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FLORIDA RESOURCES AND ENVIRONMENTAL
ANALYSIS CENTER (FREAC)

FLORIDA STATE UNIVERSITY

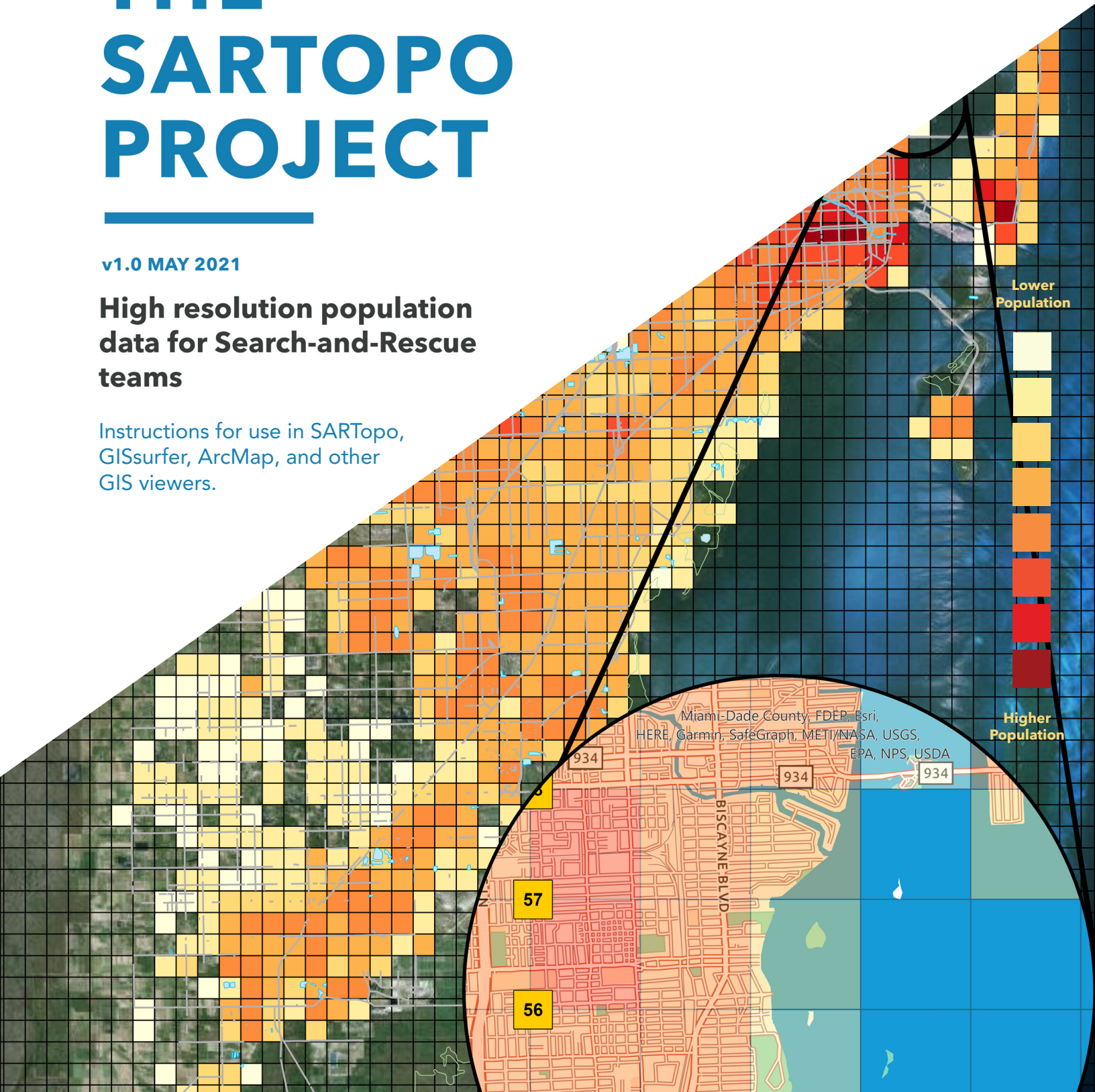
PREPARED IN COOPERATION WITH
THE UNITED STATES NATIONAL GRID
INSTITUTE

THE SARTOPO PROJECT

v1.0 MAY 2021

High resolution population data for Search-and-Rescue teams

Instructions for use in SARTopo,
GISsurfer, ArcMap, and other
GIS viewers.



Contributors and Contacts

Michael Core | FREAC, FSU | mcore@fsu.edu

- Expansion of area of coverage
- General technical questions or concerns
- Hosting MapServer and Web Map Service (WMS) services

Georgianna Strode | FREAC, FSU | gstrode@fsu.edu

- General project questions

Al Studdt, CFPS | Cocoa, FL | USNG08@gmail.com

- USNG Advocate & Instructor
- Member FL-TF4 Urban Search & Rescue Team, Orlando, FL
- General use of SARTopo.com

Fennis Reed | Fennis.Reed@gmail.com

- Conversion from WorldPop to USNG format

Ben Lantow | CALTopo | blantow@caltopo.com

- SARTopo Mapping Support

Joseph Elfelt | GISsurfer | jelfelt@mappingsupport.com

- GISsurfer Creator

Steve Swazee | SharedGeo | sdswazee@sharedgeo.org

- General USNG questions

Brittany Gress | FREAC, FSU | bgress@fsu.edu

- Design Layout

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Background

This dataset was developed under the guidance of the U.S. National Grid Institute due to a mission request from the FL-TF4 US&R Team operating in Louisiana after Hurricane Laura, August 2020, to support future similar Search-and-Rescue missions. The original population data are from WorldPop.org, converted to a 1-km USNG format courtesy of the USNGCenter.org, and mapped and hosted at the Florida Resources and Environmental Analysis Center (FREAC), Florida State University (FSU). Web-based map viewers are available as a courtesy of CalTopo, GISsurfer, and Esri.

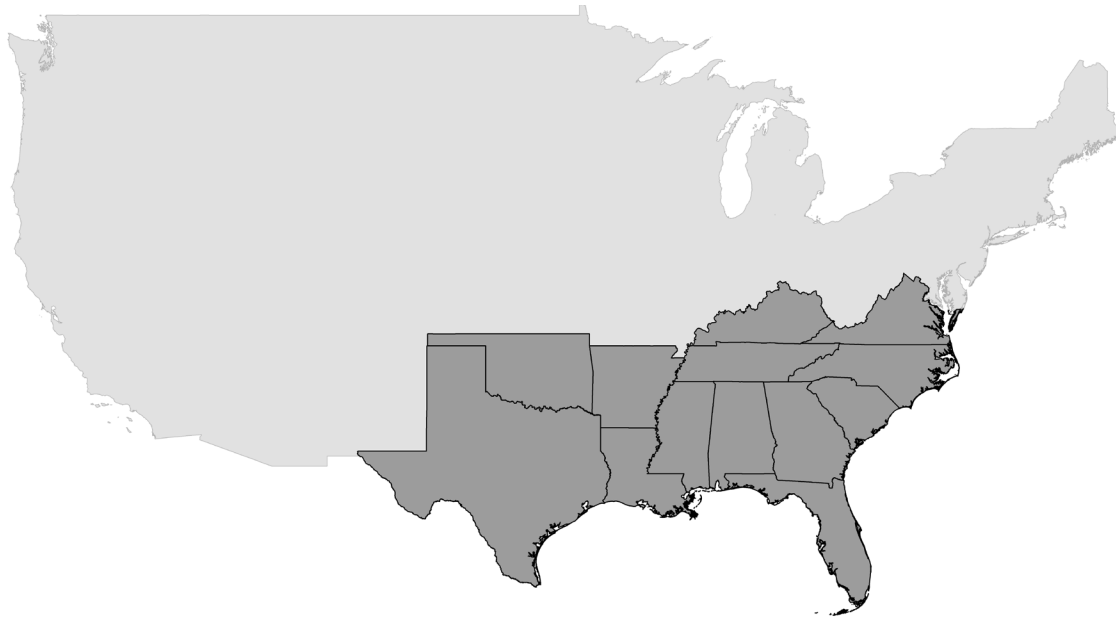
Introduction

Accurate and timely population data are necessary for Search-and-Rescue personnel, first responders, and other groups concerned with public safety and resource allocation. Population data are often mapped using large geographic areas, such as census tracts, making it difficult to determine the actual population in smaller, specific areas. To avoid this problem, this project uses 1-km gridded maps to more accurately reflect population density. The U.S. National Grid (USNG) is the selected grid format as the USNG is a recognized standard of the Federal Geographic Data Committee (FGDC) and is already familiar to many rescuers. SARTopo and GISsurfer are well-known Geographic Information System (GIS) viewers accessible via a web browser. This document features instructions specific to SARTopo and GISsurfer viewers, with additional instruction on using this population data in any GIS supporting a Web Map Service (WMS) format.

The population data are developed using original data from WorldPop (worldpop.org). The WorldPop open access project strives to provide researchers and policy makers the population data needed to ensure that every person is mapped and counted in decision making processes. The population estimates are developed with geospatial modeling methods combined with various data sources used to estimate populations including census data, land cover, roads, buildings, and other features that can predict population. WorldPop data has been used by researchers and policy makers from across the world. This project reformats WorldPop data into a format familiar to Search-and-Rescue operators and first responders.

Area of Coverage

This first version of this project covers a generous portion of the southeastern United States. The coverage area can be expanded to additional geographic areas by request.



