Online Map Tool: GeoSTRAT

This online map tool provides users with numerous layers related to the geology and hydrology of Missouri. For the purpose of the karst and watershed education project, use is focused on layers showing karst features, groundwater depth, and dye tracings.

Getting Loaded:

- **Option 1:** Click on this link: Missouri Geological Survey | Missouri Department of Natural Resources (arcgis.com)
- **Option 2:** Search: Missouri Geological Survey GeoSTRAT
- The page comes up "Geosciences Technical Resources Assessment Tool (GeoSTRAT). Click on: **Geoscience Technical Resource Assessment Tool** which in is bold face type. It will take you to the tool. Click OK on a pop-up box that gives permission to leave the site.

NOTE: Layers appear at different scales when you zoom in and out of map. Be aware that a layer may take a while to become visible. If layers do not ever become visible, try to zoom in or out. Keep in mind internet speeds affect loading times.You may need to refresh or clear map and start over.

- **Either option, continued:** On the new page, "Missouri Geological Survey," scroll down not far to the title **GeoSTRAT** and click on **View** below the title and picture (aerial photo).
- The map will load.
- A white box labeled "Layers" will appear on the left side of the screen. This white box has a list of layers that can be used to add data to the map. Each item on the list has a small box to its left. Click inside a box to add or remove a layer on and off your screen.
- Go to the map and use the plus icon (+) to zoom into the south-central Missouri Ozarks region. Unfortunately, the county boundary layer only shows at certain scales. Use West Plains location label to guide you.

Adding Karst Features:

- Go to the white Layers box on the left and scroll down to find the following layers. Click on the small box to the left of each layer name and watch them appear: **Losing Streams (Red), Springs (blue dots), Sinkhole Points (yellow dots), and Sinkhole areas (blue outlines).** Note: This white layer box can be moved in and out of your screen by clicking on the arrow midway down its right margin.
- In the search box on the top left put your school address. Click on the search icon on the location box. A black box will appear at your school location; click on the X on the black box to remove it.

- Click on the minus icon (—) so the map zooms back out.
- Go slowly and sink hole areas will appear as blue outlined areas around some of the sinkholes (yellow dots).
- Add the cave density layer to find out the number of caves on the boxed area that your school is located. This rectangle represents the 7.5-minute topographic map for that area. The darker the shade of the rectangle the more caves in that area.
- Continue out until county borders appear. Once you see the extent of these karst features, click out of all the layers to clear the map.

Adding the Alluvium Layer:

- Have Howell County as your center area where you can see at least part of the bordering counties. Go to the white Layer box on the left and click on Alluvium. Alluvium is sand and gravel deposits that occur along rivers and streams. Alluvium areas are where flooding from a river has occurred in past years.
- Click on the + icon and drag the map until West Plains is in the center of your screen. Continue until you can see streets. Examine the extent of the alluvium. Think about the flood of 2017!
- Remove the Alluvium layer. Go to the bottommost layer: Geologic Hazards Potential. Add that layer. Everywhere with the green slashed lines has collapse potential. Click on the - icon which brings more of Missouri into view. *Notice this collapse potential is mainly in the Ozarks.* This can be examined closer on the main GeoSTRAT page under Additional Applications: Geological Mapping for Natural Disaster. Remove this layer.
- Note: GeoSTRAT does not have a watershed boundary outline layer.

Groundwater Depth and Dye Tracing Layers:

- Add the Ground water depth layer. The lines connect areas of equal ground water depth similar to the way topographic map contour lines connect areas of equal elevation. Check out the groundwater depth in your school location and other areas. Note that you may have to change your zoom level for the layer to be seen.
- Note there is also a ground water elevation layer. That layer tells how high the groundwater level is above sea level. Be sure not to confuse them.
- Remove the groundwater depth layer.
- Turn on the Dye Injection Layer. This layer shows locations where nontoxic fluorescent dye was placed in losing streams or sinkholes and flowed into the underground karst system.

- Turn on the Dye Recovery Points Layer. This layer shows where the dye was recovered.
- Turn on the Dye Paths layer to see where dye entered into the karst losing stream was detected returning to the surface. This process is explained in the GeoSTRAT Additional Application feature called “Follow the Water” on the main GeoSTRAT page.

GeoSTRAT Additional Application Features:

- Open a new browser window, then go to the main page for “Missouri Geological Survey, Featured Datasets and Applications.” Become familiar with the other types of maps available.
- Scroll down to view the Additional Applications links.
- Click on **“Follow the Water.”** This page has several sections about karst and maps: *Introduction, Geology of the Ozarks, A Unique Ecosystem, Springs Through the Ages, Water Quality and Role of MGS (Missouri Geological Survey).*
- Other useful Additional Application Maps on this GeoSTRAT page include the Geological Mapping Natural Disaster Map mentioned above and the Public Drinking Water Facilities Map.
- The main GeoSTRAT map has many other layers to explore. You might be able to find your own well log!