

Google Map Viewer Lets Anyone Surf GIS Data

Gmap4 Beta version 9.0 June 22, 2018

by Joseph Elfelt

For questions and feedback you can reach me at jelfelt@mappingsupport.com or 425-881-8017 (9a.m. - 8p.m. pacific time). I welcome all comments, bug reports and suggestions for improvements. And if you know of any web apps that provide a similar **GIS surfing feature**, I would enjoy hearing about them.

New in the June 22 beta

1. The GIS surfing feature now works on all devices, including cell phones.
2. You can now display data from GIS servers where the layer numbers are not sequential.

Screenshot: https://mappingsupport.com/p/surf_gis/screenshot_1.jpg

Launch beta version of Gmap4: https://mappingsupport.com/p/gmap4_beta_9-0.php

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Concept

There is a vast amount of open GIS (Geographical Information System) data on public-facing ArcGIS servers operated by all levels of government. The purpose of this new Gmap4 feature is to provide an *easy* way for anyone to surf that data using an interface built on the familiar Google maps. **The primary target audience is people with little to no knowledge about GIS.** In particular I am hoping that students in middle school and high school use this GIS surfing feature to explore geospatial data for their own community. Public data can be found on the ArcGIS servers operated by many cities and counties. See the “Quick start” section below for a PDF file with 600+ addresses for government GIS servers.

Big picture

Gmap4 has 5 permanent built-in overlays. This GIS surfing feature lets you **add/delete GIS overlays**. When an overlay is added to the map it is automatically ‘on’ and also the ‘top’ layer. If you click an overlay that you just added to the map then you will see a display with all the **attribute data** the GIS server has for the thing that you clicked. See below for more information about working with overlays.

Main work remaining before production release

1. Update interface for ‘Directions’.
2. Update interface for ‘Draw and save’.
3. Update documentation.

Limitations

1. Currently this feature only displays **MapServer** and **ImageServer** data. Support for **FeatureServer** data will be added in a future update after the initial production release of this GIS surfing feature.
2. A future update will also likely add support for WMS tiles, WMTS tiles and XYZ tiles.

Quick Start (for a more detailed step-by-step, see the last section of this file)

1. Click the basemap button (next to the “Menu” button)
2. Click “Add GIS overlays”. A text input box appears.
3. Enter the internet address of any ArcGIS server and click “Send request to GIS server”. If you do not know any addresses then here is a list I am curating with the addresses for **600+ federal, state, regional, county and city ArcGIS servers with open data.**
https://mappingsupport.com/p/surf_gis/list-federal-state-county-city-GIS-servers.pdf
4. When the sidebar opens, drill down until you see checkbox(es).
5. Check a box to add that data to the map
6. Currently you need to manually zoom and pan so the GIS data appears on your screen.
7. Uncheck the box to remove data from the map.
8. **To add data to the map from another server**, close the sidebar and repeat steps 1-5.

Tip: Sometimes you will be able to find useful data faster if you click on any GIS server address so its table of contents opens in your browser. Then drill down on the various **folders and services** until you find data you would like to see on the map. Look at your browser tab and copy the address for that table of contents page. Follow the “Quick start” instructions up to step 3 and then paste in that address.

You should be able to add a maximum of 35 overlays.

Text input box

You can enter the internet address for any page that is part of an ArcGIS server’s table of contents. Even if you enter the full address for a specific data layer, the sidebar will still appear. The reason is to educate people - particularly GIS newbies - to the concept of **surfing up/down through an ArcGIS server’s table of contents.**

Sidebar

1. You can navigate up and down the GIS server’s table of contents.
2. Checkboxes for **ImageServer** data appear one level higher in the sidebar than checkboxes for **MapServer** data
3. The sidebar always displays a link that will open the actual table of contents page as hosted by the ArcGIS server. This allows the user to check for any useful **metadata.**
4. When the sidebar displays **MapServer** layers then there is a button that will display the corresponding **legend** for those layers.

Overlay Menu

Click the basemap button (next to the “Menu” button) and look under the “Overlay” heading. You will see five permanent hardcoded overlays. **Those are followed by any GIS data that you add to the map.**

The **highest numbered overlay** is on ‘top’ and can be clicked to display all the **attribute data** the GIS server has for the thing that you clicked. Sometimes the attribute data has a link that leads to more information. This can be extremely useful.

Clicking an overlay name will toggle it on/off. Toggling an overlay off does not delete the overlay from the map. You can click the overlay name again to turn it back on. Turning an overlay off and then back on will move the overlay to the ‘top’ of the stack.

GIS data you add to the map will always be an overlay. To make an overlay simulate a basemap, change the basemap to “awb - All white basemap”.

Manage GIS Overlays

Click the basemap button and look under the “Overlays” heading. One of the choices near the top says “Manage GIS overlays”. That option will display an interface screen that lets you delete one or more overlays from the map. You can also select an overlay and then view the same sidebar that you used when you added that overlay to the map.

