





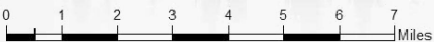

MVUM Symbology and Samples

Objective: Discuss cartographic principles as they apply to the production of MVUMs to help users better interpret the product.

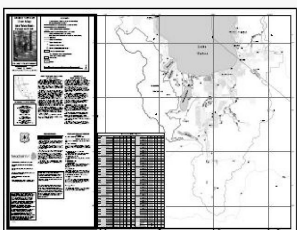
16-1



Elements of a Good MVUM

- Scale 
- Symbology 
- Annotation *Angora Lakes* Mt. Tallac
- Designation tables
- Collar

Route #	Legend	Special Vehicle Designation	Date Allowed	Beginning Mile Post	Ending Mile Post
113	Special Vehicle Designation	Trail Open to Wheeled Vehicles on 50' Wide	Yearlong	0.00	14.20



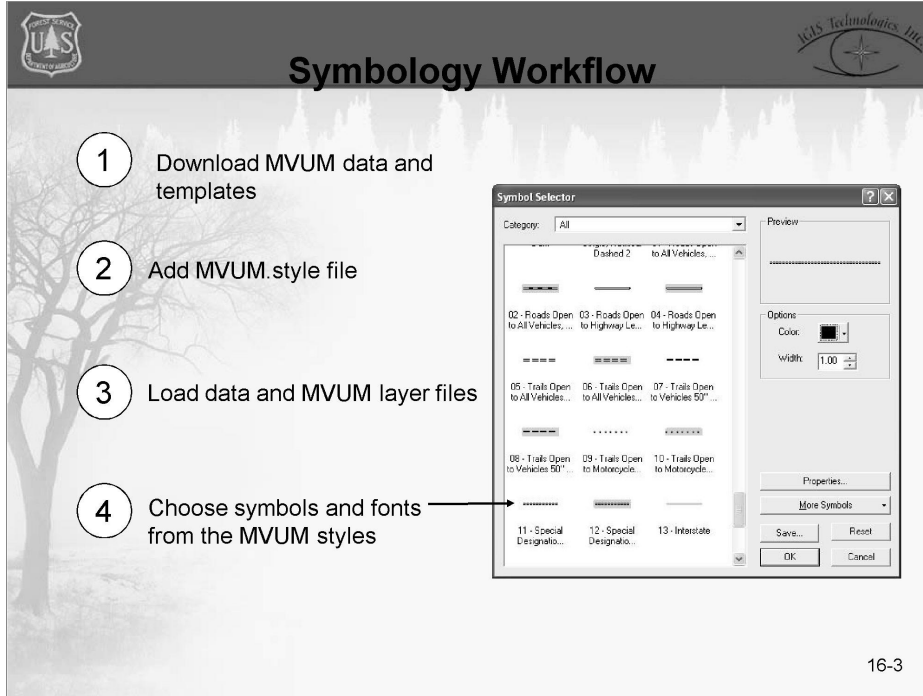
16-2

There are several components of a good MVUM. The main elements are scale, symbology, annotation, designation tables, and the map collar information.

To ensure usability and readability, it is important to have the map displayed at a suitable scale.

Symbology on MVUMs is limited, yet it needs to be adequate in order to create a good map. Point symbology mainly consists of trailheads, peaks, campgrounds and milepost markers. The line symbology used for the roads and trails is designated by their classifications.

Annotation is very important on MVUMs. Because of the limited symbology and the few features actually mapped, annotation is vital for MVUMs to be practical to the user. In addition to graphically represented features, annotation should also be used to represent points of interest and other helpful features not plotted on the MVUM. Examples of features represented solely by annotation include off highway vehicle areas, mountain peaks, and campgrounds. Annotation can be frequently placed as long as it does not clutter the map. The designation table is an extension of the map legend. This table list all the roads on the MVUM that have special designations, dispersed camping-game retrieval, and short road designations. The collar is everything on the MVUM outside of the data frame and contains essential information to the map.



Symbology Workflow

- 1 Download MVUM data and templates
- 2 Add MVUM.style file
- 3 Load data and MVUM layer files
- 4 Choose symbols and fonts from the MVUM styles

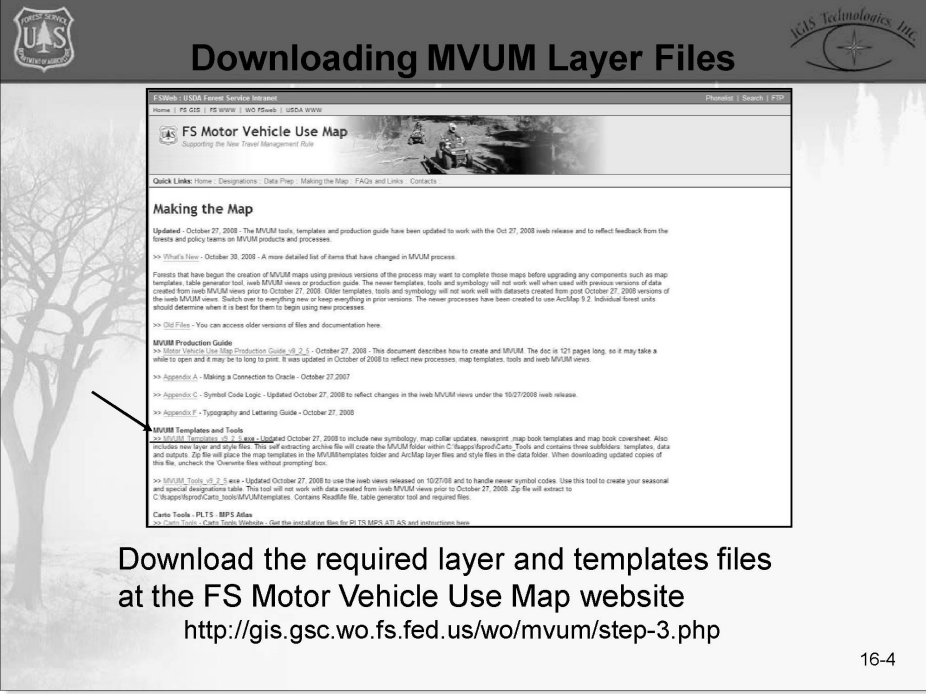
The Symbol Selector dialog box shows the following categories and options:

- Category: All
- Preview: Dashed 2 to All Vehicles...
- Options: Color: [Black], Width: 1.00
- Properties...
- More Symbols...
- Save... Reset
- OK Cancel

16-3

The workflow for symbology can be looked at in four steps. First the needed layer files, style file and templates need to be downloaded from the MVUM website. Next, the MVUM.style file needs to be added to the ArcMap session using the Style Manager. Now the downloaded MVUM layer files can be added to the map. Lastly, the correct MVUM symbols should be assigned to the features on the map.

MVUM Symbolology and Samples



Downloading MVUM Layer Files

US Forest Service | U.S. Department of Agriculture | U.S. Forest Service | U.S. Forest Service | U.S. Forest Service

Home | FS GIS | FS Maps | WO FSweb | USDA WWW

FS Motor Vehicle Use Map
Supporting the New Travel Management Rule

Quick Links: Home | Designations | Data Prep | Making the Map | FAQs and Links | Contacts

Making the Map

Updated - October 27, 2008 - The MVUM tools, templates and production guide have been updated to work with the Oct 27, 2008 web release and to reflect feedback from the forests and policy teams on MVUM products and processes.

>> What's New - October 26, 2008 - A more detailed list of items that have changed in MVUM process.

Forests that have begun the creation of MVUM maps using previous versions of the process may want to complete those maps before upgrading any components such as map templates, table generator tool, web MVUM news or production guide. The new templates, tools and symbology will not work well when used with previous versions of data created from web MVUM news prior to October 27, 2008. Older templates, tools and symbology will not work well with datasets created from post October 27, 2008 versions of the web MVUM news. Switch to everything new or keep everything in prior versions. The newer processes have been created to use ArcMap 9.2. Individual forest units should determine when it is best for them to begin using new processes.

>> Old Files - You can access older versions of files and documentation here.

MVUM Production Guide

>> Motor Vehicle Use Map Production Guide v9_2_5 - October 27, 2008 - This document describes how to create and MVUM. The doc is 121 pages long, so it may take a while to open and it may be too long to print. It was updated in October 2008 to reflect new processes, map templates, tools and web MVUM news.

>> Appendix A - Making a Connection to Oracle - October 27 2007

>> Appendix C - Symbol Code Logic - Updated October 27, 2008 to reflect changes in the web MVUM news under the 10/27/2008 web release.

>> Appendix F - Typography and Lettering Guide - October 27, 2008

MVUM Templates and Tools

>> MVUM_Templates_v9_2_5.exe - Updated October 27, 2008 to include new symbology, map collar updates, newspaper map book template and map book cover sheet. Also includes new layer and style files. This self extracting archive file will create the MVUM folder within C:\Program Files\Carto_Tools and contains three subfolders: templates, data and outputs. Zip file will place the map templates in the MVUM\templates folder and ArcMap layer files and style files in the data folder. When downloading updated copies of this file, uncheck the "Overwrite files without prompting" box.



>> MVUM_Tools_v9_2_5.exe - Updated October 27, 2008 to use the web news released on 10/27/08 and to handle newer symbol codes. Use this tool to create your seasonal and special designations table. This tool will not work with data created from web MVUM news prior to October 27, 2008. Zip file will extract to C:\Program Files\Carto_Tools\MVUM\templates. Contains ReadMe file, table generator tool and required files.

Carto Tools - PLTS - MPS Atlas
>> Tools - Tools - Carto Tools - Get the Installation Files for the MPS Atlas and instructions here.

Download the required layer and templates files at the FS Motor Vehicle Use Map website
<http://gis.gsc.wo.fs.fed.us/wo/mvum/step-3.php>

16-4

To download the needed template and style files you must access the website shown on the slide. The needed file is the MVUM_Templates_v9_2_5.exe. The style file includes a new dispersed camping symbol and other public trails symbol. New templates have wider margins, updated symbol descriptions and a few minor errors have been corrected. This self extracting archive file will create the MVUM folder within C:\fsapps\fsprod\Carto_Tools and contains three subfolders: templates, data, and outputs. It will place the Carto Tools MPS Atlas and ArcMap templates in the MVUM/templates folder and ArcMap layer files in the data folder. The outputs folder will eventually contain completed map documents and any exported PDFs that you create.



