



Forest Service  
U.S. DEPARTMENT OF AGRICULTURE

# ArcGIS Pro - Map Series

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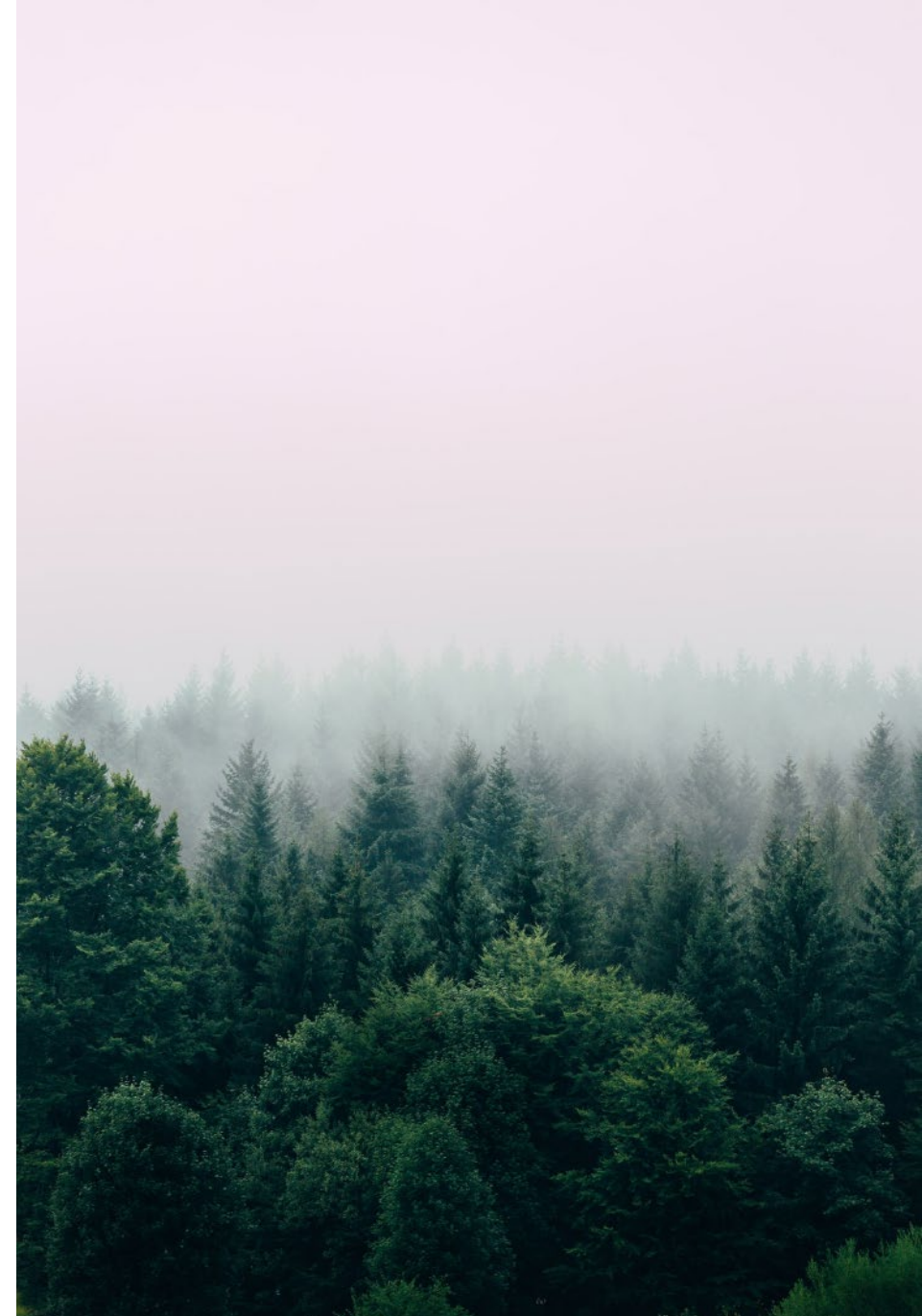


Geospatial Technology  
and Applications Center



# Course Outline

- **10:00 MDT**  
**Lesson 1- Map Series Concepts**
  - Break for Exercise
- **12:00 -12:30 MDT**  
**Lesson 2: Grid and Strip Map Index Layers**
  - Break for Exercise
- **2:00-2:30 MDT**  
**Lesson 3- Map Books**
  - Break for Exercise





# Course Overview

- Introduction to Map Series
- Map Series Concepts
- Create/Setup/Manage Map Series
- Map Series Tools
- Feature and Grid-based Indexed Mapping
- Create a Map Book



# LESSON 1

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## Map Series Concepts and Feature Index Layers

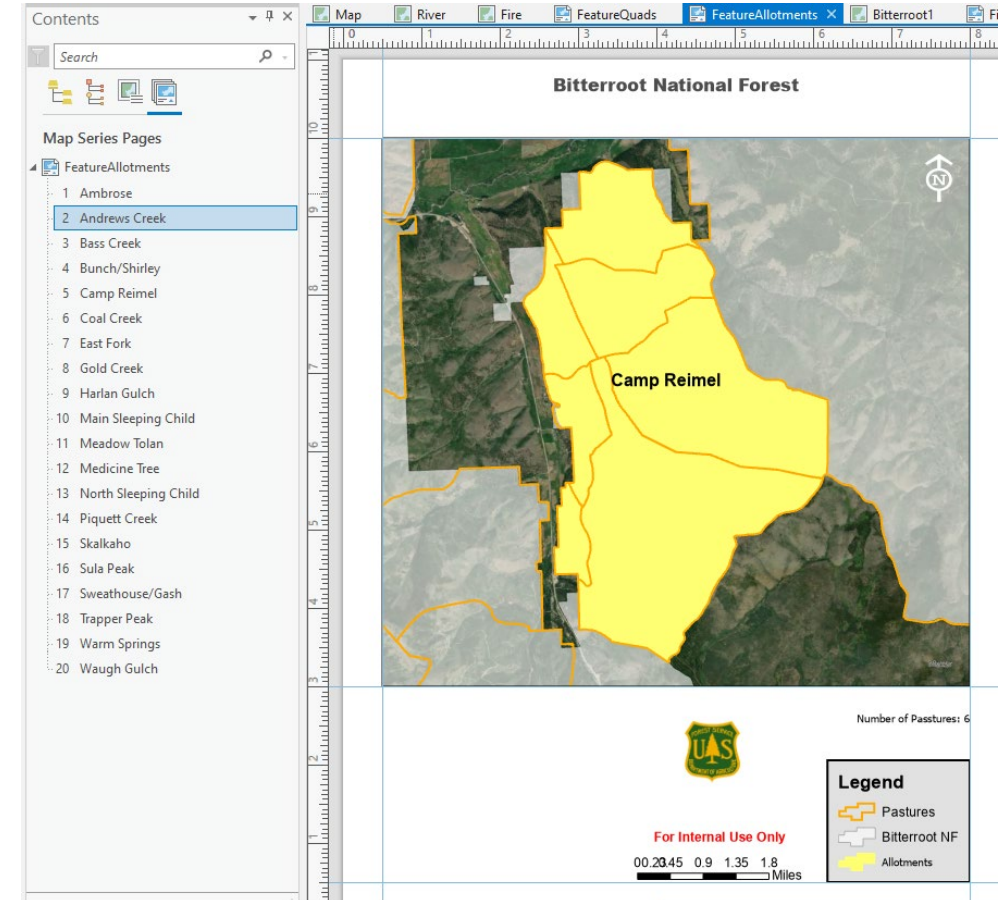


# Lesson Objectives

- What is a Map Series?
- Key Terminology
- Map Series setup
- Map Series Tools
- Feature Index Layers
- Exporting Map Pages

