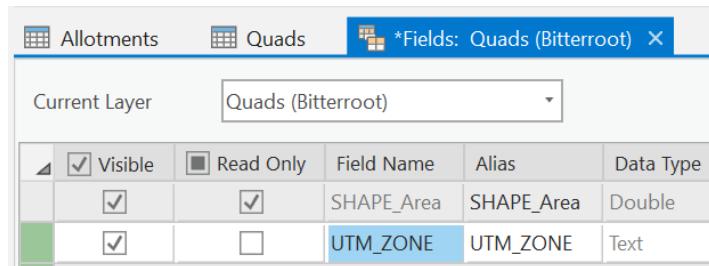
You know that the Bitterroot National Forest straddles 2 different UTM Zones. Thus, you will need to create a field with the spatial reference information to tell Map Series how to draw the maps properly.

1. Add a New Field

- a. On the Contents pane, Bitterroot Map Frame, right click the **Quads** layer in the **Bitterroot Map Frame** and select **Attribute Table** from the context menu.
- b. On the top of the attribute table click the **Add Field** button



- c. In the Fields table set the following properties:
 - Name: **UTM_ZONE**
 - Type: **Text**
 - Length: **600**

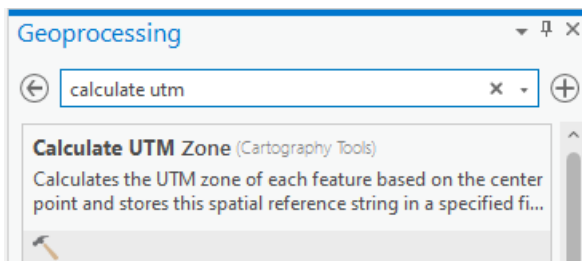


- d. Close the Fields table and click **Yes** to save all changes.

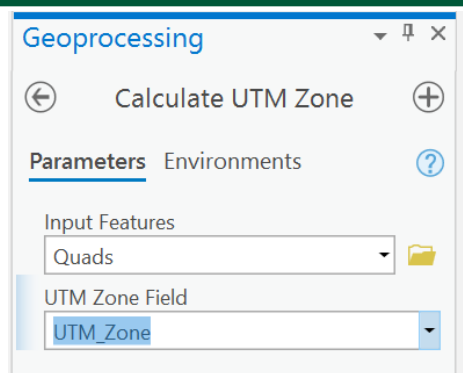
2. Run the Calculate UTM Zone Tool

When using either the Calculate UTM Zone Tool or the Calculate Grid Convergence Angle, both the input layer and the associated data frame must be in a projected coordinate system.

- a. If the Geoprocessing pane isn't open, click the **Analysis** tab then click the **Tools** button.
- b. In the Geoprocessing pane search window, enter "**calculate utm**".



- c. Click on the **Calculate UTM Zone Tool** to open it.
- d. Enter the following parameters:
 - Input Features: **Quads**
 - UTM Zone Field: **UTM_ZONE**



- e. Click **Run**.
- f. Once the tool has completed successfully, **look in the attribute table** for the **Quads** layer to **verify that the UTM_ZONE field has been populated**.

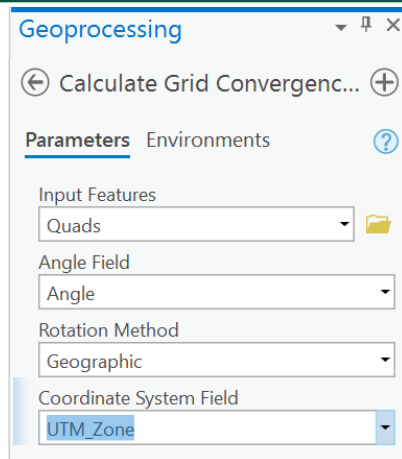
Part 10: Calculate Grid Convergence Angle Tool

The only other thing to do before resetting the Map Series is to calculate the angle of rotation needed to make the Quads orient to true north. You can use the Calculate Grid Convergence Angle Tool to accomplish this task.

1. Add a new field
 - a. Add another field to the attribute table of the **Quads** layer.
 - b. Set the following properties for the new field:
 - Name: **Angle**
 - Type: **Double**
 - c. Close the Fields table and click Yes to save all changes.
2. Run the Calculate Grid Convergence Angle Tool
 - a. In the **Geoprocessing** pane, click the back button to get to the search pane.



