GISsurfer
Advanced ArcGIS Tips
By: Joseph Elfelt, contact

This PDF file is online at
https://mappingsupport.com/p2/help/GISsurfer-advanced-arcgis-tips.pdf

The GISsurfer homepage is at
https://gissurfer.com

Table of contents

1. Introduction

In addition to displaying data hosted on ArcGIS servers, GISsurfer can also tell those servers to restyle the data before it appears on the map. **This PDF assumes you have working knowledge for making GISsurfer map links that display ArcGIS data.** If you need a refresher, then open the GISsurfer website https://gissurfer.com and click Menu > Help. Take a look at the PDF file "How to use the &data parameter". There is a section in that PDF showing how to display ArcGIS data.

Some ArcGIS MapServer layers (but not all of them!) support a feature called "**dynamic layers**". This is an extremely useful feature since it means GISsurfer can tell the ArcGIS server to restyle the data. The instructions and examples below walk you through that process.

You can also make GISsurfer map links that only display some of a MapServer or FeaturerServer layer instead of displaying all of the data in the layer.

Layers can be made semi-transparent and labels can be turned off.

Finally, custom labels can be made for MapServer layers that support dynamic layers.

As you learn about using these features, keep in mind that it is the **layer number** on the ArcGIS server that is important, not the layer name.

2. Restyling lines

Here is a link for the **ArcGIS server table of contents** that shows the main layer of trail data for the U.S. Forest Service (USFS):
https://apps.fs.usda.gov/arcx/rest/services/EDW/EDW_TrailNFSPublish_01/MapServer

Open the above link and scroll to near the bottom of the page. Note where it says **"Supports Dynamic Layers: true"**. This means that GISsurfer can restyle this data.

The following map displays this USFS trail layer using the default styling defined on the ArcGIS server. The trails are easy to see on the basemap that is used when the map opens. But if you change the basemap to an aerial or the scanned topo then you will notice that it is much harder to see the trail data.

https://mappingsupport.com/p2/gissurfer.php?center=39.081849,-120.182877&zoom=11&basemap=USA_basemap&overlay=USFS_trail&data=overlay^name=USFS_trail^url=https://apps.fs.usda.gov/arcx/rest/services/EDW/EDW_TrailNFSPublish_01/MapServer^layers=0

Follow these steps to use the ArcGIS server's table of contents to see the details for the **default styling** the ArcGIS server applies to the trail data.

1. Open the ArcGIS server's table of contents for this data layer. See link above.
2. Find the "Layers" heading and click on the layer name - "National Forest System Trails".
3. Find the section heading "Drawing Info:". That section defines the **default styling**. Here is a description of that styling information.

Style: esriSLSSolid This style will draw a solid line. You can also make lines using dots, dashes and combinations. For the allowed values for 'style' see: https://developers.arcgis.com/web-map-specification/objects/esriSLS_symbol/

Color: [0, 0, 0, 255] [red,green,blue,transparency]. An RGB value of 0,0,0 is black and 255 means no transparency (i.e, solid black). The Leaflet map API (which is used by GISsurfer) treats the transparency value more like vibrance. I leave transparency at either 255 or 0. Setting transparency to 0 has the effect of making the data not visible. A different section of this PDF will show you how to making a GISsurfer map with semi-transparent data.

Width: 1 1 pixel wide.

Thus the default styling for the USFS trail data is a black line 1 pixel wide.