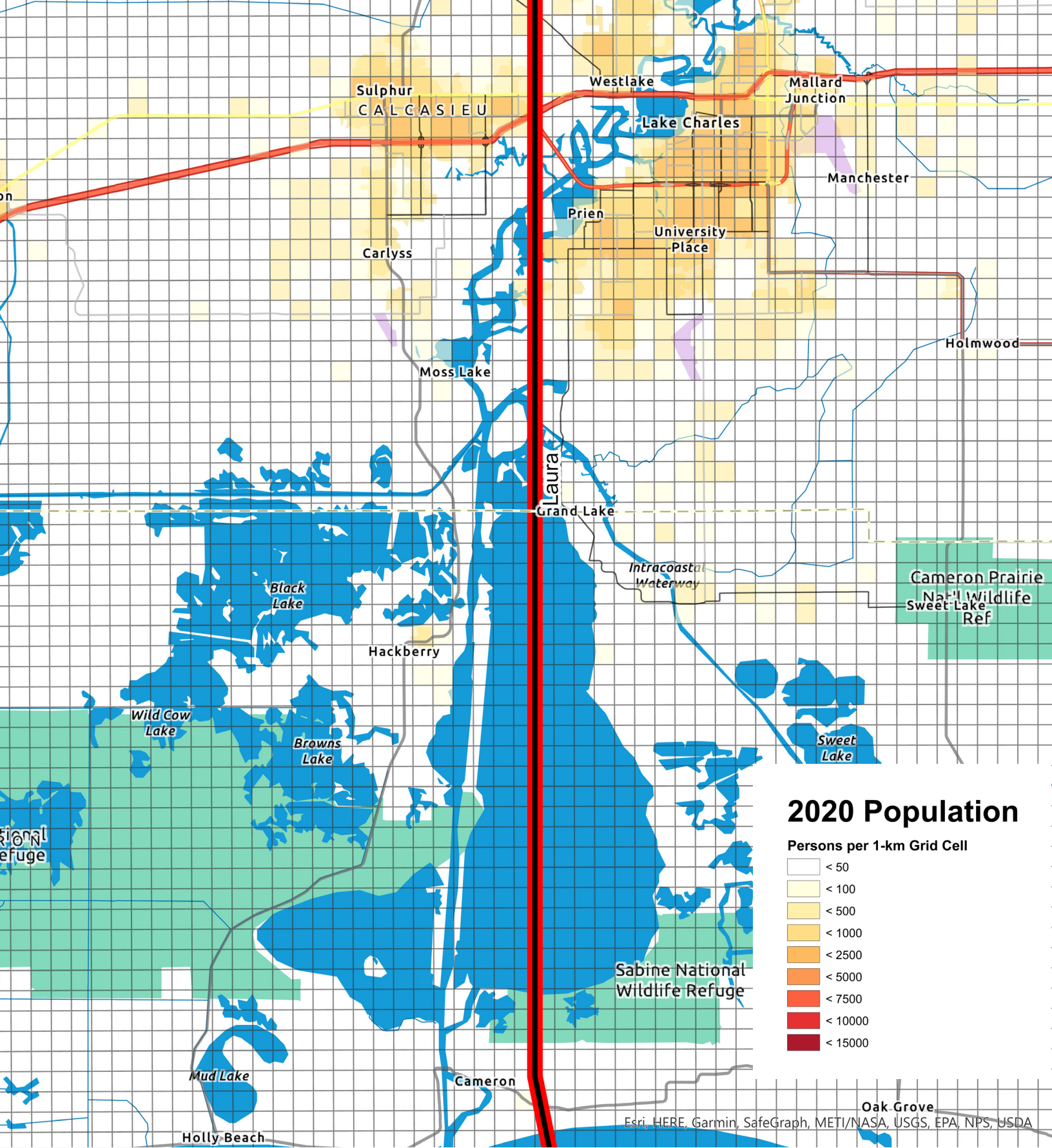
Data Updates

The population data are expected to be updated annually.

Methods

The USNG 1-km 2020 Population data were processed utilizing:

1. The WorldPop Constrained 100-M PPP (persons per pixel) population counts for the United States of America can be located at the web address: <https://www.worldpop.org/geodata/summary?id=49727>.
2. The USNG 1-km grid data is accessible via the website: <https://usngcenter.org/portfolio-item/usng-gis-data/>.
3. The USNG 1-km grid and the WorldPop 2020 Population datasets were processed via the Florida Resources and Environmental Analysis Center (FREAC) of the Florida State University using the python script: <https://github.com/fennisreed/WorldPop-to-USNG>.
4. The population count results (Step 3) were joined to the USNG 1-km shapefiles (Step 2) to combine the population count attributes to the USNG 1-km grid cells.



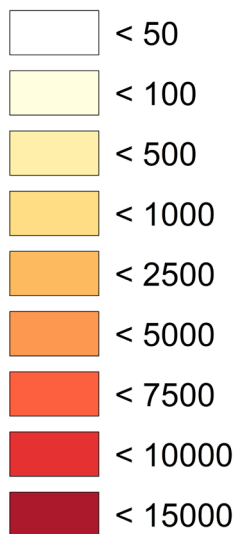
Sample Output. The above image shows the gridded population for Lake Charles, Louisiana. Darker cells represent higher population areas, and lighter cells represent less. The black and red line was added to represent the track of category 4 Hurricane Laura as it made landfall on August 27th, 2020, near Cameron, Louisiana.

Legends

The data is displayed with the US National Grid as a black outline. The color ramp for the gridded population data is presented in a choropleth sequential multihued classification system to highlight the low-population areas in light colors and the high-population regions in dark colors. The classification system is used to display the data for the entire Southeast United States. The classification system was designed to aid rescuers in determining the degree of resources and staff that needs to be deployed into a sector.

2020 Population

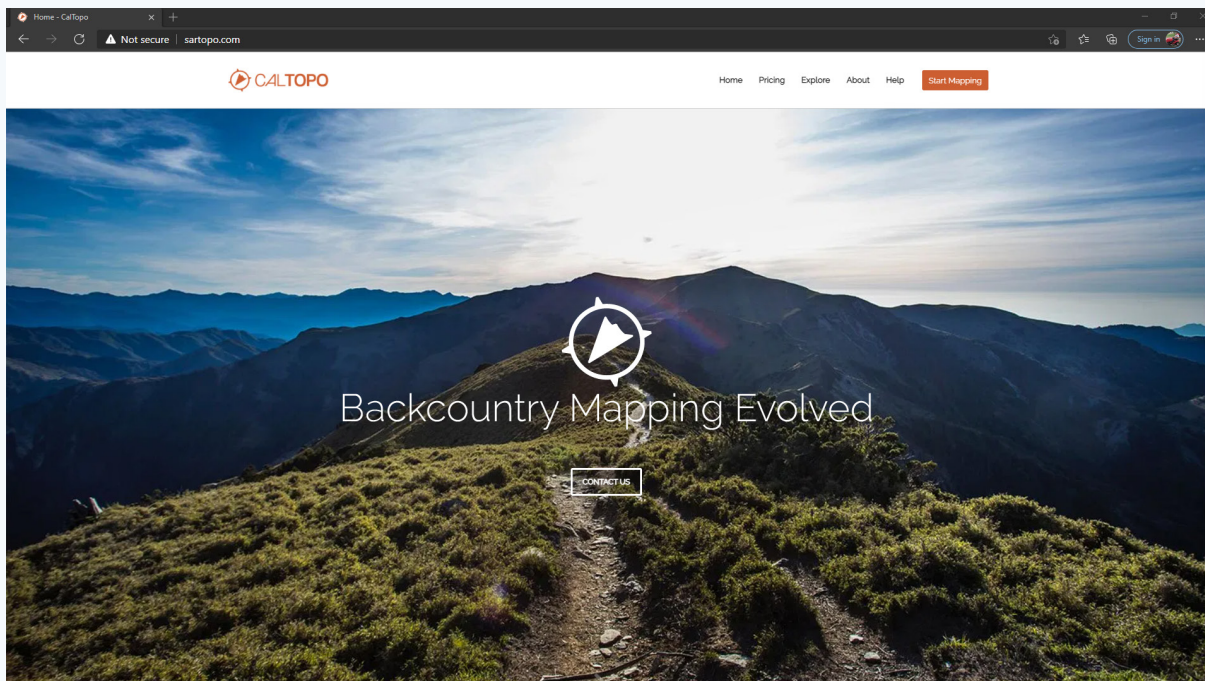
Persons per 1-km Grid Cell



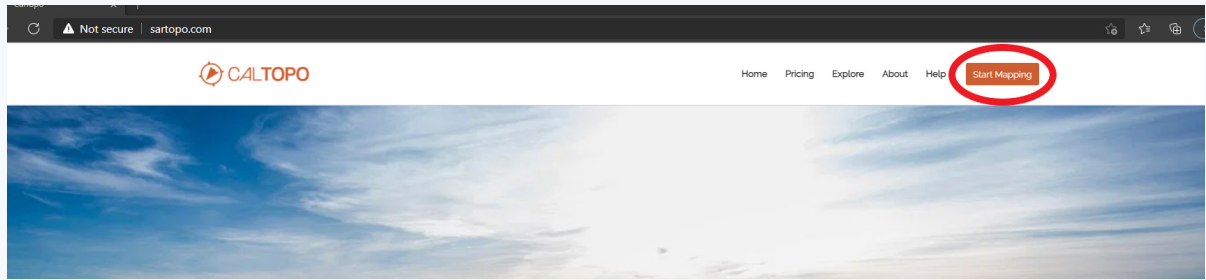
How to Display USNG 1-km Gridded Population Data in SARTopo

CalTopo is the creation of Matt Jacobs as a solution to challenges facing Search-and-Rescue members. Matt recognized some of these problems as a member of a Search-and-Rescue organization in the San Francisco Bay area in 2010. CalTopo was launched as a tool to integrate several layers of mapping information with tools that searchers needed to use, such as drawing objects onto maps and working in multiple coordinate systems. Several particular applications, such as viewshed analysis for radio and cell phone locations, spun off to the SARTopo name as the popularity of CalTopo as a backcountry planning tool for recreationists increased. CalTopo maps and tools are frequently used nationwide and internationally by first responders and recreationists to plan, navigate, and return home safe from their backcountry adventures. What started as a hobby project in 2010 has now become a small and growing company. Matt began working full-time on CalTopo in 2017 and has added several employees over the years since.

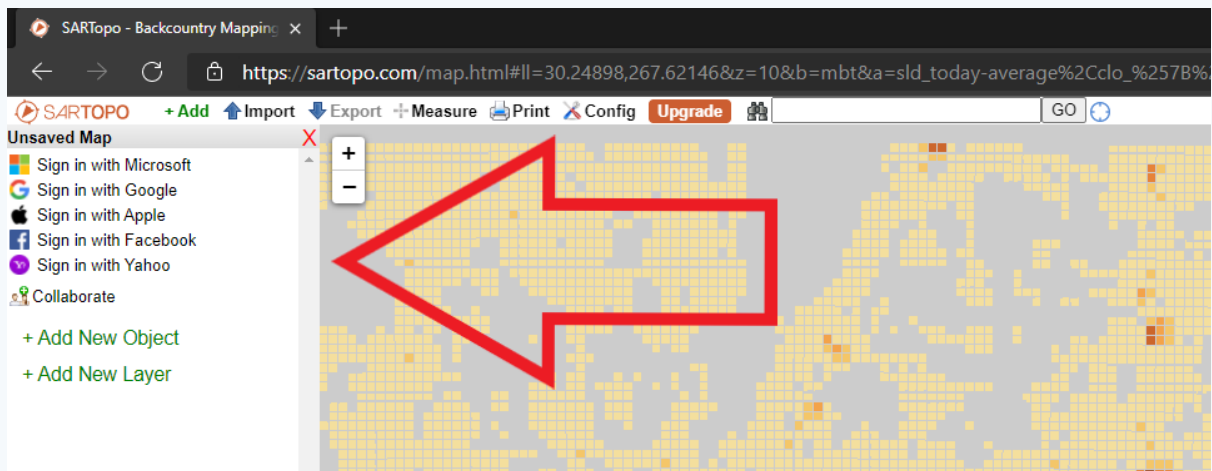
1. Go to www.sartopo.com.



