





Using the MVUM map template

Objective: Learn how to choose a map template

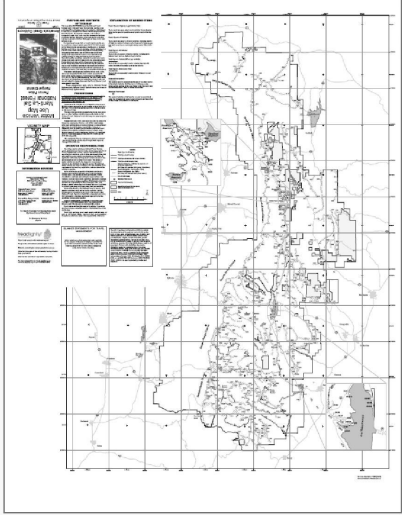
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Using the MVUM map template



Purpose of Templates

- Consistency
- Meet needs of varying National Forests
- Efficient production




Manti-la Sal MVUM


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The MVUM templates were created for a number of reasons. The first is to maintain consistency in terms of layout. Throughout this class, we have been stressing the goal of consistency in the production of the MVUM so that a recreational user can interpret a consistent cartographic product from any forest they visit. Templates help ensure this. In addition, the five templates were created to meet the needs of individual forests that may vary in acreage and density of transportation features. Through these five templates and the four accompanying scales, the MVUM team has sought to standardize MVUM products and reduce the time needed to create them.

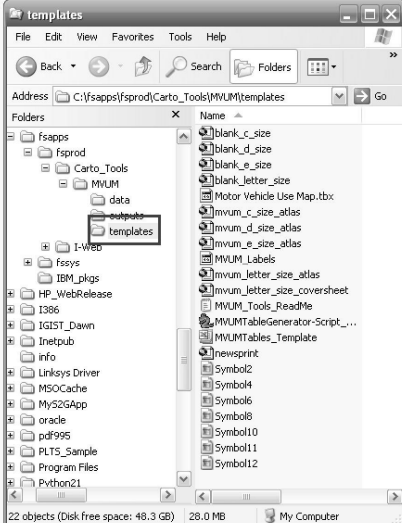
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Downloading the Templates





- Downloaded as part of MVUM Templates zipped executable file
- Website:
<http://gis.gsc.wo.fs.fed.us/wo/mvum/step-3.php>
- Self-extracts to:
C:\fsapps\fsprod\Carto_Tools\MVUM\templates



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The templates are included in the MVUM Templates zipped executable file. You can download this from Step 3 of the Forest Service's MVUM website: <http://gis.gsc.wo.fs.fed.us/wo/mvum/step-3.php>. Once you have run the executable, the templates self-extract to c:\fsapps\fsprod\Carto_Tools\MVUM\templates.


Using the MVUM map template



Choosing the Map Scale

- Integral to template selection
- Dependent on feature density and length
- Visibility of features at different scales



Scale	Visibility Threshold
1 : 7,920	132 ft
1 : 24,000	400 ft
1 : 63,360	1,056 ft
1 : 126,720	2,112 ft



Roads Open to Highway Legal Vehicle Only:
Roads Open to All Vehicles:
Seasonal Designation:

Example of a feature that is too small to determine that it is a Seasonal Designation. 13-4

The choice of scale is an integral step to choosing an MVUM template. It is dependent on the length and density of the route features. The more dense the features, the larger the scale will need to be. The MVUM team has determined any road line feature needs to be at least 0.2 of an inch in order to be visible on the map. This table shows how the threshold length translates into an actual length for four common scales. Note that you are not constrained to these four scales; you may use any scale that meets your needs. While this table is very handy for noting the visibility threshold, the Production Guide outlines how to calculate the threshold for any scale, which we'll go over in the next slide.