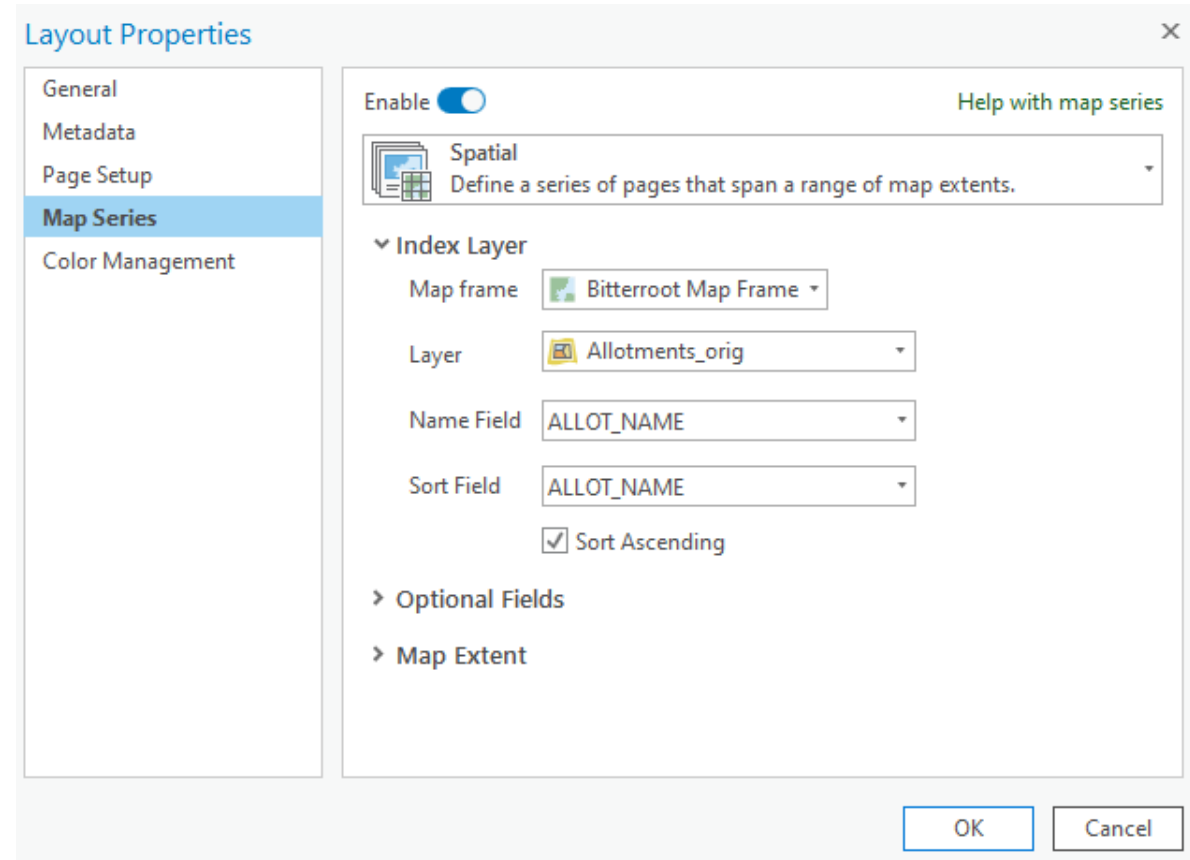
# What is a Map Series?

- “Map Series” allow you to quickly and easily create a series of layout pages from a single map document
- Two main options:
  - Build a unique map for individual index features
    - Feature Index Layer
  - Tile feature(s) into several sections for use in a wall map or map book
    - Grid Index Layer
    - Strip Map Index Layer




# Key Terms to Know


- Index Layer: a *feature* layer that defines the geographic extent of the map frame for each map page
  - One map page per index feature
  - Raster layers cannot be used as an index layer





# Key Terms to Know


- Dynamic Text: type of text in a map layout that changes based on defined attributes
  - Page numbers, page names, dates, times, etc.

Dynamic Text ▾

Add ▾

New ▾

Import

Add Item ▾

All ▾

System

Current Time

4/26/2022 4:00 PM

User

Iroles

Layout

Date Exported

4/26/2022 1:06 PM

Date Printed

Metadata

Layout Metadata

Name

FeatureAllotments

Service Layer Credits

Earthstar Geographics

Map Series

Page Name

Camp Reimel

Page Number

5

Page With Count

Page 5 of 20

Page Index

5

Attribute



# Key Terms to Know

- Page Query: an SQL query that allows one to specify which features of a layer are drawn
  - Only works with Map Series
  - This query is dynamic (will change with each map page)

Layer Properties: Allotments

General  
Metadata  
Source  
Elevation  
Selection  
Display  
Cache  
Definition Query  
Time  
Range  
Indexes  
Joins  
Relates  
**Page Query**

Map Series Page Filter

Filter rows based on the current map series page. The values in this field are matched against the current map series page name. The filter is only applied when a map series is enabled.

ALLOT\_NAME

Show features that:

☒ Match  
☐ Don't Match

OK Cancel



# Dynamic vs. Static Elements

- Dynamic = elements will change

- EXAMPLES

- Geographic extent of the map
    - Map scale
    - Dynamic text
    - North arrow
    - Legend

- Static = elements stay the same

- EXAMPLES

- Size and orientation of layout page/view
    - Size and position of data frames
    - Static text

# Map Series Setup

The screenshot displays the ArcGIS Pro software interface, specifically the ribbon menu. The 'Layout' tab is active, and the 'Map Series' dropdown menu is open. The ribbon includes tabs for Layout, Insert, Analysis, View, Imagery, and Share. The 'Map Series' dropdown menu shows two options: '<None>' with the text 'The layout has no series.' and 'Spatial' with the text 'Define a series of pages that span a range of map extents.' The 'Spatial' option is highlighted. The background shows the 'Layout' tab with various tools like 'Navigate', 'Select', 'Orientation', 'Map Series', 'Rulers', 'Guides', 'Margins', 'Activate', and 'Zoom Map View'.

Layout Insert Analysis View Imagery Share

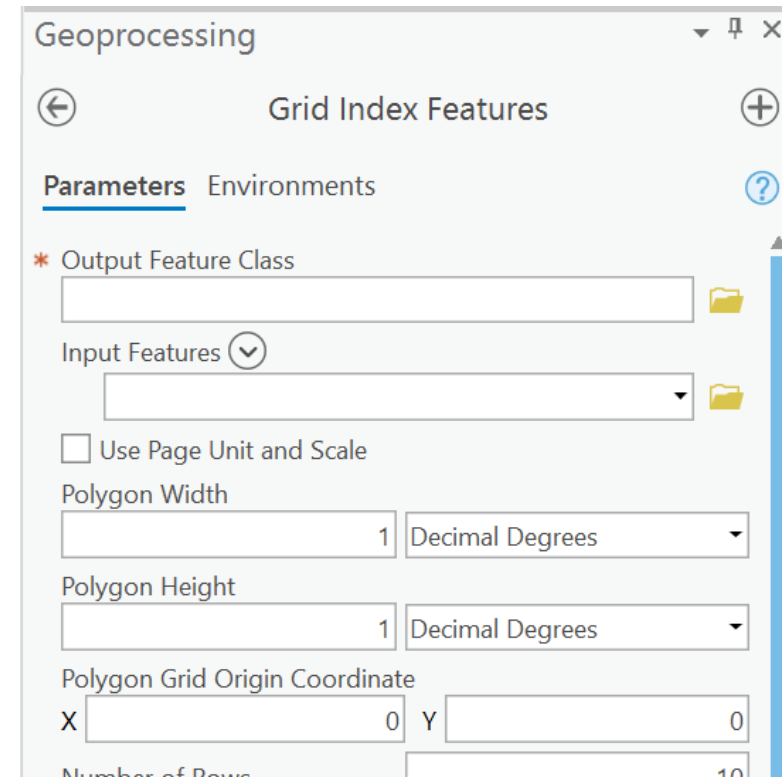
Map Series

<None>  
The layout has no series.

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

# Map Series Tools

- Tools that create and prepare an index layer for use in Map Series.
- Map Series Tools:
  - Calculate Adjacent Fields
  - Calculate Central Meridian and Parallels
  - Calculate UTM Zone
  - Calculate Grid Convergence Angle
  - Grid Index Features
  - Strip Map Index Features

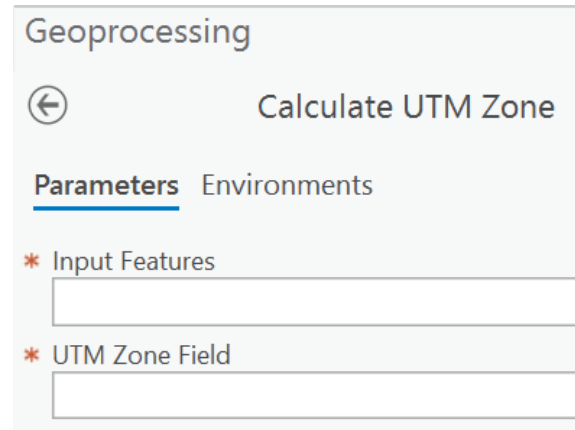


The screenshot shows the 'Geoprocessing' window with the 'Grid Index Features' tool selected. The 'Parameters' tab is active, showing the following settings:

- Output Feature Class:** An empty text box with a folder icon to its right.
- Input Features:** A dropdown menu with a folder icon to its right.
- Use Page Unit and Scale:** An unchecked checkbox.
- Polygon Width:** A text box containing '1' and a dropdown menu set to 'Decimal Degrees'.
- Polygon Height:** A text box containing '1' and a dropdown menu set to 'Decimal Degrees'.
- Polygon Grid Origin Coordinate:** Two text boxes for 'X' and 'Y', both containing '0'.
- Number of Rows:** A text box containing '10'.

