



Mapping With Style, Vol. 1

John Nelson, Esri

Contents

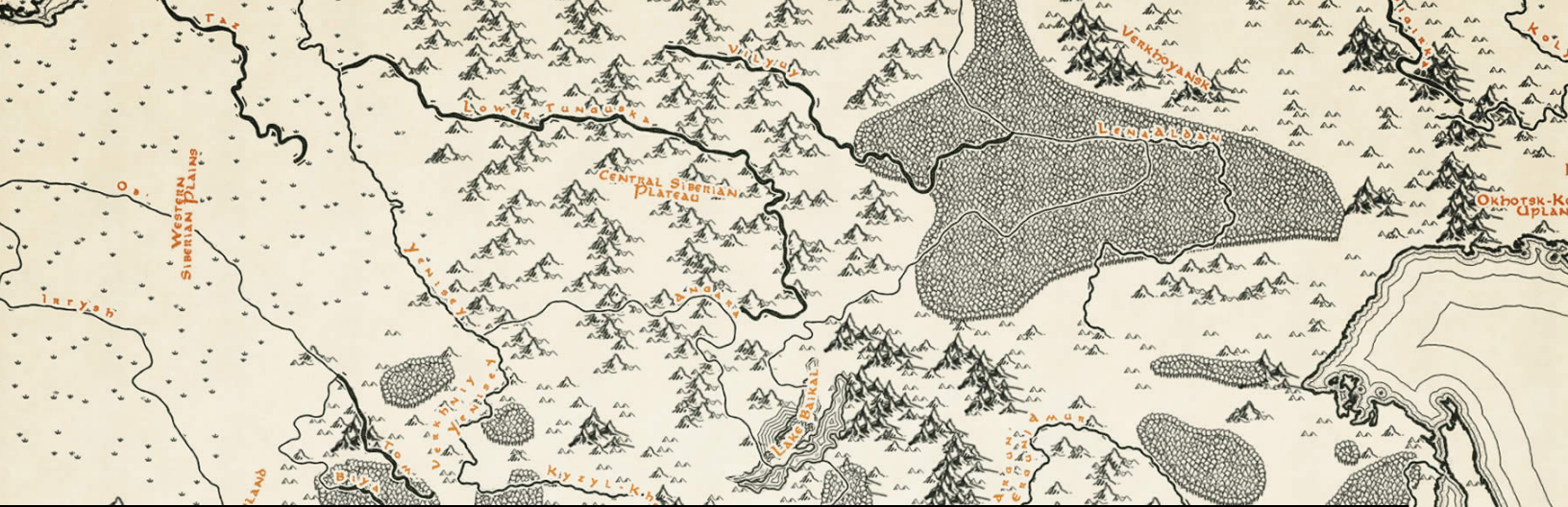
[1] Middle Earth Style

[2] Eduard Imhof Topography Style

[3] Firefly Style

[4] 1850s Physical Geography Atlas Style

[5] Hachure Style



[1] Middle Earth Style



Some of the earliest full-on engagements I had with maps were those that were printed in the inside covers of books. But my sister's Lord of the Rings volumes had huge folded inserts! Fantastic books need fantastic maps, and these unfolded a new world.



I recently spent some time revisiting this wonderful yellowed map of Middle Earth created by J.R.R. Tolkien and Pauline Baynes. I sketched tiny little map elements, inspired by their print, that I fed into an ArcGIS Pro style. My hope was to create a reusable resource for fans, like myself, to turn their maps into something with echoes of youth and imagination.

It worked!

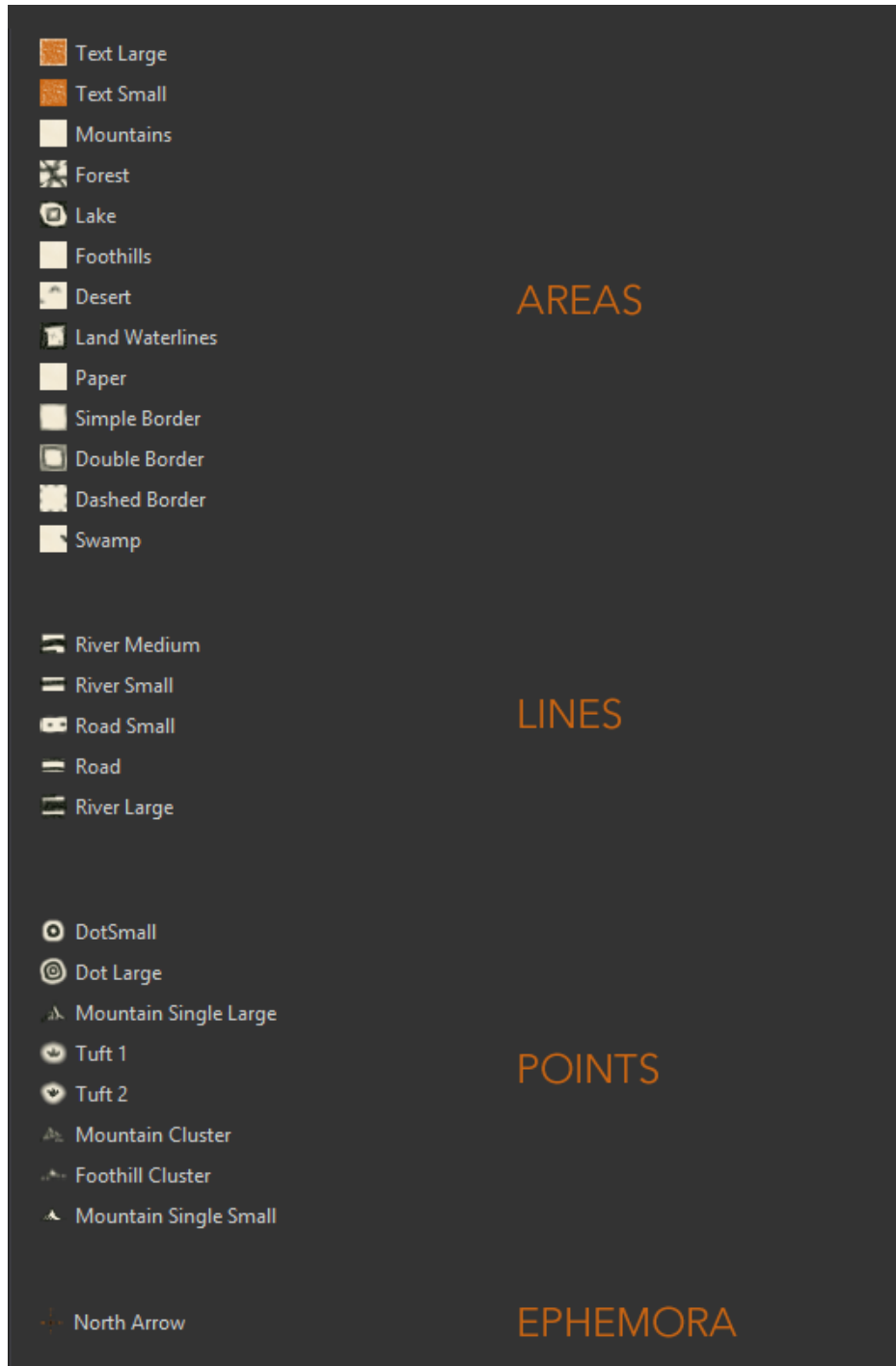






These are maps that use a simple combination of layers ([Natural Earth](#) rivers, [Project Linework](#) coasts, and [Living Atlas](#) world landforms) and [this style](#).

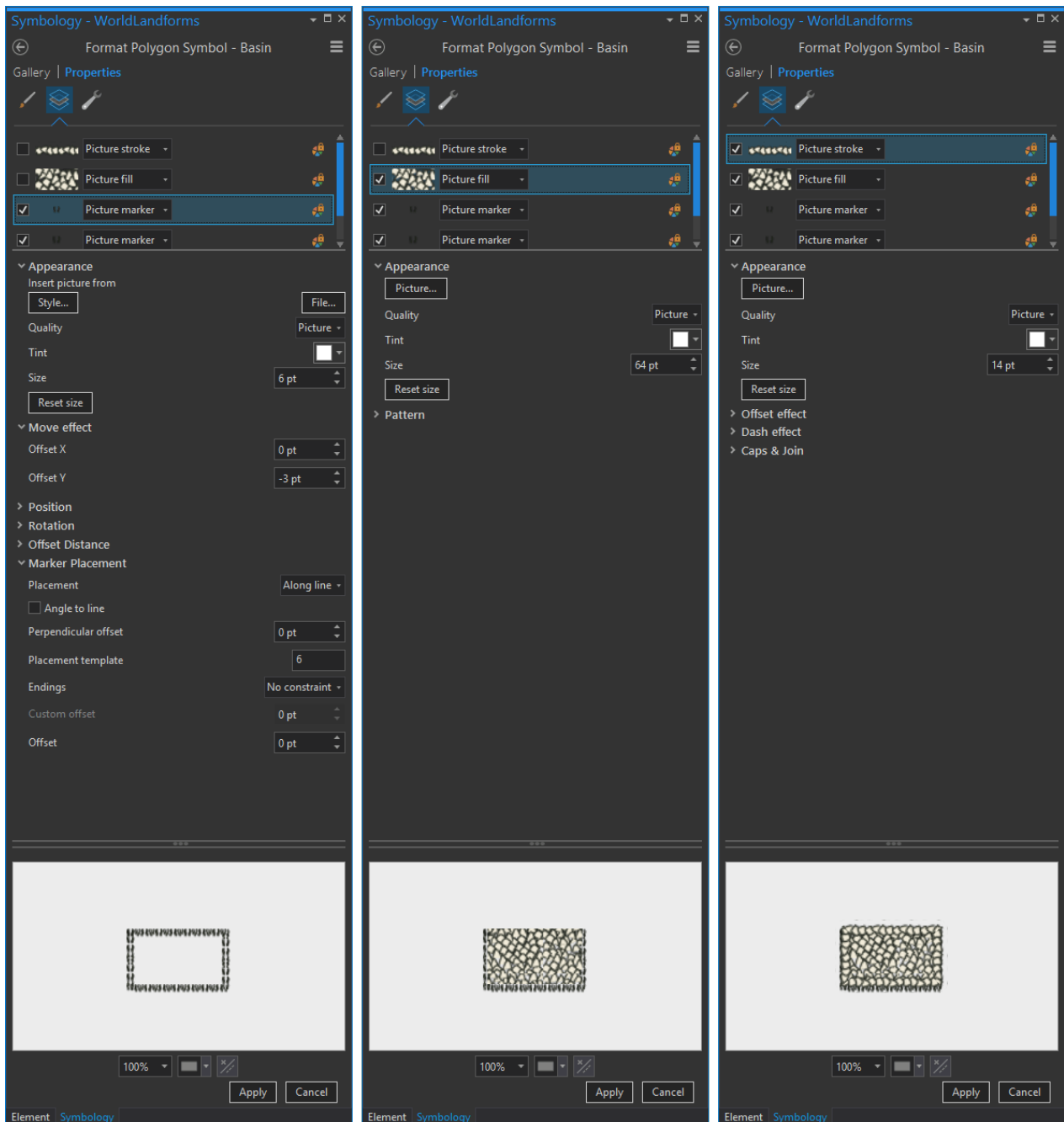
All we have to decide is what to do with the map style that is given to us.



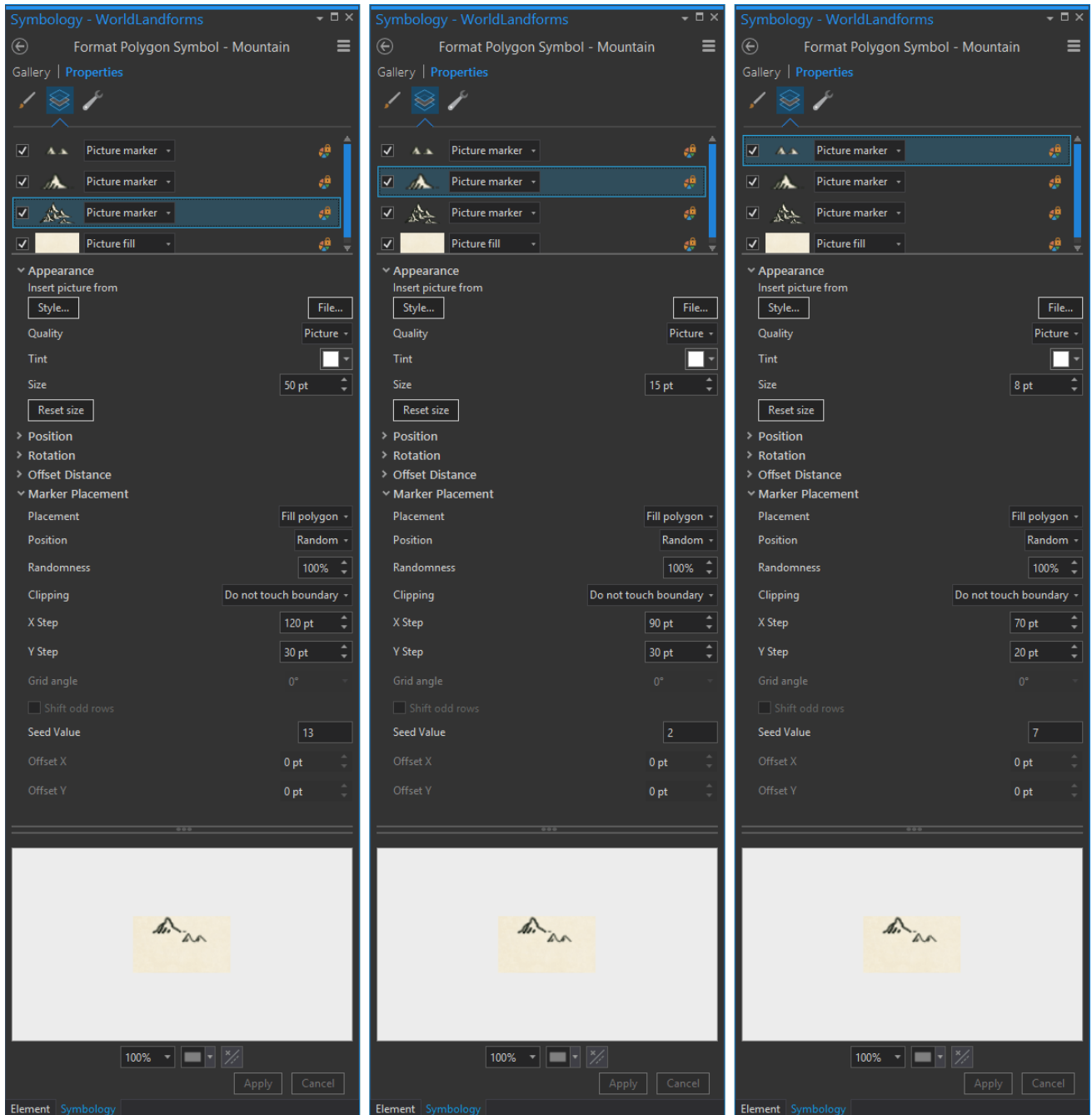
How

You can download [the style file](#) and save it to your machine. Then in ArcGIS Pro's catalog, choose the "styles" category then right-click and choose "add", then point to the style file. You'll be inking your own adventures in no time.

