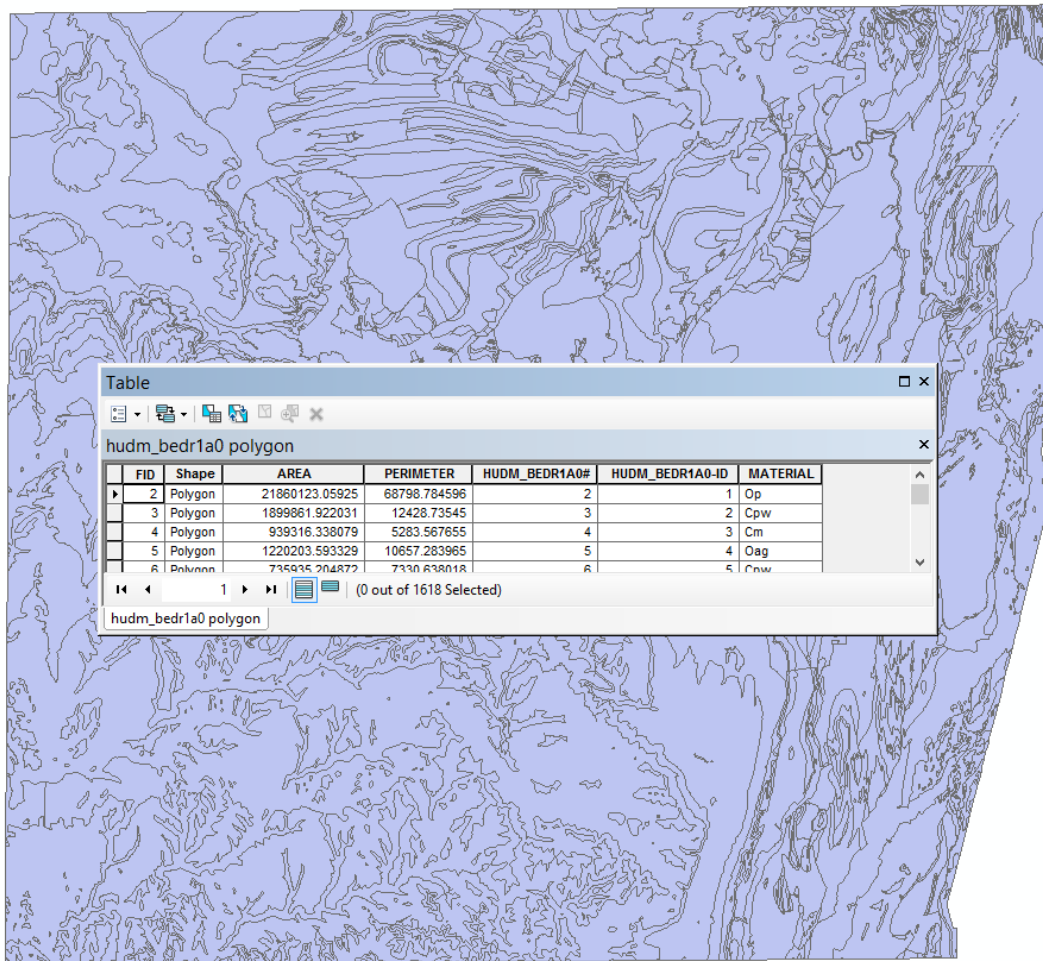


Using Eye Dropper tool and “Match to Map Styles”
to Approximate Color Scheme of NYS Geologic Map

Digitized versions of the NYS bedrock geologic map sections can be downloaded from the NYS Museum website (<http://www.nysm.nysed.gov/gis/>)

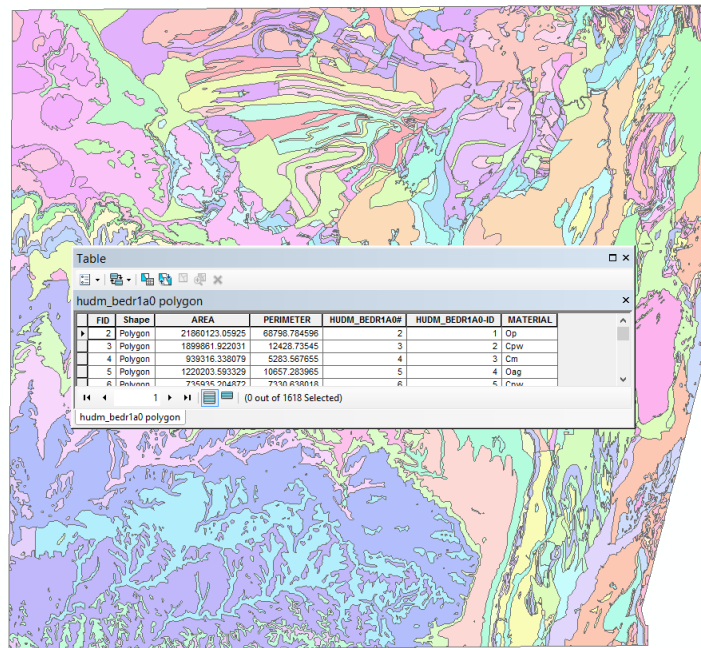
The ArcInterchange files (E00) can be converted to coverages using ArcTools. The resulting polygon files define various rock units, called Material in the attribute table.



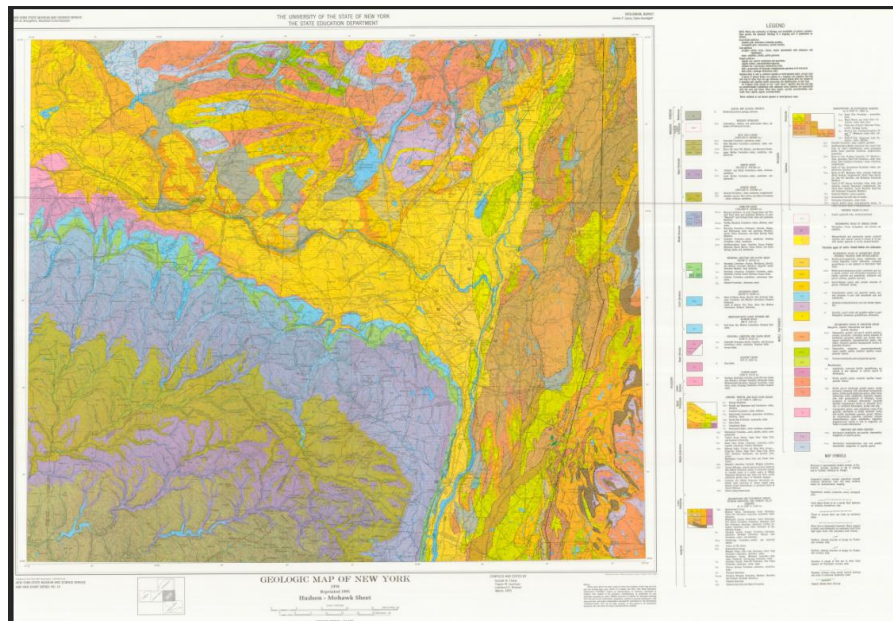
As with all ArcMap documents the default fill is a single color selected by the program.

Using the Material field it is possible to symbolize the polygons with individual colors matched to the various units.

Unfortunately this looks nothing like the printed version of the map.



On the NYS Museum site there are scanned versions of the printed map sections.