# Tools to Calculate Spatial Reference Information

- 2 tools:
  - Calculate UTM Zone



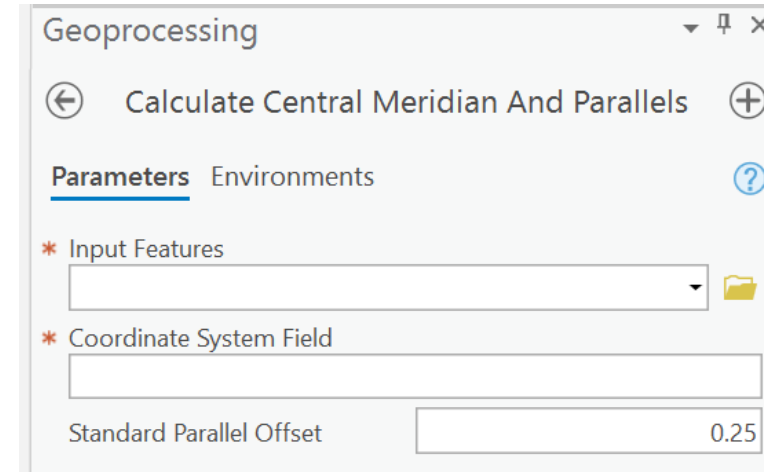
Geoprocessing

← Calculate UTM Zone

Parameters Environments

\* Input Features

\* UTM Zone Field



Geoprocessing

← Calculate Central Meridian And Parallels →

Parameters Environments

\* Input Features

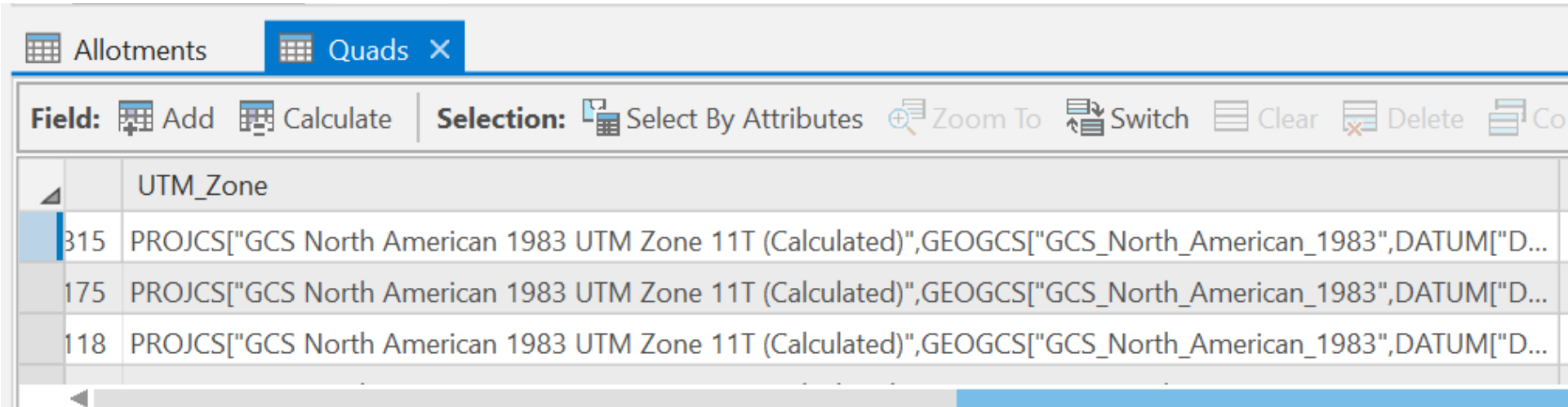
\* Coordinate System Field

Standard Parallel Offset 0.25

- Calculate Central Meridian and Parallels
  - Used more for creating your own coordinate system (i.e. surveying)
- Best practice: add a field
- Data frame and input features must be in a projected coordinate system

# Tools to Calculate Spatial Reference Information

- 2 tools:
  - Calculate UTM Zone

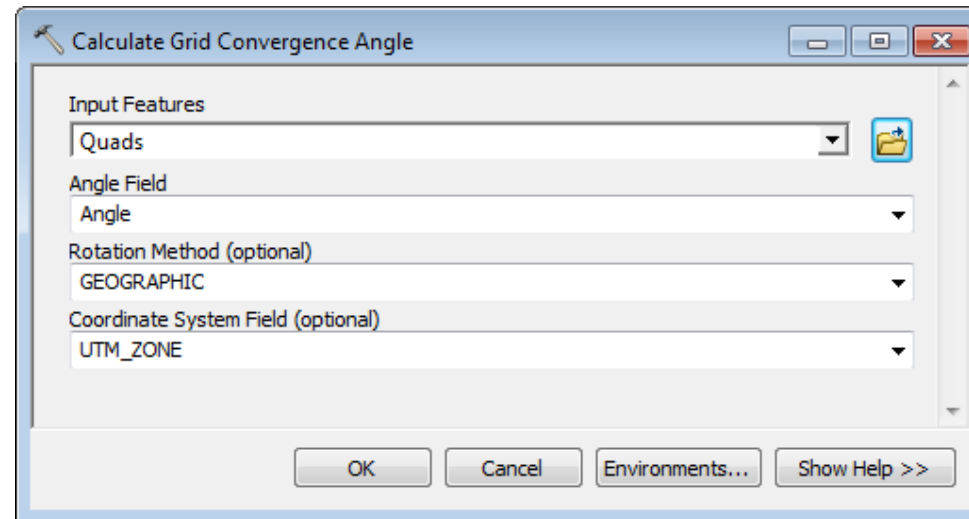


	UTM_Zone
315	PROJCS["GCS North American 1983 UTM Zone 11T (Calculated)",GEOGCS["GCS_North_American_1983",DATUM["D...
175	PROJCS["GCS North American 1983 UTM Zone 11T (Calculated)",GEOGCS["GCS_North_American_1983",DATUM["D...
118	PROJCS["GCS North American 1983 UTM Zone 11T (Calculated)",GEOGCS["GCS_North_American_1983",DATUM["D...

- Calculate Central Meridian and Parallels
  - Used more for creating your own coordinate system (i.e. surveying)
- Best practice: add a field
- Data frame and input features must be in a projected coordinate system

# Calculate Grid Convergence Angle Tool

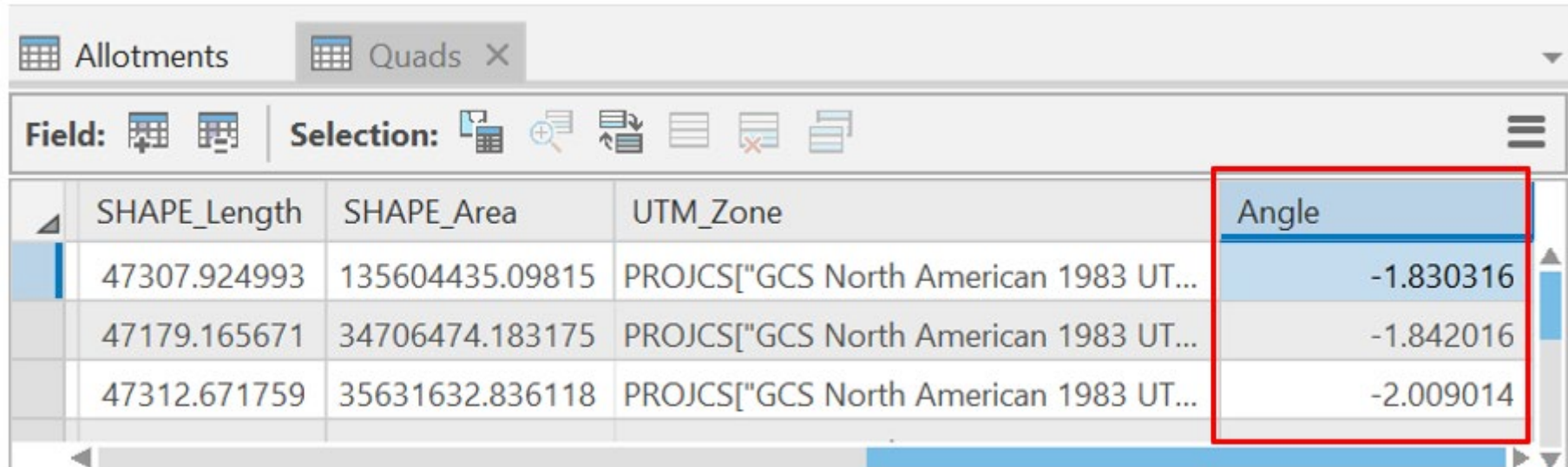
- This tool will calculate the angle needed to rotate the data frame in order to orient the feature of focus to true north.