Creating the discrete forest was the biggest challenge. But symbol layers allowed for all sorts of adventure. I drew a repeating fill pattern, and a picture line symbol to disguise the clipped edges of the fill pattern. Then, beneath these I added a marker line of little tree trunks and moved it down so it only appeared at what looks like the base of the forest edge. Fun, right?



The second distinguishing feature of these maps is the strongly linear mountain chains. To get this, I drew a few clustered mountain graphics and added them in as marker fills, randomly distributed but with a tighter vertical spacing and broader horizontal spacing.



Why?

Maps can be amazing and inspiring things. I've found that the maps I absorbed as a kid have a lot to do with the sorts of cartographic styles that grab me as an (technically) adult. A style like this can turn a regular place into a fantastic one. This isn't a trick. The world is actually a pretty fantastic place filled with knowns and unknowns mysteries and adventure. A map like this isn't whipping up excitement where there is none. It's echoing how great and interesting the world actually is.

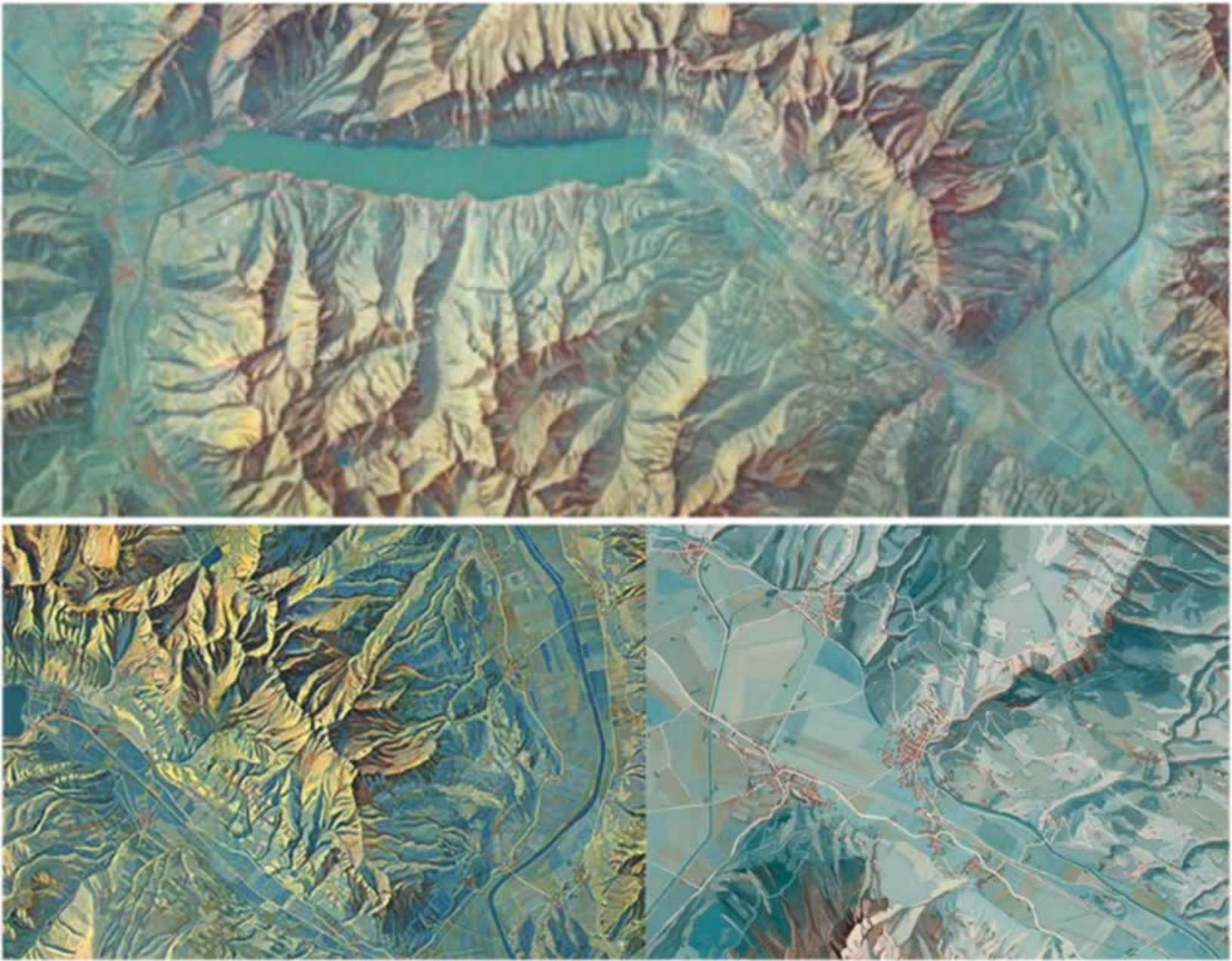
Happy Mapping!



[2] Eduard Imhof Topography Style

Eduard Imhof was a remarkable Swiss cartographer renowned for his beautiful impressionistic topographic mapping style. He used hues to create a sense of sun-bathed warmth and cool shadow and feathered a sense of atmospheric perspective into his hillshades that rendered directly-illuminated peaks as crisp golden angles and blanketed valleys in the blues and greens of scattered incidental light.

Here is a little glimpse of how amazing Imhof's work was.

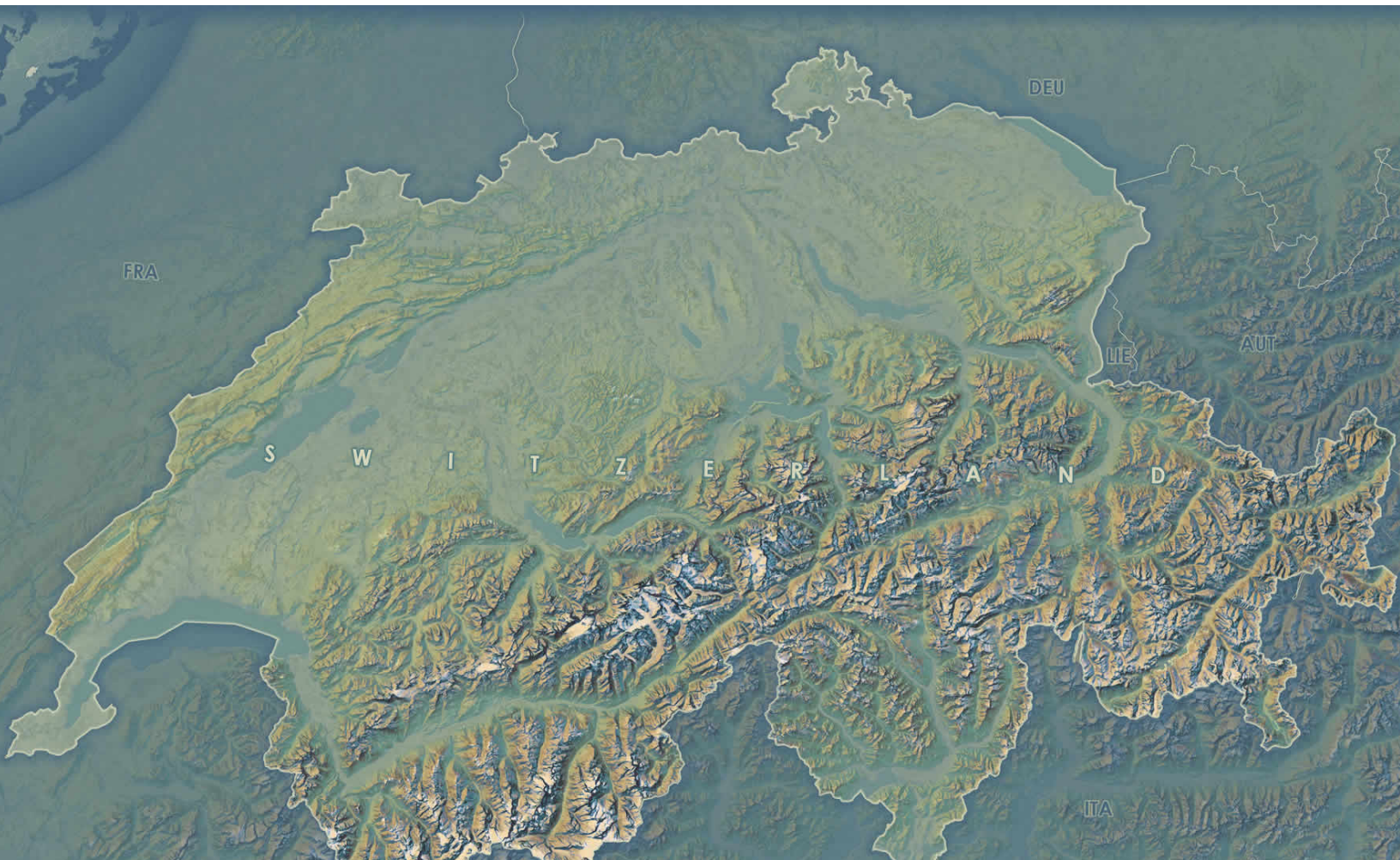




Easy, right? 😊

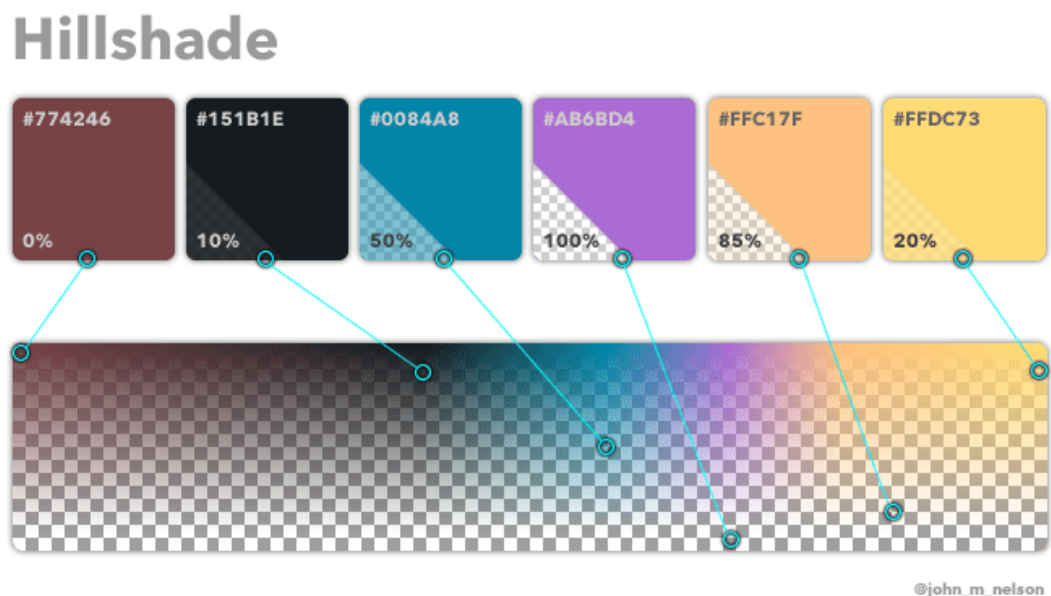
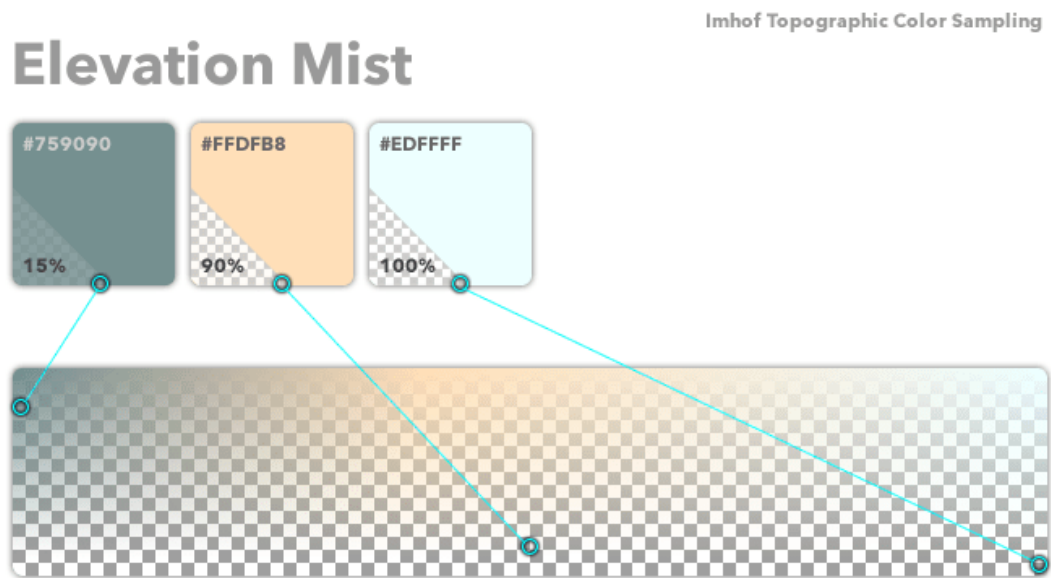
In an attempt to learn more about his style, I have been feathering terrain layers together with some Imhof-inspired colors and transparencies. And it's been a total blast! As a creature totally unable to keep fun and interesting news to himself, I of course am excited to share the method and resources that I found most effective. Get ready to live!

Here's a map that uses these layers, colors, and opacities, [in a manner](#) somewhat reminiscent of Imhof's. Sort of like fan fiction, but with maps.



