GISsurfer
Tips For Surfing ArcGIS Servers

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

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1. About GISsurfer

GISsurfer (https://gissurfer.com) is a general purpose web map with broad support for displaying data hosted on various kinds of geographic information system (GIS) servers. For a list of **video and PDF tutorials** see https://mappingsupport.com/p2/gissurfer-help.html.

2. Introduction to surfing ArcGIS data

Government agencies at all levels are hosting vast amounts of data on GIS (Geographic Information System) servers. Most of these servers are public-facing. In other words, login credentials are not required. Anyone with the right software can look at that data. Whether you are interested in recreation, weather, travel, government, farming, business, disasters or just about anything else, there likely are data layers on an GIS server that you would enjoy seeing on a map.

GISsurfer makes it super easy for anyone to browse through the **table of contents** for an ArcGIS server, click on a data layer and see that information on the map. No prior GIS knowledge or experience is required. **You can add multiple layers to the map from multiple GIS servers and then save a link that will replicate your map.**

There are of course a few things to know about this feature that will make your life easier. To get the most benefit from this ability to surf data that is hosted on ArcGIS servers, please take a few minutes to read through these tips.

3. List of ArcGIS server addresses

In order to display data from an ArcGIS server on a map, you need to know the internet address of the server. I curate the following list of **3,000+ addresses** for USA-based government ArcGIS servers. There are servers from the federal level down to the local level. Each address that includes **"rest/services"** will open the table of contents for an ArcGIS server. All addresses are scanned by my code once per week and any bad addresses are either fixed or flagged. An updated list is usually posted every Wednesday.
https://mappingsupport.com/p/surf_gis/list-federal-state-county-city-GIS-servers.pdf

If you want to copy a "rest/services" address from this list and start surfing data with GISsurfer, then great - go for it. But if you are new to GIS then I highly recommend you finish reading the rest of these tips before you start surfing.

The table of contents for an ArcGIS server is a **series of web pages** that are hosted on that server. When I am exploring a new server to get a feel for the kind of data it contains I copy the link from my server list and open that web page with my browser. This web page is the 'top' of the table of contents.

Sometimes the 'top' page has a list of GIS layers that GISsurfer can display. Other times I have to drill down one or two steps in order to see a list of layers that can be displayed. When I find an interesting page in the ArcGIS server's table of contents then *that* is the address I open with GISsurfer.

Here is another way to use the list of ArcGIS server addresses. Assume you want to know if a specific ArcGIS server has data on trails. Simply do a **Google advanced search** like so:

trails site:_____

Replace the underline with the internet address for the server. If you get a hit then click that link and a page from the server's table of contents will open. Now you can copy the address for that page from your browser bar and paste that address into GISsurfer to open the sidebar. Whatever you might be interested in (parks, fishing, campgrounds, "boat launch", climate, carbon, etc) you can do a Google advanced search to see if a specific ArcGIS server has any data layers that meet your search criteria.

4. How to read the table of contents of an ArcGIS server

Before you jump into surfing GIS data, it will help you a lot if you become more familiar in general with the information contained in the table of contents of an ArcGIS server. This section focuses just on the pieces of information in the table of contents that you will likely find to be the most useful.

Action: Click the following table of contents link. Notice that the address ends in "rest/services" which indicates that this is the 'top' of the table of contents for this server. This is a **demonstration server** that is maintained by ESRI. That is the company that produces the ArcGIS software that runs the servers. Most USA-based government agencies use ESRI software.
https://sampleserver6.arcgisonline.com/arcgis/rest/services

Note that at least some of the data on "sampleserver6" is not real. Instead, this data was 'made up' for demonstration purposes.

The table of contents for an ArcGIS server can have up to 3 levels of organization that are named as follows:

Folders (optional)
- **Services** (optional)
  - **Layers** (required)

A GIS server for a large government agency might have all three levels of organization and if you start at the top of the server's table of contents then you will need to drill down to get to the layers. By contrast, the GIS server for a small government agency might have just a single set of layers. When you open the sampleserver6 table of contents you will see a list of folders followed by a list of services.

As you navigate down and up through the table of contents, notice the **names** for the folders, services and layers. Hopefully you will see full words used for those names. Names that are full words make it much easier for anyone to know the nature of the data that will be displayed. Unfortunately too many servers use folder, service and/or layer names that are **cryptic abbreviations**.