Below is a GISsurfer link with dynamicLayers syntax that tells the ArcGIS server to make the trail data green and 2 pixels wide. Everything within the square **[ ]** brackets is part of the

dynamicLayers syntax. When you are restyling **line data**, the only things you will change are the items in yellow. Note that the **layer number** (from the ArcGIS server table of contents) appears in 3 places. Also, layer numbers start with zero instead of starting with 1.

https://mappingsupport.com/p2/gissurfer.php?center=39.081849,-120.182877&zoom=11&basemap=USA_basemap&overlay=USFS_trail&data=overlay^name=USFS_trail^url=https://apps.fs.usda.gov/arcx/rest/services/EDW/EDW_TrailNFSPublish_01/MapServer^layers=**0**^**dynamicLayers**=[{"ID":**0**,"source":{"type":"mapLayer","mapLayerId":**0**},"drawingInfo":{"renderer":{"type":"simple","symbol":{"type":"esriSLS","style":"**esriSLSSolid**","color":[**0,255,0,255**],"width":**2**}}}}]

The next map uses dots for the trails.

https://mappingsupport.com/p2/gissurfer.php?center=39.081849,-120.182877&zoom=11&basemap=USA_basemap&overlay=USFS_trail&data=overlay^name=USFS_trail^url=https://apps.fs.usda.gov/arcx/rest/services/EDW/EDW_TrailNFSPublish_01/MapServer^layers=**0**^**dynamicLayers**=[{"ID":**0**,"source":{"type":"mapLayer","mapLayerId":**0**},"drawingInfo":{"renderer":{"type":"simple","symbol":{"type":"esriSLS","style":"**esriSLSDOT**","color":[**255,0,0,255**],"width":**2**}}}}]

A technique that you might find useful is to **display the same data twice**. The next map displays the USFS trail data first as a wider bright green line and then as a narrower black line. The **&overlay=** parameter in the map link controls the order by which the two overlays are displayed. If you open this map and zoom in then you will notice how easy it is to see the trails on different basemaps. Note that **different layer names** are used,

https://mappingsupport.com/p2/gissurfer.php?center=39.081849,-120.182877&zoom=11&basemap=USA_basemap**&overlay=USFS_trail_green,USFS_trail_black**&data=overlay^name=**USFS_trail_green**^url=https://apps.fs.usda.gov/arcx/rest/services/EDW/EDW_TrailNFSPublish_01/MapServer^layers=**0**^**dynamicLayers**=[{"ID":**0**,"source":{"type":"mapLayer","mapLayerId":**0**},"drawingInfo":{"renderer":{"type":"simple","symbol":{"type":"esriSLS","style":"**esriSLSSolid**","color":[**102,255,0,255**],"width":**3**}}}}]||overlay^name=**USFS_trail_black**^url=https://apps.fs.usda.gov/arcx/rest/services/EDW/EDW_TrailNFSPublish_01/MapServer^layers=**0**^**dynamicLayers**=[{"ID":**0**,"source":{"type":"mapLayer","mapLayerId":**0**},"drawingInfo":{"renderer":{"type":"simple","symbol":{"type":"esriSLS","style":"**esriSLSSolid**","color":[**0,0,0,255**],"width":**1**}}}}]

The value for width does not have to be an integer. Sometimes I will make the wide line 3.25 and use 1.25 for the narrow line.

The next example will use a USFS ArcGIS layer that shows closed roads. It is layer number 1 at: https://apps.fs.usda.gov/arcx/rest/services/EDW/EDW_RoadBasic_01/MapServer

Here is a map that displays the default styling for this layer. Note that these closed roads have **labels**.

https://mappingsupport.com/p2/gissurfer.php?center=47.374676,-121.343393&zoom=14&basemap=USA_basemap&overlay=USFS_closed_roads&data=overlay^name=USFS_closed_roads^url=https://apps.fs.usda.gov/arcx/rest/services/EDW/EDW_RoadBasic_01/MapServer^layers=1

The next map restyles this layer by displaying red dashes for the USFS closed roads and **turns the labels off**. Note that there is no need to use the same name that the server uses for the layer.

https://mappingsupport.com/p2/gissurfer.php?center=47.374676,-121.343393&zoom=14&basemap=USA_basemap&overlay=USFS_closed_roads&data=overlay^name=USFS_closed_roads^url=https://apps.fs.usda.gov/arcx/rest/services/EDW/EDW_RoadBasic_01/MapServer^layers=**1**^**dynamicLayers**=**[**{"ID":**1**,"source":{"type":"mapLayer","mapLayerId":**1**},"drawingInfo":{"renderer":{"type":"simple","symbol":{"type":"esriSLS","style":"**esriSLSDash**","color":[**255,0,0,255**],"width":**1.5**}},**"showLabels":false**}}**]**