Color Schemes

I sampled a range of colors from the crisp higher elevation peaks, for sunlit slopes, shadow, and several intermediate (largely transparent) stops. I then sampled the overall incidental light mist color predominant in Imhof's valleys. From these colors I produced two color schemes. One for hillshade and the other for elevation mist. Here is a schematic...



Hillshade

I found that Imhof's formidable cognition/hand did a remarkable job of representing the larger order topographic character of an area while still capturing the fine grain of it. He did this because he was an artist, familiar with the [sfumato](#)-layering and blending of paints to create a realistic sense of depth and light. In my experience, conventional hillshading techniques do a fair job of capturing that overall landform, while a multi-directional method teases out the local nuances well. I was comparing their relative merits when I just decided to use both layers concurrently...

John Nelson @John_M_Nelson

I was wrestling with traditional v multidirectional hillshades. But when I do both, I likes it. In a Bertin-ish palette.



10:31 AM · 20 Aug 2018

15 Retweets 113 Likes

3 15 113

Add another Tweet

Mike Foster @mjfoster83 · Aug 20
Replying to @John_M_Nelson
Hey this is really pretty. Nice work!

John Nelson @John_M_Nelson · Aug 20
Thanks Mike! Meant to say Imhoff.

John Nelson @John_M_Nelson · Aug 20
Also meant to spell it Imhof. I'm just going to go take a nap.

Andy Woodruff @awoodruff · Aug 20
AdventuresInNapping dot com
(May your nap be as beautiful as your map!)

Here are the [ingredients](#)...

- Imagery base
- Traditional Hillshade
- Multi-directional Hillshade
- Elevation Mist

(if you don't want an imagery service you can just apply [hillshade](#) techniques to [these](#) sweet NASA geotiffs)

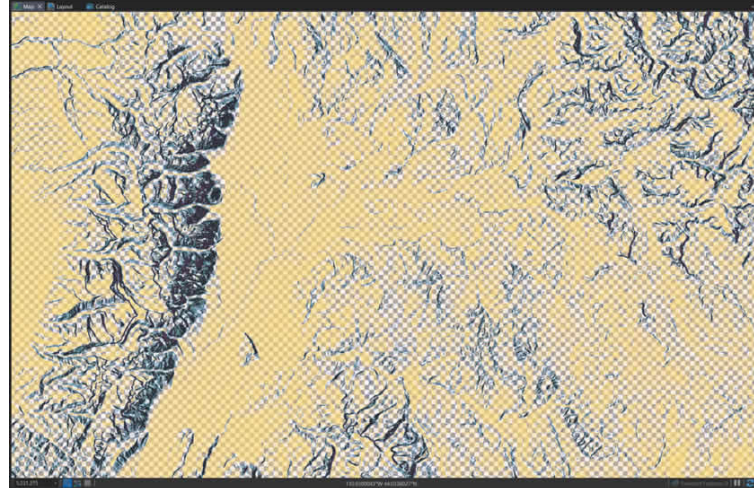
Which, when given [Imhof-inspired palettes](#) look like this...



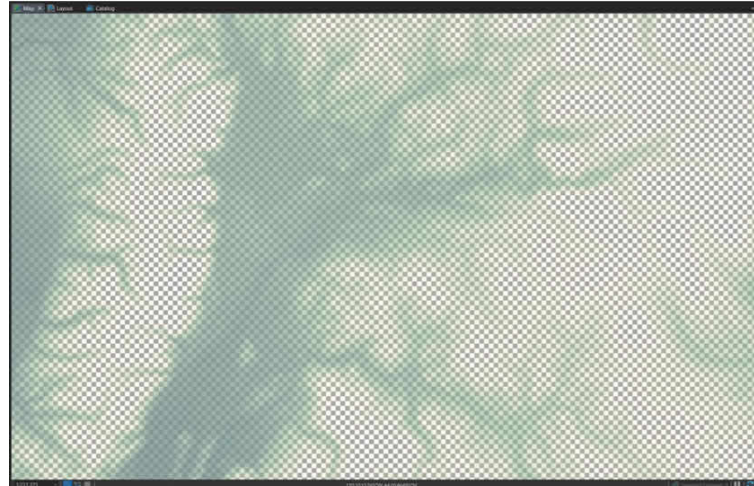
+



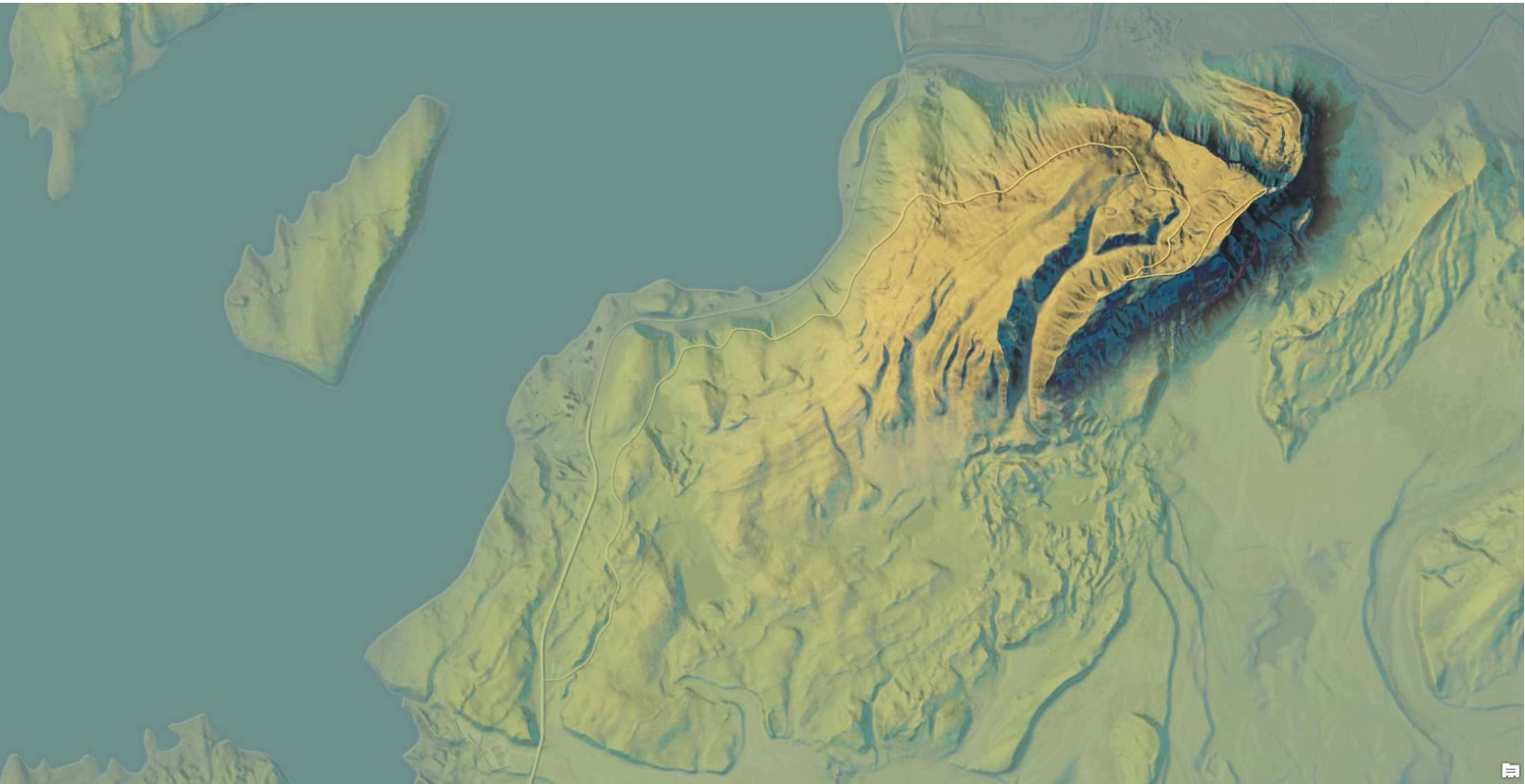
+



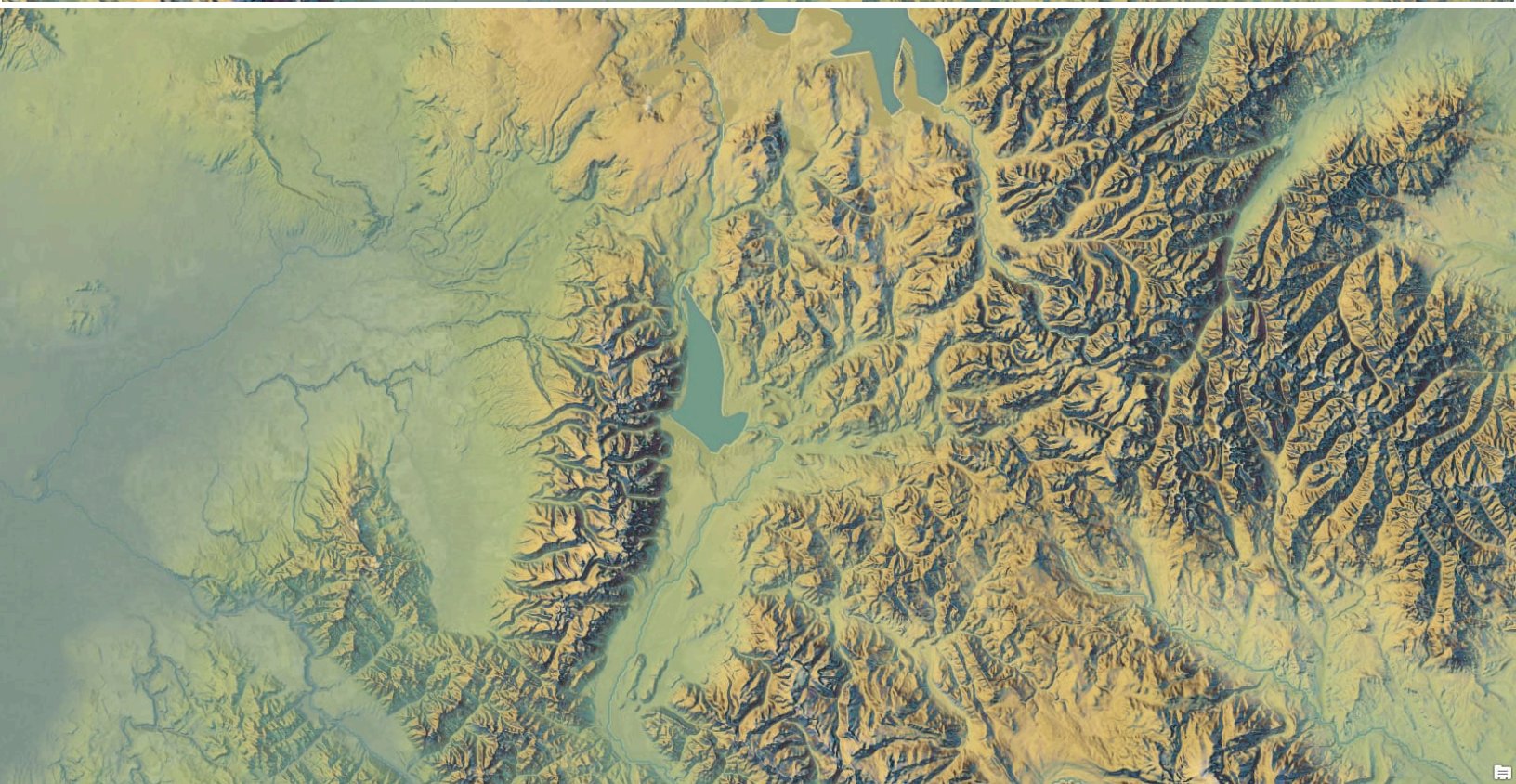
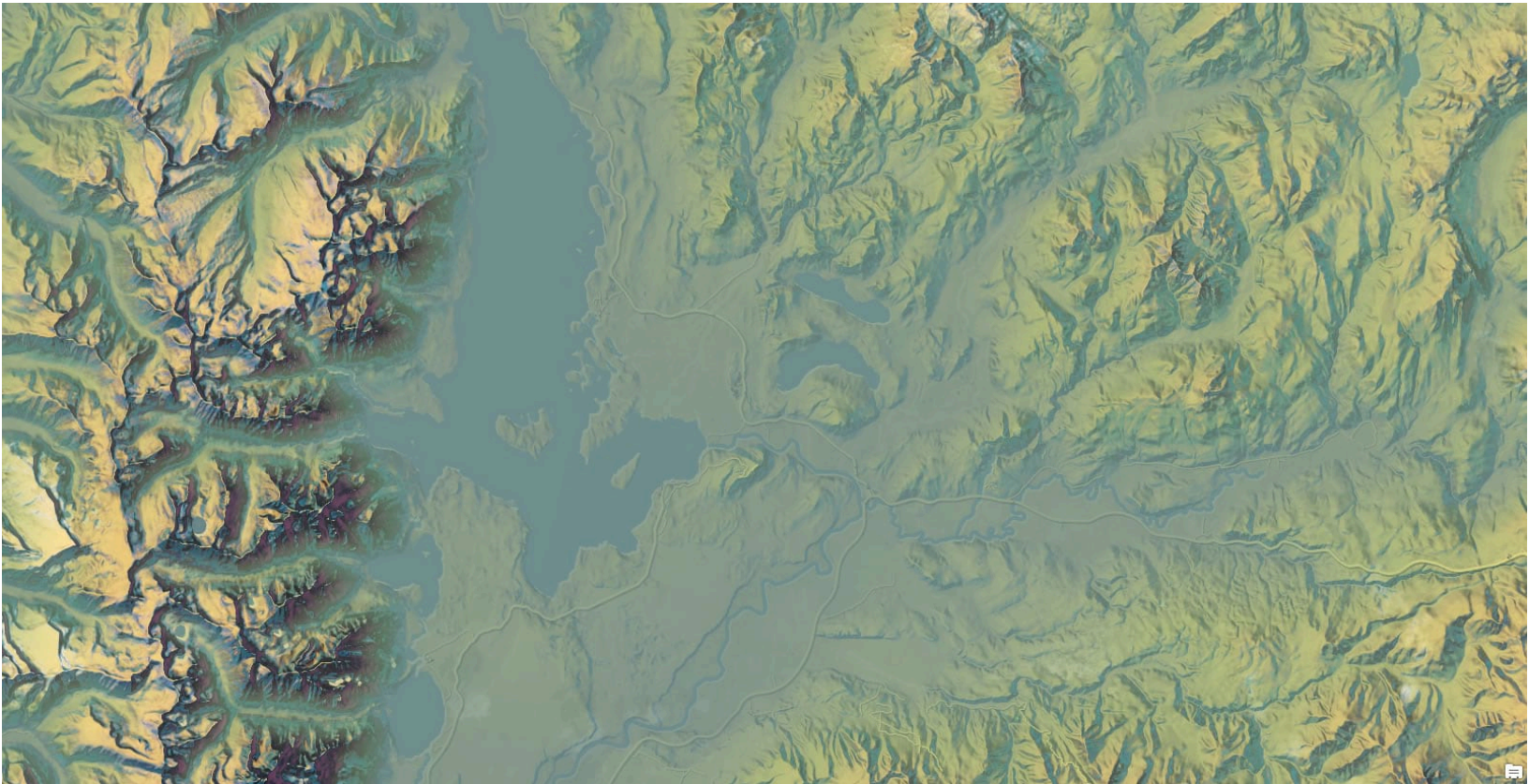
+