Action: Using sampleserver6, click the folder "LocalGovernment". Notice that you get a list of services and each one has a both a **FeatureServer** version and **MapServer** version. I always pick the MapServer version which means the GIS server will send data to the map in the form of images (referred to as "tiles"). Each tile is most likely a png file. By contrast, if you pick FeatureServer then the GIS server sends the map latitude longitude coordinates and related data. There are other technical reasons why I recommend **you should always pick MapServer** when that option is available.

GISsurfer can display the three most common types of services which are:

MapServer
FeatureServer
ImageServer (often aerial photos)

There are other types of services (for example - GPServer) that GISsurfer does not support. When you are surfing GIS data with GISsurfer, you will only see services that GISsurfer supports.

Action: Using sampleserver6, click the service "LocalGovernment/Recreation (MapServer)". Below are the noteworthy things on the table of contents page you now see.

The second line on the page has a series of links. You can always navigate 'up' the table of contents by clicking those links.

The name of the service you clicked (LocalGovernment/Recreation) is shown in large bold type followed by the type of service "(MapServer)".

Service Description
This is intended to briefly describe the data layers. But way too often this entry is blank. The ArcGIS servers operated by NOAA often have extensive descriptions.

Legend
The legend is another webpage that is hosted on the GISserver. It shows the **default styling** defined on the GIS server for each layer. When you make a map that shows GIS data it is usually a good idea to provide a way for people looking at your map to see the legend for the various layers that your map can display.

Dynamic All Layers
Underneath the legend link you *might* see the phrase "Dynamic All Layers". This phrase means that software that displays the data layers listed on this page can restyle the data. Examples of restyling include changing line color, line width, fill color, turning fill off and more. Typically an ArcGIS server will either (1) not support dynamic layers at all since it puts more load on the server or (2) only support dynamic layers for some of the data that the server is hosting. **GISsurfer supports dynamic layers for those servers that have enabled this feature**. However, this is an advanced topic and will be covered in sometime in the future with a separate PDF file.

Layers
Here you will see a **list of each layer that GISsurfer can display on the map**. Sometimes there will be a single layer, other times there will be a list. Layers are numbered starting with **0**. **Layer numbers** are a lot more important than layer names.

Single Fused Map Cache
Usually this will be "false" which indicates that you can display each "layer" as a separate overlay on the map. But if this is "true" then all of the layers listed will display as a single overlay on the map.

Min Scale and Max Scale
If these are both 0 then the layers listed on this page can be displayed on the map at every zoom level. However, if either one is not 0 then you might have to zoom in or zoom out before the data will appear on the map.

Action: Using sampleserver6, click the layer "Facilities (0)" and a new page appears.

Scroll to near the bottom of this page and find the heading "**Fields**". Under this heading is a list of **attribute names**. If you add this layer to a GISsurfer map and then click one of the symbols that appears on the map, then you will see a display that shows these attribute names and their values. Sometimes the attribute data includes a **link that leads to more information**. All this attribute data is hosted on the GIS server.

The **attribute data** can easily convey more information than the information conveyed just by the symbology you see on the map. For example, open any GISsurfer map, zoom in a bit anywhere in the USA and then turn on the built-in "Congressional districts" overlay. After this overlay data appears on the map, then click any district and notice all the useful attribute data that is displayed.

Reminder: When a GISsurfer map displays multiple layers of GIS data, only the **'top' layer** can be clicked to display the attribute data for the thing that you clicked.

5. GISsurfer menu item "Add GIS overlays"

If you are new to GIS then I say "welcome" and I encourage you to **read the prior section** before you start adding layers to a GISsurfer map.

If you are in the USA then here is a link that opens GISsurfer with the "USA basemap" displayed and showing most of the 'lower 48' states.
https://mappingsupport.com/p2/gissurfer.php?center=38.582709,-98.789062&zoom=5&basemap=USA_basemap

To open the "Add GIS overlays" interface screen, click the basemap button (next to the "Menu" button). Then look under the "Overlay" heading (mobile users scroll down) and click "**Add GIS overlays**".

This interface screen lets you:

- **Send request to GIS server**
  Enter an ArcGIS server address in the window and then click this button to open the sidebar. You are not limited to only entering the 'top' address for the table of contents. You can enter an address for anywhere within the table of contents.

- **Prior GIS sidebar**
  Open the prior sidebar. This feature applies to the current GISsurfer session and provides an easy way to re-open the most recent sidebar. When you start a new GISsurfer session, there is no "prior" sidebar.

- **Test**
  Enter an ArcGIS server address in the window and then click this button to see if the server is in working order. If a server does not seem to be responding then this feature might display some useful information. Another thing you can do is simply try browsing to the server's table of contents.