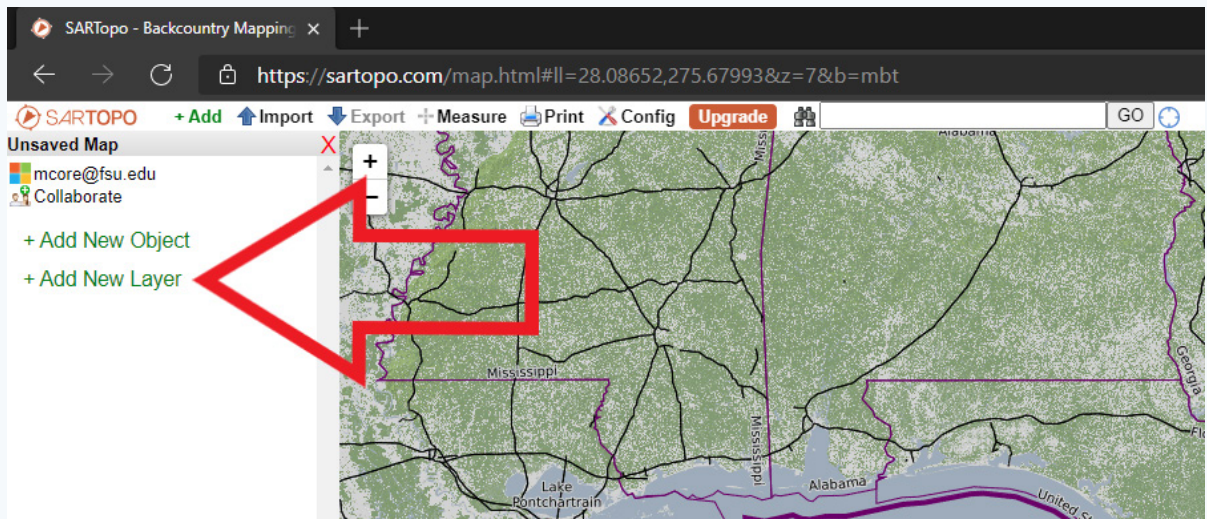
2. Click the Orange Button, 'Start Mapping.'



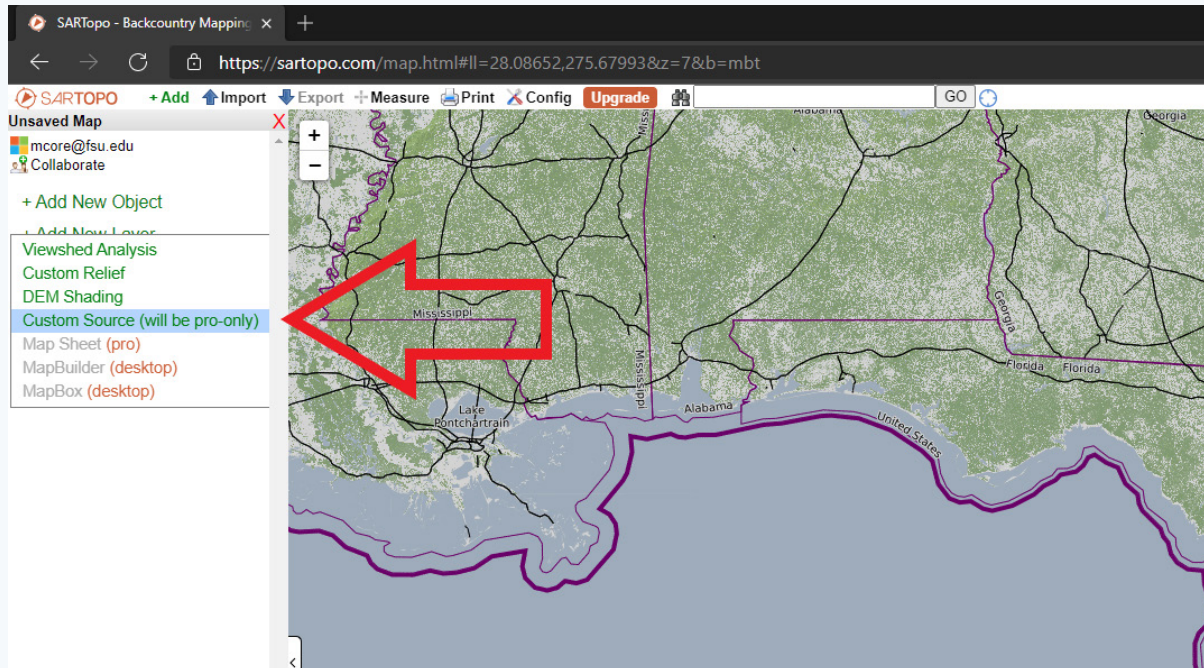
3. Sign in to your Microsoft, Google, Apple, Facebook, or Yahoo account.



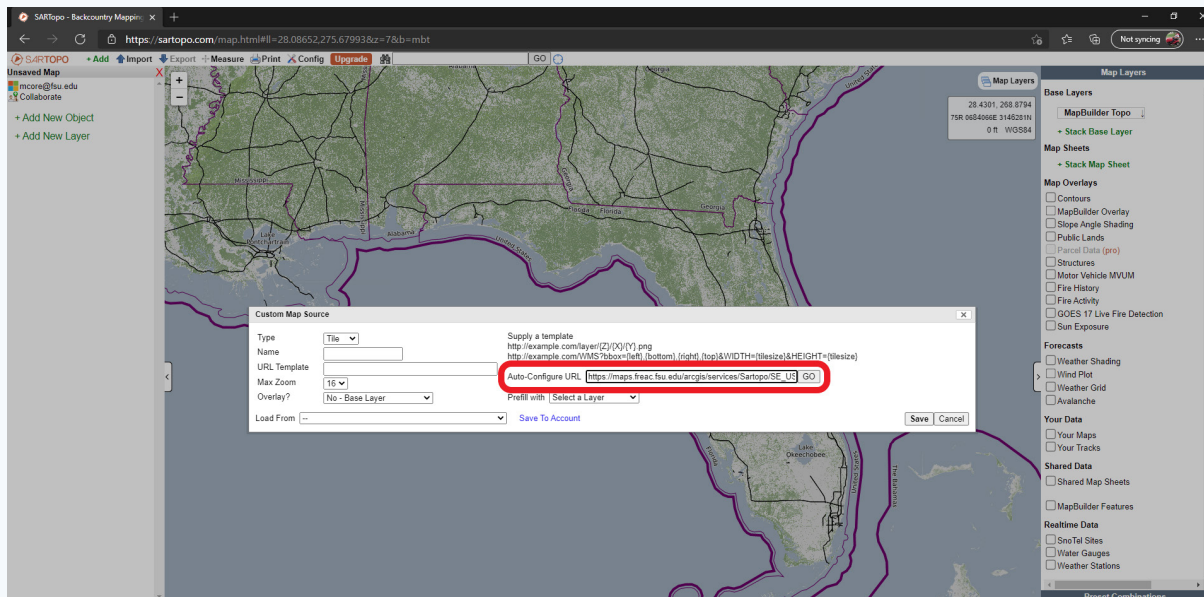
4. Click the green link, '+ Add New Layer.'



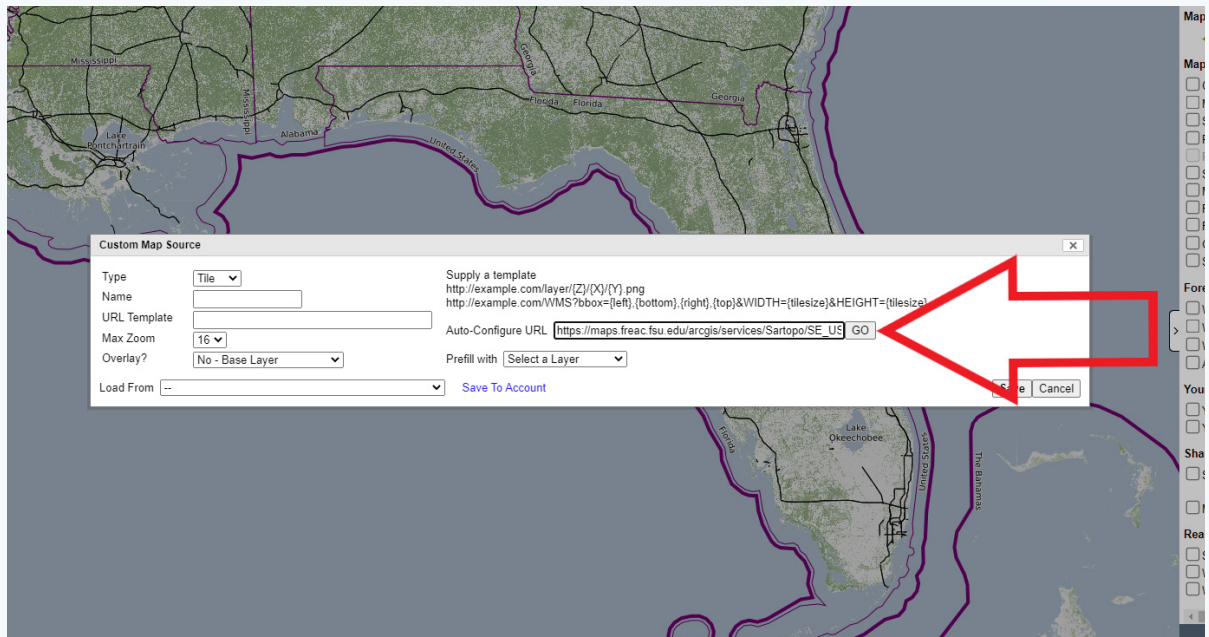
5. Click the green link, 'Custom Source (will be pro-only).'