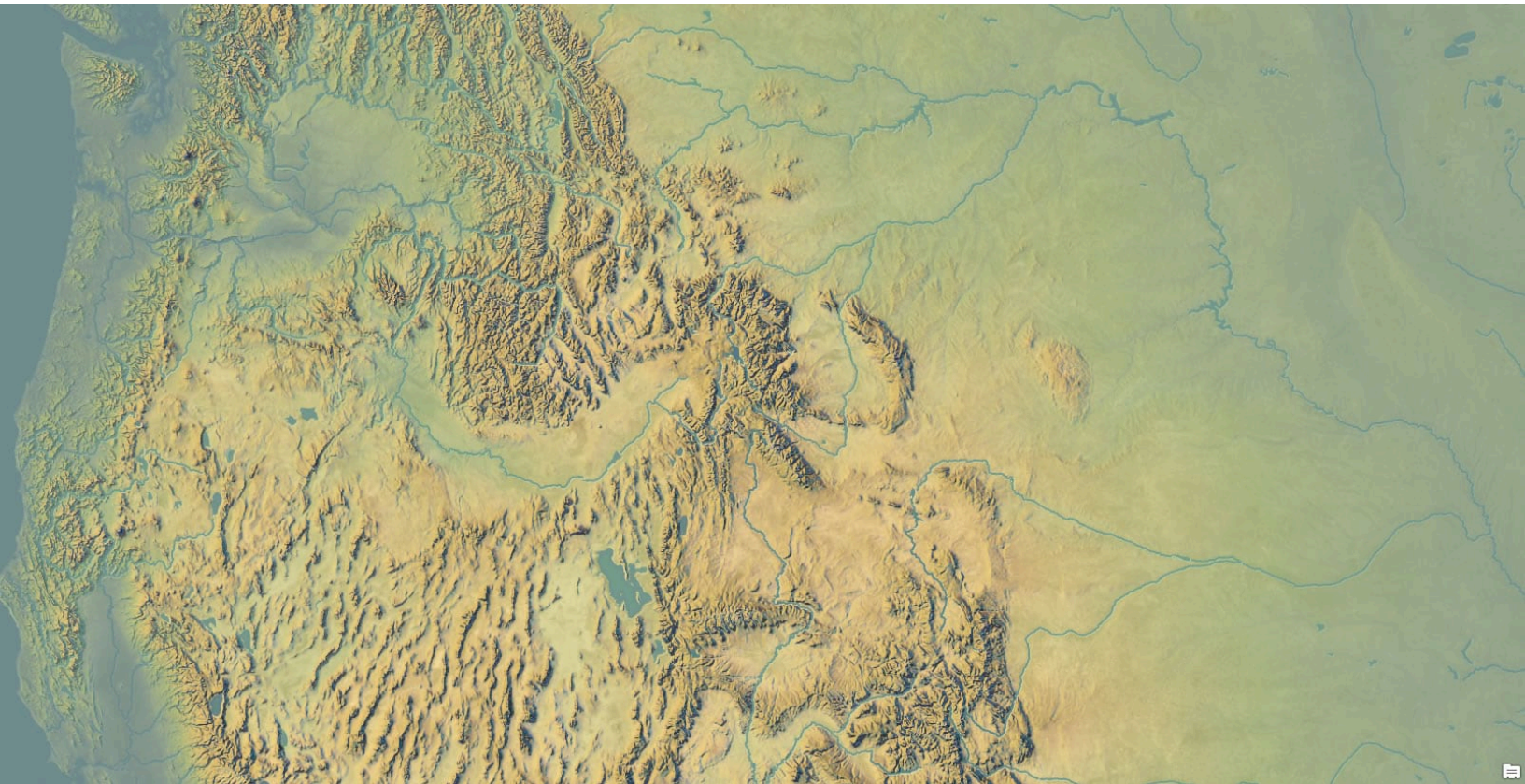


And stack up to look like this...



And it scales!





Style

[Here is the ArcGIS Pro style](#), jam packed with all the symbology you need to take your DEMs and Hillshades to the Hall of the Mountain King. Download the style file to your machine, [add it](#) to your ArcGIS Pro project, then apply any of the Imhof symbologies from the symbol panel's gallery to your layers.

You'll be breathing spruce-tinged Swiss topographic life into your relief maps in no time. If you are thirsty for more, here is an [assortment of maps](#) in the Imhof style.

Happy Painting!

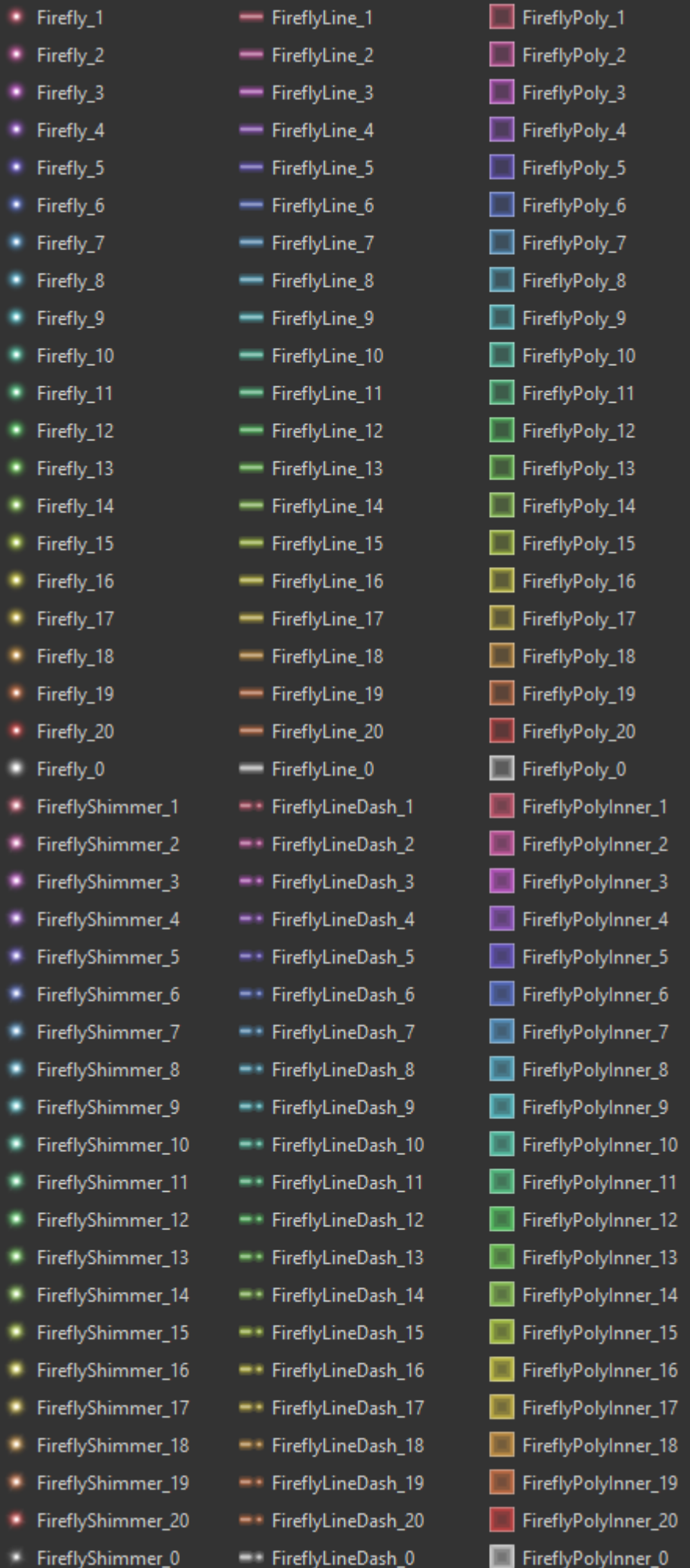
An aerial photograph of a landscape with a river and fields, overlaid with numerous glowing blue dots of varying sizes, representing data points in a map style.

[3] Firefly Style

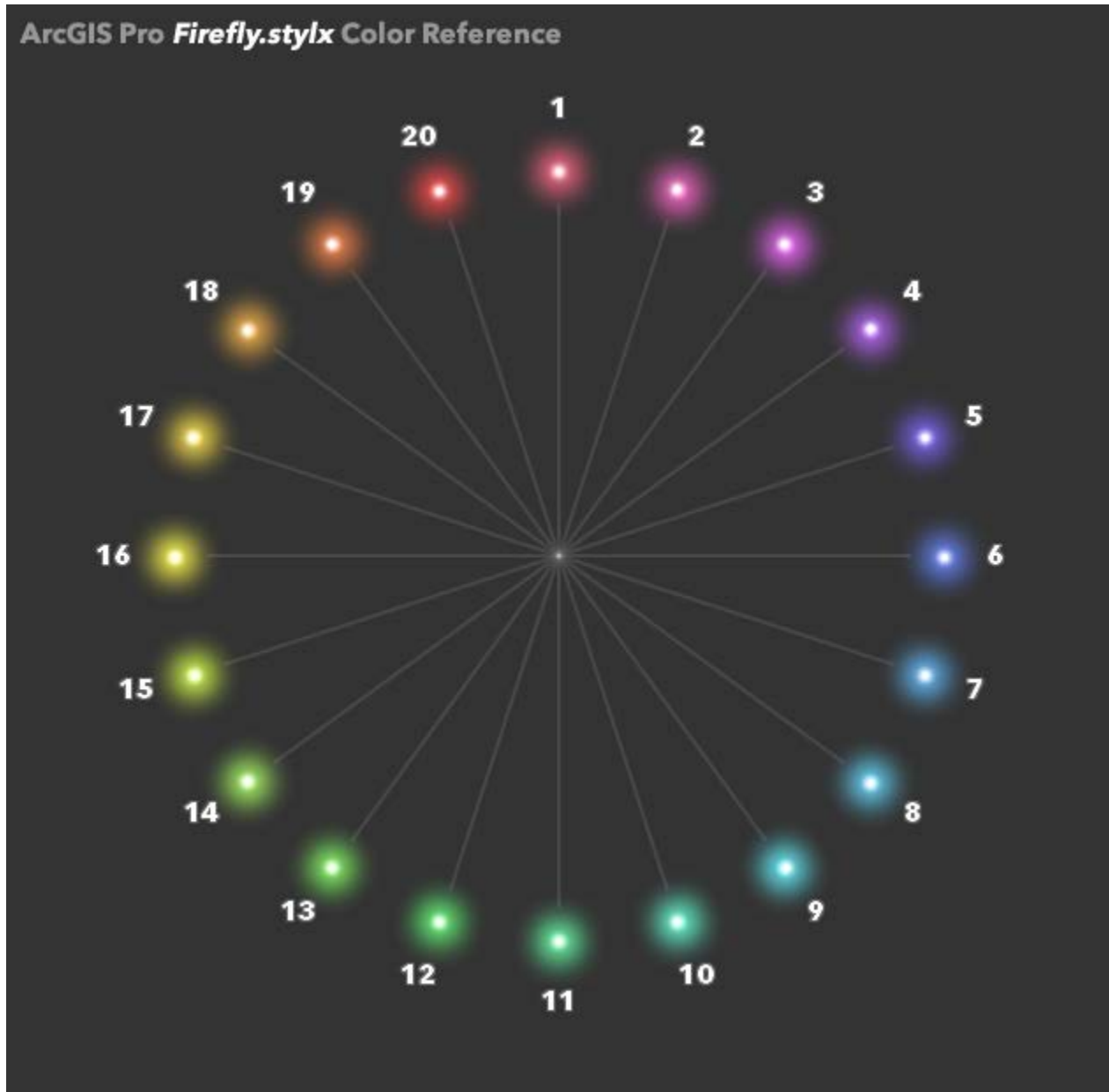
[Firefly](#)...the map style that captures our attention and dutifully honors the First Law of Geography. Those of us that know it best think about it often. I swear...the maps I've seen. Sometimes it gives me pause, though, Firefly being free, belonging to every cartographer who wants to take a chance. I have to remind myself that some map styles aren't meant to be caged. Their radiance is just too bright. And the part of me that knows it was a sin to keep it to myself does [rejoice](#).

So [here it is](#). Do interesting things with your data.