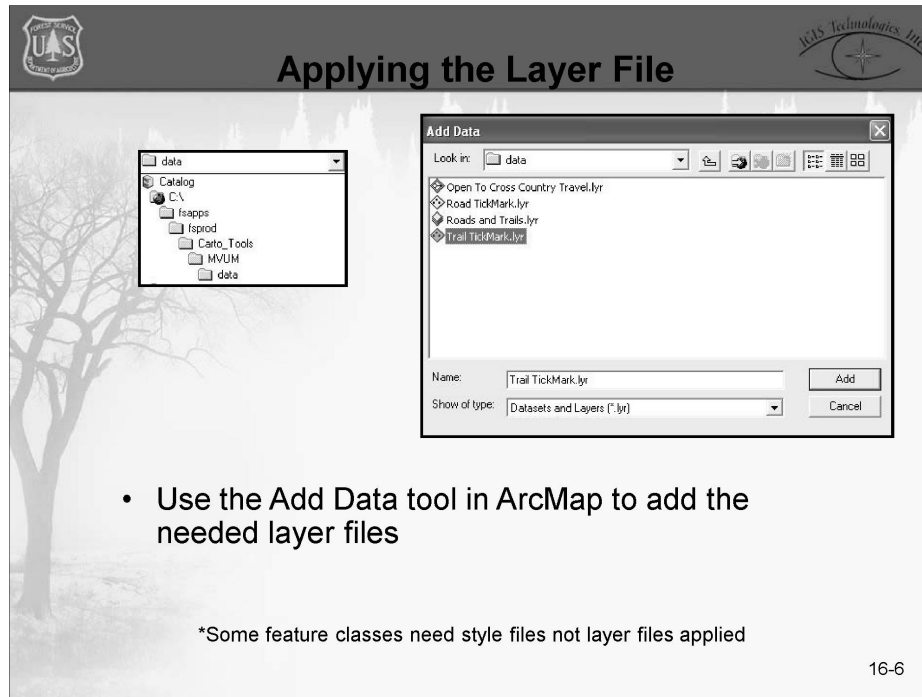
Adding MVUM Reference Layers

- Start with map sheet extents
- Add .lyr files and map their source data
 - RoadTickMark.lyr
 - Roads and Trails.lyr
 - Trail TickMark.lyr
 - Open to cross country Travel.lyr
- Limit certain data by queries
 - Query out small lakes



Annotation
Road and Trail Ticmarks
Designated Roads and Trails
Roads and Trails Outside FS boundary
Recreation Symbols: Trailheads, Campgrounds, Picnic Area, Information Site
Peak symbols
Areas open to cross country travel
Forest or Unit Boundary
Wilderness Areas
Lakes
Ownership
Township and Range, Section Lines
Political Boundaries

16-5

Layers added to a MVUM are most often decided by the features found within or absent from the map extent. In addition to MVUM specific layers, important layers such as: Township, Range, and Section lines, forest boundaries, political boundaries, and ownership should always be included on the MVUM if any features of that layer falls within the map extent. It is left up the map author's discretion when adding additional layers meant to aid the user such as: peaks, lakes, and recreation symbols. After adding all layers to the map, symbols not found on the map must be manually removed from the legend. Queries should be used to select out features of a layer that should not be mapped. For example: it may have been decided no lakes smaller than five acres in size be mapped. A query can be used to cull the unwanted features so only lakes large enough are displayed.



A layer is what you see in the ArcMap table of contents. After you have downloaded MVUM_Templates_v9_2_5.exe, double click to execute the file which will create the folder structure shown here. To apply layer files click on the add data tool in ArcMap and navigate to the data folder to see the MVUM layer files. Add the needed layer files. You will then have to map this layer file to your roads and trails feature classes through the layer properties data source.



Tickmark Layer File


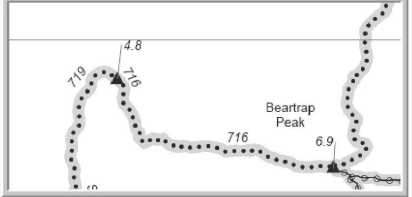


Table of contents

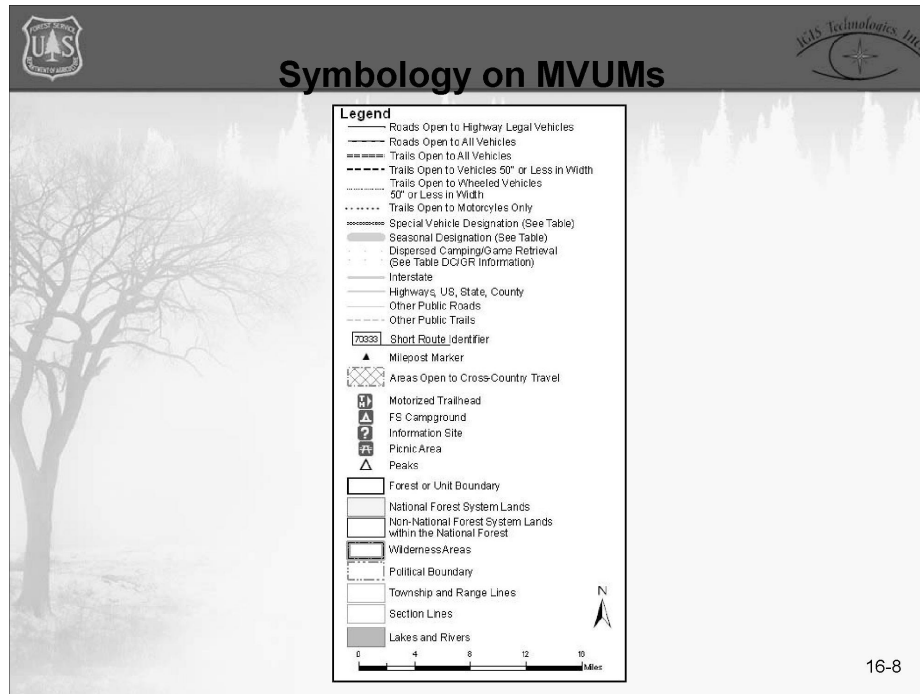


Tickmarks plotted out on an MVUM

- Tickmark layer is apart of carto tools
- Labels displays the mile post location on the route

16-7

The tickmark layer file provided with the carto tools is used to symbolize tickmarks. This file symbolizes tickmark point features with a black triangle and label displaying the milepost location along the route the tickmark is located is located.



Roads open to highway legal vehicles only allow vehicles licensed under state law for general operation on all public roads within the state.

Roads Open to All motor Vehicles allow highway legal vehicles and smaller off highway vehicles that may not be licensed for highway use.

Trails open to all motorized vehicles allow both highway and non highway vehicles such as ATVs to operate on them.

On trails open to vehicles 50" or less the motor vehicle must be no wider than fifty inches at it's widest point.

Trails open to wheeled Vehicles 50" or less only allow wheeled vehicles less than fifty inches in width at their widest point.

Trails open to motorcycles only are limited specifically to motorcycle traffic. Motorcycles with sidecars are not permitted to travel these routes.

Special Vehicle Designations show that a road or trail is open to classes of vehicles other than those listed in the legend. For further information on these features refer to the seasonal and special designation table.

The seasonal designation symbol indicates a road or trail is not

open during a specific portion of the year. The Seasonal and Special Designation table lists the restricted dates for routes with this designation. Routes with dispersed camping/game retrieval symbology allow limited cross-country motor vehicle use within a specific distance of a route which is solely for the purpose of dispersed camping and/or game retrieval. The dot symbols show on what side of the route this activity is permitted. When a route uses this symbology, the dispersed camping/game retrieval table needs to be referenced for the exact restrictions and allowances of that route.

Interstates, highways, other public roads and other public trails are symbols that represent features not designated for motorized use by the Forest Service. These are often part of reference layers showing connections to towns and cities outside of the forest boundary.

The short route identifier is used to represent a route too short to be symbolized by a line feature. The route identifier number for the feature is displayed inside a box with a leader line pointing to the location of the route.

The milepost marker is used to display the beginning and ending of a road that has a change in designation but not symbology. An example of this is when a route has a seasonal designation change midway through. A milepost symbol is placed along a route where the designation changes.

Areas open to cross country travel are National Forest System land that allow cross-country travel by motorized vehicles. Specific vehicle classes and seasonal designations may be indicated in the Seasonal and Special Designation table for areas open to cross country travel.

MVUM Symbolology and Samples

The motorized trailhead access symbol indicates access to a motorized route. Not all motorized routes have trailheads. Routes designated by the motorized trailhead access symbol may range from primitive to developed.

Forest Service Campgrounds, Picnic Areas, Information Sites, and Peaks are placed on the map as reference points. Campground and picnic symbols should be used where there are established improved sites easily recognized by the user. The Information Site is a catch-all symbol that can be used for Forest Service facilities or points of interest. The Peaks symbol represent prominent mountain peaks visitors to the forest may recognize or use as a point of interest. It is up to the discretion of the forest to place these symbols where they will be useful to the user as a reference point.

The Forest or Unit Boundary symbol shows the Forest boundary if the entire forest fits on the MVUM. If only a portion of the forest is on the MVUM, it may represent a forest unit boundary.

National Forest Service System lands are those owned and managed by the Forest Service. These lands can be national forest, national grasslands, experimental forest areas, experimental grassland areas, and other lands administered by the Forest Service.



Non-National Forest System lands are lands outside of the Forest Service jurisdiction but inside the boundary of the forest.

Wilderness areas are delineated by polygons and require no data items. These areas were designated by Congress as a part of the National Wilderness Preservation System.

The political boundary symbol represents those political boundaries that overlay the MVUM. National, State, and County boundaries will use this symbol. It will be important that a label accompanies this line feature so the user understands what the line is.

Township and Range lines and Section Lines are a part of the Public Land Survey System (PLSS). This system is important to show because it allows the user to cross reference their location with other resources such as U.S. Geologic Survey topographic quadrangle maps showing the PLSS data.

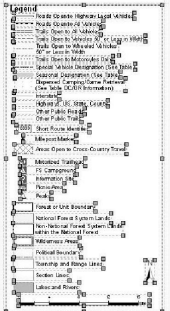
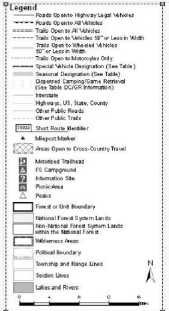
Lakes and rivers usually depict “major” waterbodies. Depending on the scale of your map, the road/trail density and the number of lakes, a forest may choose not to display (and label) all of its lakes. Large streams and rivers may also be shown. These are typically depicted by a polygon feature that shows both banks of the river. The intent is to not show every stream, but a selected few that are well known to aid the public in determining their location on the map.