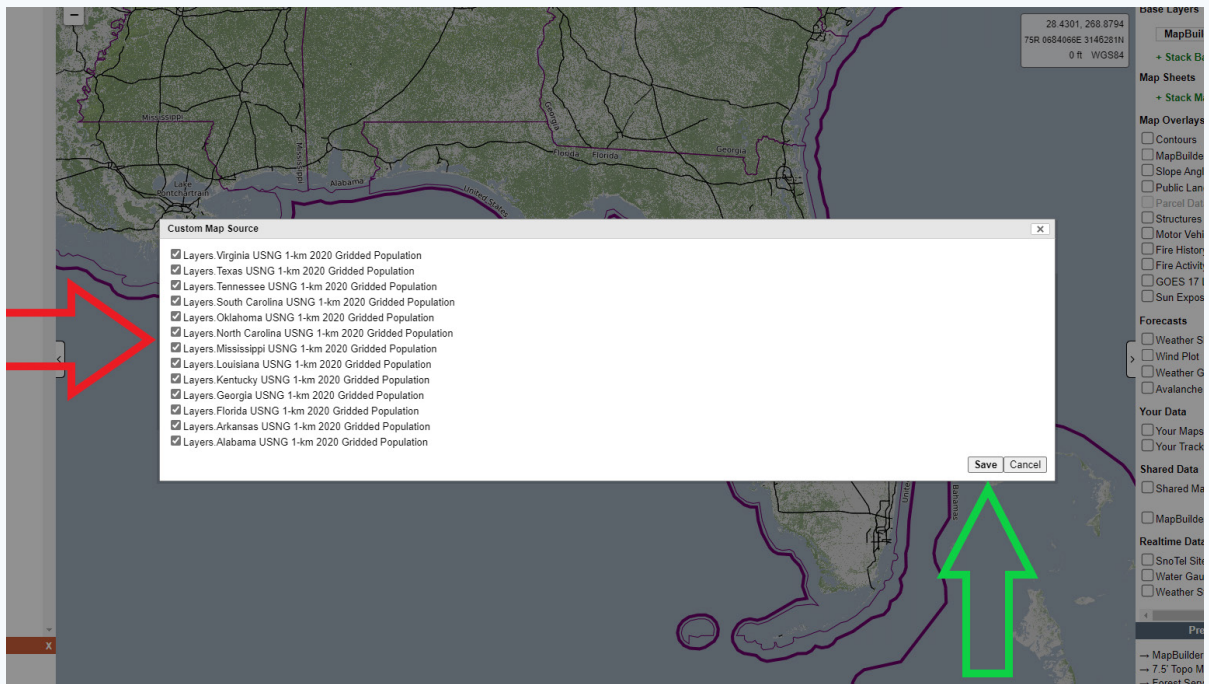
6. Copy & Paste the link, 'https://maps2.freac.fsu.edu/arcgis/services/Sartopo/SE_USNG_Pop/MapServer/WMSServer?request=GetCapabilities&service=WMS' into the field, 'Auto-Configure URL.'



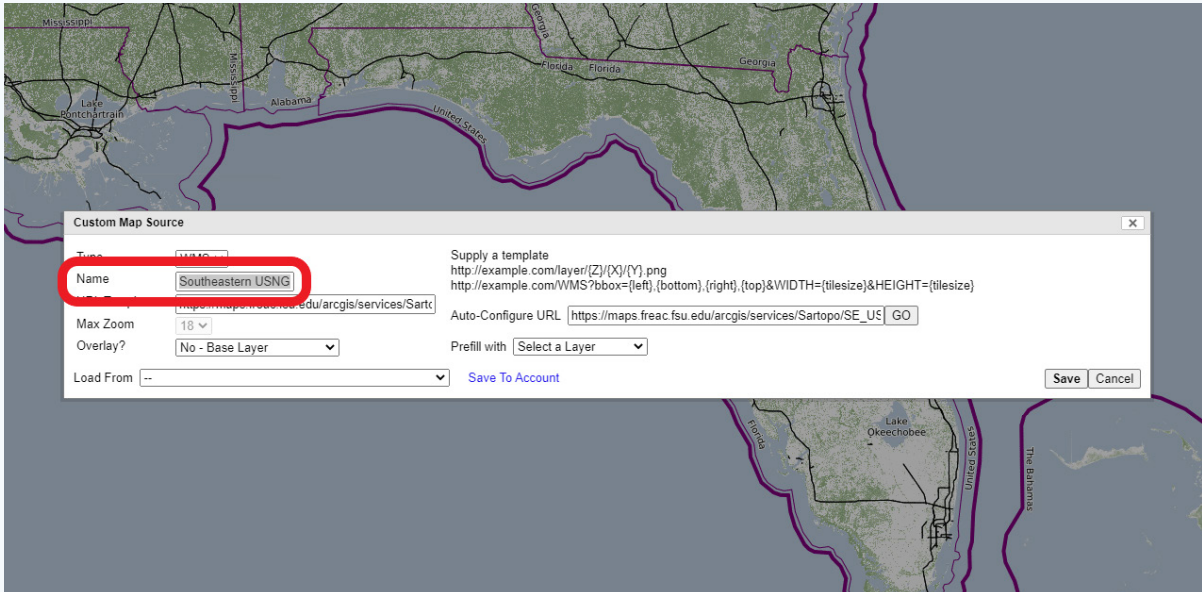
7. Click, 'GO.'



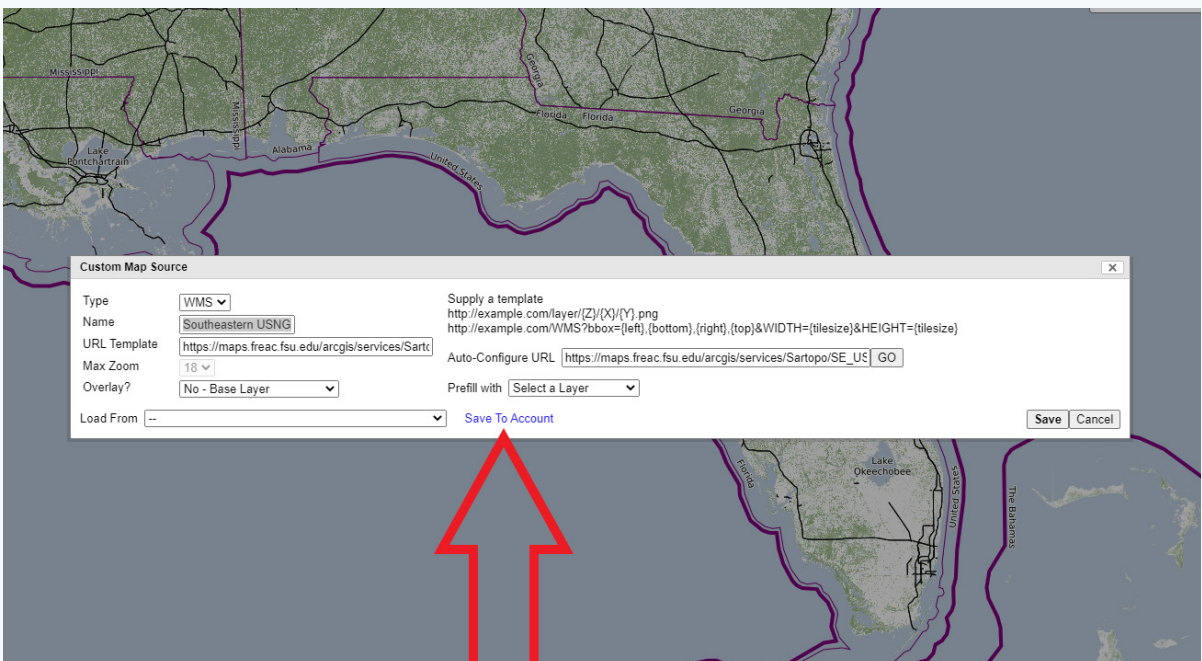
8. Check the radial boxes for the population data for each needed state. You must select at least one state, then click, 'Save.'



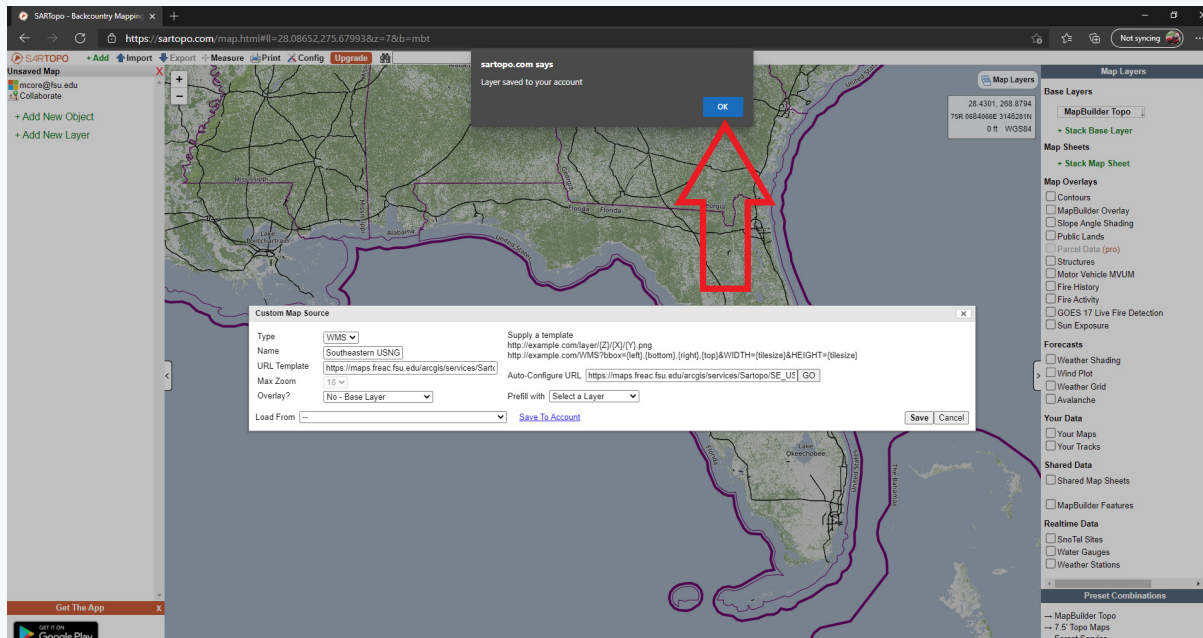
9. Give the layer an appropriate name like 'Southeastern USNG 1-km 2020 Gridded Population.'



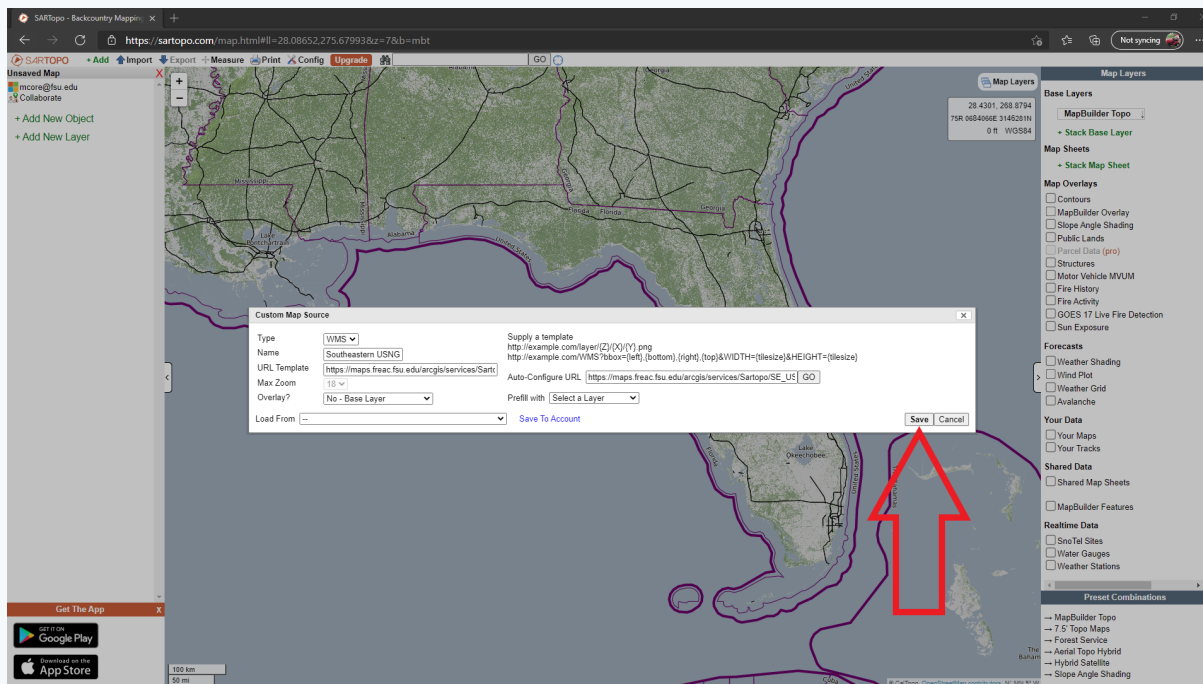
10. If you wish to save this layer to your account for future use, click the blue link, 'Save to Account.' If you do not want to save the layer to your account, skip to step number 12.