3. Restyling polygons

NOAA has an ArcGIS layer that displays forecast zones. The attribute data includes a link to the detailed forecast discussion. It is layer number 1 at:
https://nowcoast.noaa.gov/arcgis/rest/services/nowcoast/forecastdiscussion_meteoceanhydro_zones_geolinks/MapServer

Here is a GISsurfer map that displays this layer with the default styling defined on the ArcGIS server. Note that a shorter layer name is used and that the polygons have **solid fill**. To read the forecast discussion, **click the map and follow the link**.

https://mappingsupport.com/p2/gissurfer.php?center=35.924965,-99.492187&zoom=4&basemap=USA_basemap&overlay=NOAA_forecast_discussion&data=overlay^name=NOAA_forecast_discussion^url=https://nowcoast.noaa.gov/arcgis/rest/services/nowcoast/forecastdiscussion_meteoceanhydro_zones_geolinks/MapServer^layers=1

If you open the above ArcGIS server table of contents page, click on layer 1 and scroll down to "Drawing Info" then you will see the following default styling.

Style: esriS**F**SSolid	Polygons can have solid fill, no fill or fill with various kinds of lines. For allowed values for "style" see: https://developers.arcgis.com/web-map-specification/objects/esriSFS_symbol/
Color: [255, 190, 190, 255]	Already described - see the section above on restyling lines. To turn polygon fill off you could set the last value to 0, however I recommend you do **[0,0,0,0]** since it is more obvious when you sometime later look at your GISsurfer map link.

Outline:	This is an line around the polyon. The two settings below work exactly the same way as restyling lines.
Style: esriSLSSolid	Already described - see the section above on restyling lines.
Color: [255, 0, 0, 255]	To turn the polygon outline off you could do **[0,0,0,0]**
Width: 2	Another way to turn the outline off is to set width to 0.

Below is a GISsurfer map link that uses dynamic layers to (1) turn fill off , (2) change the outline color to black and (3) turn the labels off.

https://mappingsupport.com/p2/gissurfer.php?center=35.924965,-99.492187&zoom=4&basemap=USA_basemap&overlay=NOAA_forecast_discussion&data=overlay^name=NOAA_forecast_discussion^url=https://nowcoast.noaa.gov/arcgis/rest/services/nowcoast/forecastdiscussion_meteoceanhydro_zones_geolinks/MapServer^layers=**1^dynamicLayers=[**{"ID":**1**,"source":{"type":"mapLayer","mapLayerId":**1**},"drawingInfo":{"renderer":{"type":"simple","symbol":{"type":"esriSFS","style":"**esriSFSSolid**","color":[**0,0,0,0**],"outline":{"type":"esriSLS","style":"**esriSLSSolid**","color":[**0,0,0,255**],"width":**1.5**}}},**"showLabels":false**}}**]**

The next example uses an ArcGIS layer showing Bureau of Land Management wilderness areas. It is layer 0 at https://gis.blm.gov/arcgis/rest/services/lands/BLM_Natl_NLCS_WLD_WSA/MapServer.

Here is a map showing the default styling. Note the **solid fill**.

https://mappingsupport.com/p2/gissurfer.php?center=34.753206,-116.411133&zoom=8&basemap=USA_basemap&overlay=BLM_wilderness&data=overlay^name=BLM_wilderness^url=https://gis.blm.gov/arcgis/rest/services/lands/BLM_Natl_NLCS_WLD_WSA/MapServer^layers=0

The next map displays this same ArcGIS layer **twice**. First, the Leaflet map API is used to make the fill **semi-transparent**. Second, dynamic layers are used to display the layer with **no fill and a solid outline**. The layer is displayed twice since an "opacity" setting affects both the polygon fill and polygon outline. Note that **different layer names** are used.