- b. Search for the **Calculate Grid Convergence Angle** tool and open it.
 - c. Enter the following parameters:
 - Input Features: **Quads**
 - Angle Field: **Angle**
 - Rotation Method: **GEOGRAPHIC**
 - Coordinate System Field: **UTM_ZONE**



- d. Click **Run**.
- e. When the tool has completed running, check the attribute table for the **Quads** layer and verify that the **Angle field** is populated.
- f. Close the Quads table.

Part 11: Update the Map Series Setup

Now you can reset the Map Series and the new parameters will ensure the map pages draw appropriately.

1. Setup Map Series
 - a. Select the **FeatureQuads** Layout tab.
 - b. On the **Layout** ribbon (**Page Setup** section) click the **Map Series** button.
 - c. In the Layout Properties window, expand the **Optional Fields** section and make the following changes:
 - Rotation: **Angle**
 - Spatial Reference: **UTM_ZONE**
 - d. Click **OK**.

Layout Properties

General
Metadata
Page Setup
Map Series
Color Management

Enable ☒ [Help with map series](#)

Spatial
Define a series of pages that span a range of map extents.

Sort Field: OBJECTID
☒ Sort Ascending

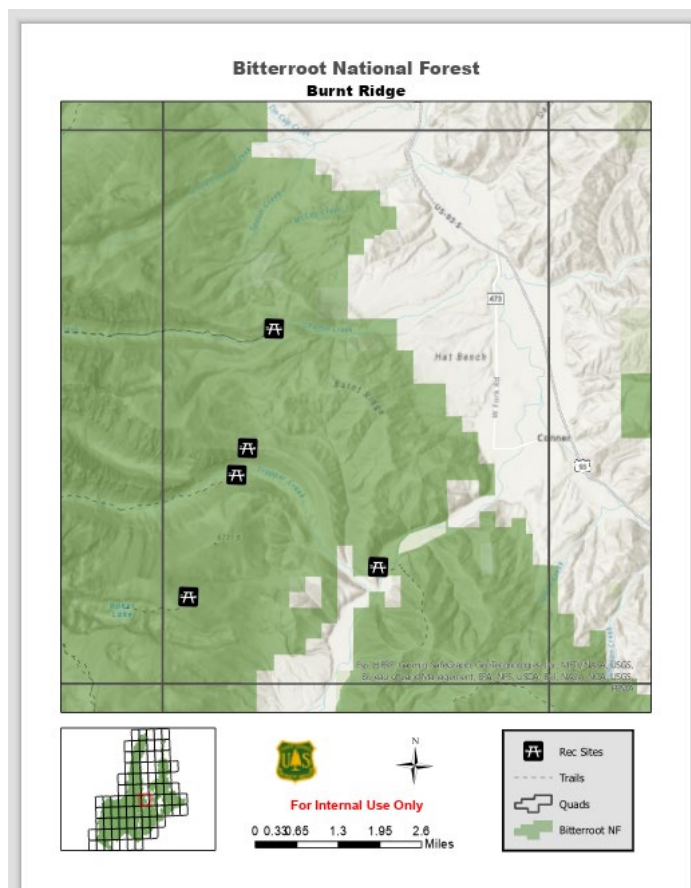
▼ **Optional Fields**

Group By: <None>
Page Number: <None>
First Page: 1

Rotation: Angle
Spatial Reference: UTM_Zone

2. Examine the map pages

- Go to the **List Map Series Pages** tab and navigate through several of the map pages in the series.
- Notice how all the quads are oriented to true north.

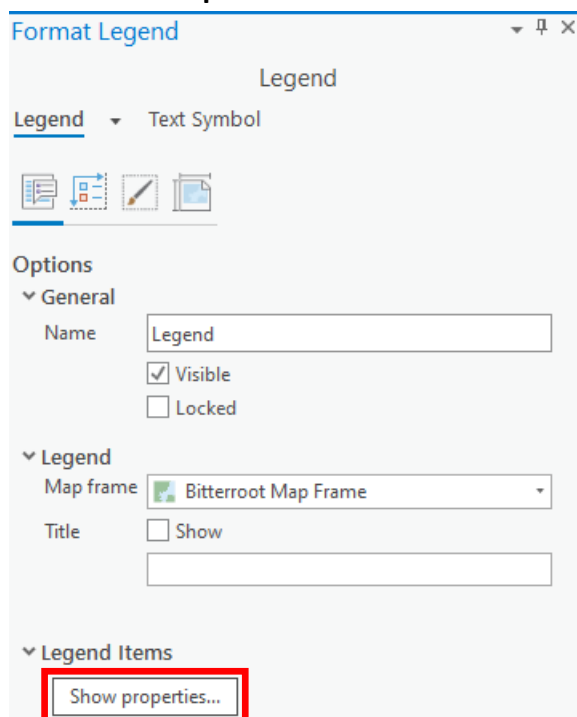


At this point, you could set a page definition query to isolate only the quad that is being focused on within each map page. Also, you could add dynamic text to show the neighboring quads.