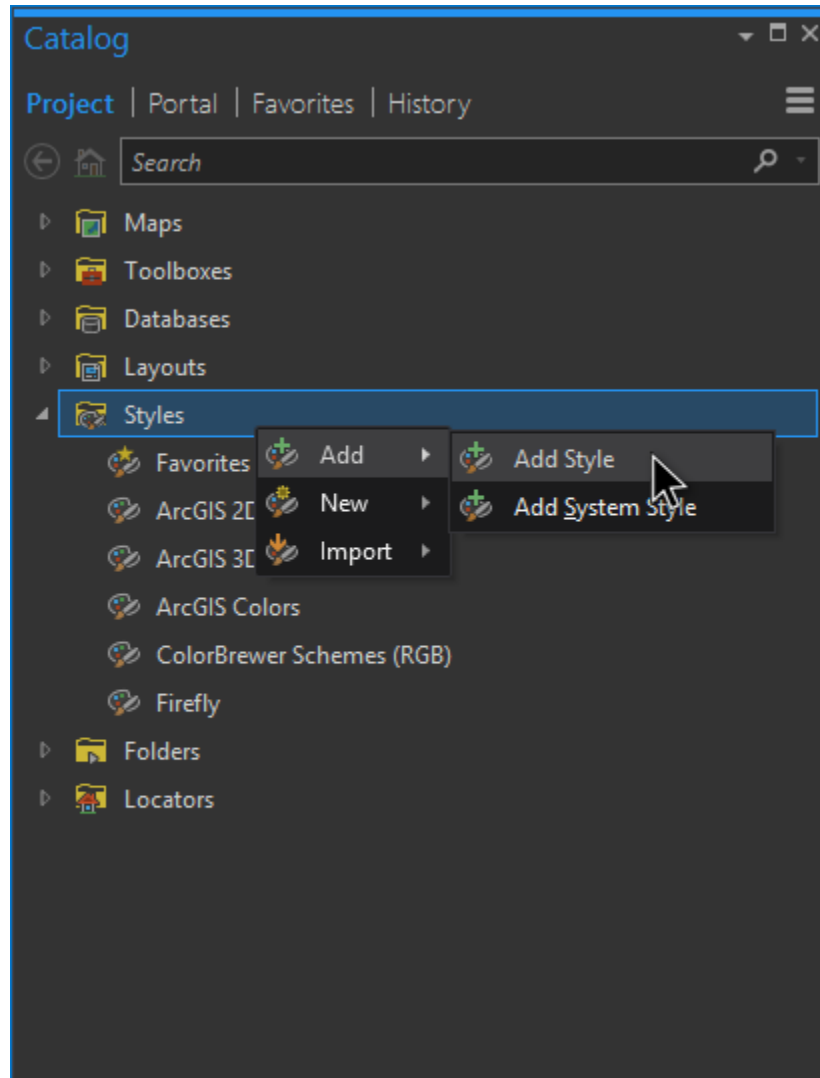
The **Firefly** style consists of the following point, line, and polygon symbols, packaged up for your adventures in ArcGIS Pro...



There are 20 pre-defined colors available for each symbol (but there is no reason you can't tweak them for whatever visualization scheme you cook up). Here is a reference of their numbering...

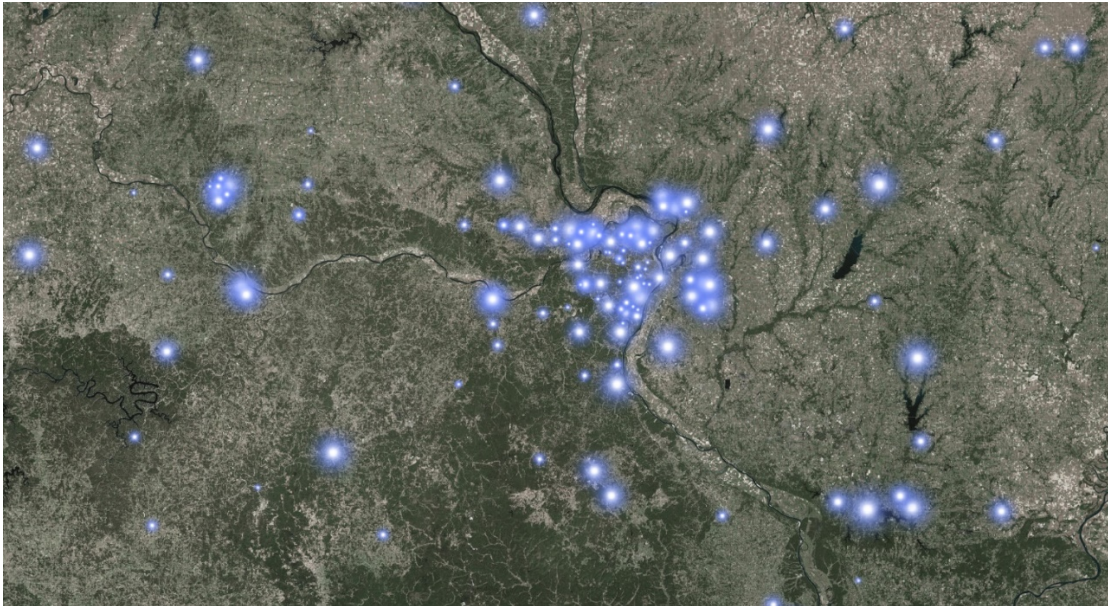


To add these to your Pro project, first download the [Firefly.stylex](#) file and save it to your machine. From your project's Catalog panel, right-click the [Styles](#) category and choose to *add a style*.

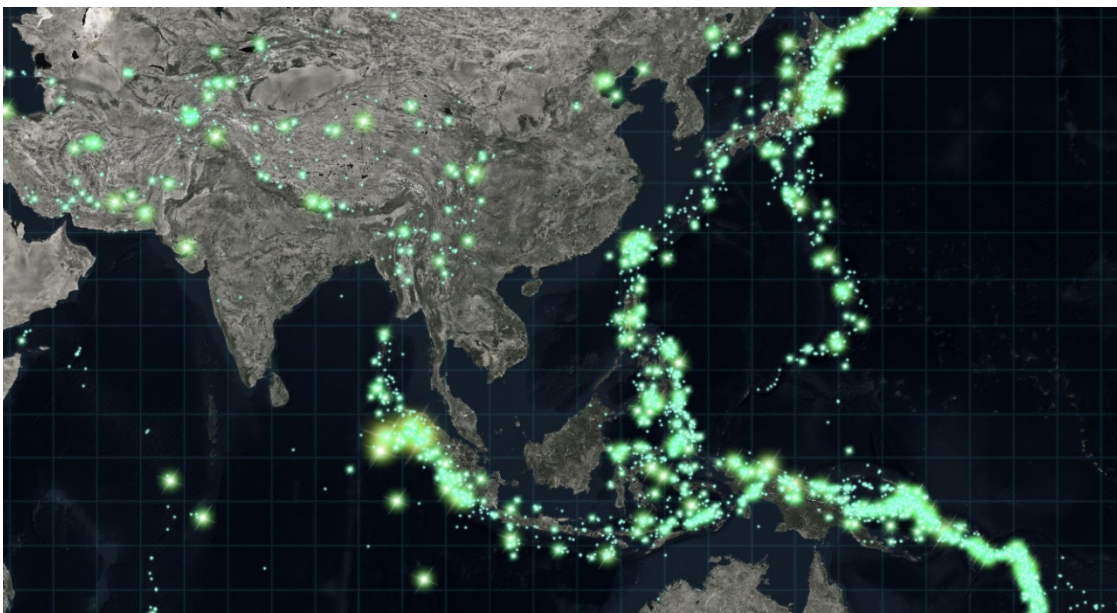


Points

Here's a look at the standard Firefly point symbol, in this case showing, obviously, Taco Bell locations scaled by revenue...

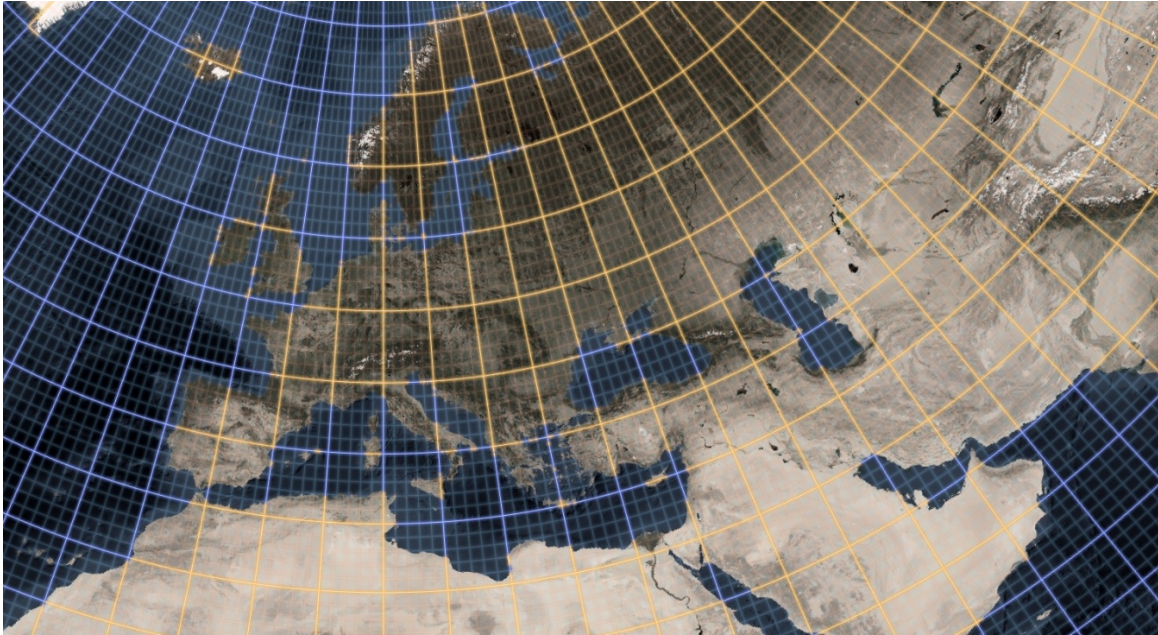


But sometimes you want to turn your Firefly point features up to eleven. I've got you covered. There is an alternative version with a twinkly lens flare shimmer sort of thing going on. Like in this map of luminescent earthquakes...

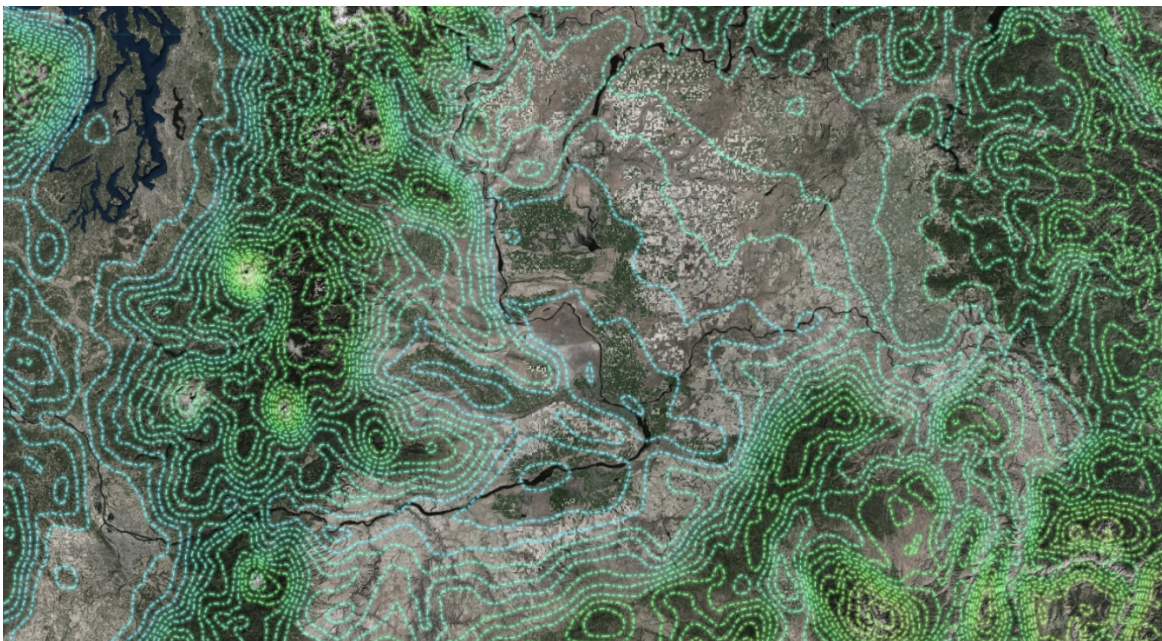


Lines

Firefly has two line styles. But, again, you can totally play with the Symbol settings to teach it whatever tricks you need. Here is the standard, solid, line illustrated in this map of glowtastic graticules...

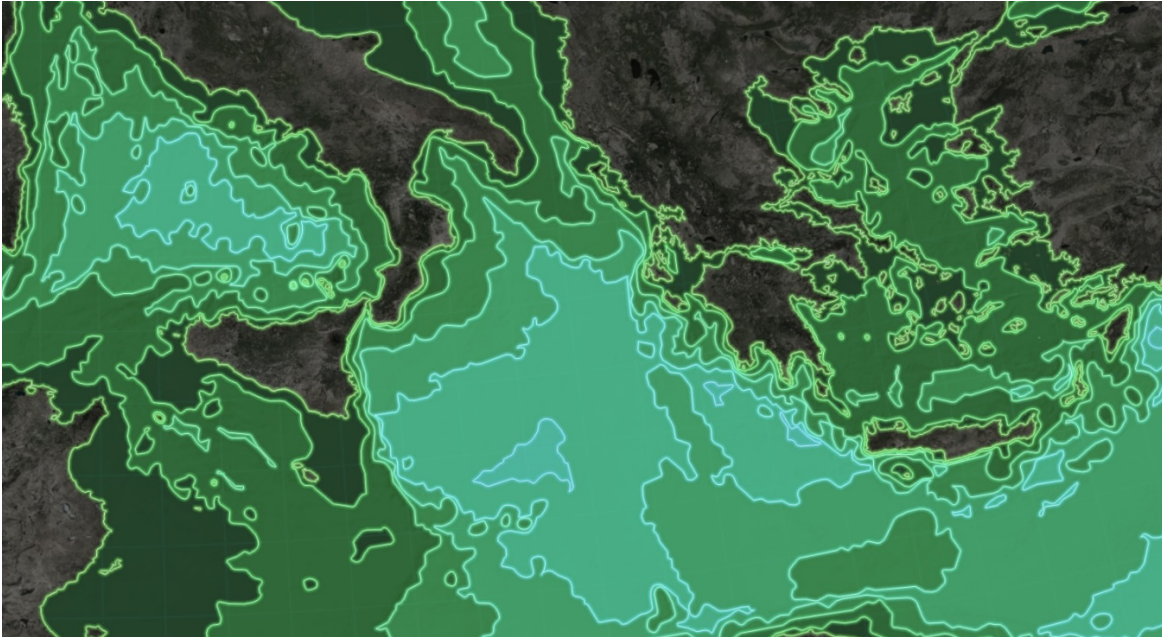


But sometimes you just need a dashed line. So here is an example of the dashed Firefly line style applied to contour lines in the Pacific Northwest...