Save your map

After you add some GIS overlays to the map you can save a link that will start Gmap4 and include the GIS overlays you added.

1. Make the map look on your screen the way you want it to look when it opens. Adjust things like the map center, zoom level and basemap. Also decide which, if any, GIS overlays should be ‘on’ when the map opens and their stacking order. Remember, only the ‘top’ GIS layer is clickable.
2. Click “**Menu ==> Link to this map**”. The link you see will replicate the map on your screen. Note that the link you get will launch the production code for Gmap4, not the beta code.

Three types of GIS overlays

1. Gmap4 has 5 built-in overlays. These cannot be deleted by the user.
2. ‘Canned’ overlays are specified either as parameter data that is part of the Gmap4 link or are specified in a text file which is referenced in the Gmap4 link. **‘Canned’ overlays cannot be deleted by the user.** If you add GIS overlays to the map, save your map as a new Gmap4 link and open the new Gmap4 link, then your overlay layers are ‘canned’ on this new map and cannot be deleted.
3. The third type of GIS overlays are ones that you added to the current map. If you add a GIS layer to the map then during that **same Gmap4 session** you can delete the GIS overlay from the map. This is the only time the user can delete a GIS overlay.

A peek under the hood

Each ArcGIS server includes a number of web pages that act as a table of contents. The web page that acts as the top of the table of contents always has a link that ends in “/rest/services”. From there you can drill down through other web pages (often just one or two levels) until you get to a web page that lists layers that can be displayed on the map. Think of each of these webpages as **nodes** on the GIS server. A good analogy is to think of starting at the top of a computer hard drive and drilling down through folders until you get to files.

The first time during a session that you ask Gmap4 to display a specific GIS server node, the Gmap4 code running in your browser sends a request to the MappingSupport server. Code on the MappingSupport server reads that GIS web page, extracts the table of contents data from that web page and sends that data back to the Gmap4 code running in your browser.

Gmap4 then displays that data in the sidebar and also saves that data in a **cache**. During this same Gmap4 session if you navigate back to this same node on the GIS server, the table of contents data for that node will immediately appear in the sidebar without the need for another trip to the MappingSupport server. The cache also remembers which data layers you have added to the map and will display the appropriate **checkmarks** if you navigate back to that same server node. Each Gmap4 session starts with an empty cache.

Reporting bugs

Typically in order to fix a bug I need to be able to replicate it. When something does not seem to work right it would help me a lot if you could take a moment to write down the steps you performed that resulted in the apparent problem. Please include the link to the **GIS server page** you were working with when the problem occurred.

Known bugs

1. Displaying GIS attribute data with `Firefox browser`
 - a. If you click on the ‘top’ overlay then you see a display of all the attribute data the GIS server has for thing that you clicked. If the attribute display is more than a couple of screens then the rest of the attribute data does not appear.

Does the Gmap4 beta version work correctly? Things to watch for as you surf.

Presumably at this point I have caught all the simple bugs and any remaining bugs will be the result of a sequence of actions by the user. So if something does not seem to work right it would be useful if you could try to recall the last several things that you did.

1. Surf up/down

After the sidebar opens, can you surf up and down through the table of contents of an ArcGIS server.

2. Cache

Does the sidebar cache seem to be working correctly? The first time the sidebar displays any part of an ArcGIS server’s table of contents, (1) you will see a message indicating a request is being made to the server and (2) the data you see in the sidebar is saved in a **cache**. If during the **same Gmap4 session** you ask to see that same part of an ArcGIS server’s table of contents (i.e. the same node), then (1) you should ***not*** see the message about going to the server and (2) the sidebar should immediately display the requested data.

This caching only applies to a Gmap4 session. Each time you start Gmap4 the cache is empty.

3. Checkmarks

Does checking a box display the data on the map and un-checking the box delete the data from the map? Note that you might need to pan/zoom to see the data. The server defines the zoom levels at which the data appears. Gmap4 has no control over that setting.

If you check some boxes, close the sidebar and then later in the **same Gmap4 session** you display the same table of contents node in the sidebar, are the correct boxes still checked?

4. Prior GIS server

When you click the Basemap button and then “Add GIS overlays”, then one of the button options says “Prior GIS server”. This should display the previous sidebar. Working?

5. Nesting

Some ArcGIS servers have data arranged in a nested form which is represented by different levels of indenting in the sidebar. If you check a parent layer then checkmarks should automatically appear for all the child layers under that parent. Likewise, if you turn off a parent layer then all of its child layers should also be turned off .

6. Fused cache

Some ArcGIS servers will list a number of data layers but the layers have really been ‘baked’ into a single layer called a “fused cache”. The sidebar will alert you when it is displaying a “fused cache” table of contents page from a GIS server. Since there really is only one layer, checking any box should cause all boxes to be checked. Un-checking any box should uncheck all boxes.

If you click the map on a layer that is a “fused cache’ then generally you will not see any attribute data.