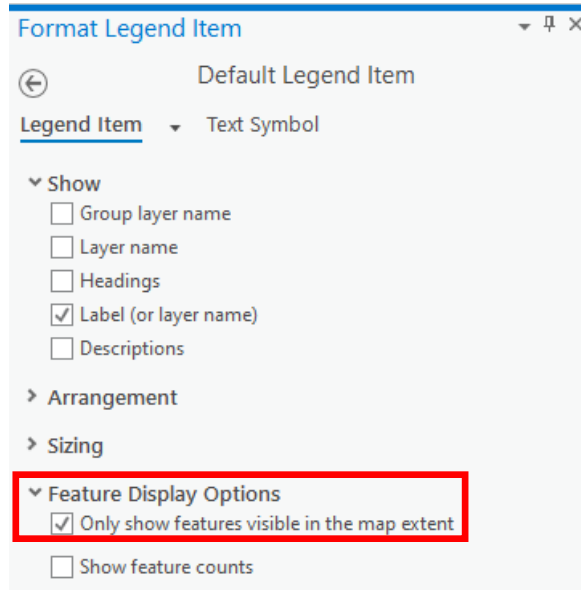
Part 12: Enable a Dynamic Legend

After examining the map series you just created, you realize that there are a few quads being mapped that do not contain any recreation sites. The functionality of a dynamic legend allows for only the layers that have features included in the detail data frame for each map page in the series to be shown in that map page's legend. Let's see how to set up a legend that has these dynamic capabilities.

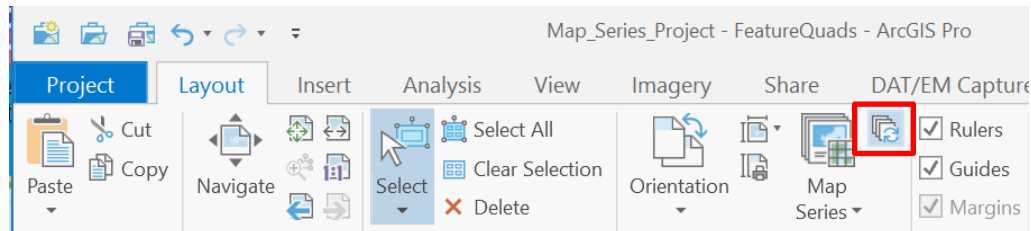
1. Enable the dynamic legend option.
 - a. Open the **Legend Properties**. (*Hint: Right-click on the Legend and choose properties*)
 - b. Click **Show Properties**.



- c. In the **Feature Display Options** section, place a checkmark next to **Only show features visible in the map extent**.

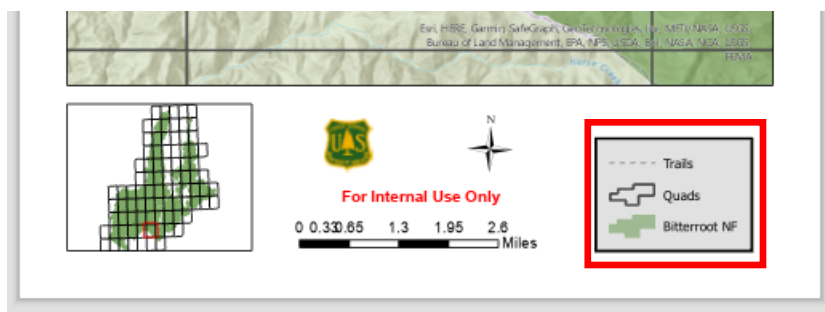


- d. On the **Layout** tab (Page Setup section) click the **Refresh Map Series** button.



3. Look through the map pages

- a. **Go to page 1 (Horse Creek Pass)** in the map series. Notice that 'Rec Sites' does not show up in the legend since there are no recreation site features in the current map extent.
- b. Look at several more pages to observe the capability of a dynamic legend.



4. Save the project.



-END OF EXERCISE