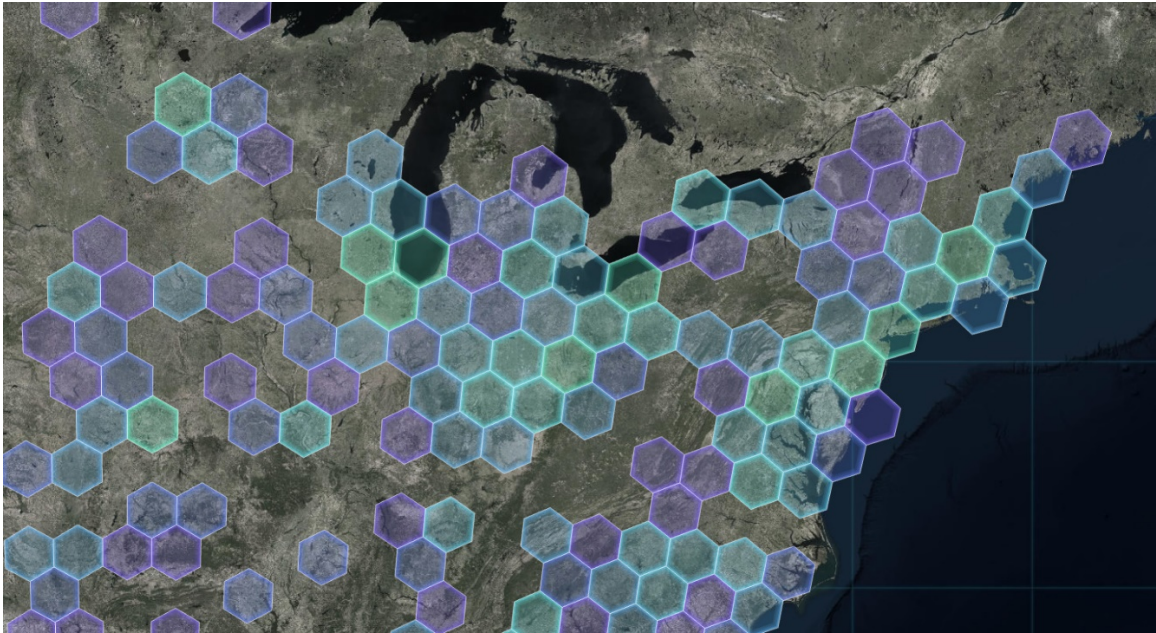


Polygons

Here is a look at the Firefly polygon style. It is a glowing boundary with a faint fill, applied to these Mediterranean bathymetric zones, submitted for your approval...



But when you have adjacent polygons, which is often the case with human geography data, the glowing edges of the Firefly polygons can bleed into, or overlap, each other and sort of make a mess. So here is an alternate version of the polygon fill with only an *inner* glow, as evidenced by these hexbins of aggregated Chipotle locations...

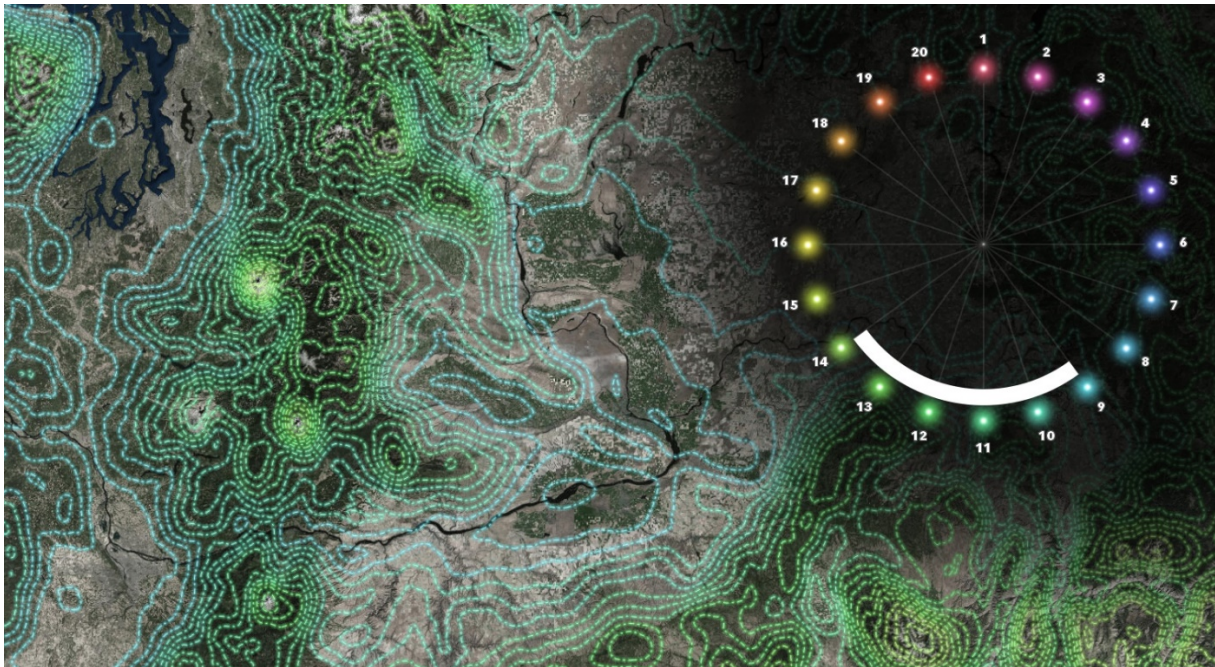


Basemaps

Ah, basemaps. When it comes to Firefly cartography, the basemap is a big player. A firefly basemap ought to be dark and nearly devoid of color. Conveniently, we have a [Firefly global image service](#) that you can use as a basemap. If that's too busy, then I recommend Dark Gray Canvas vector tiles as an alternate.

Thematics

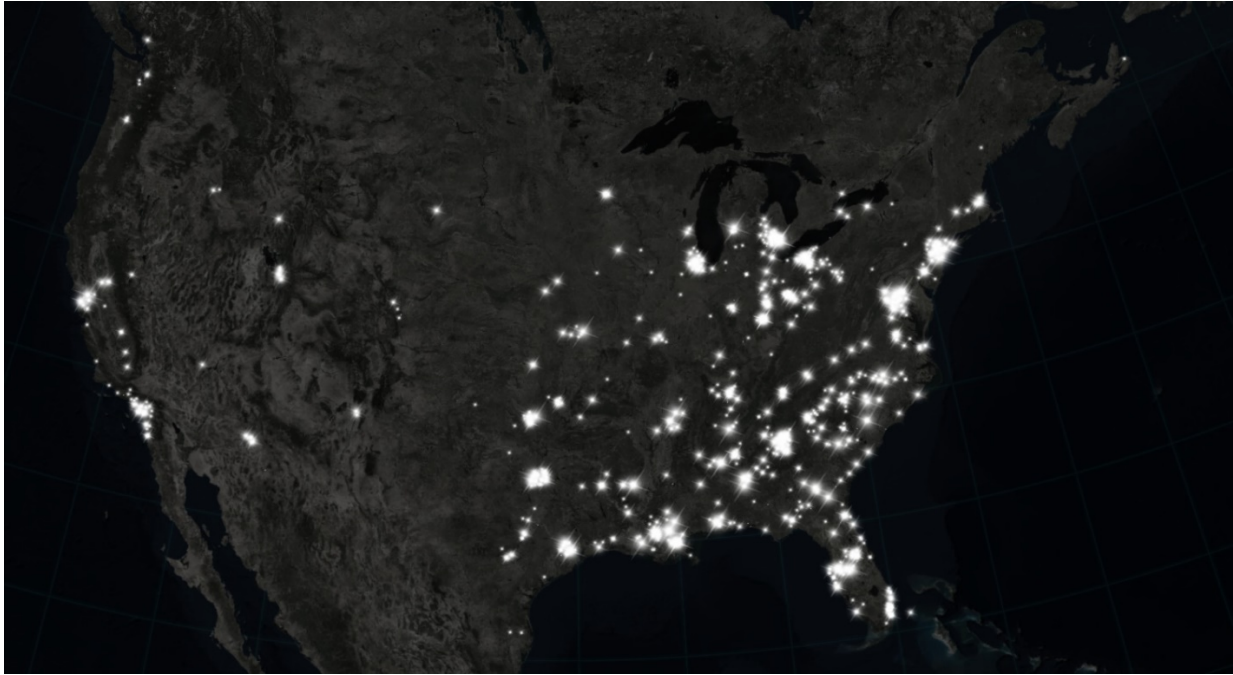
Just because there is a spectral set of colors available, please don't use all of them in a thematic map. The [rainbow color scheme has lots of problems](#) for perception in scientific visualizations. I recommend using up to 6 consecutive firefly colors if you are putting together a classed thematic map. Any more than that and you start to span into another dominant hue and perception diminishes.



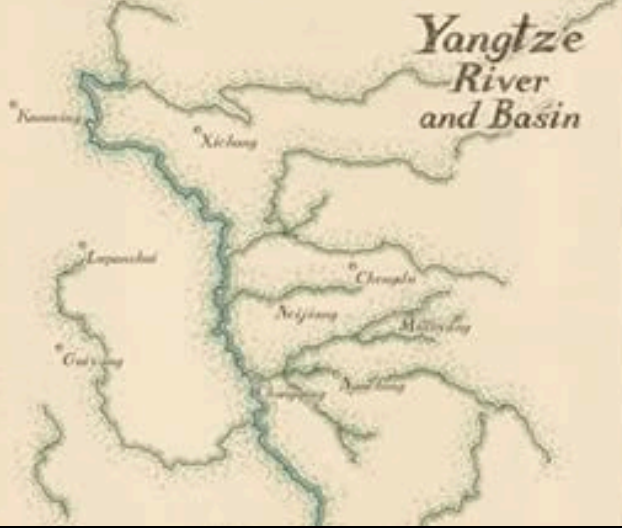
If you need contrasting colors, the colors opposite each other on this wheel tend to be differentiated well. Of course be [careful](#) to avoid colors that are particularly problematic for those with color-deficient vision.

No Color

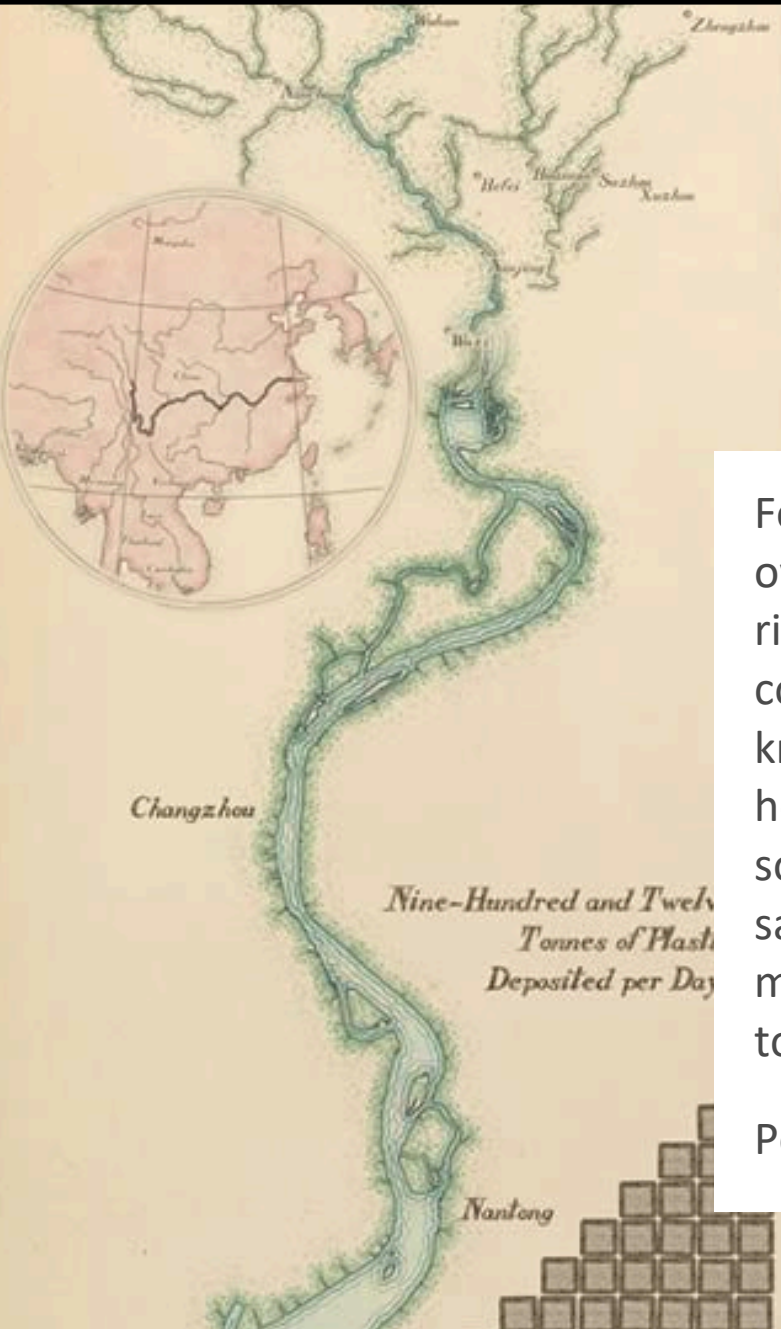
Don't want a color but still want a glowy Firefly map? No worries; there is a non-colored version of each symbol, just look at this map of top college football prospects, scaled by player size...



Happy Firefly Mapping!