Short Roads


- Records correspond to short road annotation symbol
- Table is manually created
- Placed on front or back of the map

Road Number	Route Designation	Length in Feet	Dispersed Camping Distance (ft)
108	Roads Open to Highway Legal Vehicles Only	265	100
511A	Road Open to All Vehicles	40	0
655	Roads Open to Highway Legal Vehicles Only	20	0


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Short roads must be taken into consideration when deciding on a scale. Roads too short to be seen on a map receive a short road label. These roads also appear in the short road table. This table is manually created and can be placed either on the front or back of the map. The short road table allows the user to see the details associated with each short road feature. The map must be produced so the location of the short road is understood by the placement of its label.

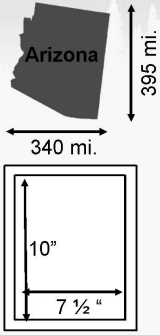
Using the MVUM map template



Calculating the Scale



- ① Measure geographic axes
 $geo_x = 340 \text{ mi.}$
 $geo_y = 395 \text{ mi.}$
- ② Measure map area (margins)
 $map_x = 7.5''$
 $map_y = 10''$
- ③ Do the math



North/South dimension	East/West dimension
$map_y = geo_y$ $10 \text{ in} = 395 \text{ mi} * 63,360 \text{ in/mi}$ $10 \text{ in} = 25,027,200 \text{ in}$ <hr style="width: 80%; margin: 5px auto;"/> 10 in $1: 2,502,720$	$map_x = geo_x$ $7.5 \text{ in} = 340 \text{ mi} * 63,360 \text{ in/mi}$ $7.5 \text{ in} = 21,542,400 \text{ in}$ <hr style="width: 80%; margin: 5px auto;"/> 7.5 in $1: 2,872,320$

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If you choose not to use one of the pre-determined scales, you will need to calculate your own scale. In the example from the Production Guide, you want to map Arizona on a 8 1/2 x 11 inch piece of paper. To allow for 1/2 inch margins the new sheet will then be 7 1/2 x 10 inches. Since Arizona's north-south dimension, 395 miles, is slightly longer than its east-west dimension, 340 miles, we will place the longer north-south dimension along the longer 10 inch dimension of the paper. The next step is to compute the scales for both dimensions of the State. The smaller of the two scales will be the one we need. Note that there are 63,360 inches in a mile. We therefore need a map of Arizona at a scale of 1:2,872,320 or less to place it on a 8 1/2 x 11 inch sheet of paper. Note that this does not leave much room for the other map elements, like a legend.

To calculate a threshold from this scale: The Production Guide states that a feature must be at least .2 inches long to be visible. To see how long that is in geographic length, take the scale and multiple it by .2 inches. In our example: $2,872,320 * .2 \text{ in} = 574,464 \text{ in} = 47,872 \text{ ft} = 9.067 \text{ mi}$. Remember that in our example, we are using the whole state of Arizona, rather than a forest, which is why the threshold is so much larger.

Choosing the Map Template

- Depends on scale and geographic extent
- Five templates:

Template	Dimensions
"Map book"	8.5" x 11"
"C"	22" x 17"
"D"	22" x 34"
"Newsprint"	22.75" x 35"
"E"	44" x 34"

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Once you've determined what scale the map will be, choose the map size and layout. There are five different map templates that are downloaded as part of the MVUM Templates file from the MVUM website. The decisions about scale and geographic extent are intertwined. For example, a geographically large forest may have relatively sparse transportation features and be able to displayed on an "E" sheet at the smallest scale – 1:126,720. On the other hand, a relatively small forest may be more appropriately displayed in map book, at a large scale, because of the length and density of its features. If a smaller scale was used, it would necessitate the use of too many insets. It is recommended that you experiment with different scales and templates for your data. The goal is to use the smallest amount of paper required to clearly display the route designations. The most common approach to cover a forest is to divide the forest up into several map extents, and make a series of mid-size maps to cover the forest.