These scanned versions contain no spatial reference information, but can be georeferenced using the coordinates at the corners of the map. Note that there is no datum or coordinate system information on the printed map. The NYS Museum site does list metadata for the digitized version, which **MAY** match the printed version. Georeferencing shows a fairly good alignment between the printed version and the digitized data, but it is not perfect.

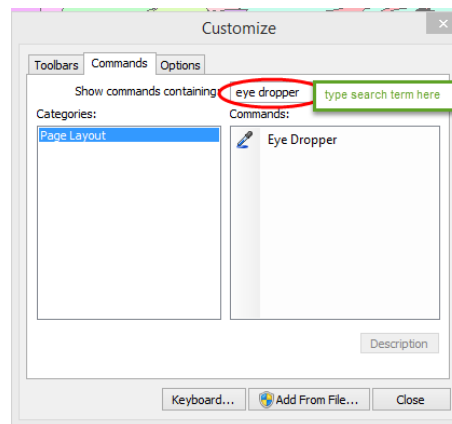
Using the eye dropper tool it is possible to select colors from the scanned map to use as a basis for creating a custom color pallet to symbolize the digitized version. There are some pattern fills used in the printed version and the patterns cannot be matched, but the colors can.

Thanks to Aileen Buckley, cartographer and Mapping Center Lead at ESRI, for the tip on adding and using the eye dropper tool in ArcMap. (<http://www.esri.com/esri-news/arcwatch/1214/finding-colors-on-maps-is-easy-using-the-eye-dropper-tool>), and that these colors can be used with “match to map styles”.

The Eye Dropper tool is added to any ArcMap toolbar:

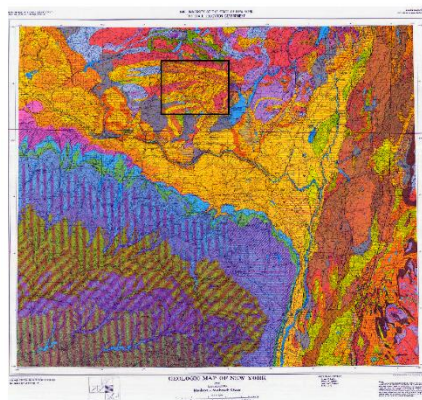
- 1) Customize > Customize mode
- 2) Commands > Page Layout > Eye Dropper
- 3) Drag the Eye Dropper icon to an open toolbar (I added mine to the Drawing toolbar)

You can also search for the tool in the Customize window



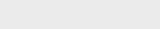
Add the scanned version of the printed map to a new ArcMap document. It comes in with an unknown spatial reference as expected (it is simply a scan) so click OK. If you wanted to create symbology for the whole map you could sample the color squares in the legend. This example will only use a small portion of the map, so sampling will be directly from the map units themselves.

Zoom in on an area just to the west of Sacandaga Reservoir





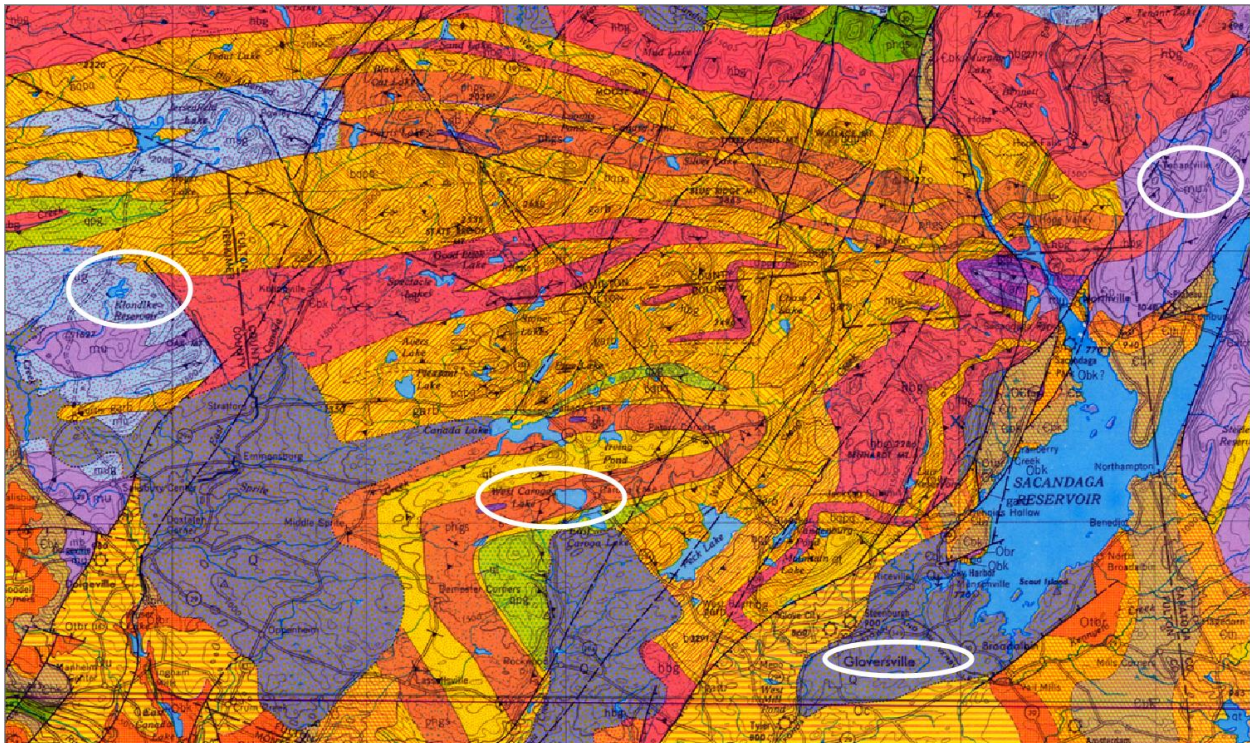
When you click with the eye dropper tool a Color dialog box comes up. The default Color Name is the RGB value of the sampled color.



Rename this with the unit name. It is critical that the name be exactly the same as the unit so the rest of the exercise will work. Clicking OK adds this color to your color pallet.



Do the same for the orange folded unit containing West Carroga Lake, the purple unit between the two arms on the north of Sacandaga Reservoir, the blue-gray unit at the south end of Sacandaga Reservoir with the town of Gloversville in it and the blue stippled unit with Klondike Reservoir in it. Be sure to name the colors with the appropriate unit names with careful attention to case.



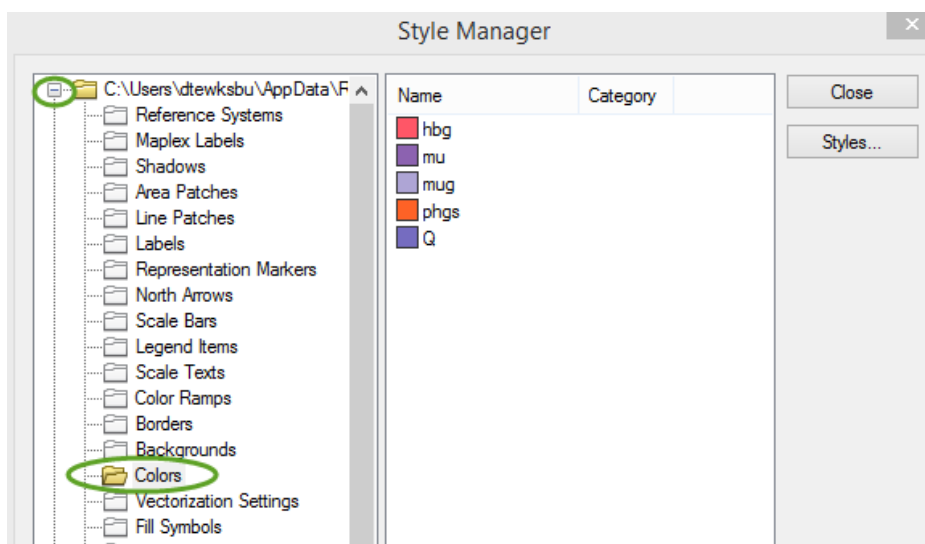
When completed there should be colors for hbg, mu, mug, phgs and Q in your color pallet.