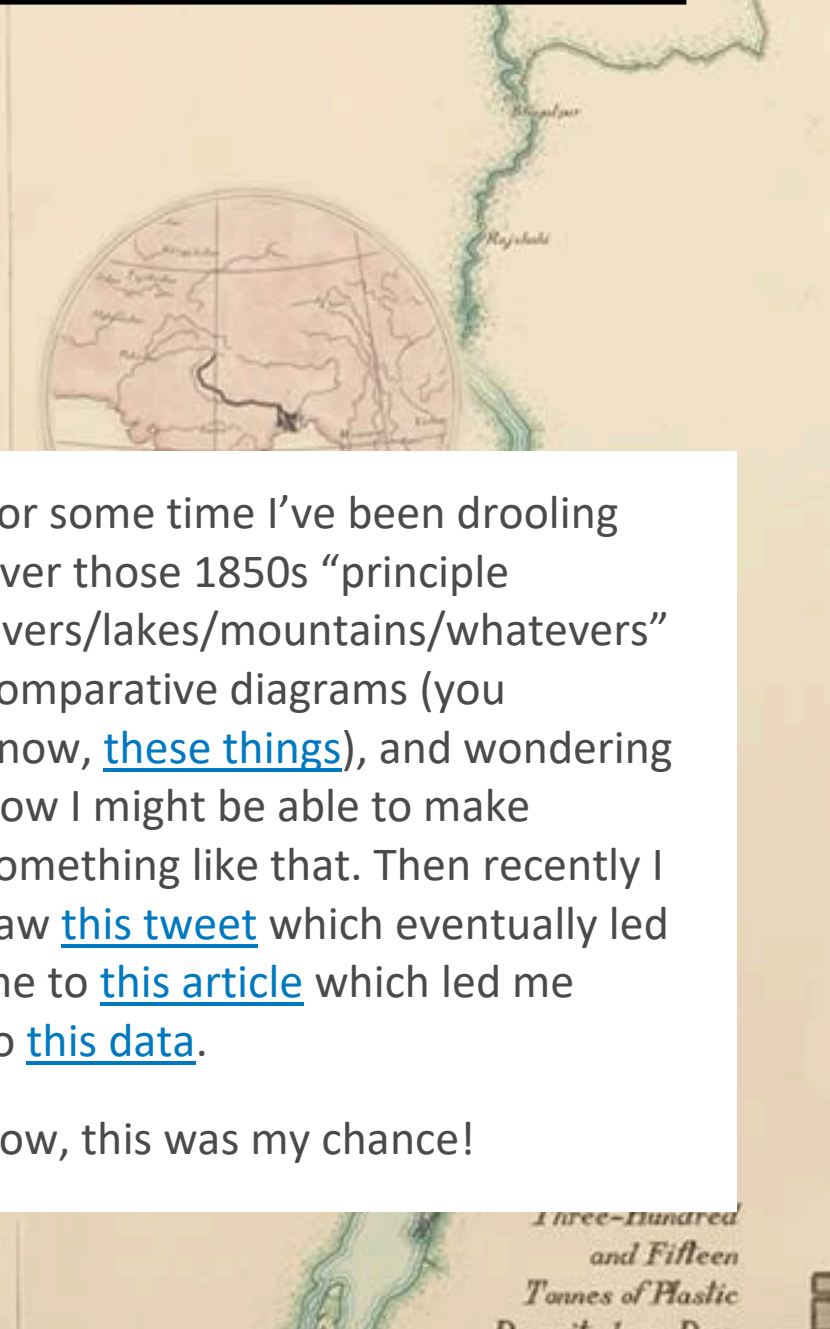


[4] 1850s Physical Geography Atlas Style

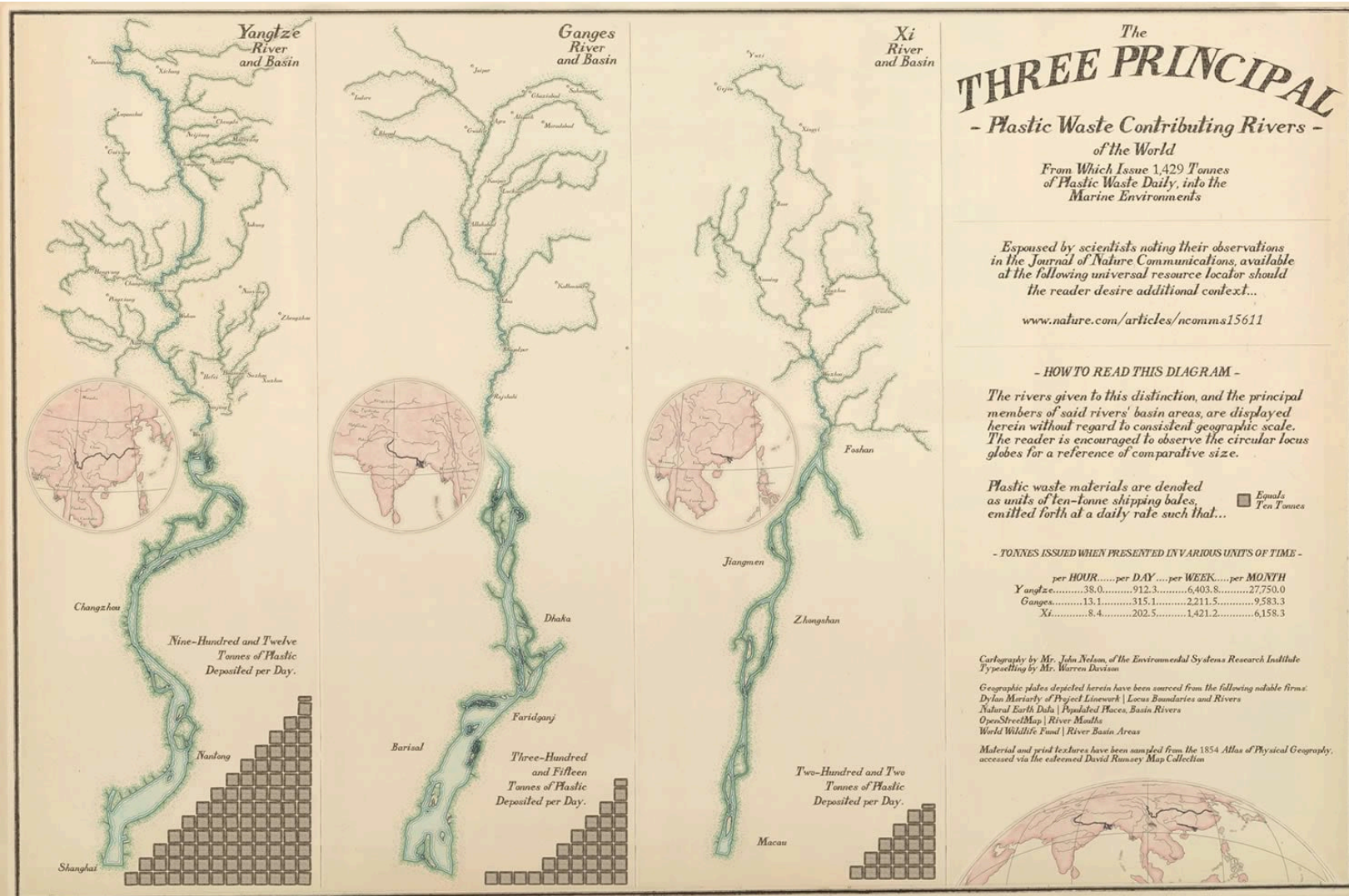


For some time I've been drooling over those 1850s "principle rivers/lakes/mountains/whatevers" comparative diagrams (you know, [these things](#)), and wondering how I might be able to make something like that. Then recently I saw [this tweet](#) which eventually led me to [this article](#) which led me to [this data](#).

Pow, this was my chance!



Here is the resulting map, created in ArcGIS Pro, which shows the three rivers that contribute the most plastic waste into the oceans.



It shows, diagrammatically, the three rivers, their primary tributaries, inset locus maps, and graphical representations of the amount of plastic dumped per day.

Wait, what? ArcGIS Pro? Yes. Here's how...

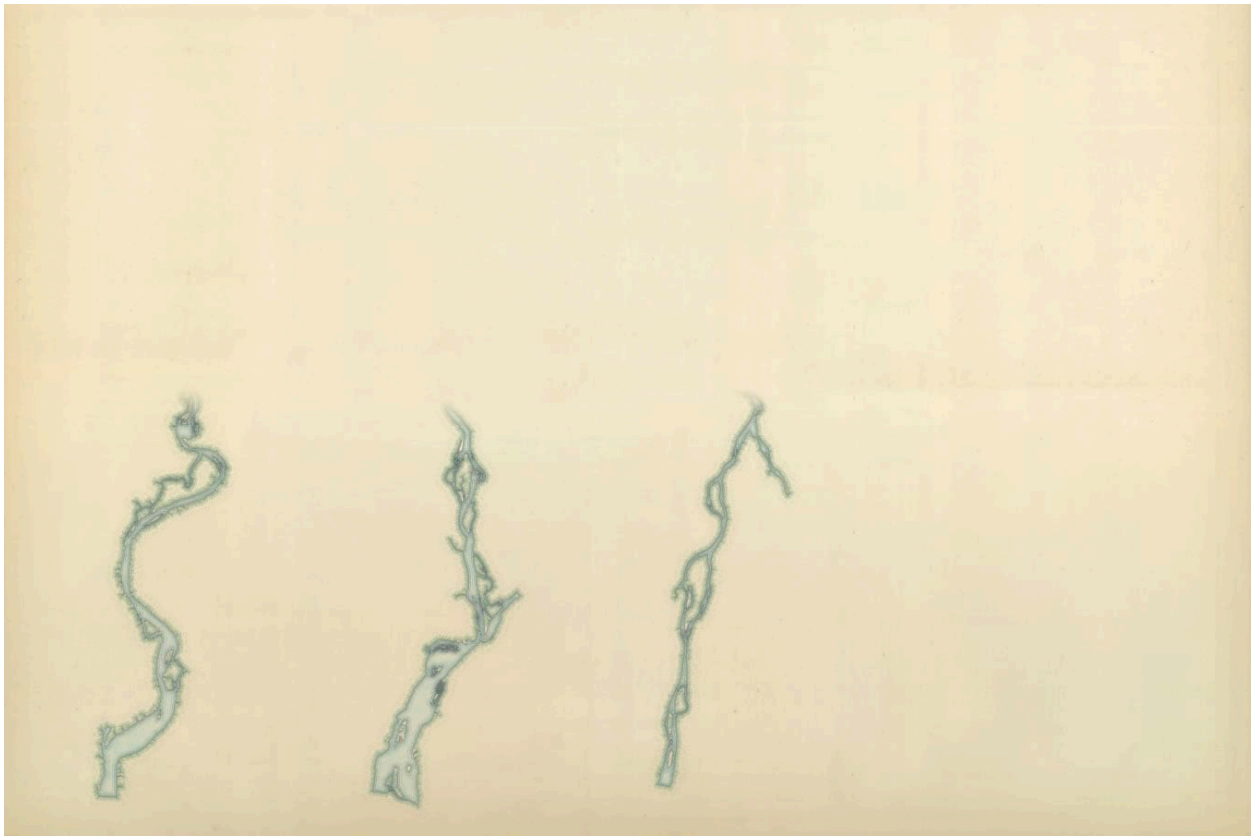
Layout Assembly

I was most inspired by [this diagram](#) from an 1854 Atlas of Physical Geography, available for your virtual perusal at the outstanding David Rumsey Map Collection. Inspired by, and sampled from! I actually screen-captured a couple of the paper and ink textures for use as map and symbology elements.

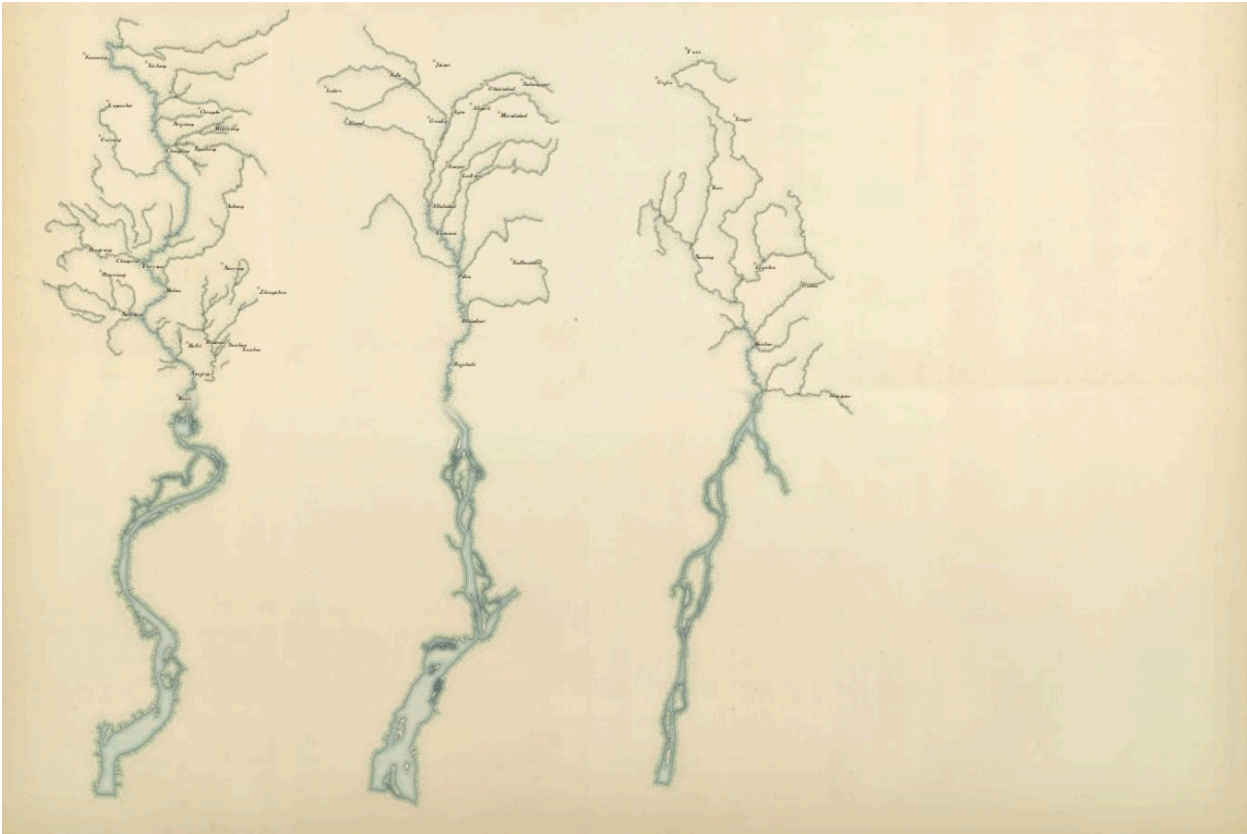
Here is an ArcGIS Pro layout with a big blank sheet of vintage Atlas paper (I Photoshopped away all the content so it could serve as a backdrop) inserted into the layout as an image. You can download this image, and other handy textures from the map, [here](#).