Editing the Legend

Legend only shows elements on the MVUM



- Use Elements tab
- Ungroup the legend
- Edit legend elements
- Re-group legend



Group Ungroup

16-9

After completing the MVUM layout, the legend must be edited. The legend is provided in the template and includes every possible feature and symbol that can be found on a MVUM. However, not all features will be found on every MVUM therefore those items not found on the MVUM must be removed from its legend manually. The legend consists of the border and many graphic elements grouped together and is referred to as the legend group. Everything inside the border of the legend is grouped together with the border to make up the legend group. To remove unneeded elements, the legend group must be selected, ungrouped, edited, and then re-grouped back together. The goal is to have the legend accurately reflect only the elements found on the MVUM.




Scale

Scale

- 1:126,720
- 1:63,360
- 1:24,000
- 1:7,920

Map Templates



- E size 44"x34"
- Newsprint size 35"x 22.75"
- D size 34"x22"
- C size 22"x17"
- Letter 8.5"x11"(2)



0 1 2 3 4 5 6 7 Miles

16-10

Scale is one of the most important characteristics of a MVUM. The map author should experiment with different scales and different templates to get the most desirable map extent for the specific forest. Any scale listed can be used with any map template. It is strongly recommended that a scale no smaller than 1:126,720 be used for production of the MVUM. The map authors may use a scale not listed above if it better suits their forest. Each size represents one template. The exception is for the Letter size, which has two templates (one for the map and one for a booklet coversheet).




Two Letter Templates

Cover Sheet

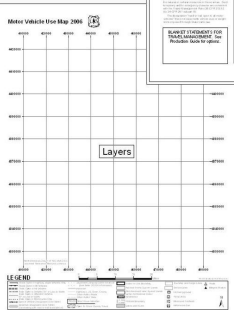
- mvum_letter_size_coversheet.mxd (template name)
- Used as a title page in a booklet of maps

Map

- mvum_letter_size_atlas.mxd
- Used as a map or inset placed in one of the larger maps





coversheet



atlas

16-11

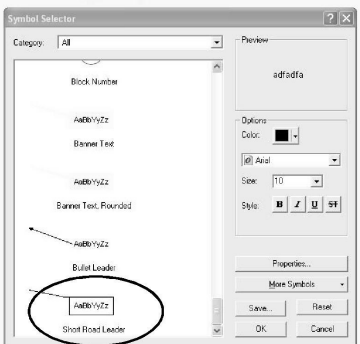
The coversheet and the atlas are both separate .mxds. The coversheet .mxd should accompany the 8.5" X 11" atlas or map sheet any time it is used. For example, these templates could be used as a booklet-style MVUM, quick handout for a popular area, or as a document used to enhance a congested area in one of the larger MVUM templates. The atlas .mxd format could also be used as a second data frame inside a larger template as an inset.



Short Route Labeling

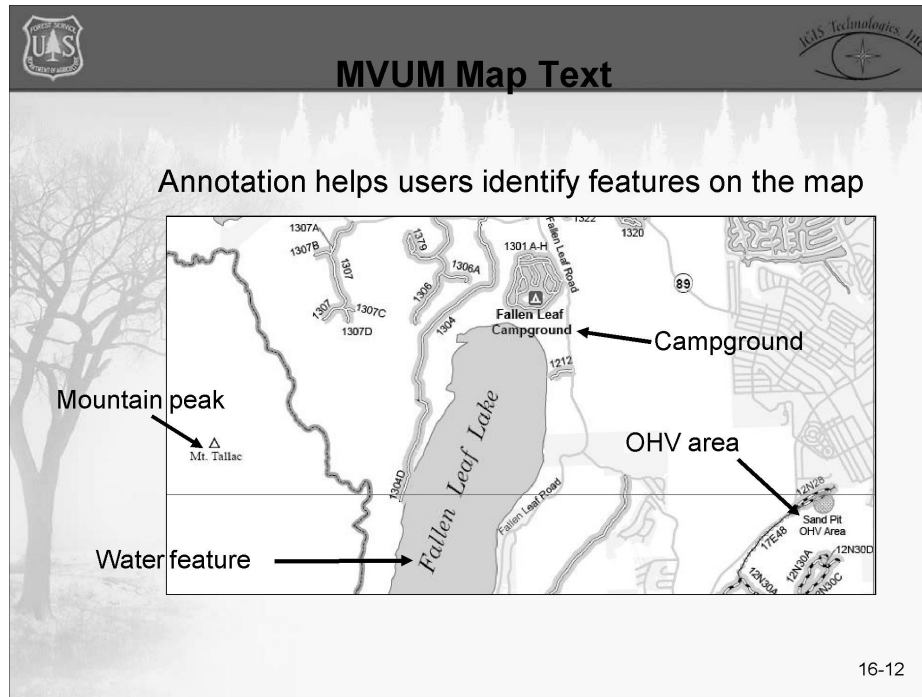
Road or trail line features approximately 0.2" or shorter

Roads Too Short to Be Seen Clearly on the Map		
Road Number	Route Designation	Length in Feet
108	Roads Open to Highway Legal Vehicles Only	265
511A	Road Open to All Vehicles	40
655	Roads Open to Highway Legal Vehicles Only	20





16-12

MVUM symbology is restricted due to the small number of features plotted on them. Because MVUMs are not feature intensive and are produced in a black and white format, symbology is important to help make the map readable. Common symbols found on a MVUM are trailheads, campgrounds, information sites and mileposts. Short routes features have their own style of identifying label. If a road or trail feature plotted on a MVUM is so short that it's symbology is hard to read, a short route identifier should be considered as a label for that feature.



Map text helps the users to locate themselves on the map. Graphically, very few features are displayed on MVUMs. Map text (i.e., labels/annotation) should be used to convey additional information to the user. Map text on MVUMs should be incorporated to represent features graphically that are graphically visible, as well as those that are not such as a river. Features such as mountain peaks, picnic areas, campgrounds and points of interest all should be shown using MVUM symbols and annotation or labeling. The use of annotation or labeling is left up to the discretion of the map author.


Seasonal and Special Vehicle Designation


- Road number
- Mode of travel
- Season
- Length of road

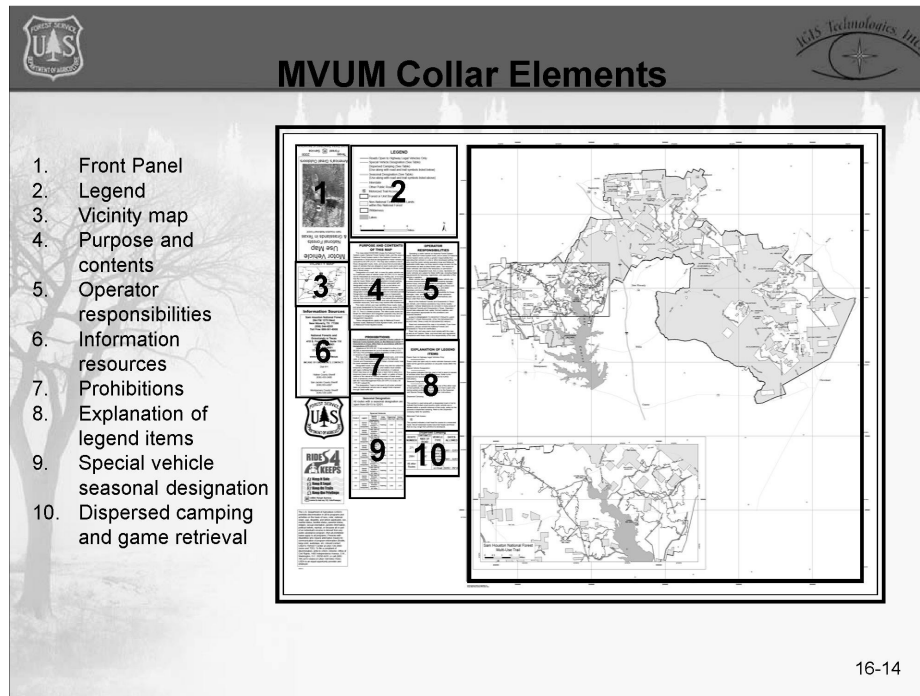
Ojai Ranger District
Seasonal and Special Vehicle Designations

Route Number	Legend	Special Vehicle Designation	Dates Allowed	Beginning Mile Post	Ending Mile Post
0N01.1	Roads open to highway legal vehicles only, with Seasonal Designation	Seasonal Designation	07/31-12/31	0.000	2.000
0N10.2	Roads open to highway legal vehicles only, with Seasonal Designation	Seasonal Designation	05/15-11/15	3.500	10.500
0N03	Roads open to highway legal 4x4 vehicles only, and by permit only.	Special Designation	01/01-12/31	0.000	21.750
0N08	Roads open to highway legal 4x4 vehicles only, and by permit only.	Special Designation	01/01-12/31	0.000	14.600
5N42.2	Roads open to highway legal 4x4 vehicles only, and by permit only.	Special Designation	01/01-12/31	1.900	3.200
0N00.1	Roads open to highway legal vehicles only, with Seasonal Designation	Seasonal Designation	05/15-11/15	3.500	10.500
0N00.2	Roads open to highway legal vehicles only, with Seasonal Designation	Seasonal Designation	05/15-11/15	3.500	10.500

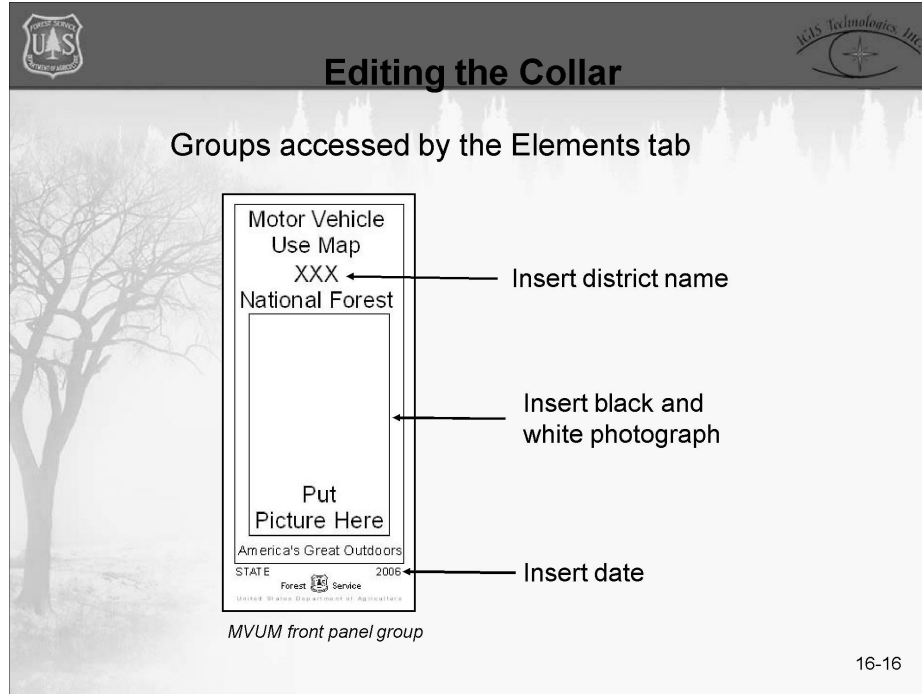
16-14

The seasonal and special vehicle designation table is an extension of the map legend. This table lists the roads with seasonal and special vehicle designations shown on that specific MVUM. The contents of the table include road or trail number, mode of travel, dates allowed to travel, and the beginning and ending mile posts. This table is extremely important because it represents designations that are directly related to management decisions. All of this designation data comes from Infra and is automated through the Table Generator Tool.