By default the software saves these colors to your styles color pallet. In order to use them to symbolize the units they must be in the Fill Symbols folder within your styles, or a new style folder.

Creating a new style

In ArcMap main menu Customize > Style Manager

This opens a window with various styles. If you have not created or added styles, the only style listed will be your style. Expand your style by clicking the + sign to the left of the folder. Click on the Colors folder and the colors added using the eyedropper tool will appear in the window at right.



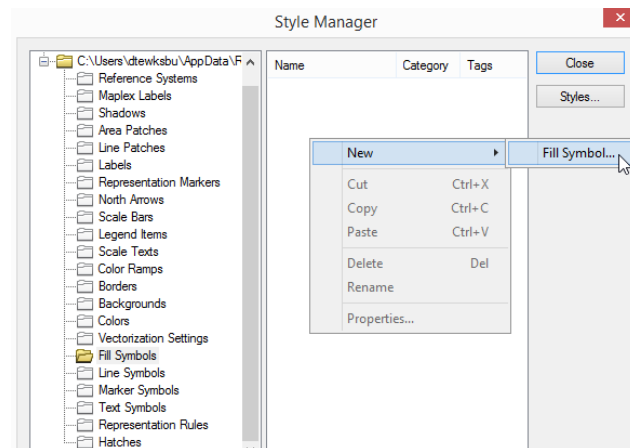
These colors need to be moved to the Fill Symbols folder to be useable. Unfortunately it is not possible to copy and paste or drag these colors from the Colors folder to the Fill Symbols folder. Additionally you may not want these to be in your default folder anyway so let's create a new Style folder specifically for the geologic map.

Click the Styles button in the upper right of this window. In the Style References window that opens click the Create New Style button. In the Save As window that opens type in the File name field NYS_geomap. Leave the type set to Esri Styles and click Save. The new style is added to the Style References list with the path C:\Users\username\AppData\Roaming\ESRI\Desktop10.2\ArcMap\NYS_geomap.style

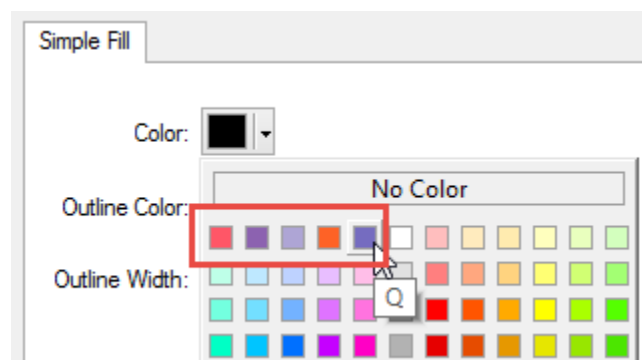
(geeky note: if you go looking for the AppData folder via Windows Explorer you probably will not find it. It is a hidden folder and unless you have changed properties to show hidden folders you cannot see it. Google "show hidden folders" to find out how to change settings to show this and all hidden folders, if interested. You do not need to be able to find this folder, just a geeky note.)

Click OK to close the Style References window.

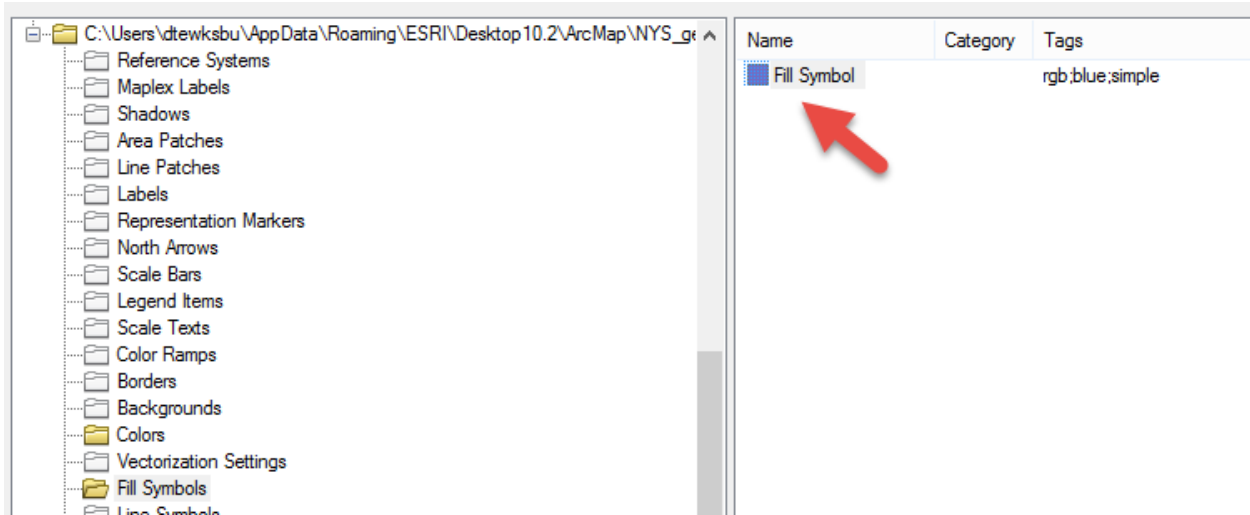
The Style Manager window will now show your original default style folder and the new NYS_geomap folder just created. Expand the NYS_geomap folder and select the Fill Symbols folder. Right click in the empty pane on the right and select New > Fill Symbol...



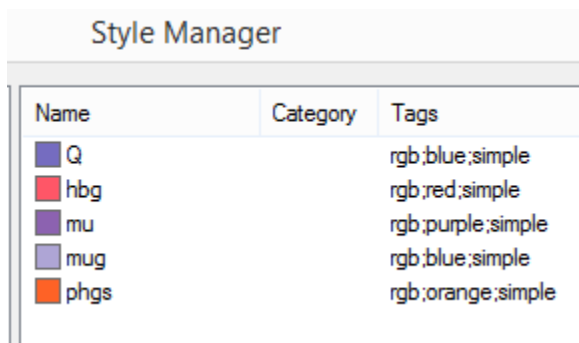
The Symbol Property Editor window opens. Click the pull down next to the color swatch and the color selector opens with the 5 new sampled colors right at the top of the pallet.



Select a color to set it and click OK. The color is added to the Fill Symbols list with the name Fill Symbol. This name has to be changed to match the corresponding unit name for the next steps to work.