Using the MVUM map template

Map Extent			
Template Name	Scale	Map Extent Area (Acres)	Map Extent Dimensions (Miles)
mvum_e_size_atlas.mxd 44"x34" "E"	1:126,720	2,108,090	54.0 x 61.0
	1:63,360	518,380	27.0 x 30.0
	1:24,000	76,800	10.0 x 12.0
	1:7,920	8,959	3.50 x 4.00
Printing Costs:	1000 copies	Single sided \$1.28	Double sided \$2.56
mvum_d_size_atlas.mxd 34"x22" "D"	1:126,720	1,023,965	40.0 x 40.0
	1:63,360	255,990	20.0 x 20.0
	1:24,000	36,000	7.5 x 7.5
	1:7,920	4,000	2.5 x 2.5
Printing Costs:	1000 copies	Single sided \$.81	Double sided \$1.52
mvum_c_size_atlas.mxd 22"x17" "C"	1:126,720	535,660	27.0 x 31.0
	1:63,360	143,355	14.0 x 16.0
	1:24,000	19,200	5.00 x 6.00
	1:7,920	2,240	1.75 x 2.00
Printing Costs:	1000 copies	Single sided \$.56	Double sided \$1.06
mvum_letter_size_atlas.mxd 8.5"x11" "letter" Map Book	1:126,720	133,115	13.0 x 16.0
	1:63,360	33,280	6.5 x 8.0
	1:24,000	4,800	2.5 x 3.00
	1:7,920	640	1.00 x 1.00
Printing Costs:	1000 copies	\$40.00 Kinkos	
mvum_newsprint_size_atlas.mxd 35" x 22.75" "newsprint"	1:126,720	1,128,280	41.0 x 43.0
	1:63,360	268,790	20.0 x 21.0
	1:24,000	39,680	7.75 x 8.00
	1:7,920	4,160	2.50 x 2.60
Printing Costs:	5000 copies		Double sided \$.20

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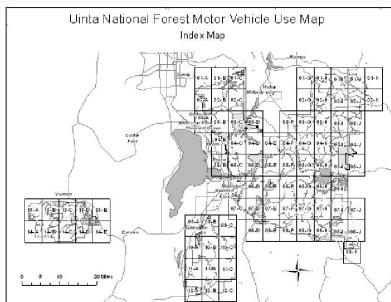
This table is located in the MVUM Production Guide and outlines the dimensions of the four different MVUM templates. It outlines four commonly used Forest Service scales, along with the geographic extent that can be covered by each map size.



Map Series vs. Map Book

- Map Books...
 - Generally have more map sheets
 - Have a cover sheet & index map
 - Also have Seasonal & Special Designation Tables
 - Index map: required
 - Inset maps: optional



Index map



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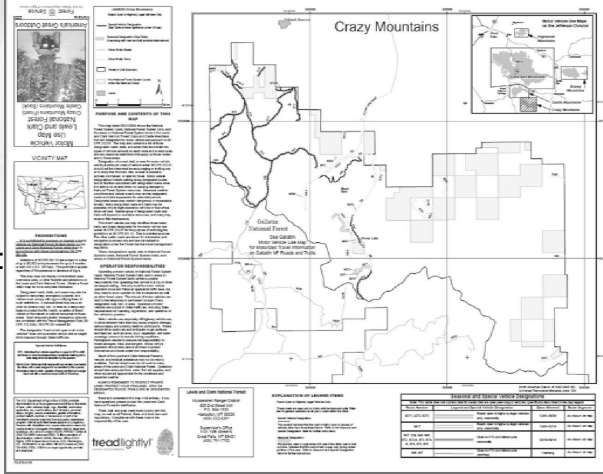
Some forests might find it best to create a map book, which is a type of map series. Whereas a “C,” “D,” or “E” sized map series might contain one or several map sheets, a map book might contain tens, or even more, map sheets. In MVUM, you may want to create a map book when you have a large area with a congested transportation system. In addition, a map book is often more economical in terms of printing costs. It is also more convenient to the user, since it is smaller: 8.5” X 11.” Map books also contain a cover sheet, which contains many of the elements of the collar in a map series: Title, Forest, photo, state, date, etc. One major difference between a map series and a map book is the addition of an index map, which helps users easily find specific map sheets. An index map must be made by hand; there is no tool for creating it. Just like the map series, the Seasonal & Special Designation Tables need to be added, either to the front or back of the map sheets. You may also find the need to create inset maps for map books.