- **Help**
  Display help for this screen

6. GISsurfer menu item "Manage GIS overlays"

To open this interface screen, click the basemap button (next to the "Menu" button). Then look under the "Overlay" heading (mobile users scroll down) and click "**Manage GIS overlays**".

This interface screen lets you:

- **Display sidebar**
  Display a list of all the ArcGIS layers that the map can display. Click a layer and the sidebar will open and show the ArcGIS server table of contents page which includes that layer. This list is in three parts depending on how the layers was added to the map.

- **Delete overlays**
  Display a list that only shows the overlays that have been added to the map via the sidebar. Only overlays that you added to the map via the sidebar can be deleted from the map. You cannot delete any of the overlays that are built-in to GISsurfer or overlays that were added to the map via the GISsurfer link that opened the map..

- **Help**
  Display help for this screen

7. GISsurfer sidebar

a. General sidebar tips

There are two ways to open the sidebar. **First**, use the interface screen "Add GIS overlays" and enter a 'table of contents' address for any ArcGIS server or click the 'prior' button. **Second**, use the interface screen "Manage GIS overlays" to display a list of all the GIS overlays that have been added to the map and select one of them.

Using the sidebar you can:

- Go down a level in the table of contents by clicking a **folder name** or **service name**.

- Go up one level or go up to the top of the table of contents.

- Click a **checkbox** to **add** that overlay to the map. A checkbox indicates data you can display on the map. Each time you add an overlay to the map is becomes the 'top' overlay. If you click the map on any of the

symbology from the 'top' overlay then you will see a display with all the **attribute data** the GIS server has for the thing that you clicked.

- It may take a few seconds (or longer) for the data to appear on the map. It depends on how busy the GIS server is and the speed of your internet connection. Also, you might need to pan the map to a different location and zoom in or zoom out before the data will appear.

- Click the checkbox again to **delete** that overlay from the map. **You can only delete overlays that you added via the sidebar.** The built-in overlays and any overlays added to the map via a text file are shown in the sidebar with a **red background** and cannot be deleted from the map.

- Display the legend. This option is available when the sidebar is showing a list of MapServer layers. The legend is simply a web page that is hosted on the ArcGIS server. It shows how each layer will appear on the map.

- Display that table of contents page directly from the ArcGIS server. For example, you might want to do this so you can see the list of attribute data for a certain layer.

- Delete all the overlays you added to the map by using **this sidebar**. This feature only applies to the portion of the server's table of contents that is displayed in the **current sidebar**. Overlays with a **red background** cannot be deleted from the map since those overlays are built-in to GISsurfer or were added to the map by a text file.

- **Get help**

b. Deleting an overlay versus turning an overlay off

If you "delete" an overlay from the map then it is gone. In order to get that overlay back on the map during your current GISsurfer session you would need to open the sidebar and click that layer name. By contrast, if you click the basemap button on the map (next to the "Menu" button) and look under the "Overlay" heading (mobile users scroll down), then you will see a list of the overlays the map can display. Overlays that are currently displayed on the map have a number in front. Click an overlay to turn it 'on'. Click it again to turn it 'off'.

Turning an overlay 'off' and then back 'on' will make that one the **'top'** overlay. Data that appears on the map for that overlay can then be clicked to display all the **attribute data** the ArcGIS server has for the thing that you clicked.

c. Nesting

Lots of ArcGIS servers have MapServer layers that are nested. If the GISsurfer sidebar is displaying nested layers and you click a parent layer, then the parent and all the children layers will be checked and data for all the children layers will appear on the map as a **single overlay**.

Alternatively, instead of clicking the parent layer in the sidebar you could click each lowest level child layer. Each layer you click will become a separate overlay on the map. This approach lets you individually turn those child layers on/off and restack them in different ways.

d. Fused cache

If you see the message "fused cache" in the sidebar, then clicking any layer will turn all layers on. There is no way to display the individual layers unless you can find them in a different place within the table of contents for that ArcGIS server.

e. "Request sent to GIS server"

Each time you display a new table of contents page in the sidebar, GISsurfer has to get that data from the GIS server. While that is happening, you will see the message "Request sent to GIS server". **That sidebar information is then saved by GISsurfer.** If you display that same table of contents page **during your current GISsurfer session**, then a trip to the GIS server is not needed. Instead, the sidebar will immediately appear.

8. Back button

Do not use your 'back' button anywhere in GISsurfer. Either nothing will happen or GISsurfer will close and the prior web page you were looking at in this browser tab will appear.