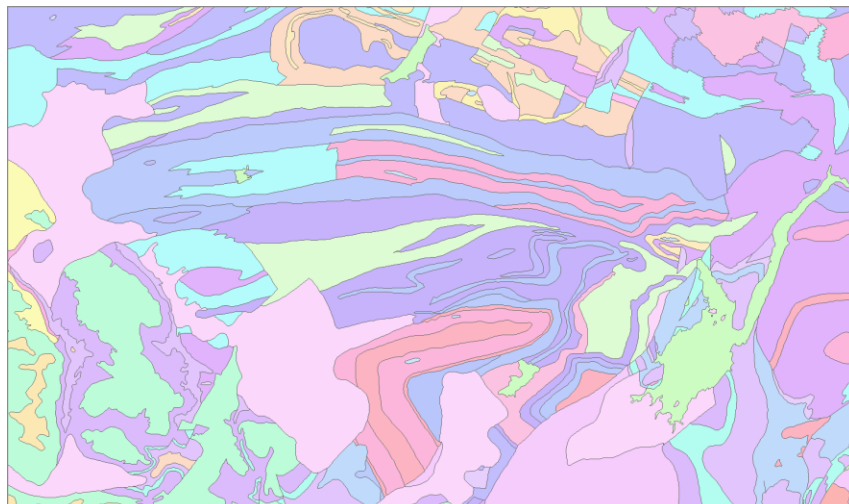


Add each of the colors and correct the name to match the unit names.

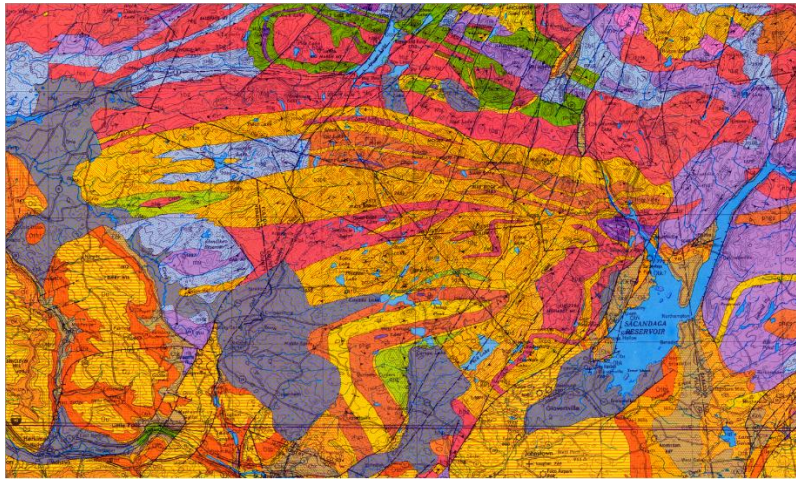


Close the Style Manager window

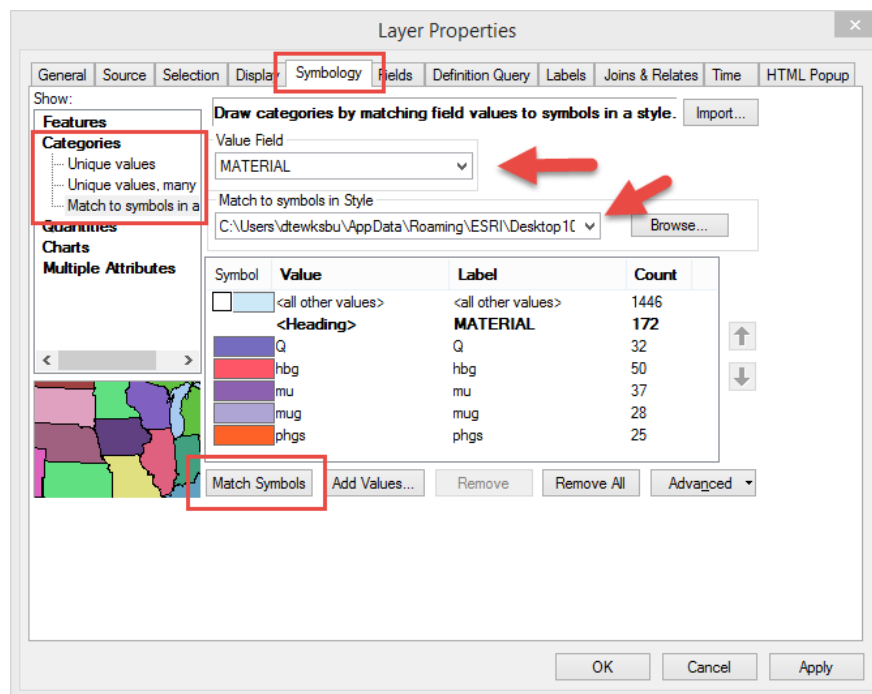
In ArcMap look at the area with the polygons symbolized based on the material field but with the default ArcMap color scheme.



And the scanned map sheet.



Select Properties of the coverage file and open the Symbology tab. Under Categories select Match to symbols in a style. Set the Value field to Material and the Match to symbols in a style pull down to ...NYS_geomap.style. Click Match Symbols button and uncheck all other values.



Click OK and look at the results.

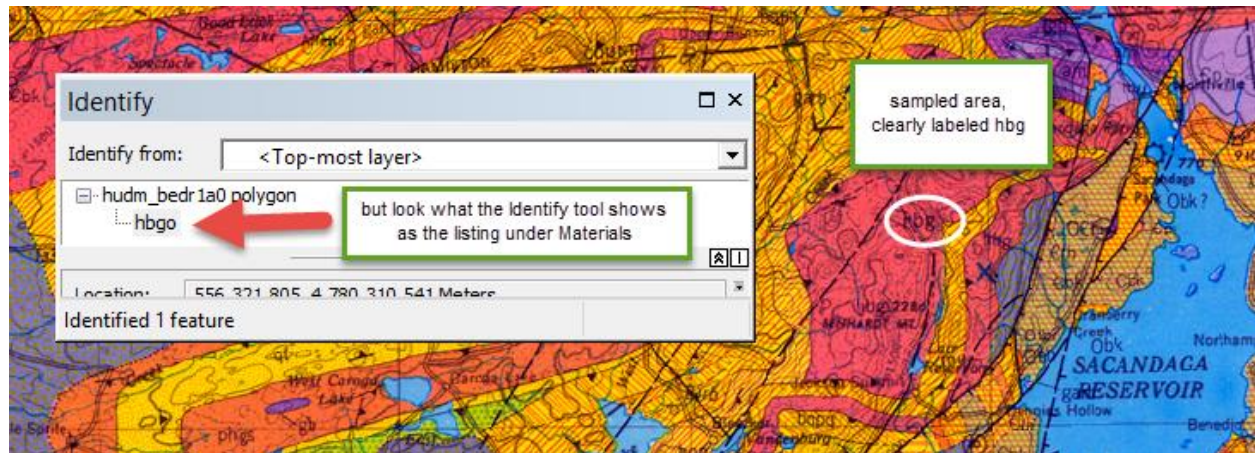


If you georeferenced the scanned map, add it, lower the transparency of the polygon shape file and check the results.



Looks good, but what about the first unit sampled, the hbg just to the west of Sacandaga Lake. It is not colorized like the other units. In fact there are units that were not sampled that are colorized.

This is why you must QA/QC your work.



Check the legend of the printed map and what do you find? There is no hbg0 listed, but there is a bit of text mentioning “overprint”, perhaps this is what the author meant with the hbg0 designation. In any case, the person digitizing the map made a decision to tag this unit as hbg0 even though it is labeled hbg on the printed map.

am	Amphibolite, commonly biotitic; garnetiferous, pyroxenic in and adjacent to central massif of Adirondacks.
bg	Biotite granitic gneiss, overprint signifies inequigranular texture.
hbg	Biotite and/or hornblende granitic gneiss, locally pyroxenic; commonly with subordinate leucogranitic gneiss, biotite-quartz-plagioclase gneiss, other meta-sedimentary rocks, amphibolite, migmatite. Amphibolite with porphyroblasts of K-feldspar locally prominent in northwest Adirondacks. Overprint signifies inequigranular texture or phacoidal structure. In northwest Adirondacks, grades into phg.