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Example

- Scale: 1:75,000
- Template: "C"
- Visible Threshold: 1,250 ft
- 1 locator map

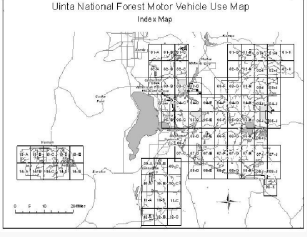
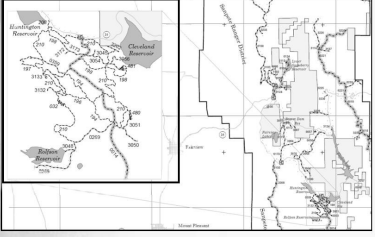


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Hints for Using Templates



- Overlapping map sheets
- Associate name with table
- Inset maps for congested areas (larger scale)
- Overview map (optional)
- No index map for map series



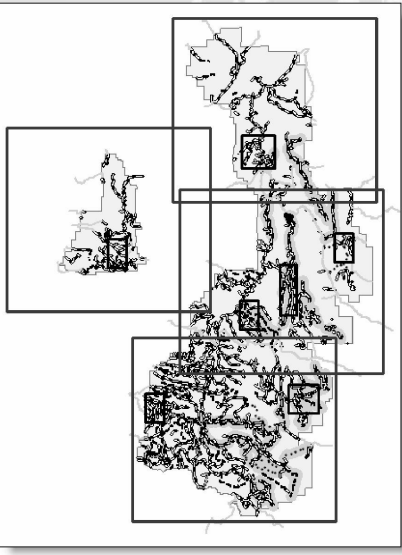
Inset map Index map 13-11

Here are some helpful hints for using the MVUM templates. Make sure that your map sheets overlap when you create a map series. This gives the users a better chance to see an entire feature (trail, lake) on either map rather than a feature being split between two maps. Use inset maps for congested areas or where the features fall below the visibility threshold. These inset maps will be at a larger scale and should not cover useful parts of the MVUM on the underlying data frame. Inset maps are created by inserting an additional data frame. An index map acts as a locator grid (A1, A2, B1, etc.) and is required for map books, however, it is not necessary for a map series.

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Calculating Map Extents




Scale: 1:63,360
MVUM template: "E"
Map extent dimensions:
27 mi X 30 mi

- ☐ # of maps: 4
- ☐ # of inset maps: 7


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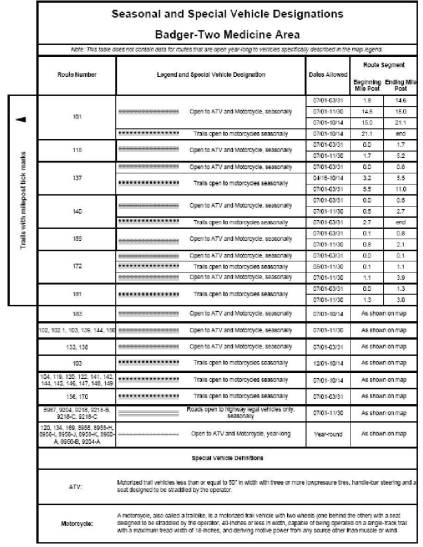
Here you can see how scale, the chosen template, and the resultant map extent dimensions all relate to one another. The target map extent dimensions that you determine will be used to create polygons for the MapExtents feature class with those exact dimensions. The end result is a map series of 4 overlapping maps.