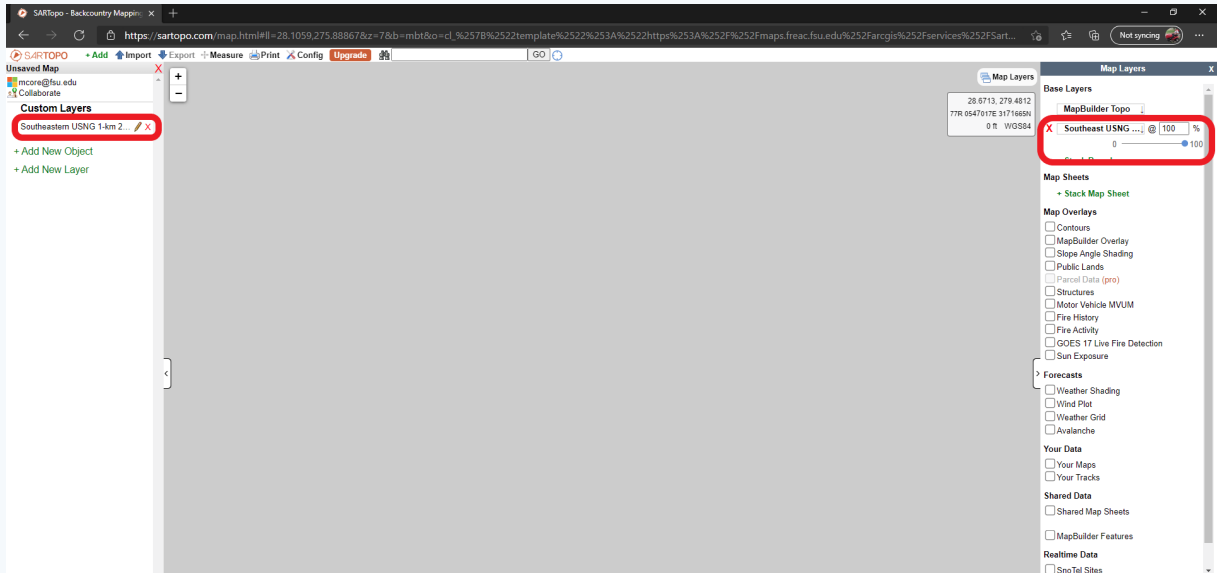
11. Accept that the layer has been added to your account by clicking, 'OK.'



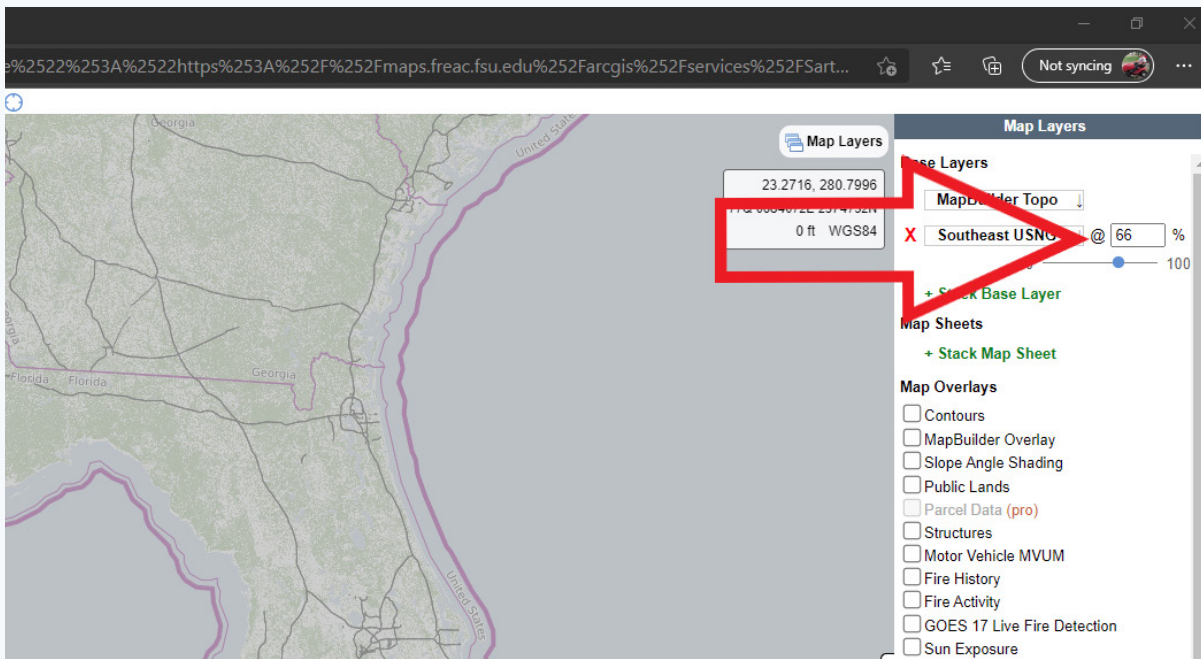
12. Click the 'Save' button.



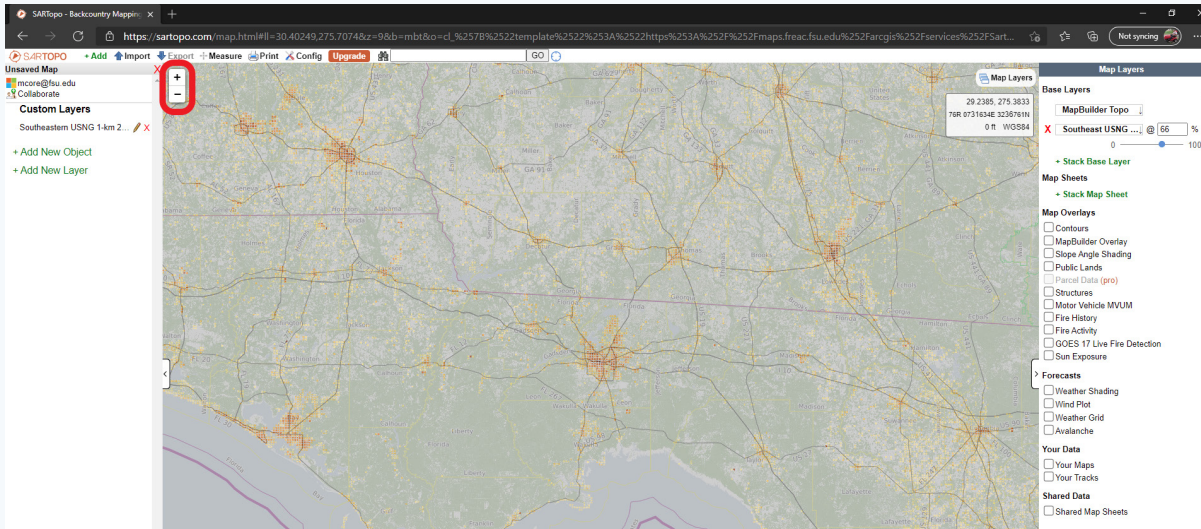
13. You can now see the new layer in two places, the right pane, and the left pane.



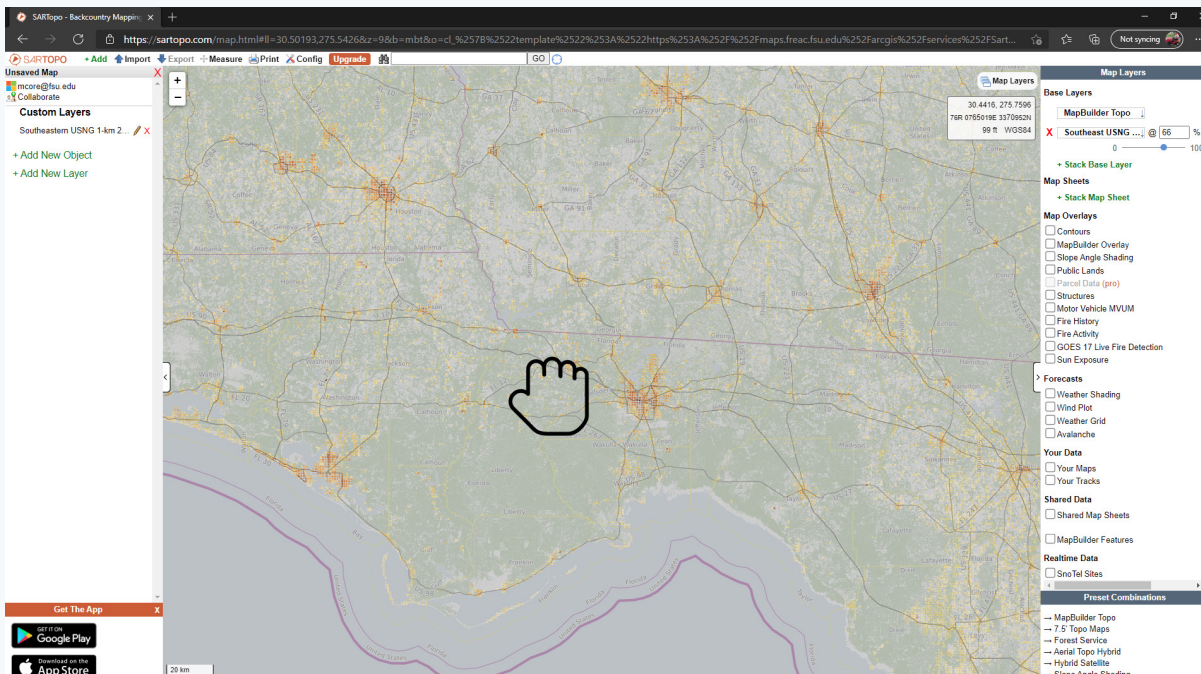
14. Adjust the new layer's opacity to see the underlying base map by changing the '@ 100%' to '@ 66%' and press the 'tab' key.