Checking further, the Bedrock text document downloadable from the NYS Museum site shows a hbgo unit in the listing

```
hbgo  Biotite and or hornblende granite gneiss
hbgo  Megacrystic Biotite and or hornblende granite gneiss
```

Here a decision has to be made to either create a new color for hbgo or change the name in the Material field from hbgo to hbg and allow the unit to be symbolized with the hbg color.

Based on the description from the text document the difference between hbg and hbgo is crystal size and given the scale of the map I made the decision to rename the hbgo units as hbg for this exercise so they are symbolized with the other hbg units.

This is a case where the area should be field checked and if the location of megacrystal units was important then symbology should be changed to reflect this.

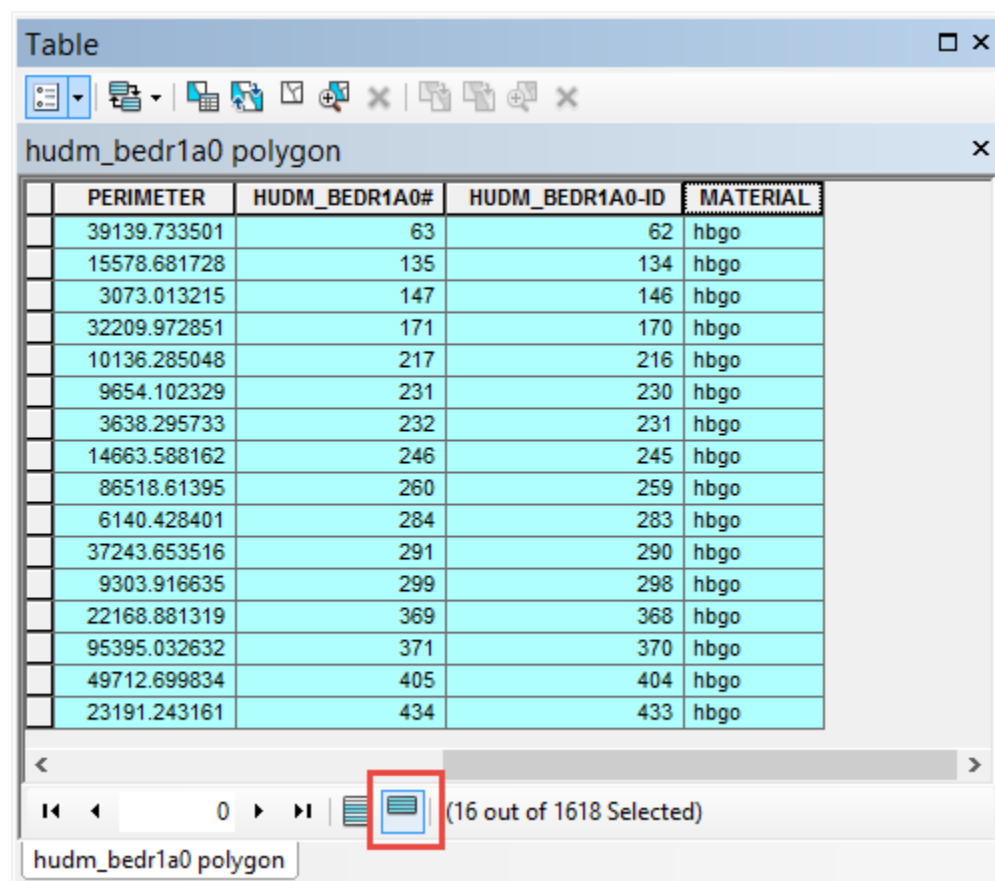
Changing hbgo to hbg in the Materials field

Make a copy of the coverage folder so if something gets messed up you can revert to a clean copy.

Open the attribute table of the polygon file and from Table Options choose Select By Attributes.

Build the Select From equation to read "MATERIAL" = 'hbgo'

Units with Material equal to hbgo will be selected. Switch to selected view of attribute table.



Table

hudm_bedr1a0 polygon

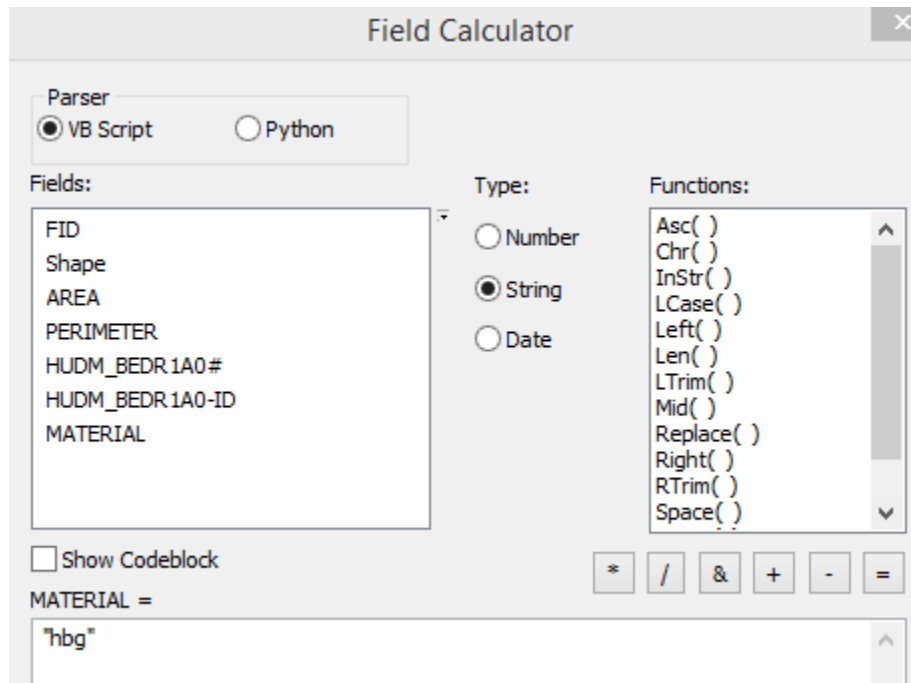
PERIMETER	HUDM_BEDR1A0#	HUDM_BEDR1A0-ID	MATERIAL
39139.733501	63	62	hbgo
15578.681728	135	134	hbgo
3073.013215	147	146	hbgo
32209.972851	171	170	hbgo
10136.285048	217	216	hbgo
9654.102329	231	230	hbgo
3638.295733	232	231	hbgo
14663.588162	246	245	hbgo
86518.61395	260	259	hbgo
6140.428401	284	283	hbgo
37243.653516	291	290	hbgo
9303.916635	299	298	hbgo
22168.881319	369	368	hbgo
95395.032632	371	370	hbgo
49712.699834	405	404	hbgo
23191.243161	434	433	hbgo

(16 out of 1618 Selected)

hudm_bedr1a0 polygon

Right click in the header of the MATERIAL field and choose Field Calculator. Click through warning that you are working outside of an editing session.