Using the MVUM map template



Placing the Seasonal & Special Designation Table







- On front
 - If there is room
- On back
 - Create separate map extents
 - One extent per table

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There are two choices for placing the Seasonal & Special Designation Table: on the front or the back of the map. If the table is to be placed on the front, make sure it does not overlap any important portions of the map. And it's likely that you have a space in mind which will dictate that you tailor the table to a certain size. A simpler method is to put the table on the back of the map where there is ample room for a long single column table. Note that for each table, you need to create a separate empty map extent. You will insert each table into a map extent in the layout. Furthermore, each map sheet will have its own table associated with it. The easiest way to associate a map sheet with its table is to use the following nomenclature: Map 1 (map) and Map 1a (table). It's also possible for a map sheet to have multiple tables associated with it if you are placing multiple extents within the same map sheet (imagine stacking 4 isolated FS allotments into the same map sheet).



Exercise:



Develop a project approach and management strategy

- Goal: Students will answer questions relating to forest data to develop a strategy for MVUM creation



1. Develop a mapping strategy
2. Diagram MVUM map outlines to represent full coverage of a forest

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Summary

- ☐ Templates were created by the MVUM team to meet the needs of varying National Forests and provide consistency.
- ☐ A template is chosen with the necessary scale and geographic extent in mind.

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Exercise 13: Develop a project approach and management strategy



Exercise goal: Students will develop a project approach for making an MVUM for the Manti-la Sal NF.

One of the biggest difficulties in creating an MVUM is the issue of scale and layout. Unless you have a small, spatially contiguous forest; you will no doubt be devoting some time to the scale and layout of your MVUM. Although the MVUM Implementation Team has developed four layouts for you to choose from, it is impossible to develop an appropriate layout, and thereby, scale, suitable for every forest. You will therefore need to interact with your data and experiment with the four different layouts, as well as different scales, to see what is most appropriate for your forest. This exercise aims to help you ask some of the necessary questions to choosing the right scale and layout.

Upon completion of the exercise, you will be able to...

- ✓ Answer questions relating to forest data to develop a strategy for MVUM creation
- ✓ Diagram MVUM map outlines to represent full coverage of a forest

STEP	DESCRIPTION	PAGE
1	Develop a mapping strategy	13 – 16
2	Diagram MVUM map outlines to represent full coverage of a forest	13 – 19

Step 1: Develop a mapping strategy

In this section, you will answer some questions about your forest's data. You can look at your forest boundary by viewing a shapefile that sits in C:\training\Ex13\ForestBoundary.shp. This is a nationwide layer of USFS boundaries. If you choose your own forest, you will need to complement this with your own route data that might be found on your network or online. The other option is to use the Manti La Sal data located in C:\training\Ex13.

Before you get started, review the following table located in the MVUM Production Guide that outlines the dimensions of the four different MVUM templates. It outlines four commonly used Forest Service scales, along with the geographic extent that can be covered by each map size.

Template Name	Scale	Map Extent Area (Acres)	Map Extent Dimensions (Miles)
mvum_e_size_atlas.mxd 44"x34" "E"	1:126,720	2,118,396	54.20 x 61.07
	1:63,360	529,512	27.10 x 30.53
	1:24,000	75,899	10.25 x 11.57
	1:7,920	8,288	3.39 x 3.82
mvum_d_size_atlas.mxd 34"x22" "D"	1:126,720	1,036,993	39.85 x 40.66
	1:63,360	259,313	19.93 x 20.33
	1:24,000	37,206	7.55 x 7.70
	1:7,920	4,048	2.49 x 2.54
mvum_c_size_atlas.mxd 22"x17" "C"	1:126,720	554,424	27.58 x 31.41
	1:63,360	138,562	13.79 x 15.70
	1:24,000	19,878	5.22 x 5.95
	1:7,920	2,158	1.72 x 1.96
mvum_letter_size_atlas.mxd 8.5"x11" "letter"	1:126,720	132,564	13.06 x 15.86
	1:63,360	33,141	6.53 x 7.93
	1:24,000	4,742	2.47 x 3.00
	1:7,920	520	0.82 x 0.99

Here is a threshold guide from the Production Guide:

"After reviewing the different symbols on the MVUM it was determined any road line feature needs to be at least 0.2 of an inch to allow the symbol to be visible on the map. Listed below are the lengths of a 0.2 feature at each scale.