- Best practice: add a field
- Data frame and input features must be in a projected coordinate system

# Calculate Grid Convergence Angle Tool

- This tool will calculate the angle needed to rotate the data frame in order to orient the feature of focus to true north.



	SHAPE_Length	SHAPE_Area	UTM_Zone	Angle
	47307.924993	135604435.09815	PROJCS["GCS North American 1983 UT...	-1.830316
	47179.165671	34706474.183175	PROJCS["GCS North American 1983 UT...	-1.842016
	47312.671759	35631632.836118	PROJCS["GCS North American 1983 UT...	-2.009014

- Best practice: add a field
- Data frame and input features must be in a projected coordinate system



# Map Series Options

- 4 components essential to create Map Series

1. Map Frame
2. Layer
3. Name Field
4. Sort Field

- Other options

The screenshot shows the 'Layout Properties' dialog box with the 'Map Series' tab selected. The left sidebar lists 'General', 'Metadata', 'Page Setup', 'Map Series' (highlighted), and 'Color Management'. The main area shows the 'Enable' toggle is turned on, with a 'Help with map series' link. Below this is a 'Spatial' section with a description: 'Define a series of pages that span a range of map extents.' The 'Index Layer' section is expanded, showing 'Map frame' set to 'Bitterroot Map Frame', 'Layer' set to 'Quads', 'Name Field' set to 'QUAD\_NAME', and 'Sort Field' set to 'OBJECTID'. The 'Sort Ascending' checkbox is checked. There are expandable sections for 'Optional Fields' and 'Map Extent'. At the bottom right are 'OK' and 'Cancel' buttons.

# Map Series Dialog Box

## Extent options

1. Best Fit Extent  
(default)
2. Center and  
Maintain Scale
3. Use Scale From  
Field

The screenshot shows the 'Layout Properties' dialog box with the 'Map Series' tab selected. The 'Enable' toggle is turned on. The 'Spatial' dropdown menu is open, showing the text 'Define a series of pages that span a range of map extents.' Below this, the 'Map Extent' section is expanded, showing three radio button options: 'Best Fit Extent' (selected), 'Center and Maintain Scale', and 'Use Scale From Field'. The 'Best Fit Extent' option has a 'Margin Size' of 10 Percent and a 'Round scale to nearest' value of 1000. The 'Center and Maintain Scale' option has a 'Scale' of 1:31,000. The 'Use Scale From Field' option has a 'Scale Field' of <None>. There is also a checkbox for 'Clip to index feature' which is unchecked. The dialog box has 'OK' and 'Cancel' buttons at the bottom right.

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.

▼ **Map Extent**

☒ Best Fit Extent

Margin Size 10  Percent ▼

Round scale to nearest 1000

☐ Center and Maintain Scale

Scale 1:31,000 ▼

☐ Use Scale From Field

Scale Field <None> ▼

☐ Clip to index feature

OK Cancel



# Feature Index Layer

- A separate map page is created for each feature in the index layer.
- Based on points, lines, or polygons
- Selection Sets
  - Does not affect which features are used to generate map pages
  - Export only map pages with selected features
- Examples of Use:
  - Monitoring Sites
  - Vegetation Transects
  - Parcels/Ownership

# Exporting Options

- All
  - Current Page
  - Selected
  - Selected Index Feature
  - Page Range
- 
- Export Pages As:
    - Single PDF
    - Multiple PDFs
      - Naming Conventions
        - Page Name
        - Page Index Number

Export

Layout

Properties Security Map Series

▼ Pages

☒ All (4 pages)

☐ Current (Page 1)

☐ Selected index features (0 pages)

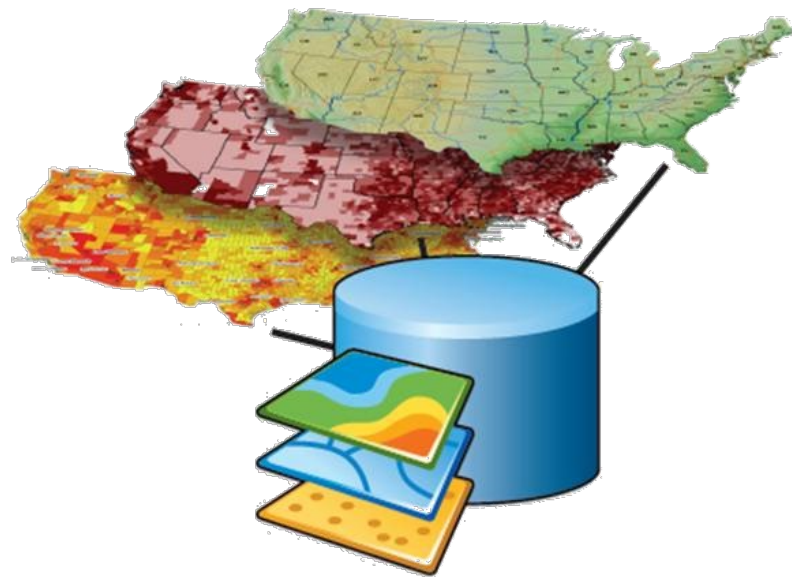
☐ Show selection symbology for index features

☐ Selected pages (0 pages)

☐ Page range (for example: "1, 3, 5-12"):

1,3,5-12

# DEMONSTRATION





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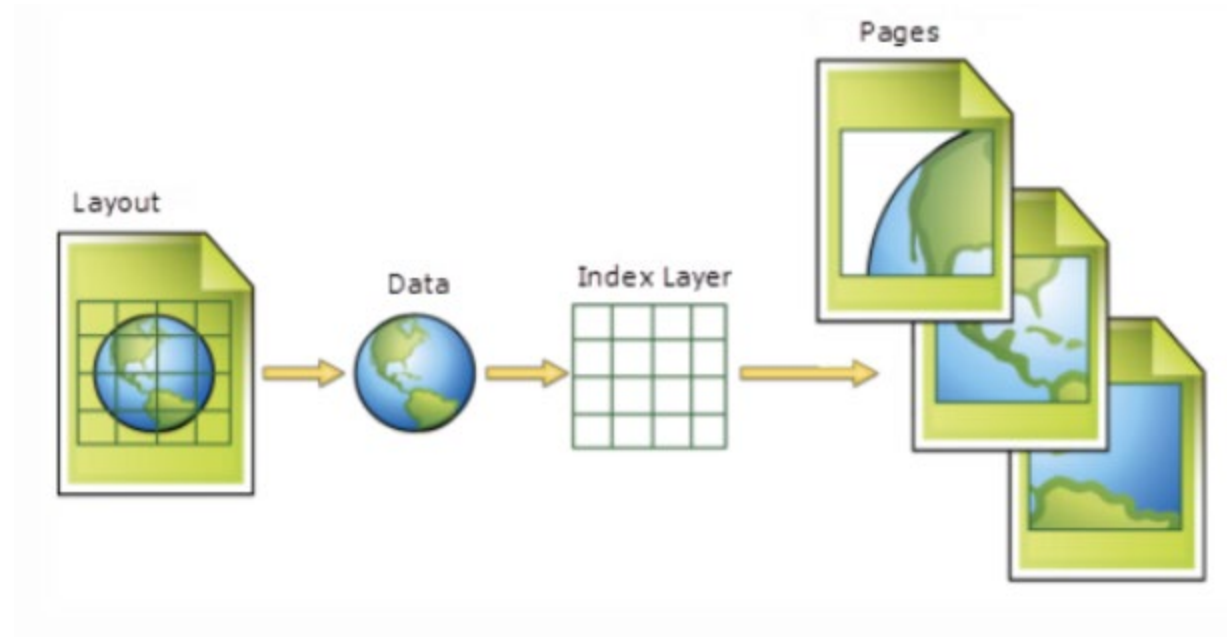
# LESSON 2