Set Field Calculator to String and that MATERIAL = "hbg" with quotes

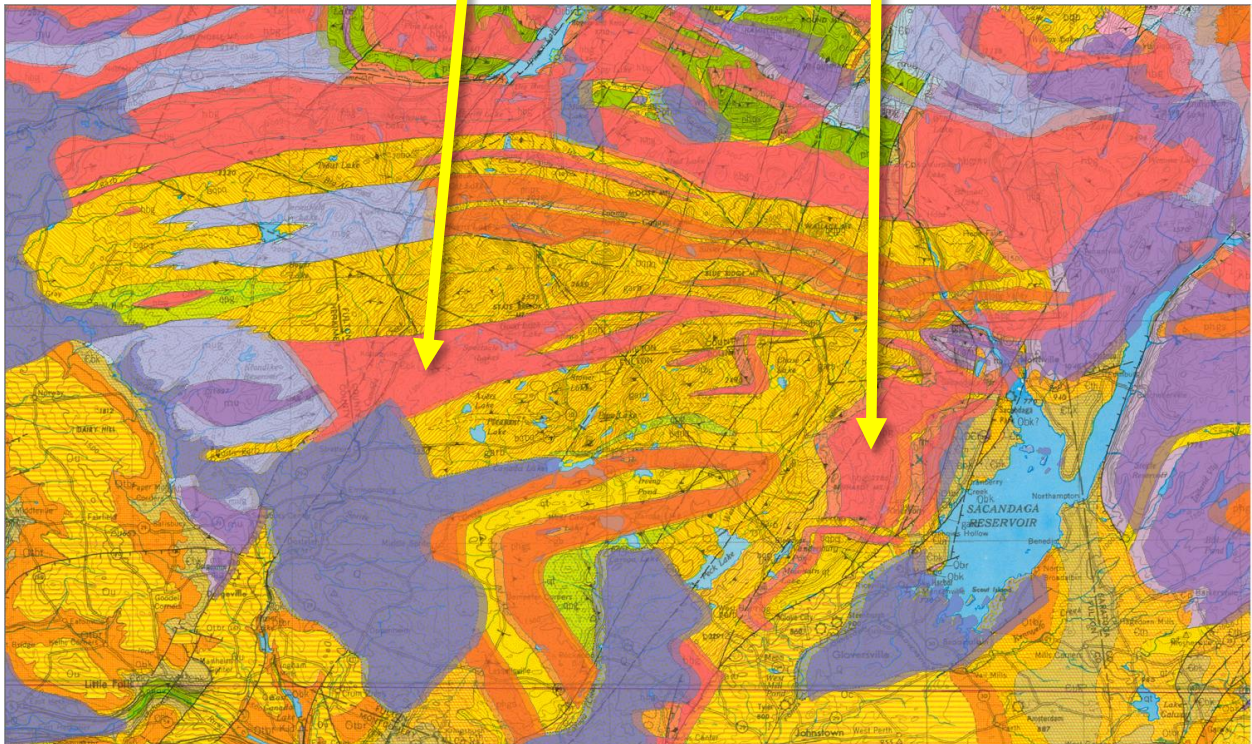


Click OK and hbgo will be replaced with hbg in the attribute table.

Redo Symbology with match to symbols in style and the units originally tagged with the hbgo material name will be symbolized with the same symbology as units tagged with hbg.



hbgo units

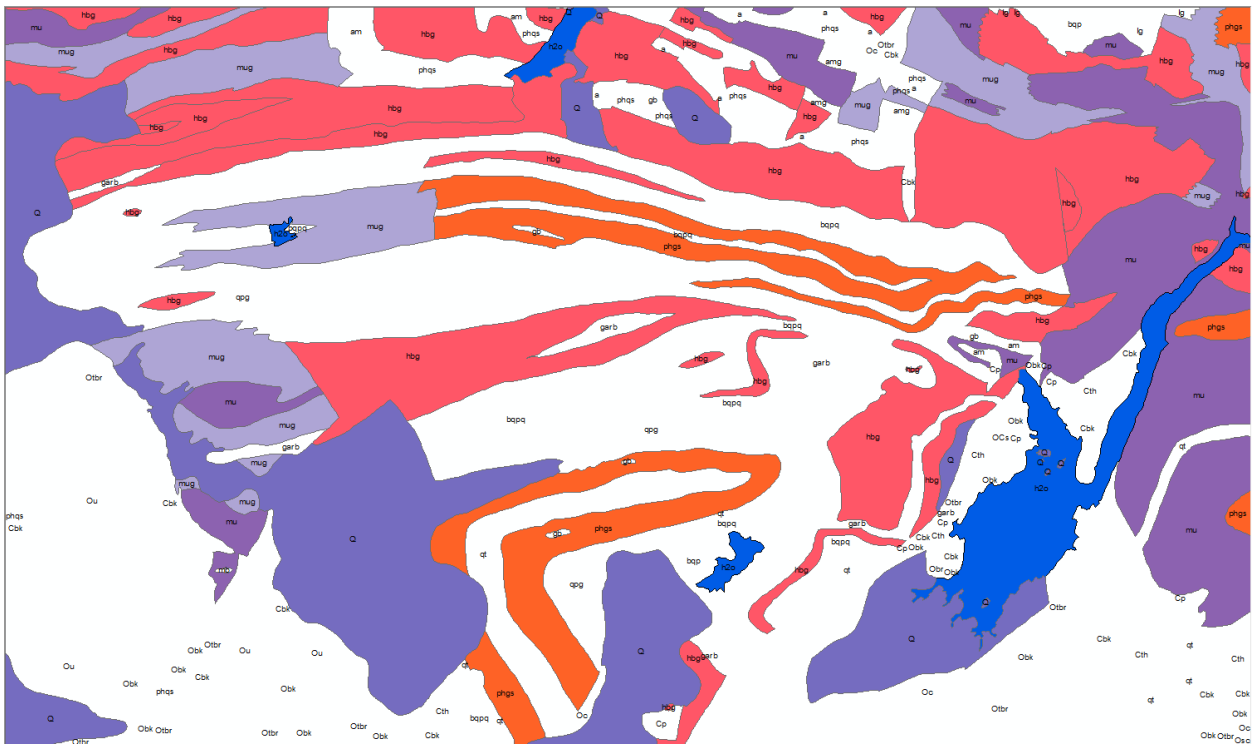


hbgo units changed to hb in Materials

Re-symbolized map without scan of printed map



Re-symbolized map with style for h2o and labels added



Addendum with suggestions from Aileen Buckley

1. It might make more sense to sample the colors out of the legend because text, basemap info and other stuff will not get in the way.
2. Note that for printed maps, you sometimes have to sample multiple times because dithering is used to create the colors, which is a way of using dots of multiple colors to create the impression of a color. If you sample from an image with dithering, you could end up with one of the colored dots and not the color itself – get it?

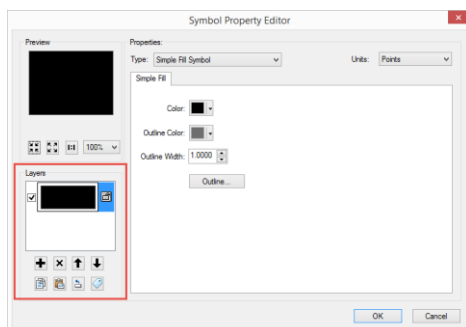


3. You can also recreate the symbols with dotted or line pattern overlays – just add a second layer to the fill symbol and use either a picture fill symbol or a marker fill symbol to specify how the dots or lines look.
4. Note that Mapping Center has a number of styles you can use – one is for veg with the colors from the original printed National Atlas. Great colors but not exactly the same ones as on your map. Just wanted you to know they were there.
(<http://mappingcenter.esri.com/index.cfm?fa=arcgisResources.gateway>)
5. There is also a geologic map template
(<http://www.arcgis.com/home/item.html?id=bb02aa75305f40ff87fb6106aa297da9>) you can download that includes not only a style, but also the geodatabase design, and example map document, and more.