Two additional tables are the dispersed camping/game retrieval (DC/GR) table and the short route identifier table. It may be necessary to have either or both of these tables on a MVUM. Instructions for creating these tables are located in the Production Guide. Both of these tables are manually produced.



The collar is all the information outside of the data frame on the MVUM. A variety of important information is located here. Since many of the rules and regulations MVUM users need to abide by are located within the collar, this collar information should not be edited except where the production guide identifies it as necessary. All but the 8.5 x 11 template were created with the intention of being folded, keep this in mind if you plan to move the collar elements and plan to have a folded map product. Also, for aesthetic and readability reasons, try to avoid large open spaces to achieve balance in the collar.



Editable items in the collar include:

1. A front picture. This should be a black and white picture pertaining to motor vehicle use.

This is called the front panel, when the map is folded it is the cover of the map. The forest will have to modify the title of the map and add a picture. The title should read:

Motor Vehicle

Use Map

Humboldt-Toiyabe

National Forest

Carson Ranger District

This would be an example. The title is centered in the front panel above the picture. Below the picture the forest would have to modify the date and the state where the forest resides.

2. Legend. This element may need to be edited. The legend should only have symbols found on the map.

3. Vicinity map. This is a smaller scale map showing the

general area the MVUM is located.

If the forest does not have a vicinity map available one can be acquired from the regional office geospatial group.

4. Purpose and contents of the map. This will be populated with standard text but will require editing in one place in the first paragraph so it reflects the correct National Forest or Unit Boundary.
5. Operator responsibilities. This will be populated with standard text but this paragraph will require the user to enter the forest and ranger district name 3 times in this paragraph.
6. Information source. This element will need to be populated with the current forest and district contact information, any emergency contact numbers in the area, and possibly a website address.
7. Prohibitions. This element states the penalties for not adhering to USFS rules and regulations and Travel Management Rules applied to the MVUM. The author will have to enter the forest name and district twice in this paragraph.
8. Explanation of legend. This element describes, in detail, the symbols displayed in the legend. This element will have to be edited to match the legend--only the items that appear on the map should be displayed.
9. Special vehicle and seasonal designation table. This element lists the roads and trails on the map with special designations related to vehicle type and the season they are open.

This is not a grouped element. It is a table generated by the table generator script from the production guide. The user will have to run the script and place this on the map either in the collar area or internal to the data frame depending on the space on the template. If the table is large it might have to be printed on the reverse side of the map.

10. Dispersed camping and game retrieval table. This element lists the roads and trails on the map where dispersed camping and game retrieval (DC/GR) are permitted.

This is a manually generated table that will have to be created by the user that has a varied definition for DC/GR. In other words, if the forest does not allow dispersed camping and/or game retrieval off of certain routes then a table will have to be created to show the routes where it is allowed. If the forest has a standard definition for DC/GR, then a blanket statement should be used and not a table. A standard blanket statement is provided in the production guide.



The slide features a dark header with the US Forest Service logo on the left and the ACTS Technologies, Inc. logo on the right. The title "Common Mistakes in MVUM Map Production" is centered in the header. The background of the slide shows a misty forest with a large tree in the foreground. A bulleted list of five mistakes is positioned on the right side of the slide. The slide number "16-17" is in the bottom right corner.

- Improper scale
- Data not refined for mapping purposes
- Nonstandard use of symbology
- Poor text placement
- Excessive editing of collar elements

16-17

During the production process these components of the MVUM can have direct affect on the ability of the map to convey user information.

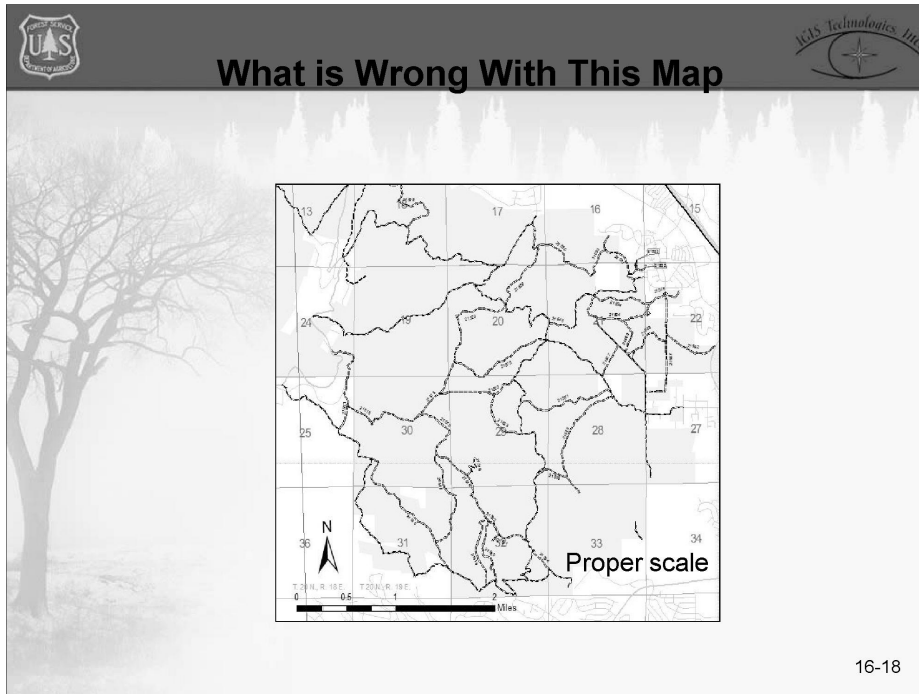
Common mistakes usually occur with the map's scale, data, annotation and/or labels.

The scale of the MVUM must be set so route symbology can be easily identified. A scale should be selected that allows the map to be clear with minimal use of insets and map sheets. Readability is key to a successful MVUM.

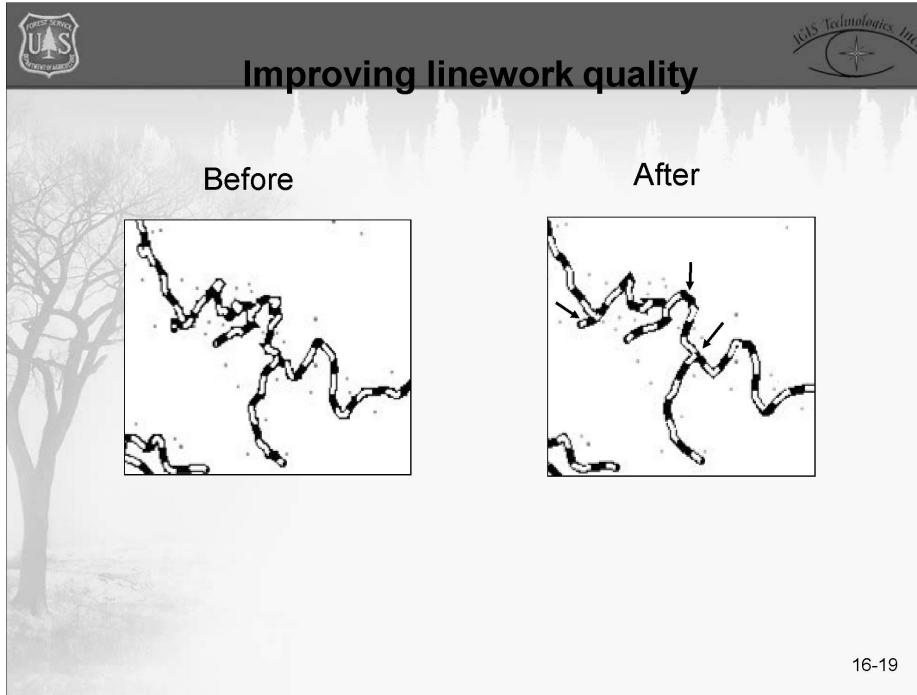
Remember a map is only as good as the data behind it. Raw GPS data is good for analysis but does not make a very readable map. It is important that the data is refined enough to make a good map, not only for the MVUM, but for use in other visual products. Data correctness is another important issue; the data should portray the designations as correctly as possible. The MVUM process may take a couple of iterations with reviews in order to get it right. Often, a review process using a draft map will usually reveal data errors.

Sometimes it takes a look at the big picture to uncover these errors.

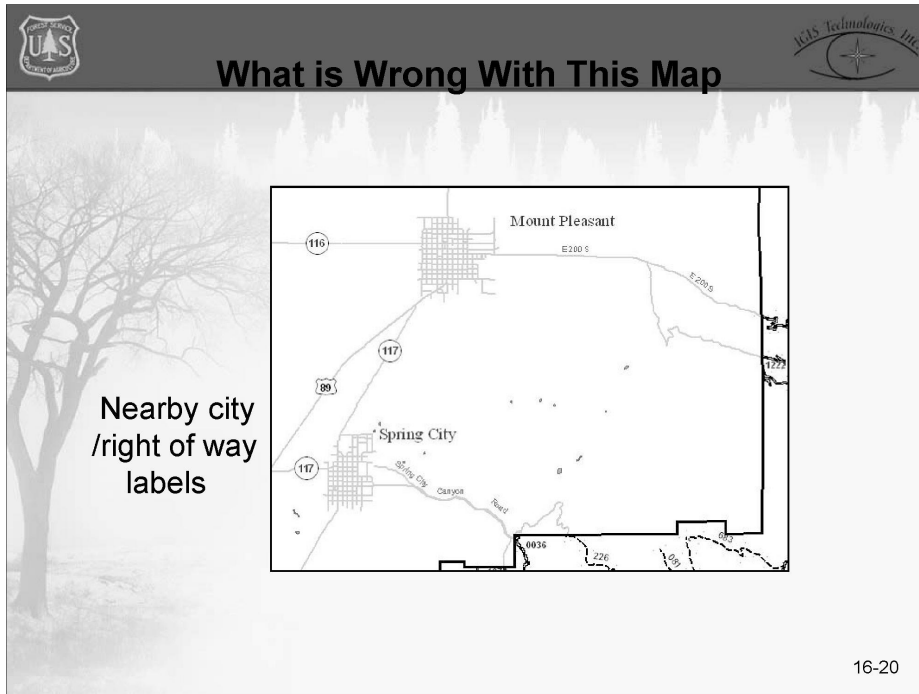
Because annotation or labeling is incorporated at the discretion of the map author, it can be easily overlooked during the production process. Not enough ma text or too much map text are two of the most common errors in map production. Map text should be used to correctly identify symbolized features. In addition, it should identify important reference features that aren't shown graphically like mountains or rivers.