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## Grid and Strip Map Index Layers

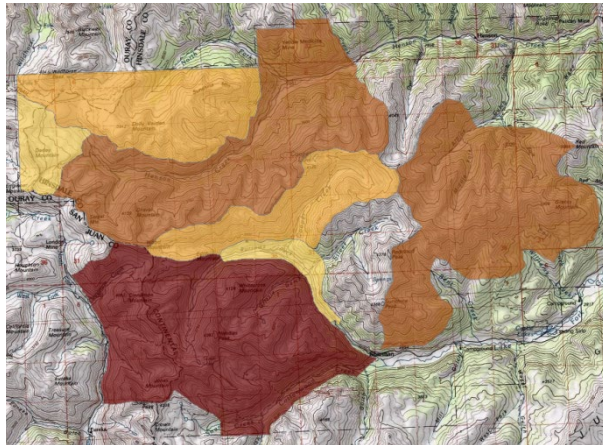
# Lesson Objectives

- Building grid and strip map index layers using Map Series tools
- Explore more options of dynamic text



# Grid Index Features Tool

- Creates a rectangular grid of polygon features that can be used to specify pages for a map book via Map Series.



Geoprocessing

Grid Index Features

Parameters Environments

\* Output Feature Class

Input Features

☐ Use Page Unit and Scale

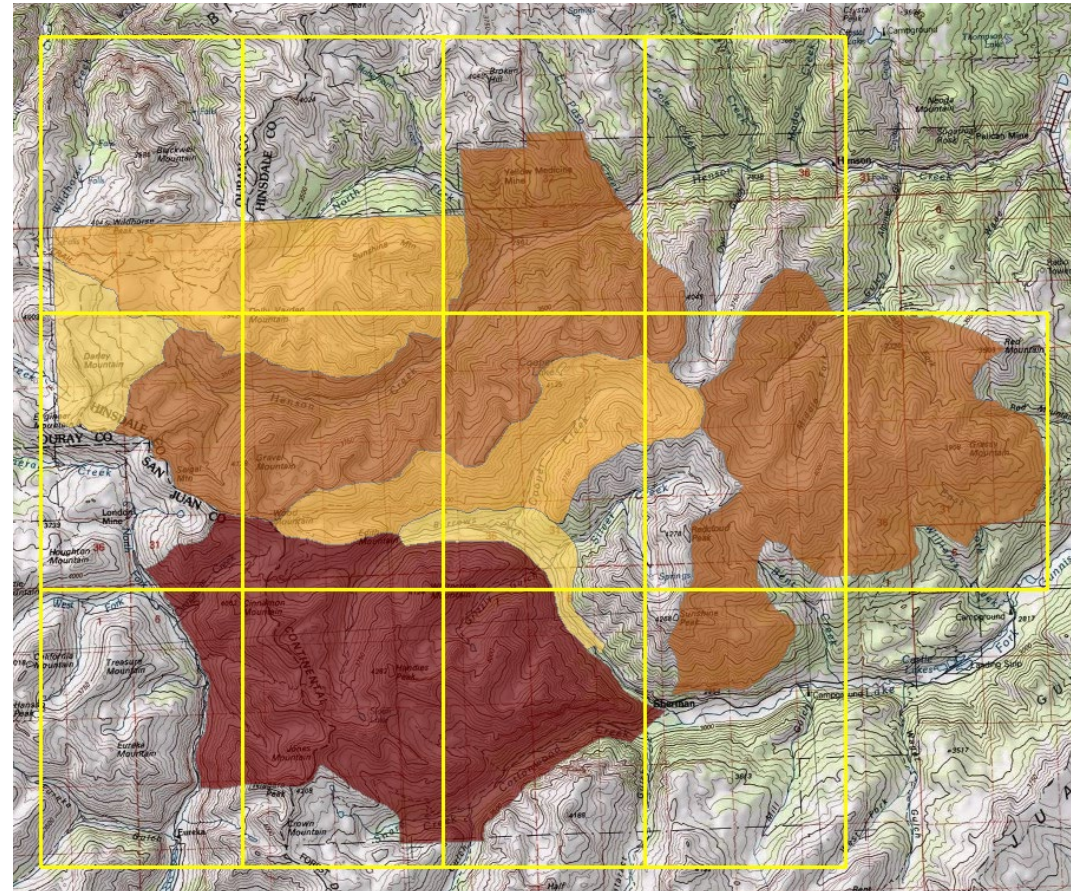
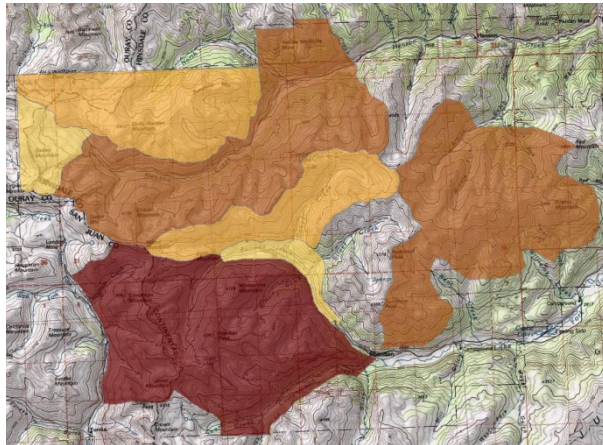
Polygon Width

Polygon Height



# Grid Index Features Tool

- Creates a grid of rectangular of polygon features that can be used to specify pages for a map book via Map Series.



# Strip Map Index Features Tool

- Creates a series of rectangular polygons, or index features, that follow a single linear feature or group of features.



Geoprocessing

Strip Map Index Features

Parameters Environments

\* Input Line Features

\* Output Feature Class

☐ Use Page Unit and Scale

Length Along the Line

2 Decimal Degrees

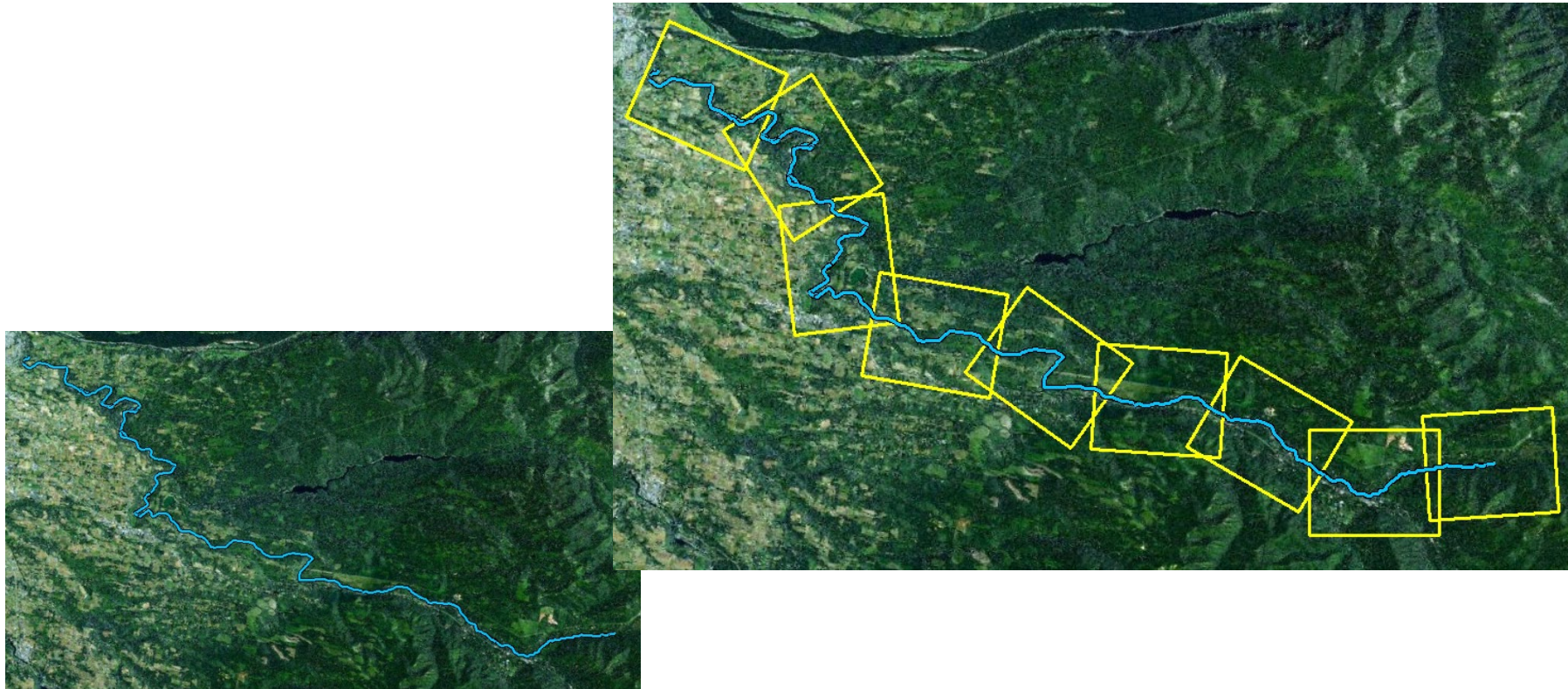
Length Perpendicular to the Line

1 Decimal Degrees



# Strip Map Index Features Tool

- Creates a series of rectangular polygons, or index features, that follow a single linear feature or group of features.