All of this is straight forward and self-explanatory except #3. Here is the technique in detail.

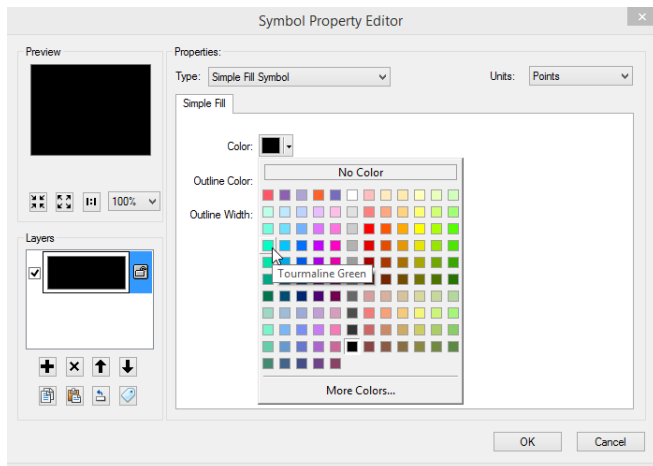
Bring up Style Manager (Customize > Style Manager)

Expand the NYS_geomap styles folder and click on the Fill Symbols folder, right click > New Fill Symbol to bring up the Symbol Property Editor box.

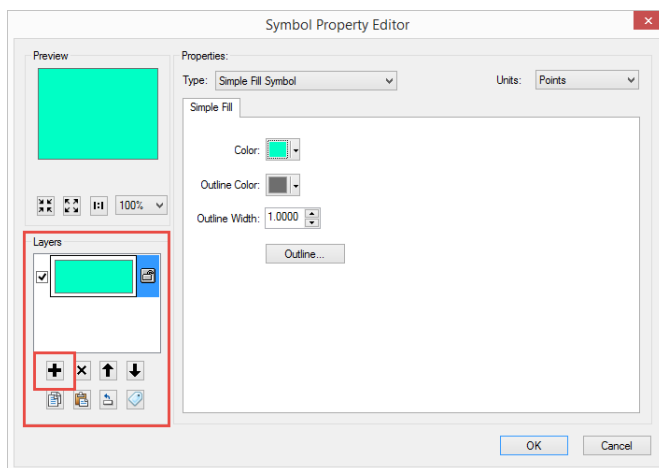


Notice the lower left section of the Symbol Property Editor box titled Layers. This is where you build the complex symbol consisting of both a color and a texture.

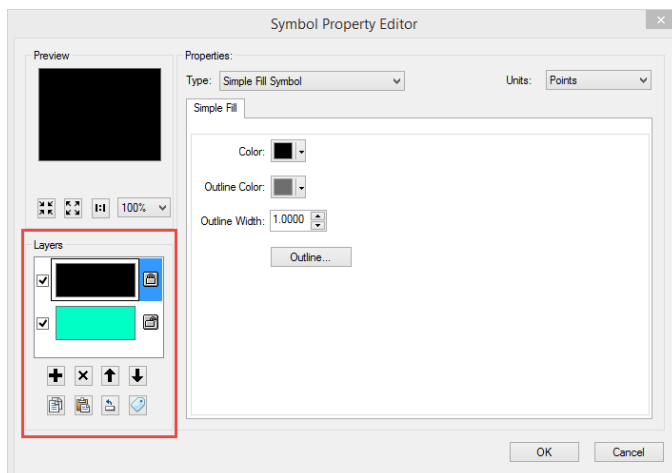
First change the simple fill color to something other than black by clicking on the Color pull down and selecting a new fill color.



The Layers area now shows a layer with Tourmaline Green fill. Within the Layers box click the “+” sign.

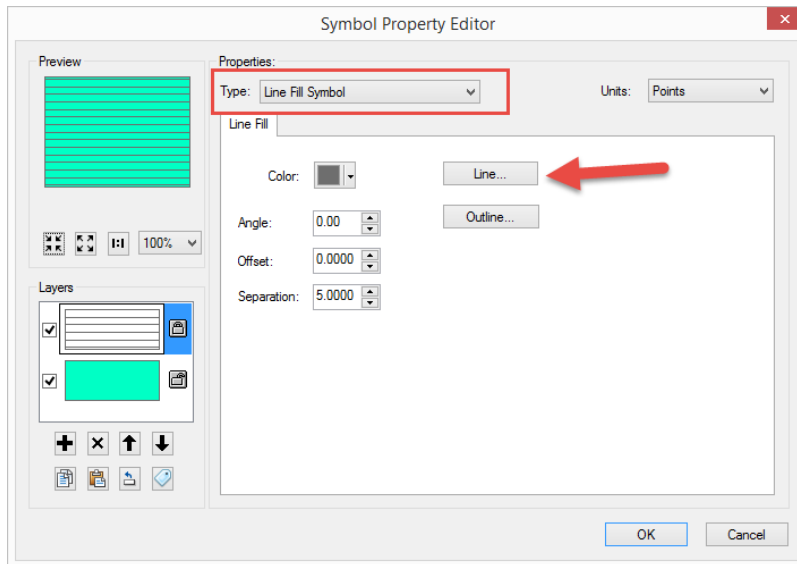


A new layer (by default a simple fill with black) is added above the previous layer.