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1:7,920 = 132 ft
1:24,000 = 400ft
1:63,360 = 1056 ft
1: 126,720 = 2112 ft”

You will now examine your data:

Question	Answer
What is the total geographical extent of your data? What is the shortest route segment on your forest? What is the smallest scale you could use so as to be above the visible threshold?	
What scale do you use for most of your forest maps?	
Would the above two answers fit into one of the templates, as is?	
Are there any features that are below the visible threshold (Perform a query for the threshold length)? If so, you will need to do an inset map for that area. If there are many features that are below that threshold, you will need to choose a larger scale and do a map series.	
Is your forest contiguous or discontinuous? If your forest is discontinuous, you may need to do a map series, depending on the size and distance between the polygons.	
If your forest is discontinuous, what is the geographical extent of the largest polygon?	
If your forest is discontinuous, are the other polygons nearby? Can they be included on the same map?	
Are your road and trail features uniformly distributed, or are there areas of clustering? Areas of clustering might need a different scale.	
If there are areas of clustering, is there just one or two areas like this, or are there many? If there are just one or two, you may be	

Using the MVUM map template

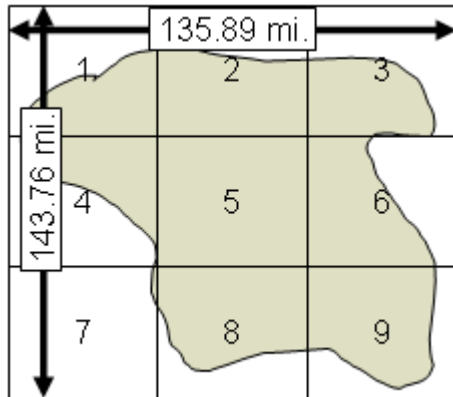
able to handle them with inset maps. With many areas of clustering, you may need to go with a larger scale, or do a map series.	
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Using the MVUM map template

Is your map too large for an “E” layout at 1:126,720? You may need to do a map series.	
If you do need a map series, enter the number of sheets you will need to create. Use the calculation below if you need to create a map series because your forest is too big.	
Other special circumstances:	

Calculating the number of sheets:

If you are using the suggested scales from the templates, the calculation is fairly straightforward. Simply look at the x,y geographic extents (in miles!) for your data and divide by the map extent dimensions in miles for your desired template and scale. Round up to the next whole number for each dimension, and then multiply the two numbers. In the example below, we want to see if we can use the “E” template at 1:126,720.



For this template and scale, the map extent dimensions (in miles) that are covered are: 54.20 mi. by 61.07 mi. We will divide these two numbers into the extents for our forest:

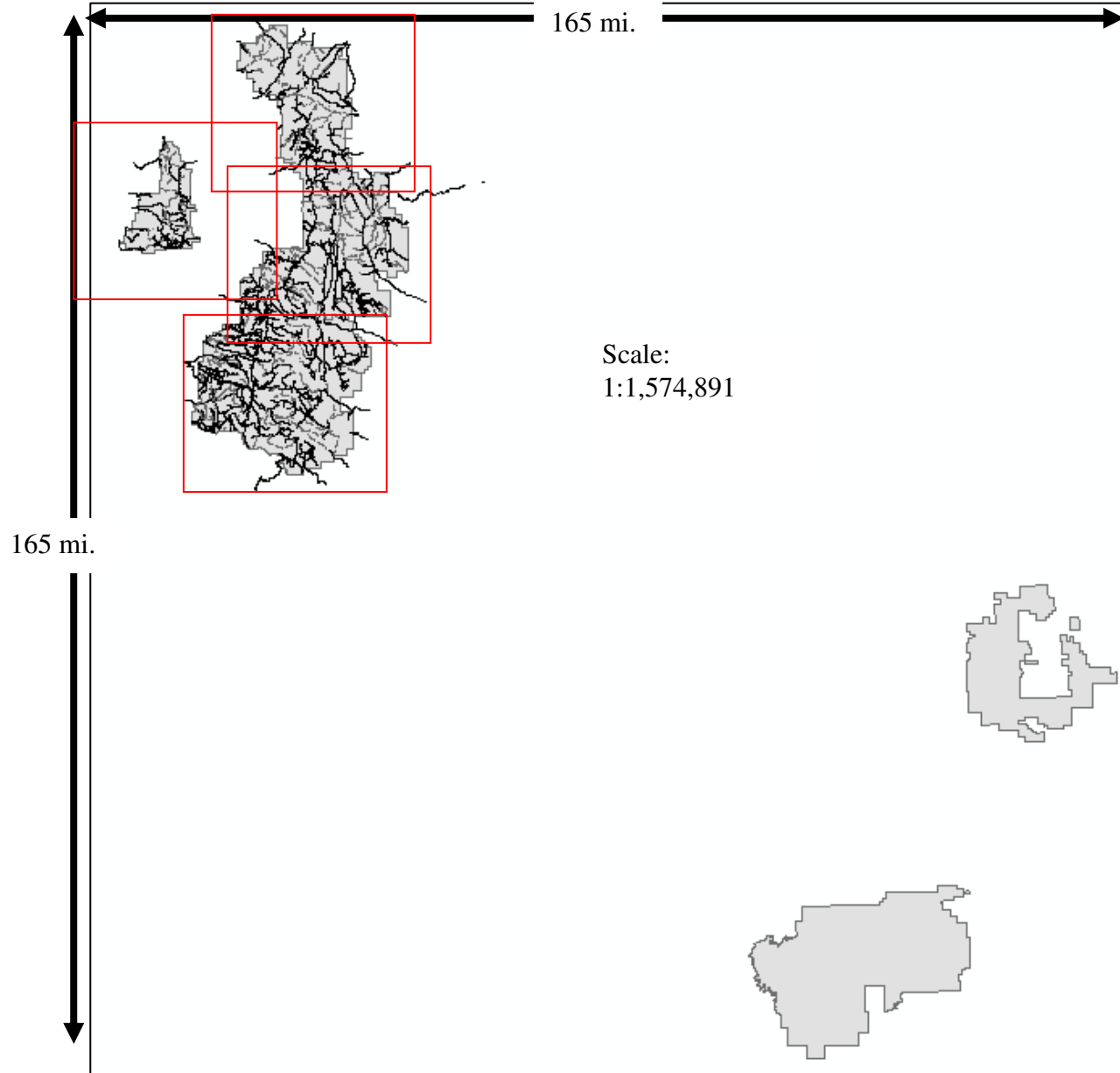
X-axis: $135.89 \text{ mi.} / 54.20 \text{ mi.} = 2.507$, round up to 3

Y-axis: $143.76 \text{ mi.} / 61.07 \text{ mi.} = 2.354$, round up to 3

$3 \times 3 = 9$ map sheets required to cover this forest at 1:126,720. Note that, depending on the shape of your forest, you may not need all of these map sheets. For example, map sheet #7 is unnecessary here.

Step 2: Diagram MVUM map outlines to represent full coverage of a forest

In the previous section, you answered some questions pertaining to your data. These questions were meant to start you thinking about developing a strategy for representing all of your data in an MVUM. In this next section, you will roughly diagram an appropriate grid for the forest of your choice. Be sure to note the scale(s) that you are using. Be sure to take into consideration the questions asked in the previous section to determine if/where map series need to be developed.



Sample Layout for
Manti-La-Sal

Using the MVUM map template

Summary: In this exercise, you learned some basic strategies for planning a project approach to MVUM development.

End Exercise.