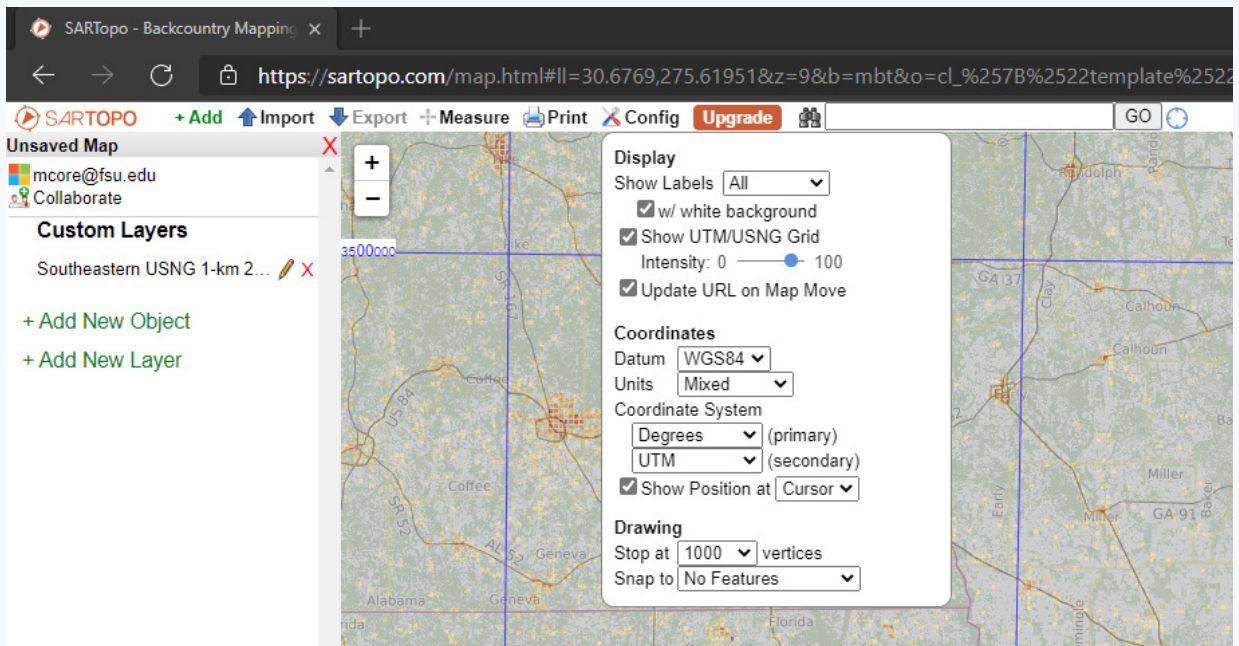
15. Click the '+' sign or scroll with the mouse wheel to zoom into the area of interest. The USNG 1-km gridded population dataset is extensive and will not display in map extents beyond 1:1,500,000.



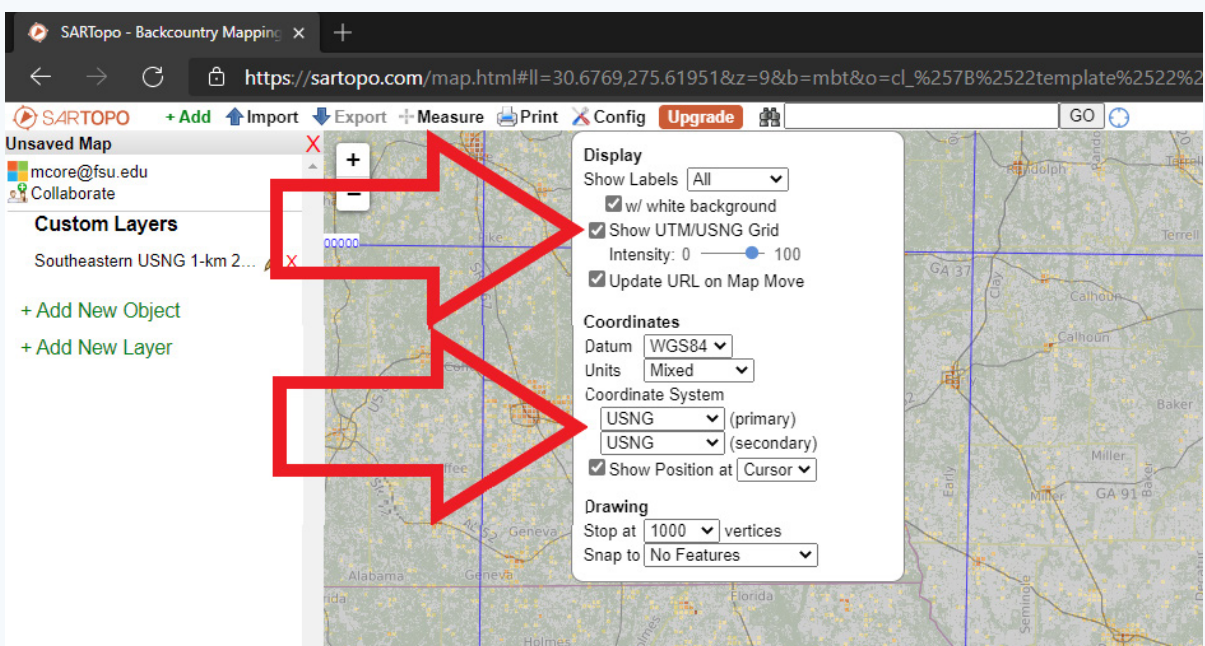
16. Navigate the map by clicking on the map, holding the right mouse button, and dragging the mouse.



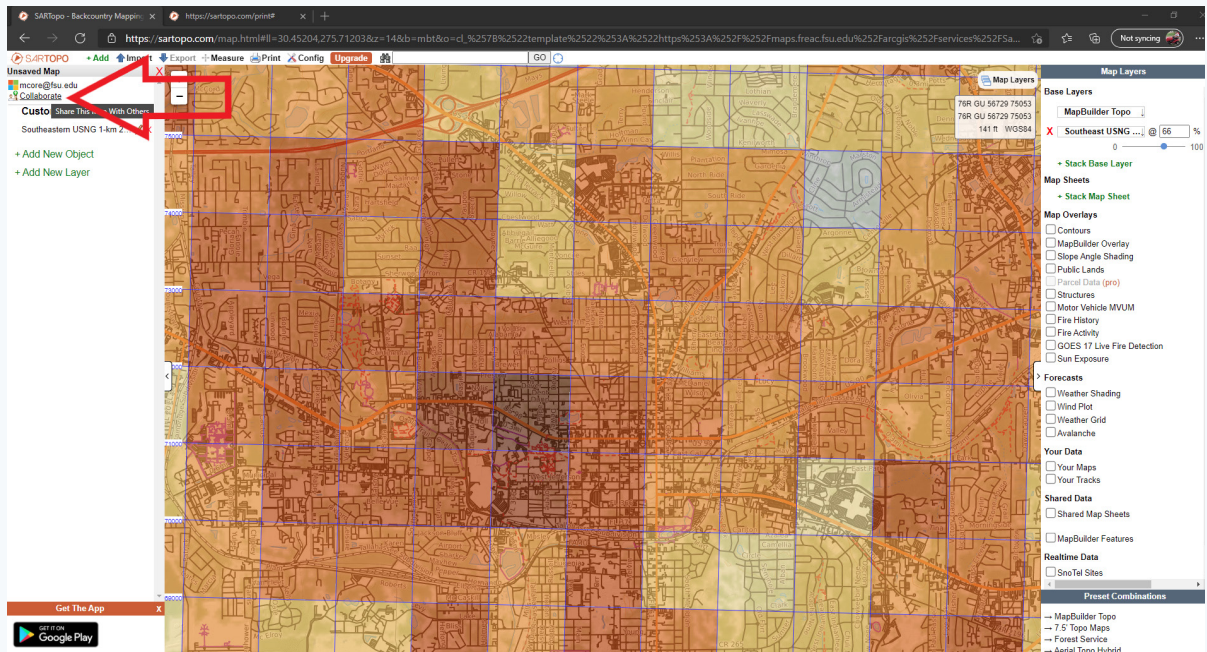
17. To turn on the blue pronounced USNG lines hover over, 'Config,' and a menu will appear.



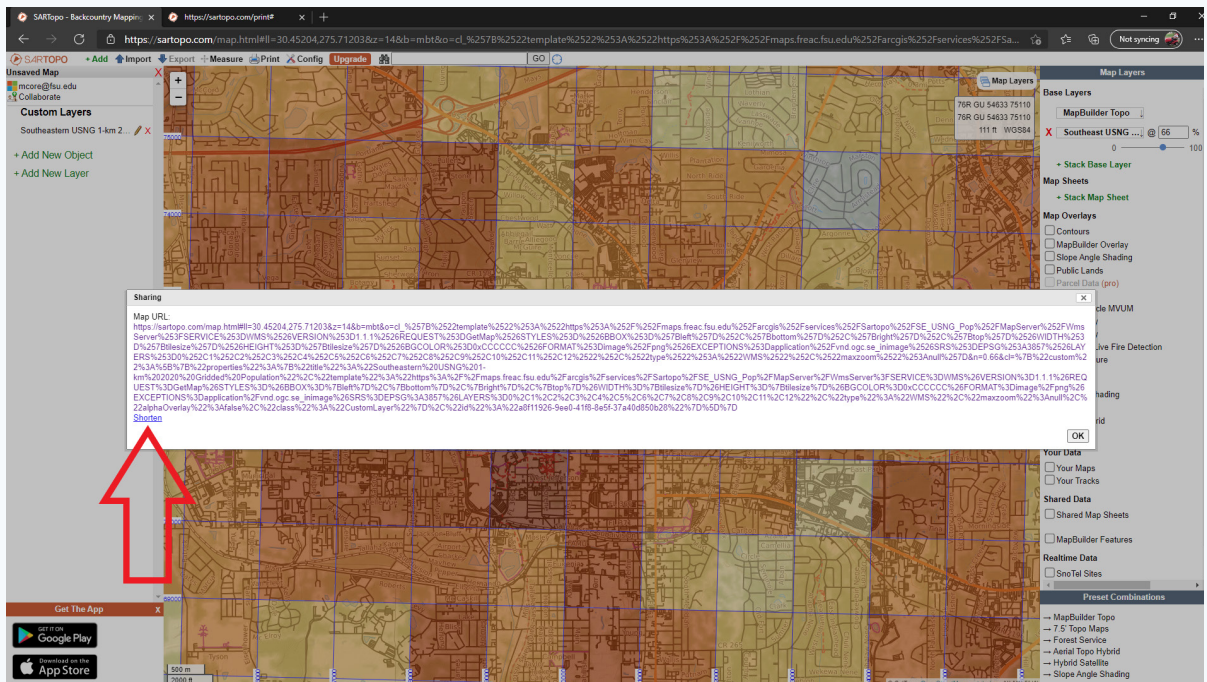
18. Check the radial boxes for 'Show UTM/USNG Grid' and use the 'Coordinate System' dropdown arrows to select 'USNG.'