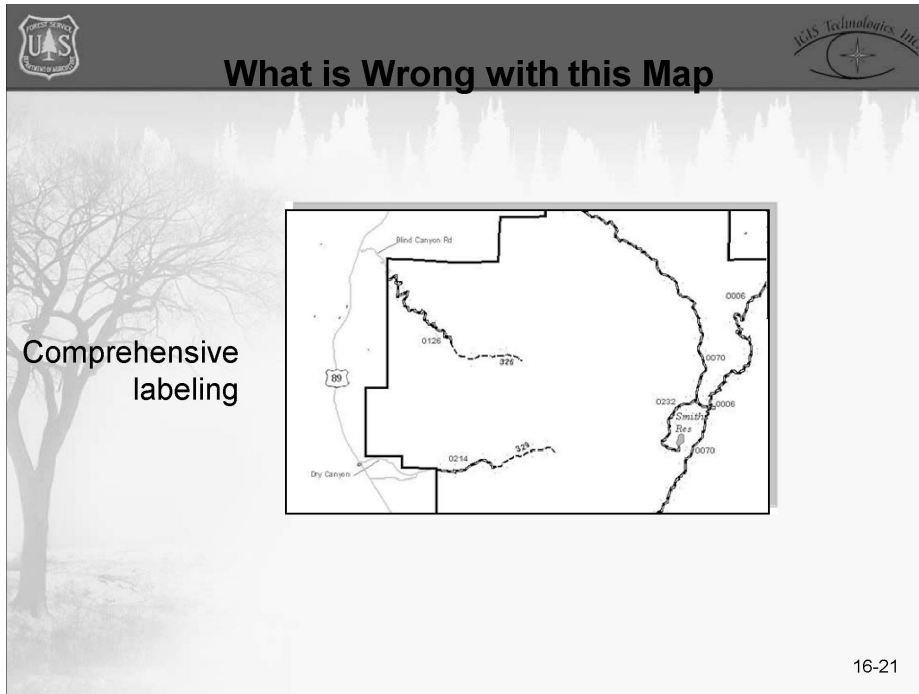
The reference scale is not set properly making the labels hard to read. Here is an example of a more suitable scale. This scale helps to make the labels and the map in general much more readable. This presentation at a more appropriate scale will help the user identify roads and trails.



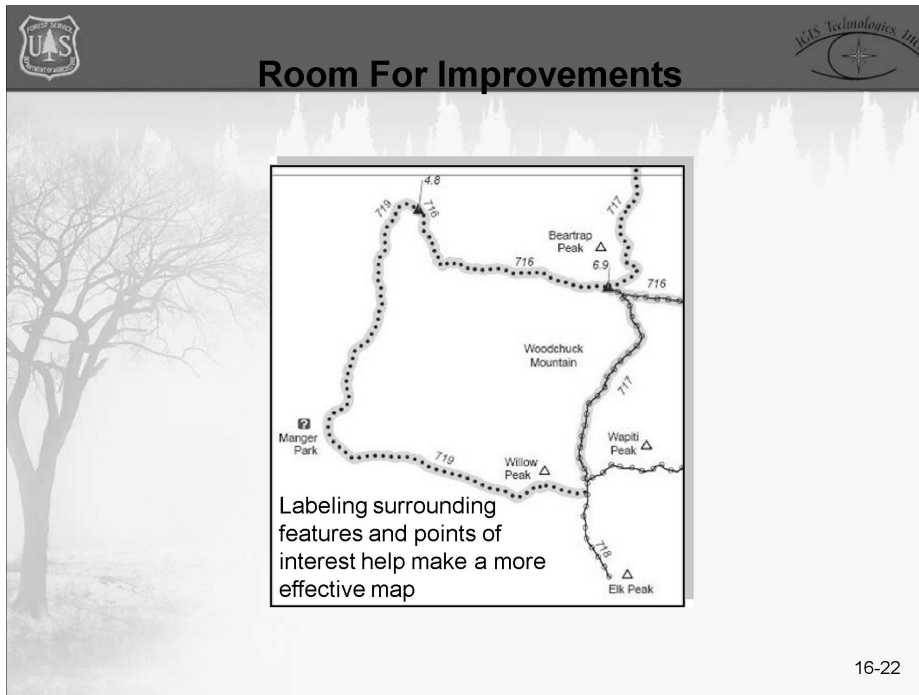
Here is an example of data that has been refined. There are tools in the ArcGIS software designed to process data. We won't touch on them here, but if the forest data has similar issues its worth the time investment to get the data cleaned up.



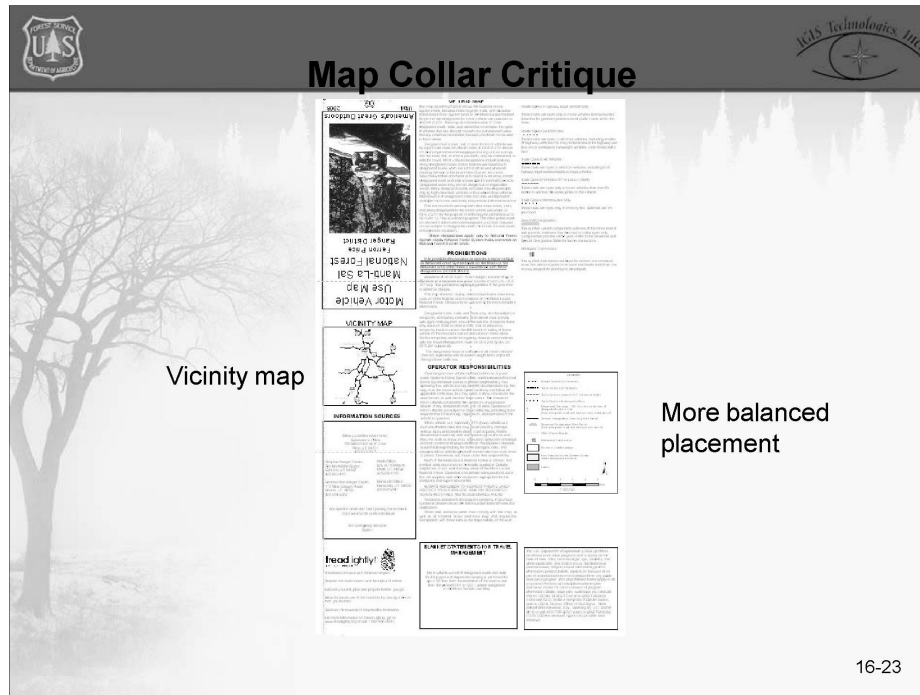
What is missing from this map? The town below Mount Pleasant should be labeled. While it is obvious that it is outside of the national forest, labeling it will not compromise the readability of any MVUM features and will be helpful to the map user.





What is missing on this map? A road, trail, and reservoir were not labeled. The road and trail may have inadvertently been removed from the map during a previous process. The reservoir may have been overlooked during the annotation process or just not thought relevant. All three of these items are shown on the map and should be labeled. Comprehensive labeling creates a clear, descriptive map which enables users to better navigate and abide by the rules and regulations of the MVUM.



At first look this map appears to be correct. However, sometimes there is room for improvement. There are features on this map that could be represented by annotation but are not. While these features are not MVUM specific, they are points of interest that could significantly help the user to navigate. Annotation of multiple mountain peaks and a river would greatly improve the usefulness of this map.



As stated earlier, many of the rules and regulations MVUM users need to abide by are located within the collar, so insuring readability and coherency is essential. The collar contains all the descriptive data outside of the main data frame. In the collar you will find the legend, vicinity map, prohibitions, information resources, and other pertinent information. Try to avoid large open spaces to achieve balance in the collar.



Summary

- ☑ Choice of scale affects readability of features and text.
- ☑ Symbology will be dictated by layer files.
- ☑ Annotation should provide clarity.
- ☑ Designation tables display Infra data and illustrate more specific route use.
- ☑ The collar has a finite list of editable elements.

16-24

Exercise 16: Using cartographic representations and understanding the Style Manager



Exercise goal: To understand how to employ styles and cartographic representations when creating MVUMs.

Why is this important? Symbology plays a key part in how users interpret a map.

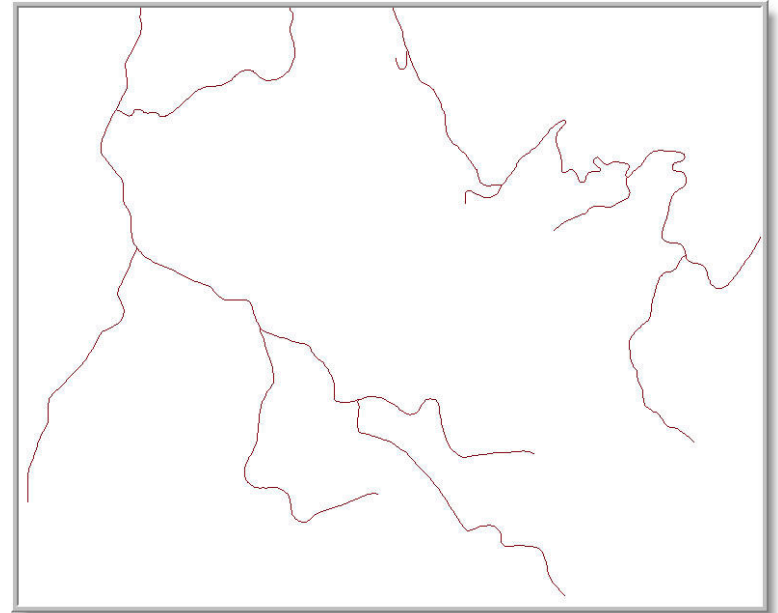
Upon completion of the exercise, you will be able to ...

- ✓ Import layer files
- ✓ Create and symbolize a new cartographic representation
- ✓ Download and run the MVUM_Templates_v5.4.exe
- ✓ Create custom symbols
- ✓ Save and import style files

STEP	DESCRIPTION	PAGE
1	View an Existing Representation in Symbol Editor	16 – 29
2	Import a Layer File into a Representation	16 – 30
3	Create and Symbolize a New Cartographic Representation in ArcMap and Symbol Customization	16 – 33
4	Work with the Representation Toolbar	16 – 38
5	Explore styles using the Style Manager and Importing a Style Files	16 – 40

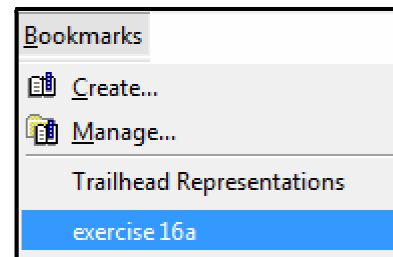
Step 1: View an Existing Representation in Symbol Editor

- a. Start an **ArcMap** session.
- b. Navigate to and open Exercise16.mxd
C:/Training/Ex16/Exercise16.mxd.
- c. View the **Roads** feature class fsdsfd.