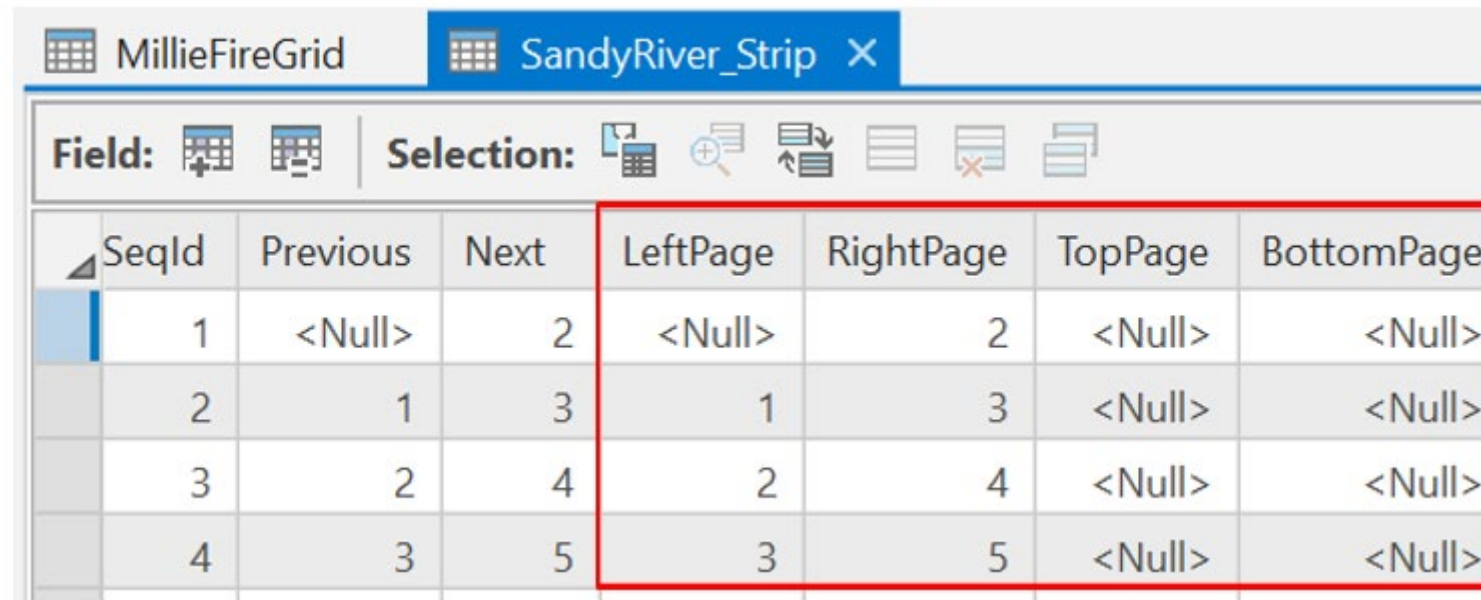
# Calculate Adjacent Fields Tool

- Used in dynamic text boxes to show identity of neighboring pages
- Use the Calculate Adjacent Fields tool to add to a grid index feature layer

MillieFireGrid X							
Field:		Add		Calculate		Selection:	
		Select By Attributes		Zoom To		Switch	
		Clear		Delete		Cc	
	PageName	Page	Shape_L	Shape_Area	PageName_NW	PageName_N	PageName_NE
	A1	1	031.2422	0.208191			
	A2	2	031.242	0.644311			
	B1	3	031.2422	0.208191		A1	A2
	B2	4	031.242	0.644311	A1	A2	

# Calculate Adjacent Fields Tool

- Used in dynamic text boxes to show identity of neighboring pages.
- Use the Calculate Adjacent Fields tool to add to a grid index feature layer
- **Not necessary for a Strip Map Index**

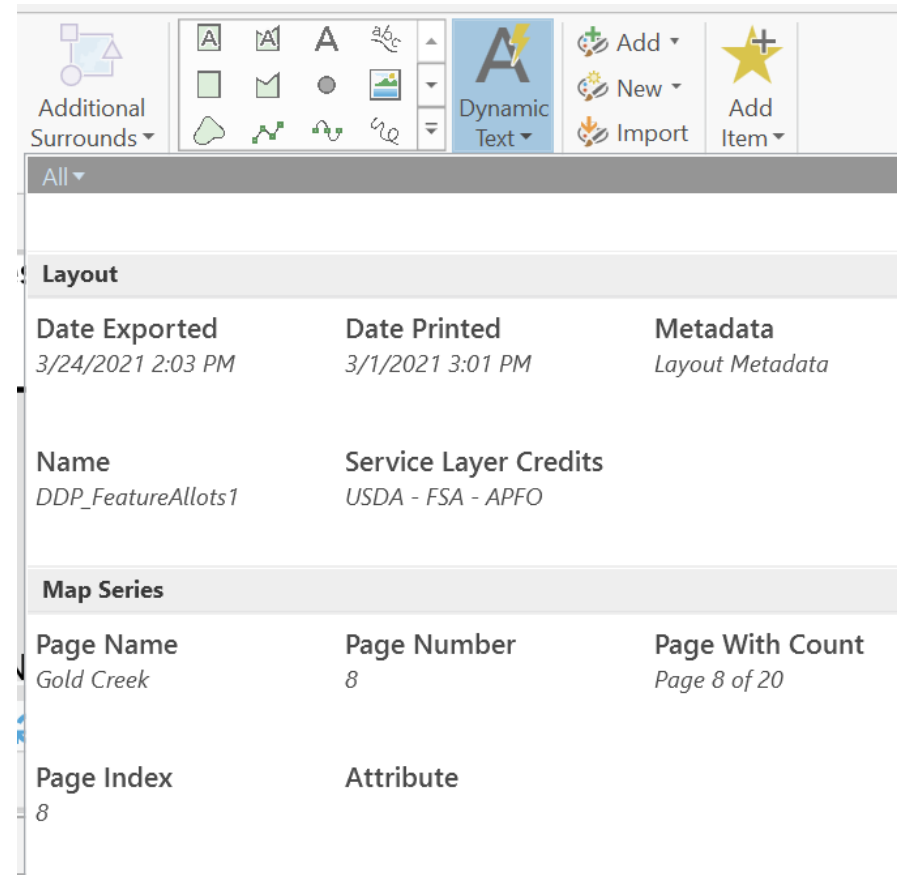


The screenshot shows the 'Calculate Adjacent Fields' tool interface. The top bar has two tabs: 'MillieFireGrid' and 'SandyRiver\_Strip'. Below the tabs is a toolbar with icons for 'Field' and 'Selection'. The main area displays a table with the following columns: SeqId, Previous, Next, LeftPage, RightPage, TopPage, and BottomPage. The 'LeftPage', 'RightPage', 'TopPage', and 'BottomPage' columns are highlighted with a red border. The data in the table is as follows:

SeqId	Previous	Next	LeftPage	RightPage	TopPage	BottomPage
1	<Null>	2	<Null>	2	<Null>	<Null>
2	1	3	1	3	<Null>	<Null>
3	2	4	2	4	<Null>	<Null>
4	3	5	3	5	<Null>	<Null>