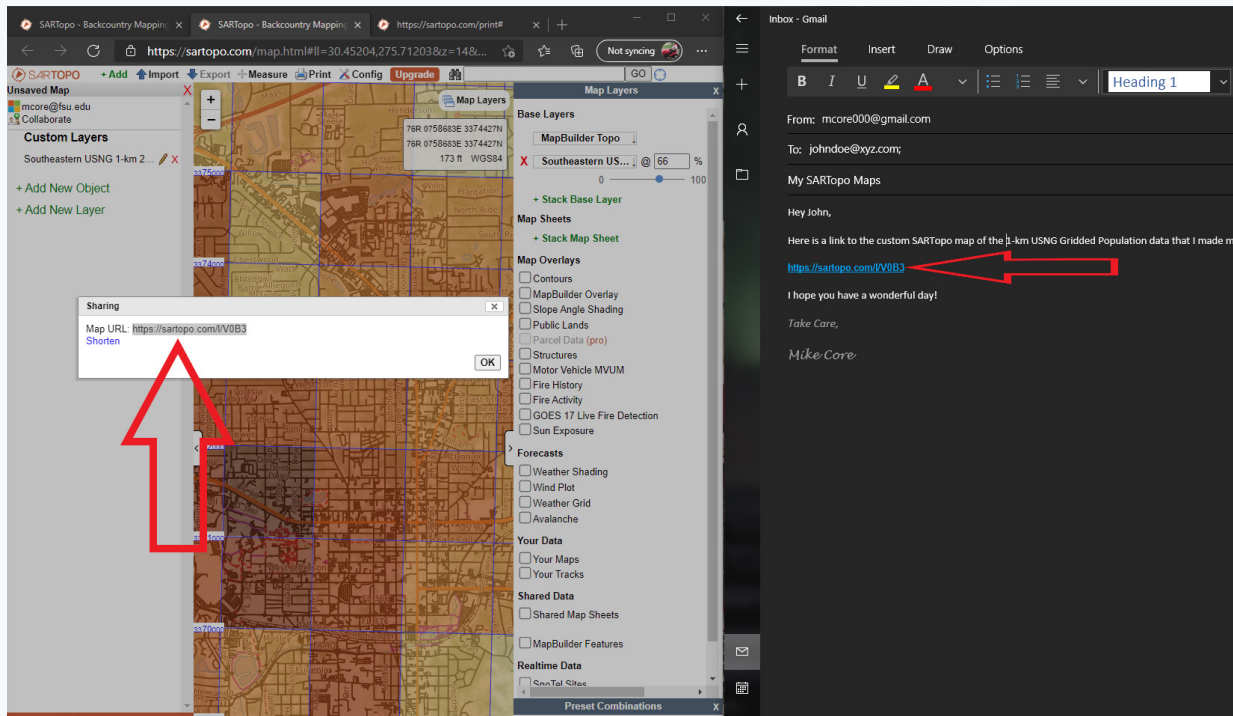
19. You can share your map via a web link; click 'Collaborate.'



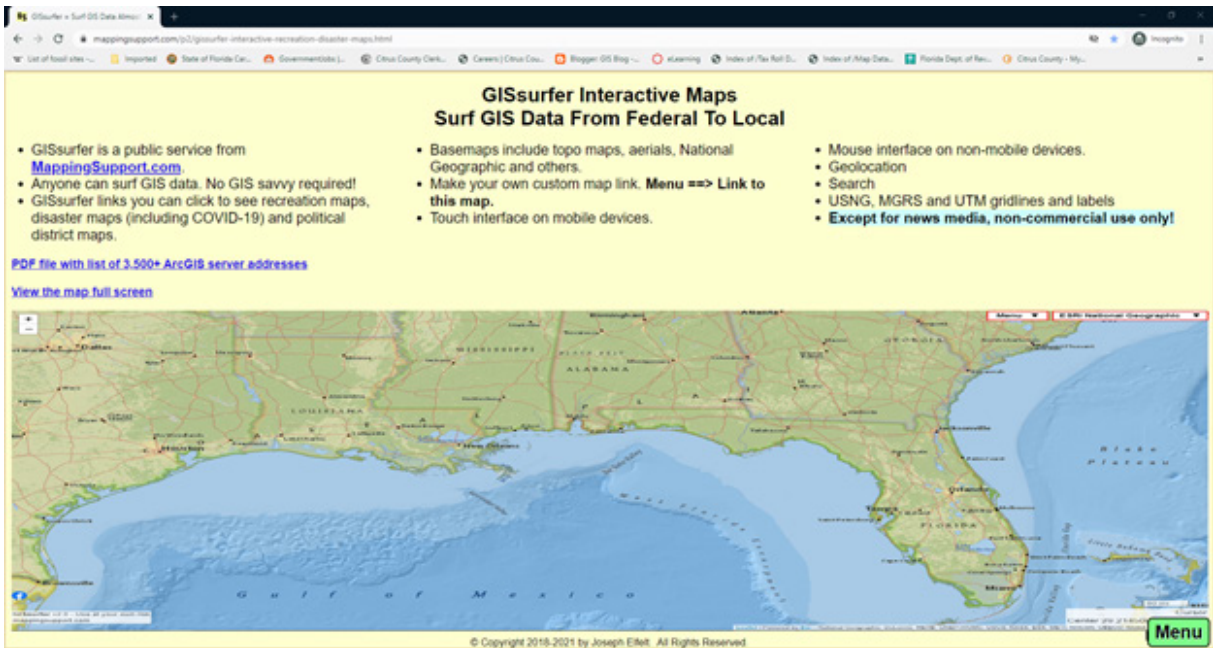
20. Shorten your URL to make it easier to share by clicking 'Shorten.'



21. Click and hold the right mouse button in front of the shortened URL to select the link. With the link highlighted, press 'ctrl + c' to copy the link to your computer's clipboard, and press 'ctrl + v' to paste your link into an email or document.



How to Display USNG 1-km Gridded Population Data in GISsurfer



The screenshot shows the GISsurfer website interface. At the top, there is a navigation bar with the title "GISsurfer - Surf GIS Data From Federal To Local". Below this, there is a list of features and a map. The map shows the Gulf of Mexico region, including parts of the United States and Mexico. A "Menu" button is visible in the bottom right corner of the map area.

GISsurfer Interactive Maps
Surf GIS Data From Federal To Local

- GISsurfer is a public service from MappingSupport.com.
- Anyone can surf GIS data. No GIS savvy required!
- GISsurfer links you can click to see recreation maps, disaster maps (including COVID-19) and political district maps.
- Basemaps include topo maps, aerials, National Geographic and others.
- Make your own custom map link. **Menu ==> Link to this map.**
- Touch interface on mobile devices.
- Mouse interface on non-mobile devices.
- Geolocation
- Search
- USNG, MGRS and UTM gridlines and labels
- **Except for news media, non-commercial use only!**

[PDF file with list of 3,500+ ArcGIS server addresses](#)

[View the map full screen](#)

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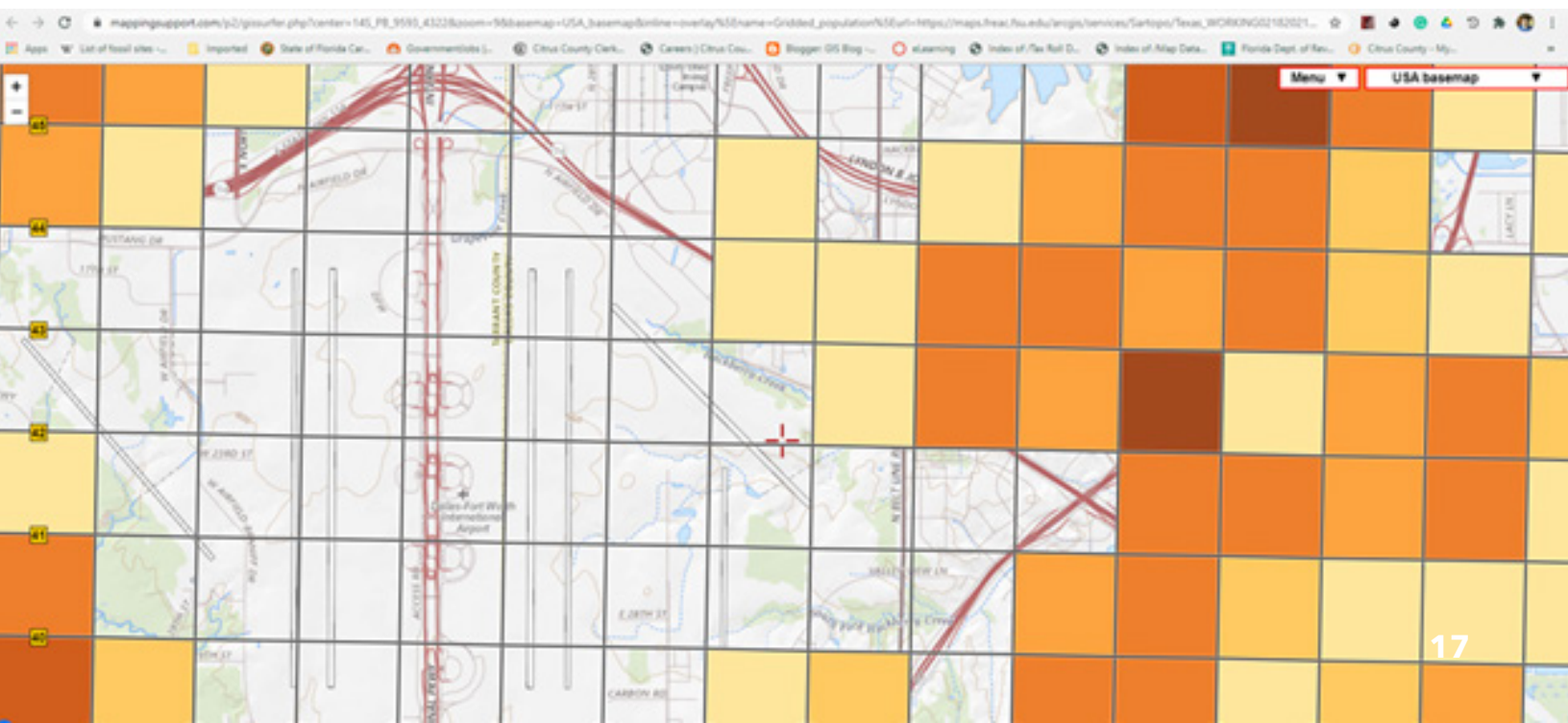
Menu