In ArcMap the Roads feature class should mirror the display to the right.
If your display is different go to the **data view**. In the main toolbar select
View → Bookmarks → exercise 16a as shown below.

- e. **Save** the map document.



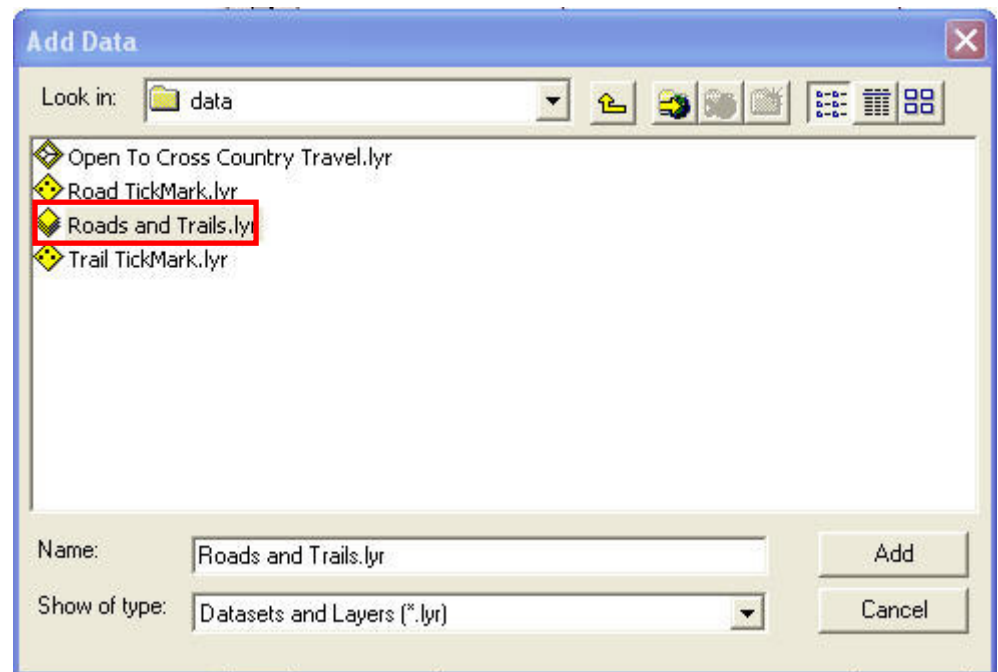
Step 2: Import the layer file *Roads and Trails.lyr* file

In this step you will import a layer file and note how it symbolizes a feature class.

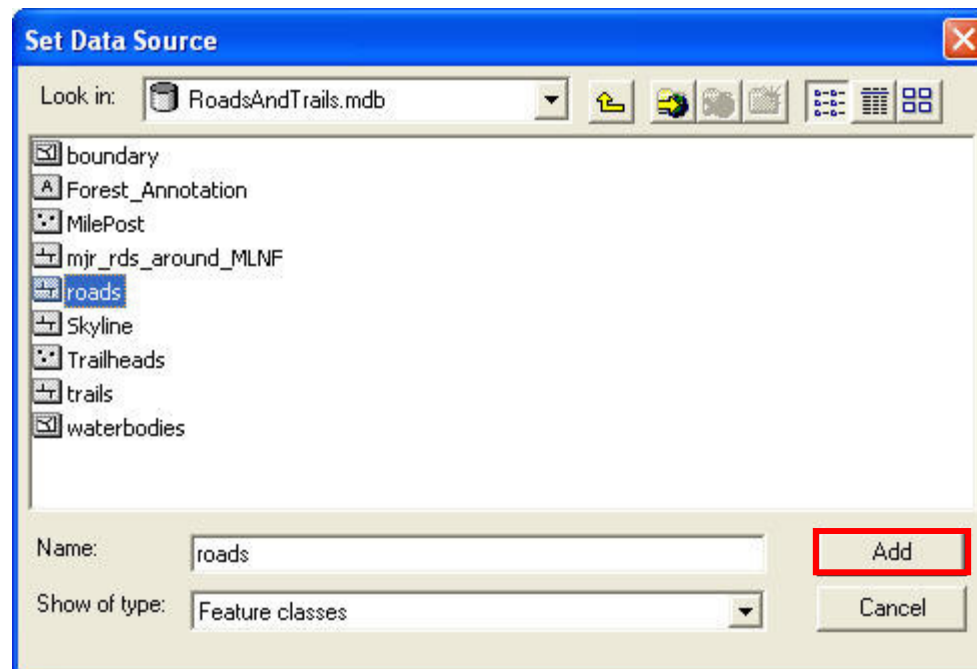
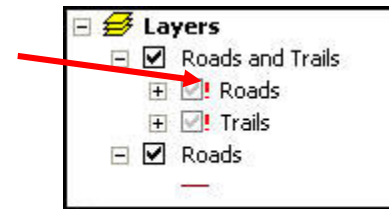
- a. Continuing from step one, click the **Add Data** button in the standard toolbar. 
- b. In the **Add Data Window** navigate to the layer files that were downloaded by the MVUM_v5.4.exe application at; **c:/fsapps/fsprod/Carto_Tools/MVUM/data**
- c. **Add** the **Roads and Trails.lyr** file



- d. The Roads and Trails.lyr file is now added to the table of contents (TOC) with broken links to the feature classes it references. Click on the red exclamation point as seen on the image below next to the Roads feature class to open the **Set Data Source** window.

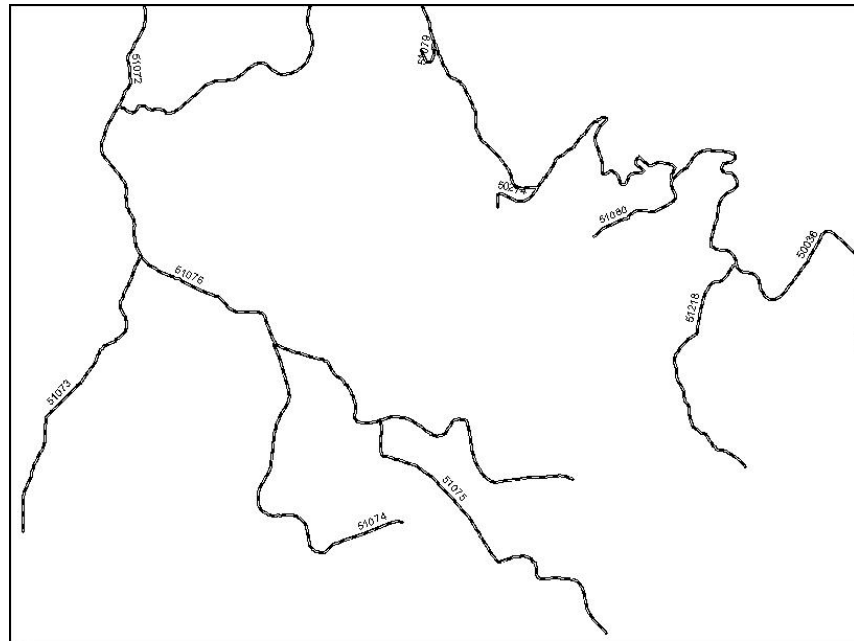


- d. In the Set Data Source window, navigate to the roads feature class at;
C:/Training/Ex16/RoadsandTrails.mdb/roads



- e. Click **add**

- f. In the TOC, expand the Roads feature class in the Roads and Trails layer and uncheck the original roads feature class. The TOC should look like the image to the right.
- g. Right-click on the Roads group of the Roads And Trails layer and select **Label Features**.



h. **Save** the map document.




Question:

1. When repairing the link to the Roads feature class, why was the link to the Trails feature class fixed at the same time?

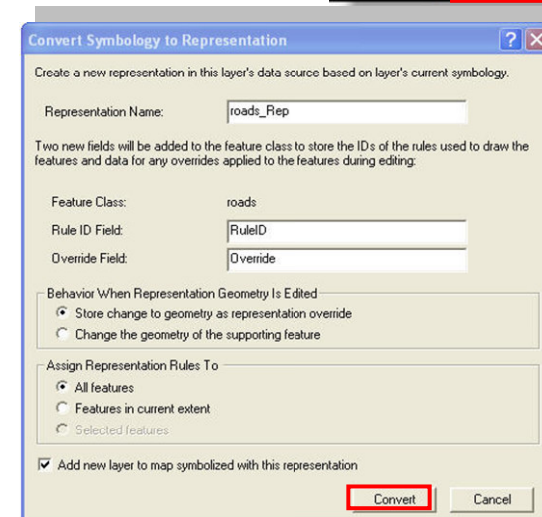
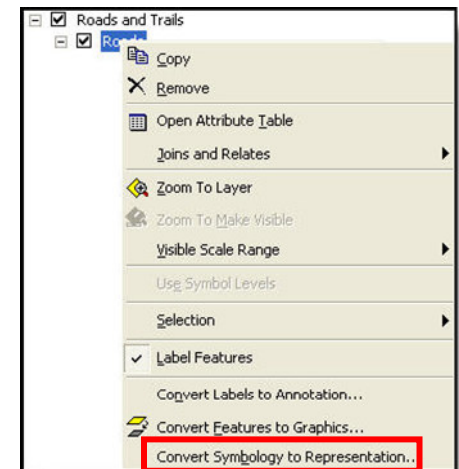
Step 3: Create and Symbolize a New Cartographic Representation in ArcMap and Symbol Customization

Now you will use the cartographic representation functionality in ArcMap to create a more visually pleasing display and create a custom symbol.

- a. Continuing on from step 2, in the TOC right-click on **Roads**. feature class in the Roads and Trails layer.
- b. Click **Convert Symbology to Representation**

 Note: You must be using ArcEditor or ArcInfo and working with a point, line or polygon layer in a geodatabase to convert symbology to representations.

- c. Accept the defaults in the Convert Symbology to Representation window and click **Convert**.



- d. A roads_Rep file will appear in the Roads and Trails layer in the table of contents. Turn off the Roads file.



The roads_Rep is the file the cartographic representation will be applied to. The features of this file are now able to be manipulated for display purposes without altering any geometry.

e. In the TOC right-click on **roads_Rep** and select **Properties**. Click the **Symbology** tab.