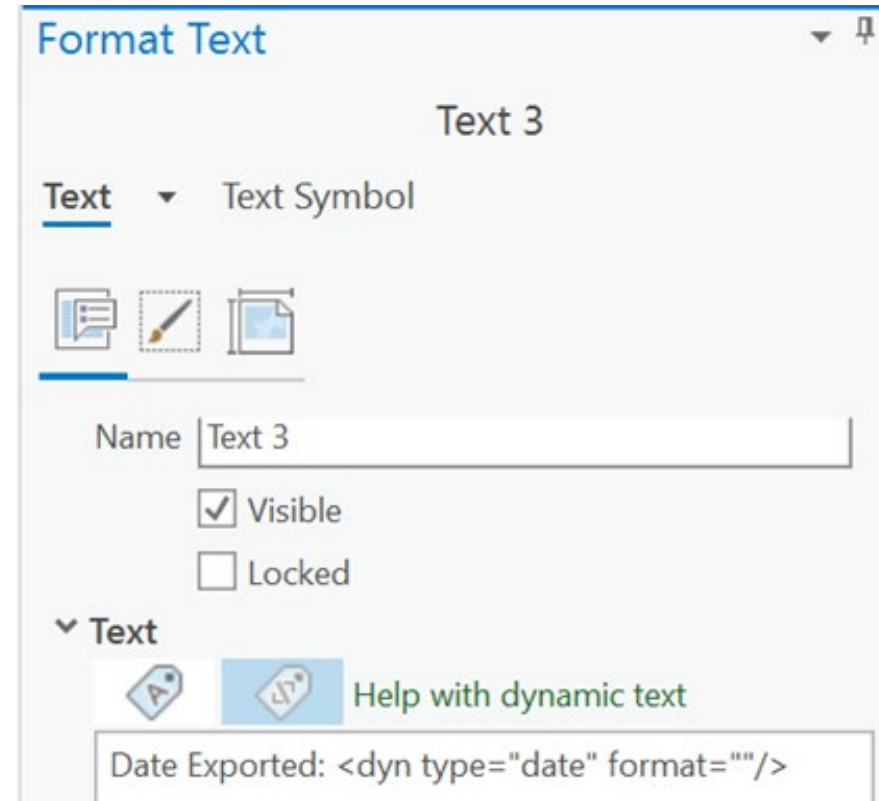
# Dynamic Text

- Preformatted Dynamic Text Types
  - Under Insert Menu > Dynamic Text



# Dynamic Text Types

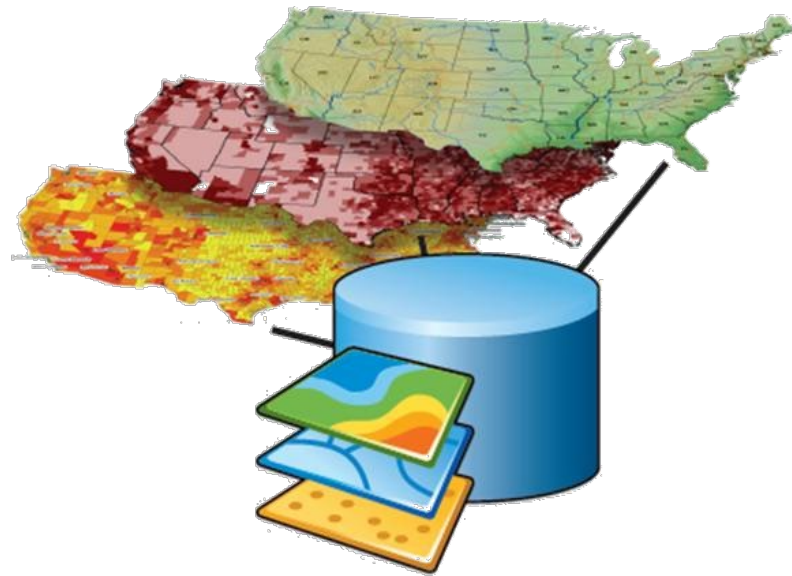
- Other Options
  - [Working with dynamic text](#)  
ArcGIS Pro Help
  - Gives you several tags that will format dynamic text in various ways
    - Date/Time Formatting
    - Coordinate System Information
- **Example:**
  - **Page with Count**



**Page** <dyn type="page" property="index"/> **of** <dyn type="page" property="count"/>



# Demonstration







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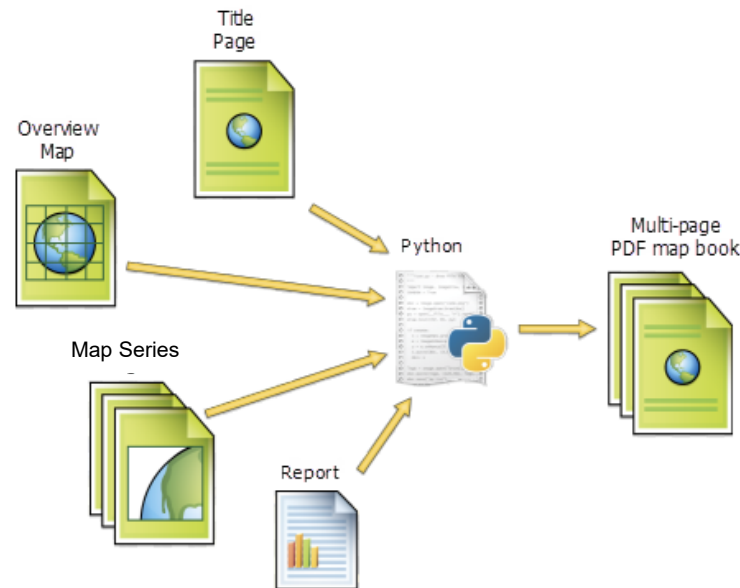
# LESSON 3

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## Create a Map Book

# Lesson Objectives

- Basics of Map Books
- Building your map book product
- Python Window
  - Arcpy.mp script builds the complete map book document





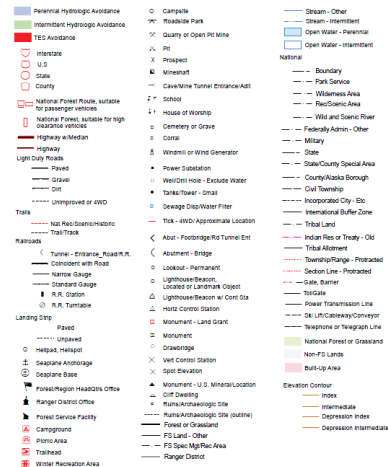
# Map Books

- Types:
  - Simple reference map series
  - Complex reports including maps, graphs, and charts
- Common components:
  - Map pages
  - Title page
  - Index/Glossary
  - Supporting documents (tables, data reports)

# How to Create Components

- Use the following programs to build ancillary documents:
  - Microsoft Office Programs (Word, Excel, etc.)
  - ArcGIS Pro
- Save everything as a pdf file

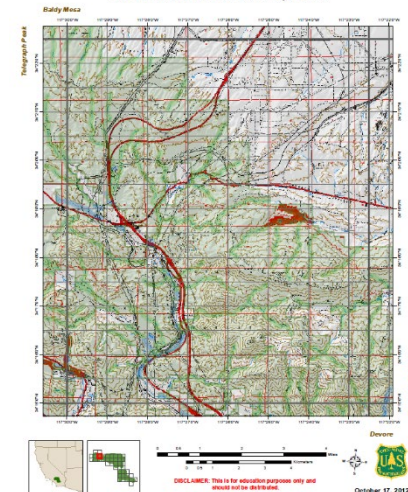
USFS AERIAL FIRE RETARDANT AVOIDANCE



Quad Index: San Bernardino National Forest



Decision Support for Aerial Fire Retardant Avoidance  
San Bernardino National Forest: Cagon Quad