7. Link to this map

After you add some overlays to the map you can click **Menu ==> Link to this map**. The link you see should replicate the map on your screen. Working right?

Remember that before you ask for this link you can adjust (1) which overlays are ‘on’ when the map opens and (2) the stacking order for those overlays. To do this, click the basemap button and then look under the “Overlays’ heading. Click an overlay to toggle it on/off. The highest numbered overlay is ‘on top’.

Note that the link you get will launch the production code for Gmap4, not the beta code.

If you would like to know more about the **parameters you can include in a Gmap4 link**, please see https://mappingsupport.com/p/help_files/gmap4_link_parameters.pdf

Change log

6-22-2018 You can now use the beta code on all devices including cell phones. The problem caused by GIS servers with non-sequential layer numbers has been fixed.

4-27-2018 You can now use the beta code on a tablet.

4-21-2018 If you click Menu ==> Link to this map, then the link you get will, in fact, use the production version of Gmap4, not the beta version.

4-17-2018 All beta functions are working. The last two things that were completed were the “Manage GIS overlays” screen and turning nested layers on/off via the sidebar.

4-8-2018

Each time you add a new GIS overlay to the map and then click the basemap button to see the list of overlays the map can display, the overlay you just added will be at the end of the list.

3-29-2018

1. “Link to this map”

The option to save a text file is now working. If you add more than just a few GIS overlays to the map, then this is a better way to ‘save’ your map.

2. When appropriate, the GIS sidebar includes a button that will display the legend for the layer(s) listed in the sidebar.

3. If you click on the ‘top’ GIS overlay to display the attribute data, then that display also includes a link to the legend. Since the legend might pertain to more than one overlay layer, you will need to find the correct layer number in the legend display.

3-25-2018 “Link to this map”

Added a Help button and a button to download a text file.

The text file download option is not yet implemented.

3-24-2018 initial Beta version released

Detailed step-by-step instructions

Assume you live near Sacramento California and you want to do some fishing. Here is how to make a Gmap4/GIS map with some relevant GIS data.

1. This link will start the beta version of Gmap4 and show much of central California
https://mappingsupport.com/p/gmap4_beta_9-0.php?ll=38.326625,-122.591415&z=8&t=t1
2. Click the basemap button (next to the “Menu” button). Look under the “Overlay” heading and select “Add GIS overlays”.

3. Copy this GIS server address and paste it into the box.
<https://map.dfg.ca.gov/arcgis/rest/services>
This server has data related to the California Department of Fish and Wildlife.
Click “Send request to GIS server”
The sidebar will open and display the ‘top’ of the table of contents for this server.
4. Click “Project_fishing”. The sidebar refreshes.
5. Click “Planting_locations”. The sidebar refreshes. Look under the “Layers” heading and you see one entry with a gray box in front. Click that layer. A checkmark will appear in the box and data for that layer will appear on the map. (If you click that layer again then that data will be deleted from the map.)
6. To see what the different types of symbols mean, look at the sidebar and click the “Legend” button. The “Legend” is simply another webpage that is hosted on the ArcGIS server. Note that the legend will cover all the layers that you see in the sidebar. To quickly find the entry you are looking for in a large legend, look for the **layer number** for the data that you displayed on the map.
7. In the sidebar click “Up one level”.
8. Click “Fishing_locations2”
9. Click “Boating locations” and that data appears on the map.
10. Close the sidebar
11. Click any boating location (green dot). You will see a display with all the **attribute data** the GIS server has for thing that you clicked. Note that there likely is a link you can click for more information.
12. Click the basemap button (next to the “Menu” button) and look under the “Overlay” heading. Mobile users scroll down. Note that 2 of the overlays have a number in front indicating those overlays are ‘on’.
13. Click “Planting_locations” to turn that layer off. Click it again to turn it back on. Notice that this layer is now #2. The highest numbered layer is ‘on top’ and can be clicked to display its **attribute data**.
14. Click the map on one of the “Planting_locations”. Note that the attribute display has a link to display the **legend**. Often times the legend display will include multiple layers and you will need to find the right **layer number** in the legend display.
15. Now click the map on one of the boating locations (green dot). Instead of seeing the display of attribute data you will see a message saying “0 records found”. Since the

boating layer is not currently 'on top' (i.e. the highest numbered layer) it cannot be clicked.

16. **Save your map**
 - a. If the sidebar is open, then close it.
 - b. Adjust the map center and zoom to your liking. Remember that the zoom level at which GIS data appears on the map is defined by the server administrator. Gmap4 has no control over that setting.
 - c. Check the **stacking order** for the GIS overlays that will be 'on' when the map opens. Only the 'top' layer is clickable.
 - d. Pick the basemap you want to see when the map opens.
 - e. Click Menu ==> Link to this map.
 - f. Copy the highlighted Gmap4 link and paste it into a browser. Your map should open. Note that the link you get will launch the production code for Gmap4, not the beta code.