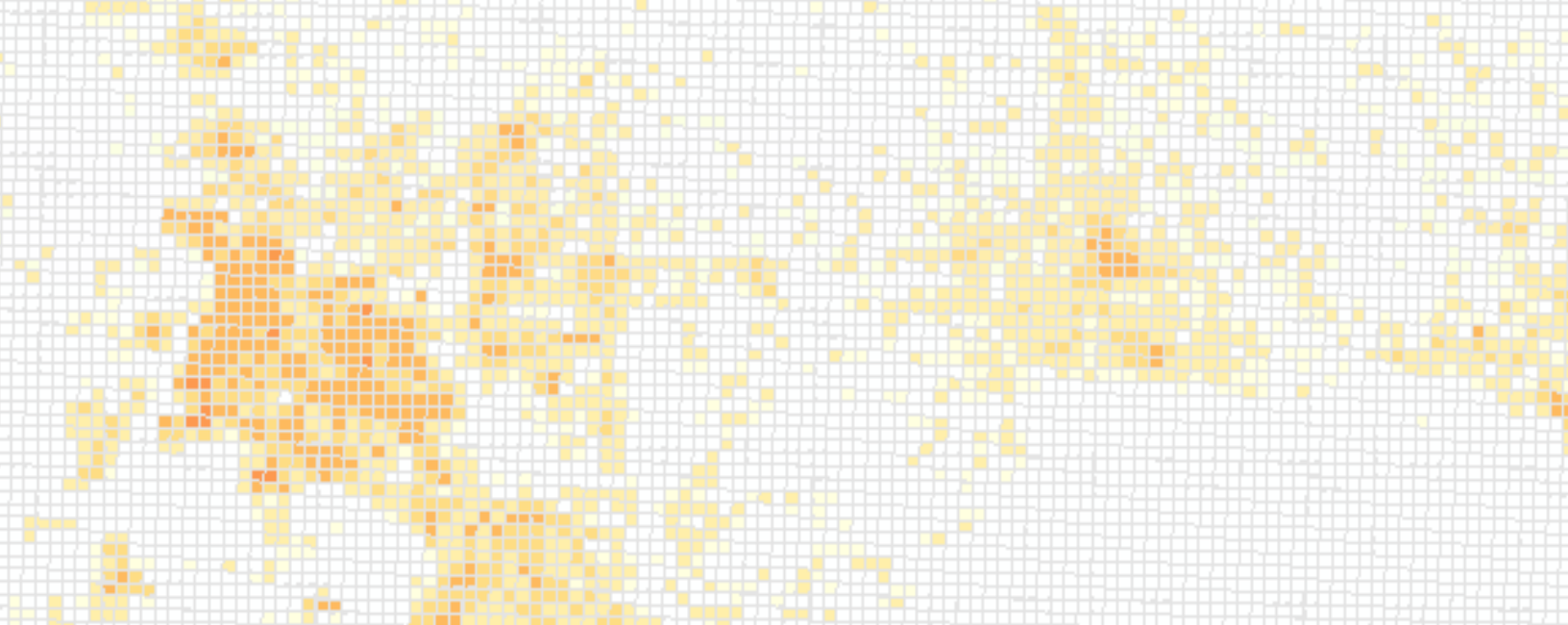
GISsurfer is a public service from MappingSupport.com. It provides interactive maps that allow users to display data that is hosted on GIS servers. Anyone can surf GIS data and no GIS savvy is required. With GISsurfer links you can click to see recreation maps, disaster maps (including COVID-19) and political district maps. Basemaps include topo maps, aerials, National Geographic and others. Key features of GISsurfer are that you can make your custom map links, utilize a touch interface on mobile devices, use a mouse interface on non-mobile devices, perform geolocation, search features and display grids such as the USNG, MGRS and UTM gridlines. Except for news media, GISsurfer is for non-commercial use only. GISsurfer works best with the internet browsers on PC Firefox, PC Chrome, iOS, and Android. GISsurfer lets you view data and offers no warranties, guarantees and is in no way affiliated with the hosting, producing, processing, or serving the USNG 1-km Gridded Population dataset.

Steps to Display the USNG 1-km Gridded Population Data in GISsurfer

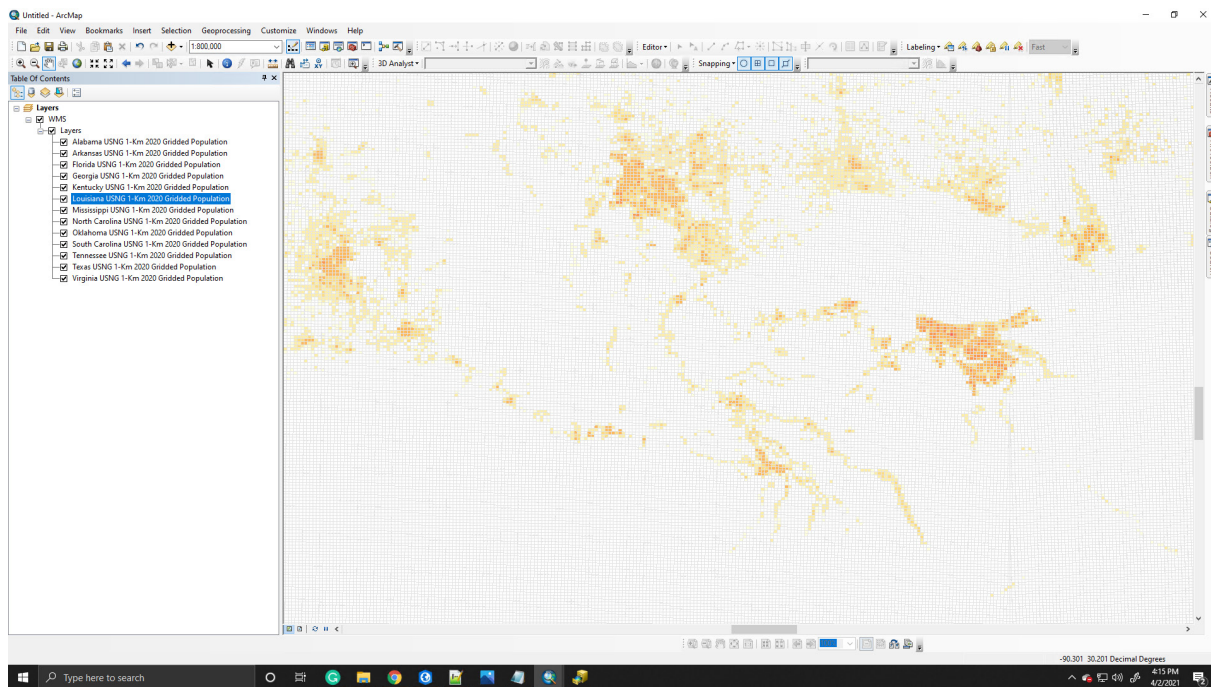
The legend for each state can be seen by following this link: https://maps.freac.fsu.edu/arcgis/rest/services/Sartopo/SE_USNG_Pop/MapServer/legend

1. Open GISsurfer: <https://mappingsupport.com/p2/gissurfer.php>
2. Zoom in on a state, county, or city where you would like to see some GIS data.
3. Click the basemap button (next to the "Menu" button) and change the base map to "USA basemap."
4. Turn on the USNG grid by clicking the "Menu" Button and then click "UTM - USNG/MGRS - LatLng". Select USNG in the popup.
5. Click the basemap button again and look under the "Overlay" heading (mobile users might need to scroll down). Select "Add GIS overlays."
6. Copy and paste the link below into the input box:
https://maps2.freac.fsu.edu/arcgis/rest/services/Sartopo/SE_USNG_Pop/MapServer/legend
7. Click "Send request to GIS server". After a few seconds, the sidebar will open and display that page from the ArcGIS server's table of contents.
8. An entry with a checkbox can be displayed on the map as an overlay. Click an entry to add that GIS data to the map as an overlay. You might need to zoom in on that state before the data appears
9. Click "Menu" ==> "Link to this map". The link that is displayed will replicate the map on your screen.





How to Display USNG 1-km Gridded Population Data in ArcMap & ArcGIS Online



To use the WMS layers in ArcMap and ArcGIS Online, use the WMS web-address, 'https://maps2.freac.fsu.edu/arcgis/services/Sartopo/SE_USNG_Pop/MapServer/WMServer?request=GetCapabilities&service=WMS' and follow the instructions at '<https://www.esri.com/arcgis-blog/products/arcgis-online/sharing-collaboration/sharing-wms-services-via-arcgis-online/>.'

Conclusion

The USNG 1-km gridded population data were created to benefit Search-and-Rescue missions in the wake of natural disasters such as hurricanes. The purpose of the dataset is to provide high-resolution population data to support decision-making during natural and man-made disasters. The data are accessible to all users through web hosting by FSU, FREAC. The USNG 1-km gridded population dataset is hosted as an Esri MapServer and WMS for easy use in many web-based and desktop GIS systems.

To Cite this Data:

The SARTopo Project (2020). Florida Resources and Environmental Analysis Center, Florida State University. GIS dataset, May 2021.

To Cite this Document:

Core, Michael; Strode, Georgianna; Studt, Al; Reed, Fennis; Lantow, Ben; Elfelt, Joseph; Swazee, Steve; Gress, Brittany. (2021). The SARTopo Project. Florida Resources and Environmental Analysis Center, Florida State University.



For More Information

USNG Center | Official Website for the USNG

Website: <https://usngcenter.org>

Link to General Information: <https://usngcenter.org/portfolio-item/usng-articles/>

Link to Directives: <https://usngcenter.org/portfolio-item/directives/>

Link to USNG GIS Shapefiles: <https://usngcenter.org/portfolio-item/usng-gis-data/>

Florida Resources and Environmental Analysis Center | Applied Geospatial Research Center at Florida State University

Website: <https://freac.fsu.edu>

WorldPop | Open Spatial Demographic Data and Research

Website: <https://worldpop.org>

Link for U.S. Population Counts Data Download: <https://www.worldpop.org/geodata/summary?id=49727>

WorldPop-to-USNG | Script to Convert from WorldPop to USNG Format

Website: <https://github.com/fennisreed/WorldPop-to-USNG>

CalTopo / SARTopo | CalTopo is a map viewing tool used to support Search-and-Rescue missions and viewsheds in multiple coordinate systems.

Website: <http://sartopo.com>

GISsurfer | Map Viewing Tool with Support for USNG, MGRS, UTM, and Latitude Longitude Coordinates

Website: <https://GISsurfer.com>

Link to Map Viewer: <https://mappingsupport.com/p2/gissurfer.php>

USNG Florida | Promoting the U.S. National Grid in Florida and Nationwide

List of Resources: <http://bit.ly/USNG-resources>

Website: <http://usngflorida.org/>

Twitter: <https://twitter.com/usngflorida>

Articles: <https://medium.com/@USNGFlorida>

Facebook: <https://www.facebook.com/USNG-Florida-107618149257256/timeline/>

Youtube: https://www.youtube.com/channel/UCi1qd3lYvj--vPf0Kd_K8jw

USNG GIS | Benefits and Examples of using the USNG as a GIS Database

Website: <https://usng-gis.org>

Wikipedia | The free encyclopedia

Website: https://en.wikipedia.org/wiki/United_States_National_Grid