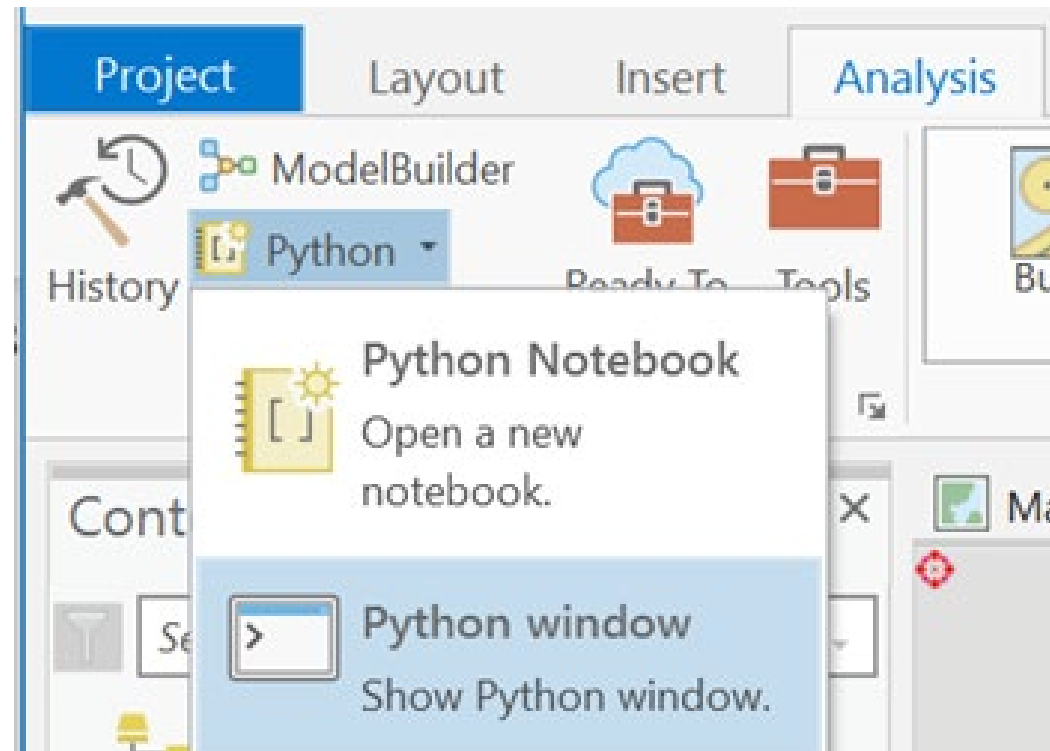


# General Process of Map Book Creation

- Map Series
  - Creates map pages
- Gather other ancillary documents
  - Create, find, and gather other PDF documents that need to be included in the map book
- ArcPy script
  - Creates and organizes the final PDF map book document

# Python Window

- Activate in the Geoprocessing section of the Analysis ribbon

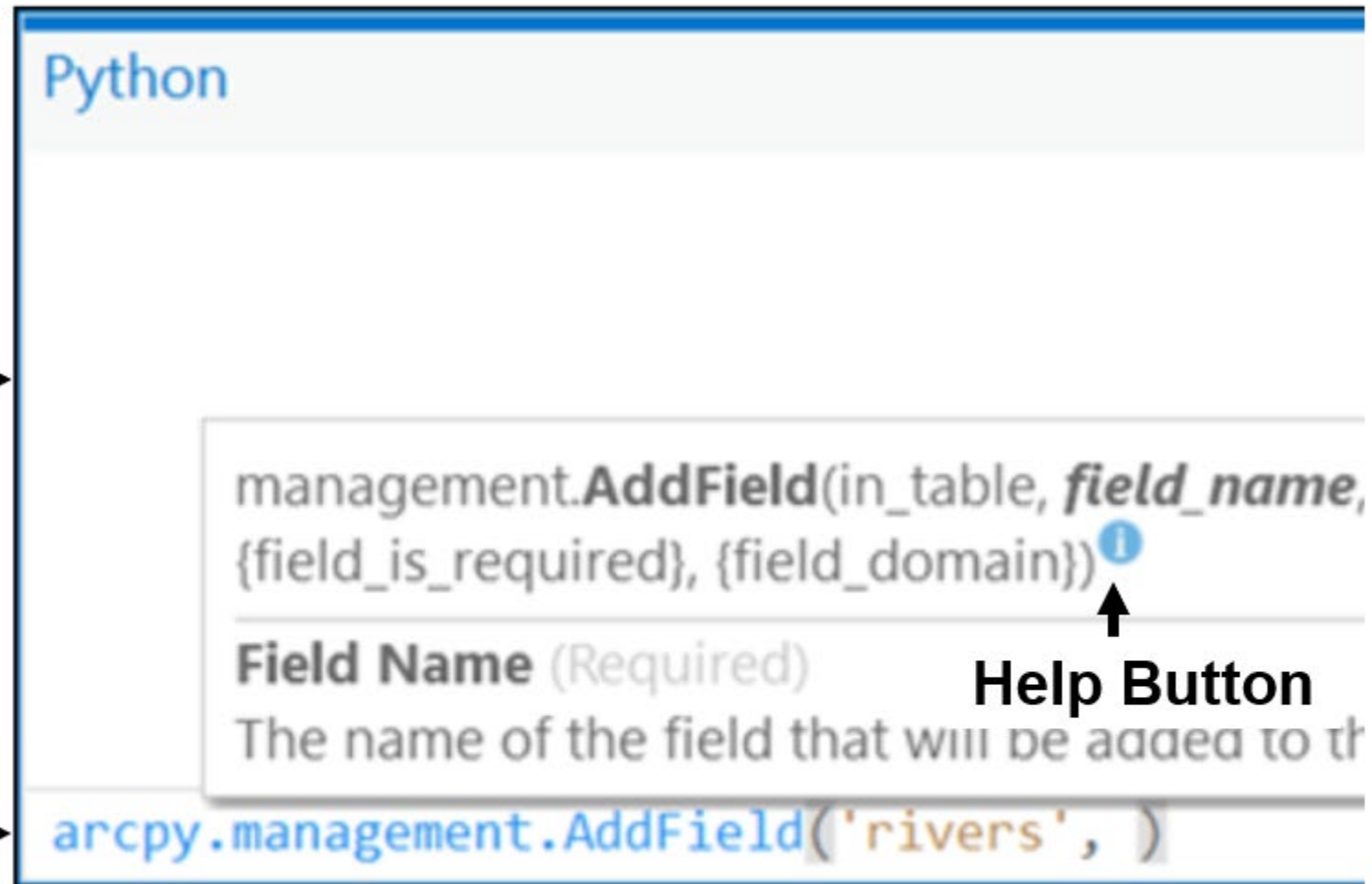




# Python Window

Transcript →

Prompt →







# arcpy.mp Script

## Python

```
outdir = r"C:\Users\markhammond\Desktop\ArcMapDataDrivenPages\student\Data\Map_Book_Files"
finalPDF = outdir + r"\SBNF_MapBook.pdf"
print finalPDF
mapBookPDF=arcpy.mp.PDFDocumentCreate(finalPDF)
mapBookPDF.appendPages(outdir + r"\TITLE.pdf")
mapBookPDF.appendPages(outdir + r"\LEGEND.pdf")
mapBookPDF.appendPages(outdir + r"\QUAD_INDEX.pdf")
mapBookPDF.appendPages(outdir + r"\SBNFmaps.pdf")
mapBookPDF.updateDocProperties (pdf_title = "San Bernardino NF Quad Map Book", pdf_layout =
mapBookPDF.saveAndClose()
del mapBookPDF
```



# arcpy.mp Script Breakdown

- Define the output location

```
outdir = r"C:\Map Series\Data\Map_Book_Files"
```

- Name the output map book document

```
finalPDF = outdir + r"\SBNF_MapBook.pdf"
```

- View the path of the location of the output Map Book

```
Print finalPDF
```

```
C:\Map Series\Data\Map_Book_Files\SBNF_MapBook.pdf
```



# arcpy.mp Script Breakdown

- Create a blank PDF document

```
mapBookPDF = arcpy.mp.PDFDocumentCreate(finalPDF)
```

- Append Map Pages

```
mapBookPDF.appendPages(outdir + r"\TITLE.pdf")
```

```
mapBookPDF.appendPages(outdir + r"\LEGEND.pdf")
```

```
mapBookPDF.appendPages(outdir + r"\QUAD_INDEX.pdf")
```

```
mapBookPDF.appendPages(outdir + r"\SBNFmaps.pdf")
```



# arcpy.mp Script Breakdown

- Set properties of output Map Book

```
mapBookPDF.updateDocProperties(pdf_title="TITLE",  
                                pdf_layout="ONE_COLUMN")
```

- Save Map Book

```
mapBookPDF.saveANDClose()
```

## *OPTIONAL*

- Remove a variable (before running another code)

```
Del mapBookPDF
```

# Script Help

- ArcGIS Pro Help
  - Project tab > Help
- ArcGIS Pro Resource Center  
<https://www.esri.com/en-us/arcgis/products/arcgis-pro/resources>

Mapbook :

[https://proceedings.esri.com/library/userconf/proc18/tech-workshops/tw\\_1515-292.pdf](https://proceedings.esri.com/library/userconf/proc18/tech-workshops/tw_1515-292.pdf)

- Search online for existing scripts

# DEMONSTRATION