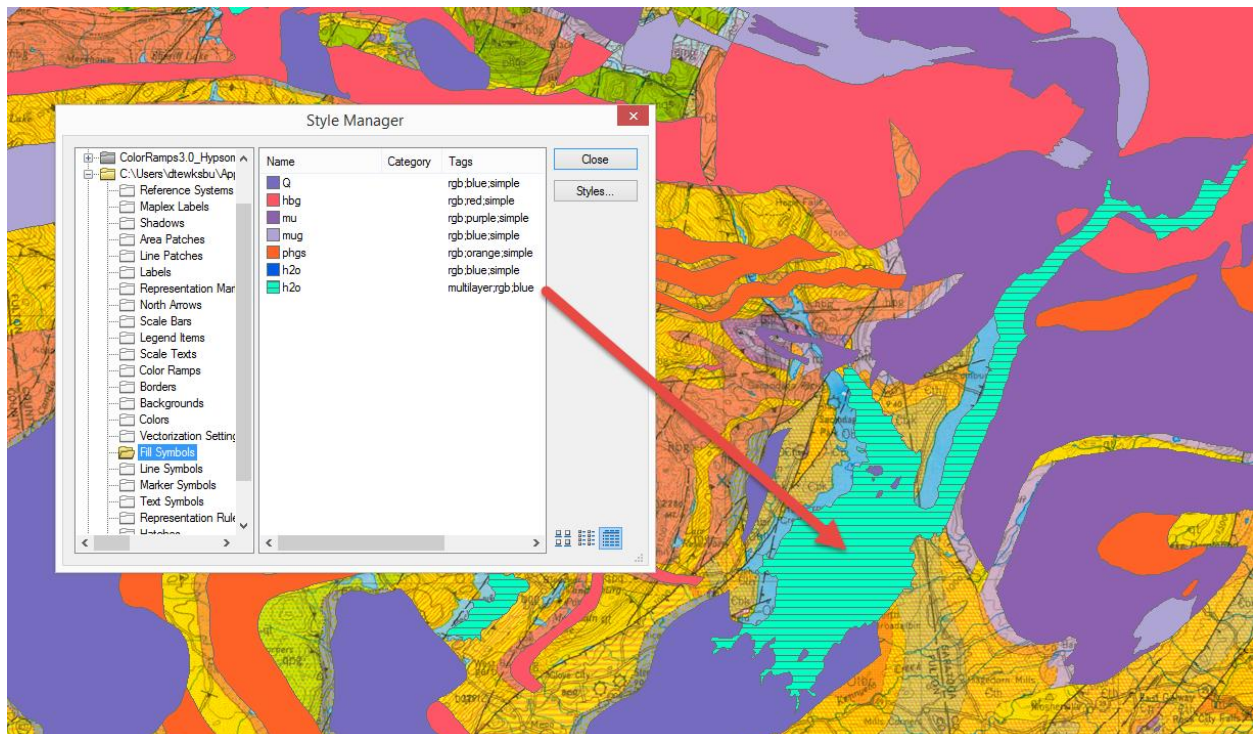


Click on this layer to select it

Change the fill type to Line Fill Symbol. The default is spaced horizontal lines, but by clicking the Line button you can browse to other line styles. The color pull down allows you to change the color of the lines.



Click OK to save this new style and assign a name to it so it will match with a field in the attribute table. Just as an example I named it h2o and it replaced the dark blue previously used for h2o symbology. Both exist in the list so not sure why it chose the new style.

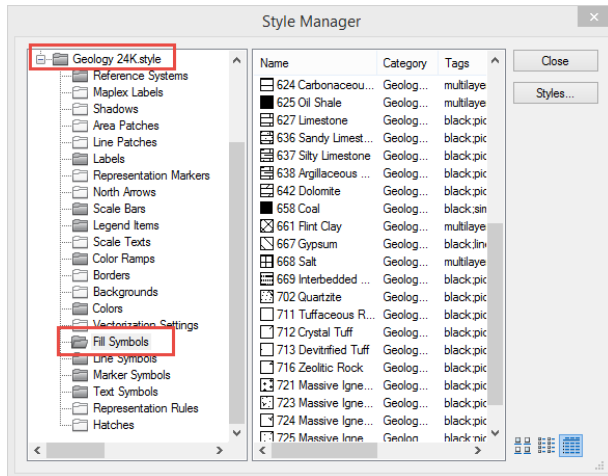


Now an opportunity to get really fancy:

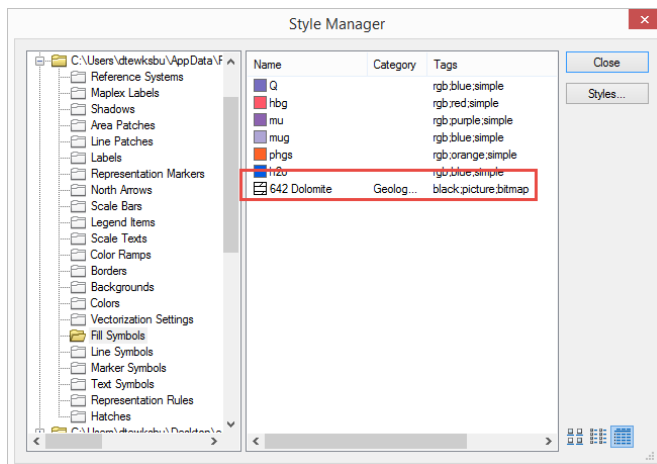
The Geology24k style includes all kinds of textures for various rock types in the Fill Symbols folder. These textures can be used as a base for creating new textured fills.

You cannot access Fill Symbols when creating a new Fill Symbol, so you need to copy the texture you want to create a new Fill Symbol style from.

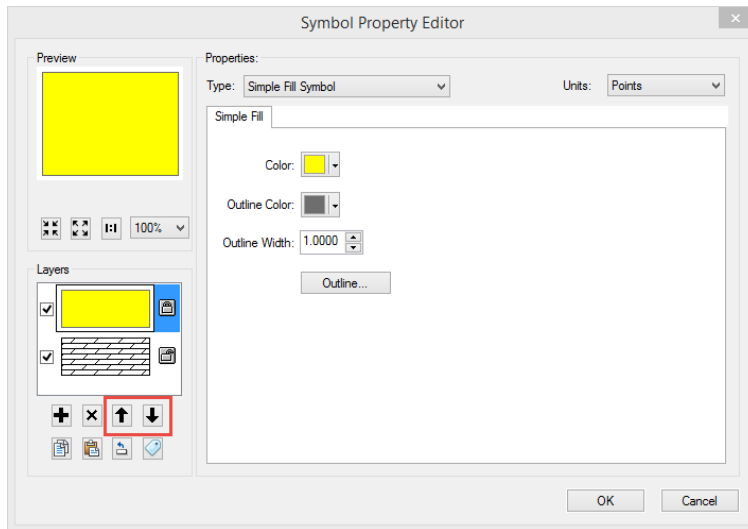
In Style Manager, expand the Geology 24k style and select the Fill Symbols folder. The right hand pane will fill with the textures in this folder.



Right click on a texture and choose Copy. Scroll to your NYS_geomap style folder and paste the copied file into the Fill Symbols folder within the NYS_geomap style.

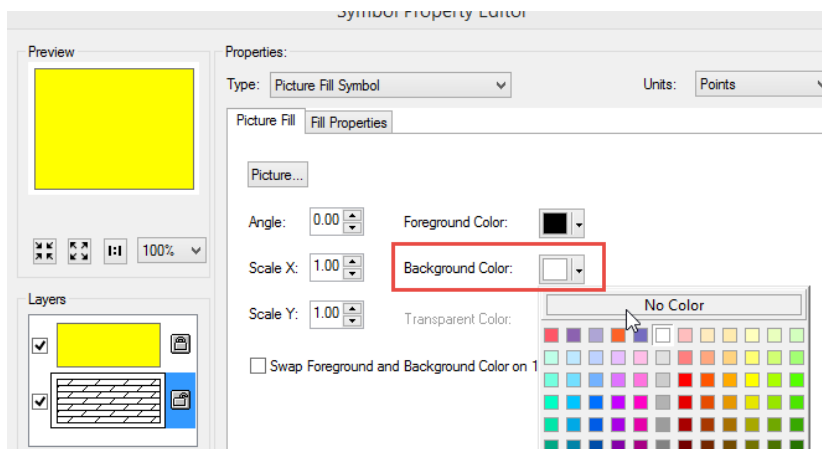


Double click on the Dolomite style to open the Symbol Property Editor window. Click the "+" sign to add a new layer and fill the layer with a light color.

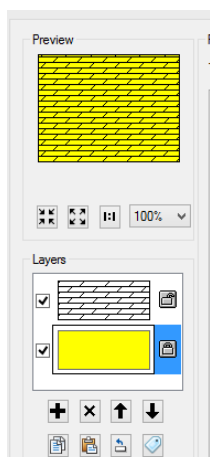


The yellow color hides the underlying texture. Use the up down arrows to change the order of the layers. Changing order does not seem to help. Issue is that the white in the texture is a solid color (white) not clear.

Click on the dolomite layer and change the background color to No Color.



Put the yellow fill below the texture and



This allows you to create textured & colorized fills.

The geologic template listed at the beginning of the addendum includes extensive styles for essentially every geologic material you could possibly want to symbolize. You can download the template and styles and use them for geologic mapping or, by sampling the Fill Symbols folder within the style have an almost endless set of textures to use with or without colors in your projects.