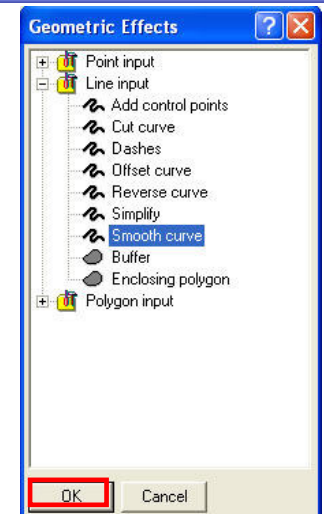
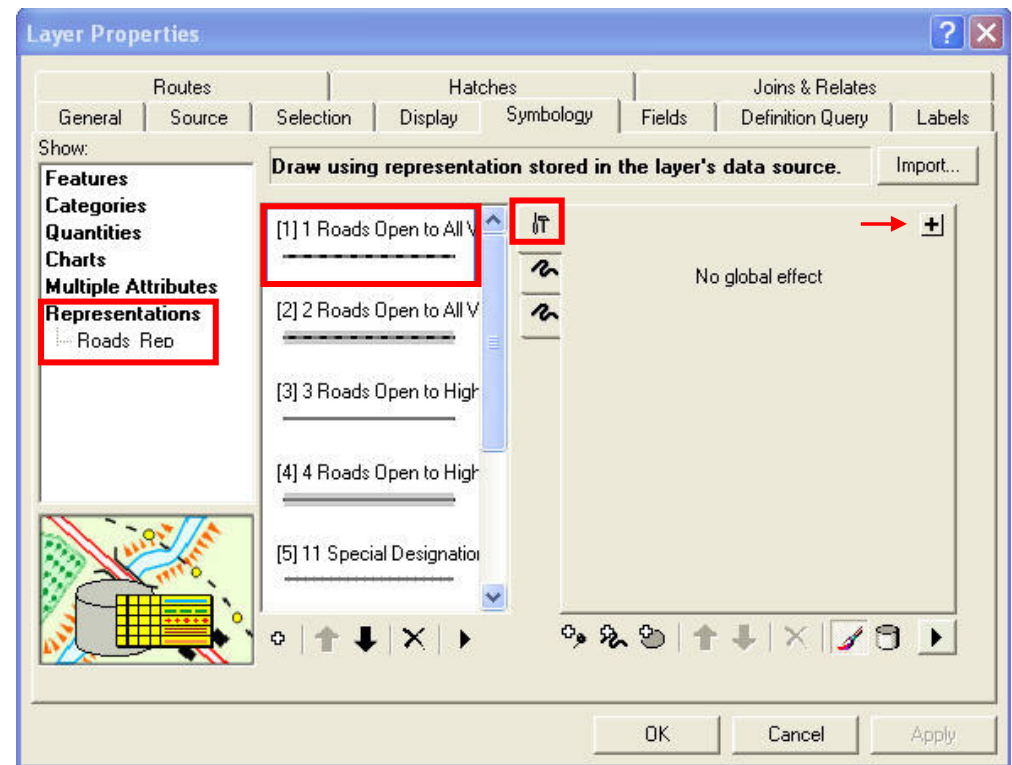
f. Select the **Roads Rep** representation rule and (1) **Roads Open to All Vehicles, Yearlong**. Click the **Global Effects** button .



g. Click the Add **Geometric Effect** and the add button.



h. In the **Geometric Effects** window, select **Smooth curve** and click **OK**. Notice the Smooth curve global effect has been added. Change the default **Flat tolerance** to 5 and click **OK**.

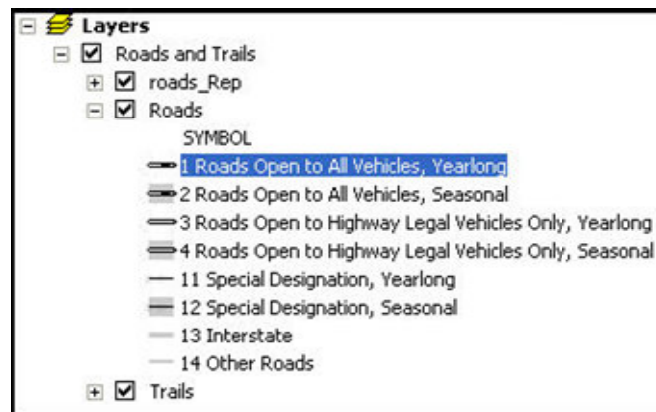


MVUM Symbolology and Samples

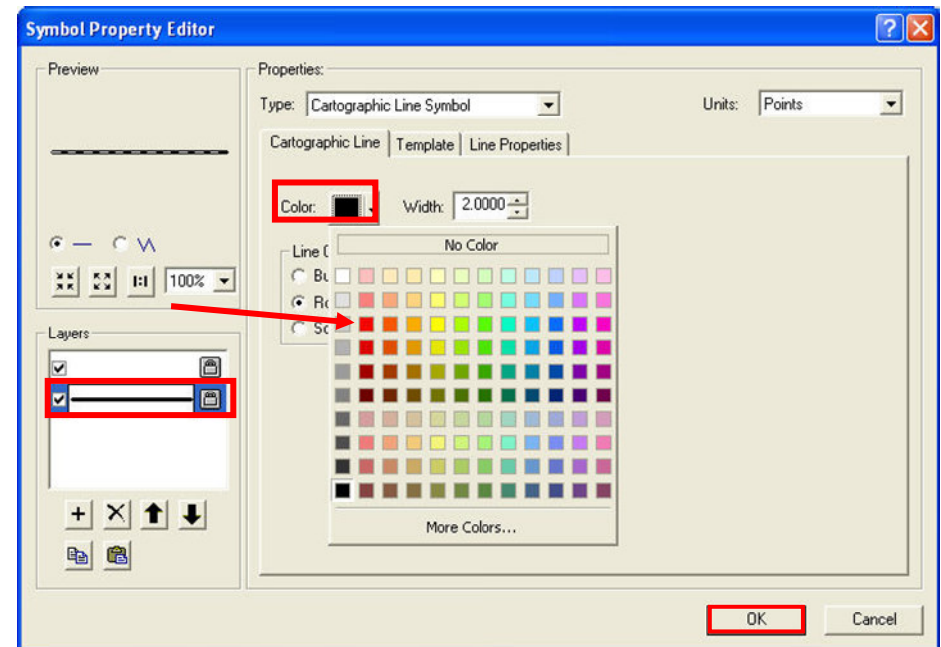
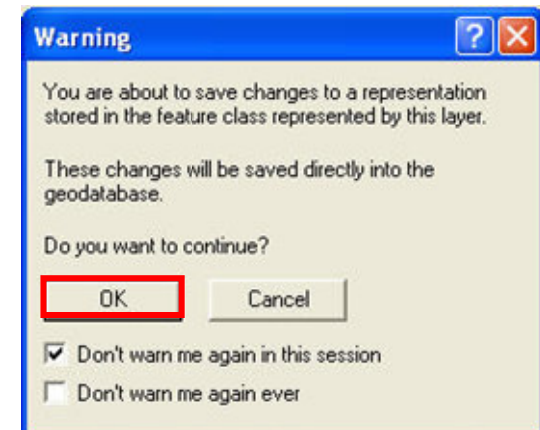
 **Note:** there are many options in the **Geometric Effects** window that allow for great enhancement and customization of cartographic representations.

Next you will customize a symbol.

- i. In the Warning box click **Don't warn me again in this session** and click **OK**.
- j. In the TOC, expand the **Roads** feature class and click on the symbol for **1 Roads Open to All Vehicles, Yearlong**

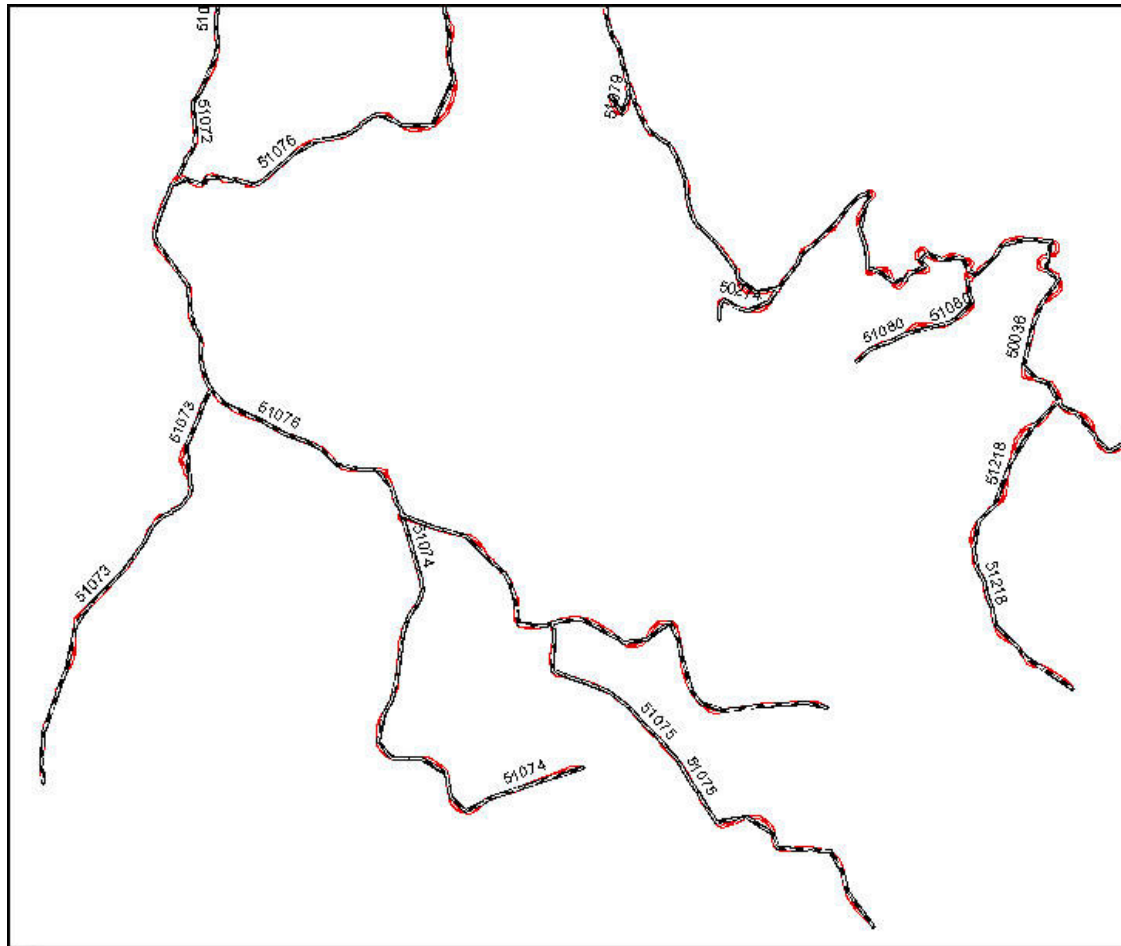



- k. In the Symbol Selector window select **Properties**. In the Symbol Property Editor window click on the **solid black symbol** in the **Layers** window. Click the **Color** drop down menu and select **Mars Red**. Click **OK** and **OK** again in the Symbol Selector window and **save** the map document.