Two vertical lines || are used to separate the definition of the two overlays. The opacity setting is part of the Leaflet map API and can be used whether or not a layer supports dynamic layers.

https://mappingsupport.com/p2/gissurfer.php?center=34.753206,-116.411133&zoom=8&basemap=USA_basemap&overlay=**BLM_wilderness_fill,BLM_wilderness_outline**&data=overlay^name=**BLM_wilderness_fill**^url=https://gis.blm.gov/arcgis/rest/services/lands/BLM_Natl_NLCS_WLD_WSA/MapServer^layers=**0^opacity=0.15**||overlay^name=**BLM_wilderness_outline**^url=https://gis.blm.gov/arcgis/rest/services/lands/BLM_Natl_NLCS_WLD_WSA/MapServer^layers=**0^dynamicLayers=[**{"ID":**0**,"source":{"type":"mapLayer","mapLayerId":**0**},"drawingInfo":{"renderer":{"type":"simple","symbol":{"type":"esriSFS","style":"**esriSFSSolid**","color":[**0,0,0,0**],"outline":{"type":"esriSLS","style":"**esriSLSSolid**","color":[**0,0,0,255**],"width":**1.5**}}}}}**]**

4. Restyling symbols

NOAA has an ArcGIS layer that displays coastal gages. The attribute data includes a link to near real time water and weather observations. It is layer number 0 at:
https://idpgis.ncep.noaa.gov/arcgis/rest/services/NOS_Observations/CO_OPS_Stations/MapServer

Here is a GISsurfer map that displays this layer with the default styling defined on the ArcGIS server. To see the data collected by a gage, **click a symbol and follow the link**.

https://mappingsupport.com/p2/gissurfer.php?center=36.985003,-100.019531&zoom=4&basemap=USA_basemap&overlay=Coastal_gage&data=overlay^name=Coastal_gage^url=https://idpgis.ncep.noaa.gov/arcgis/rest/services/NOS_Observations/CO_OPS_Stations/MapServer^layers=0

If you open the above ArcGIS server table of contents page, click on layer 0 and scroll down to "Drawing Info" then you will see the following default styling.

Style: esriSMSCircle	For allowed values for "style" see: https://developers.arcgis.com/web-map-specification/objects/esriSMS_symbol
Color: [0, 123, 128, 255]	Color of fill inside the symbol. Meaning of numbers already described.
Size: 4.0	Symbol size.
Angle: 0.0	
XOffset: 0	
YOffset: 0	
Outline:	
[0, 0, 0, 255]	Color for a line around the symbol
Width: 1	Width of the line around the symbol

Below is a GISsurfer map link that uses dynamic layers to change the symbol style and color. Note that the **outline is turned off**.

https://mappingsupport.com/p2/gissurfer.php?center=36.985003,-100.019531&zoom=4&basemap=USA_basemap&overlay=Coastal_gage&data=overlay^name=Coastal_gage^url=https://idpgis.ncep.noaa.gov/arcgis/rest/services/NOS_Observations/CO_OPS_Stations/MapServer^layers=0^dynamicLayers=[{"ID":0,"source":{"type":"mapLayer","mapLayerId":0},"drawingInfo":{"renderer":{"type":"simple","symbol":{"type":"esriSMS","style":"esriSMSCross","color":[255,0,0,255],"size":8,"outline":{"color":[0,0,0,0],"width":0}}}}]

5. Displaying only part of a MapServer layer

To be added.

6. Displaying only part of a FeatureServer layer

To be added.

7. Customizing labels

To be added.

8. More example GISsurfer maps

Here is how to see more examples of the features described in this PDF. Open any GISsurfer map, click Menu and select recreation, fire or weather maps. Each of those map links includes a **&data=** parameter that points to a txt file. Copy that txt file link and paste it into a browser. You will see the contents of that txt file and can scroll down to see the syntax that was used for each of the overlay layers that the map can display.