MVUM Symbology and Samples

By **customizing the symbol** in the Roads file to red, you are now able to see how the Cartographic Representation applied to the roads_Rep symbol altered it's display. The red shows how the feature was displayed originally.




 **Note:** In the example above only the display is altered. The geometry of the feature class was not changed.

Step 4: Working with the Representation Toolbar

In this step you will be introduced to and work with the representation toolbar.

- On the Main menu bar, click **View → Toolbars → Representation** to turn on the Representation toolbar.
- On the Main menu bar, click **View → Bookmarks → Trailhead Representations**.

 **Note:** Only features displayed as a representation can be selected and modified using the tools on the Representation tool bar. The options on the toolbar will be grayed out if:

- The feature has not been converted to a representation
- The representation layer you wish to work with is not set as a selectable layer
- An Edit session has not been started

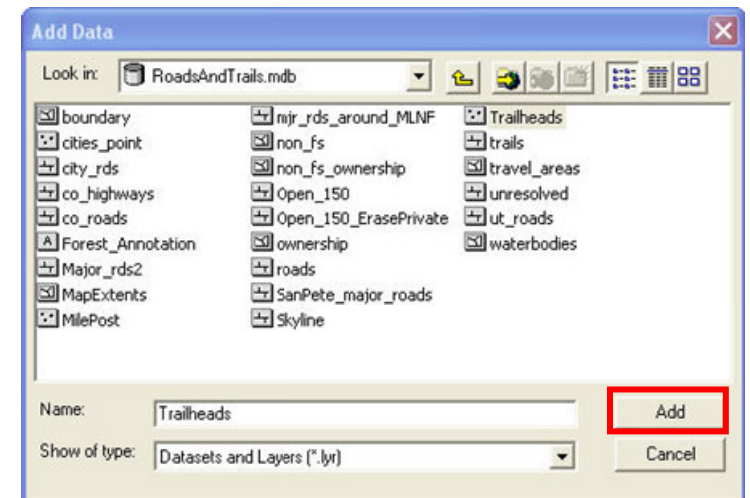
- Click the **Add Data** button in the standard toolbar. Navigate to the

C:/Training/Ex16/RoadsandTrails.mdb/Trailheads
feature class. Add this file.



- In the TOC, right-click on the **Trailheads** feature class and select **Convert Symbology to Representation**. Accept the default values and click **Convert**.

You should now see the Trailheads_Rep layer in the TOC.



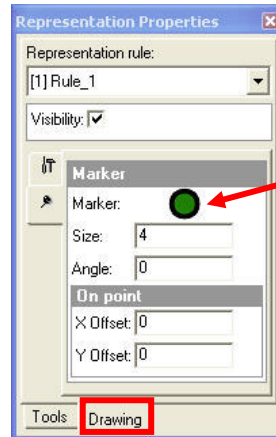
- e. Turn off the **Trailheads** layer.
- f. On the Main menu bar, click **View → Toolbars → Editor** to turn on the Editor toolbar. On the Editor toolbar, click **Editor → Start Editing**. On the Representation toolbar, click on the **Select Tool** button and select the point symbol located where road 50023 and trail 5413 begins.

- g. On the Representation toolbar, click the **Representation Properties** button to bring up the Representation Properties window.

- h. Select the **Drawing** tab if it isn't already selected. Click the **round marker** to launch the **Representation Marker Selector**.

- i. Click the **Properties** button. The **Marker Editor** launches.

- j. Click the existing marker (the circle) once and press the **Delete** key to delete the existing marker.



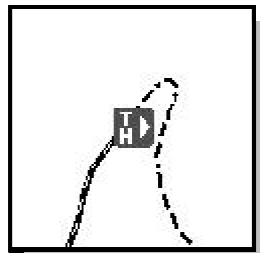
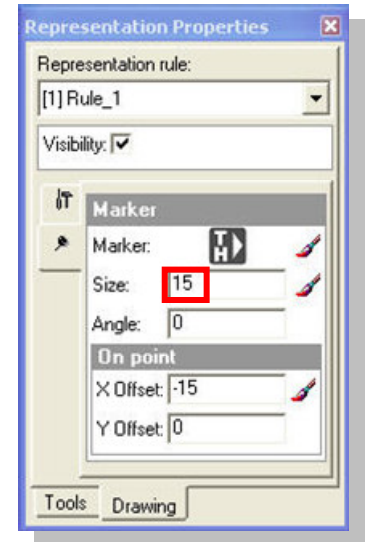
You have just deleted the generic symbol. Now you will use a standard trailhead symbol and offset it so it does not cover up existing line features.

- k. Click on the **A** button (not the dropdown arrow). In the **Font** dropdown, select **ESRI US Forestry 1**. For Unicode type **69**, Click **OK**. Click **OK** again to close the Representation Marker Selector window.

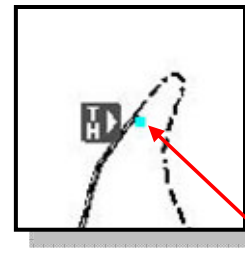
MVUM Symbology and Samples

1. Change the **Size** to **15** and the **X Offset** to **-15**.

The Offset properties allow you move the symbol of the feature while not changing its actual coordinate location. Some trailhead symbols may crowd, clutter or block out other features on the map. By offsetting the symbol using cartographic representation, the coordinates associated with that feature are accurate even though its location on the map has been manipulated for display purposes.



Before



After

Actual feature location

- m. **Close** the Representation window by clicking the in the top right corner.
- n. **Save** your map document

Step 5: Style Manager and importing Style Files

In this step you will be introduced to the Style Manager and become aware of the variety of symbols available.

- In the main menu click **Tools** → **Styles** → **Style Manager**.
- View the contents of the **ESRI.style** folder by clicking on the **+** next to it.

The ESRI.style folder contains all of the standard ESRI symbols and colors that can be assigned to features.

- Click on the **Scale Bars** folder.

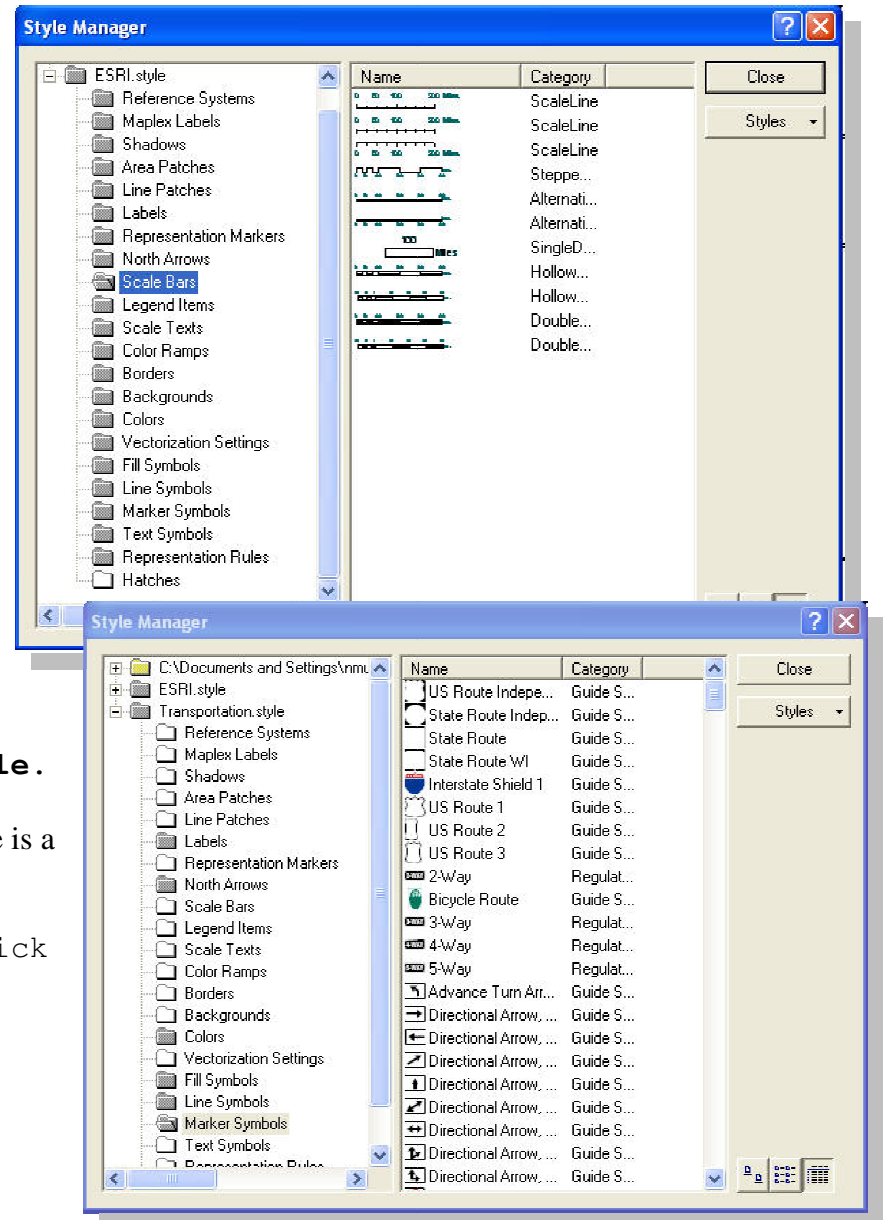
These are the default scale bars to select from when selecting one for a layout in ArcMap.

- Collapse the ESRI.style folder. Click the **Styles** button and click on **Transportation.style**.

This will add symbols specific to the transportation features. Now there is a transportation.style folder in the Style Manager TOC.

- Expand the Transportation.style folder and click on the **Marker Symbols** subfolder. (See image below)

Notice all of the symbols are road signs or transportation oriented. When working on a layout, the .style folders should be reviewed to find the most suitable symbols for the map.





Note: Only the styles loaded in the Style Manager are available to use in the ArcMap layouts.

Question:

2. What is the difference between the shaded and white folders?
-

Summary: In this exercise you were introduced to cartographic representation, customizing a symbol, and the style manager. Although little symbology customization is required with MVUMs, for the occasions where it is needed, cartographic representation can be the right solution.

End Exercise.