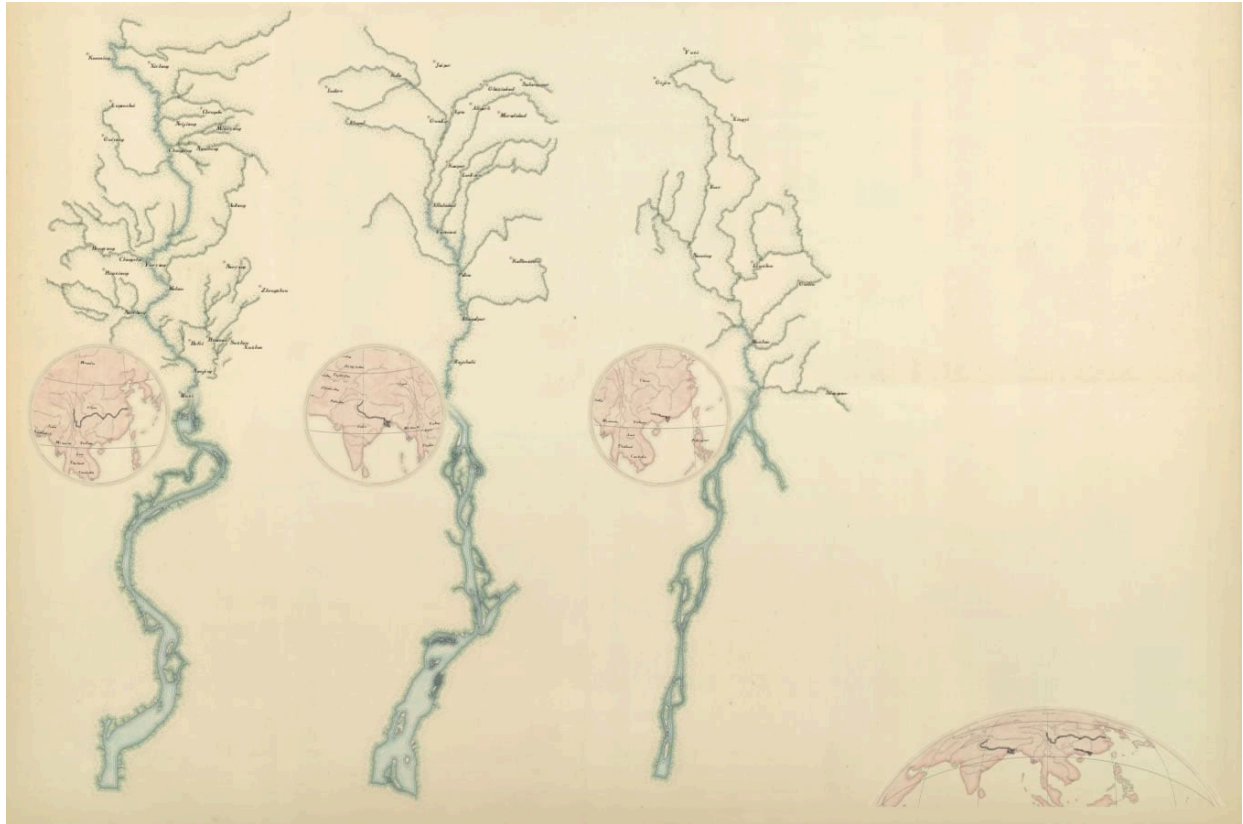
Then I added three map views showing a reasonably zoomed-in look at each of the three river banks near its terminus.



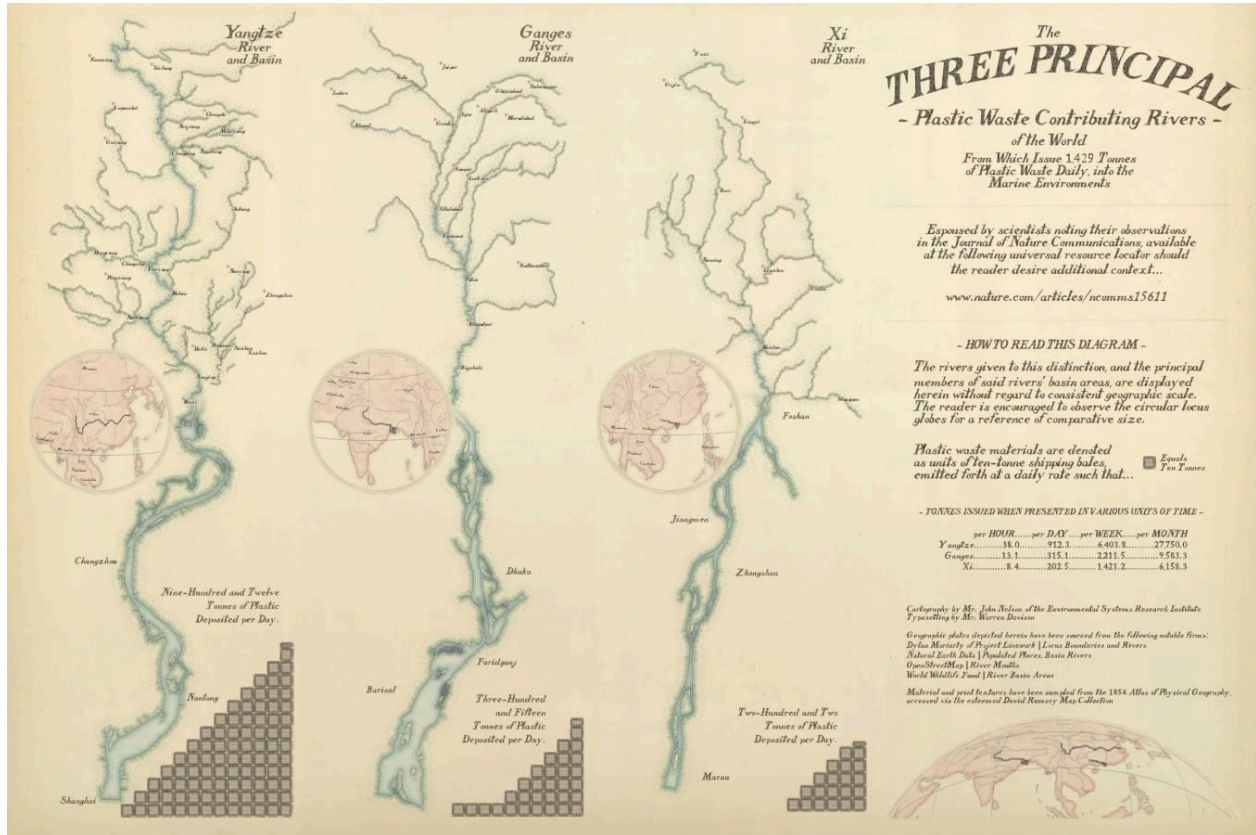
Next I added three more map views, this time showing the basin area of each river with the primary tributaries and large cities situated among them.



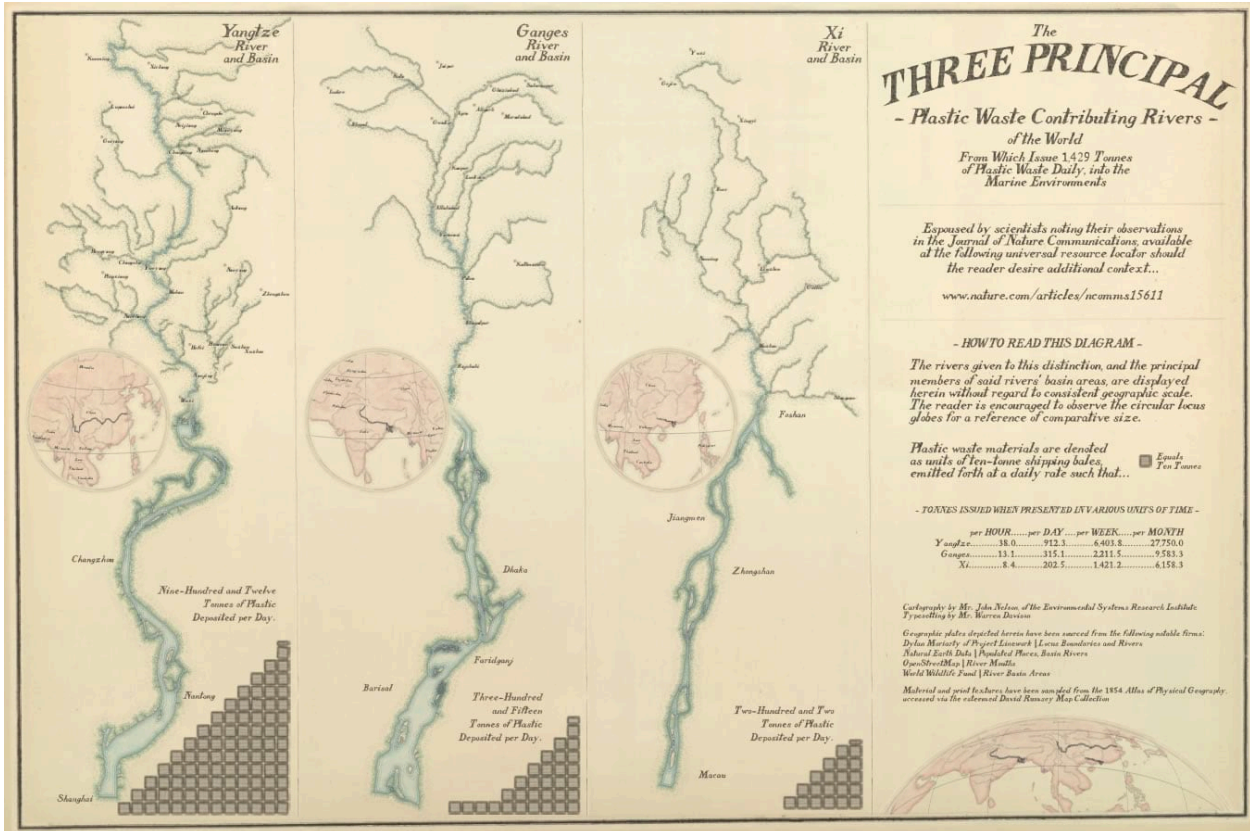
To provide some geographic context to these rivers and basins which are relatively stripped of their true scale and orientation, I added in some inset locator maps as [circular map views](#).



I then added in graphical indicators of pollution quantity, a title, some period-style prose for fun (why was everything so wordy then?), and sources.



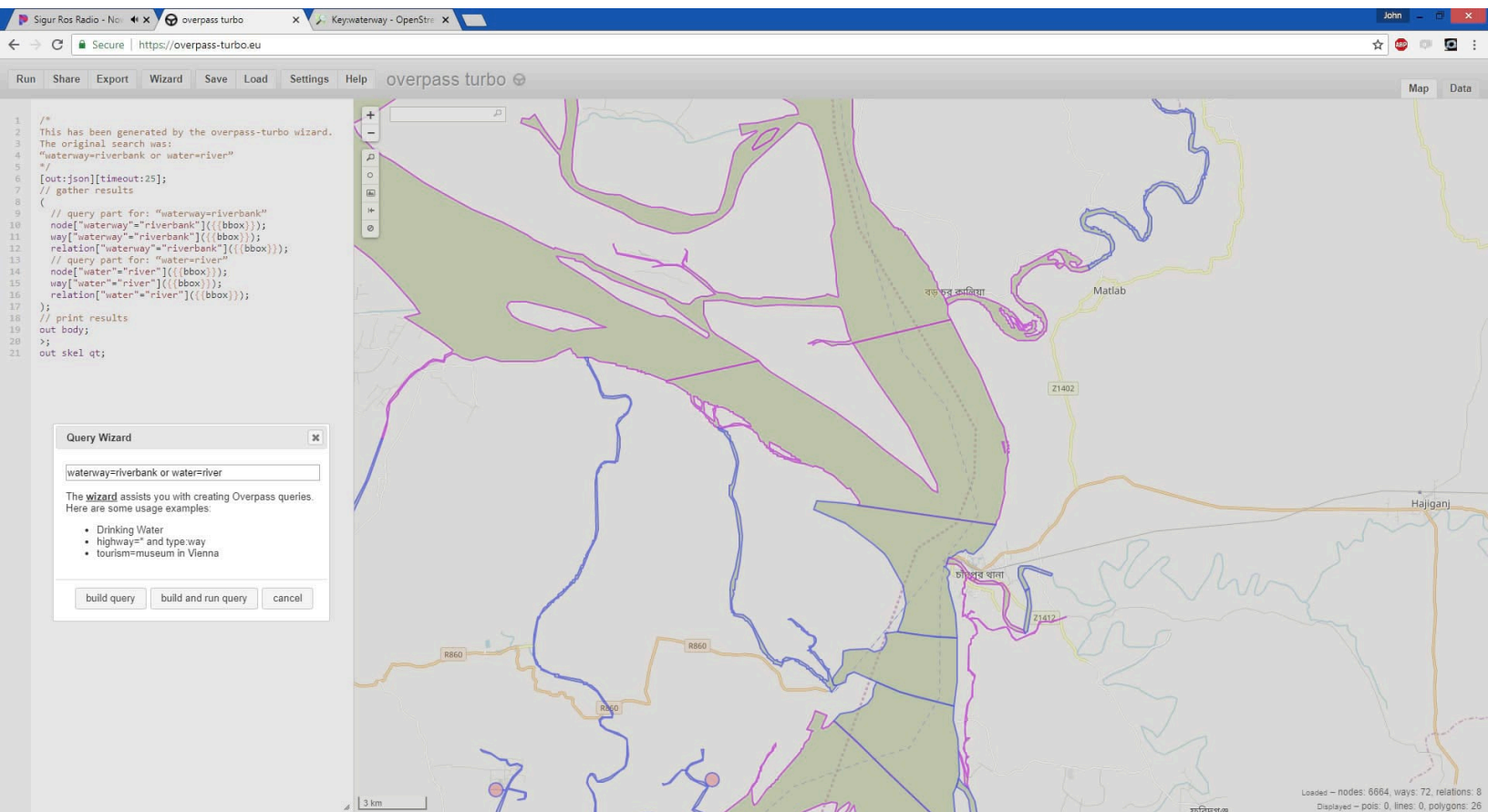
Lastly, the neatlines and divider graphics were added. If you are familiar with my maps, and opinions about maps, then you probably know that I am not a fan of the neatline. But, in this case I think it helps the map conform to the aesthetic of the day. These graphics are available [here](#) in this set of map textures I scraped, if you didn't download it earlier in the post.



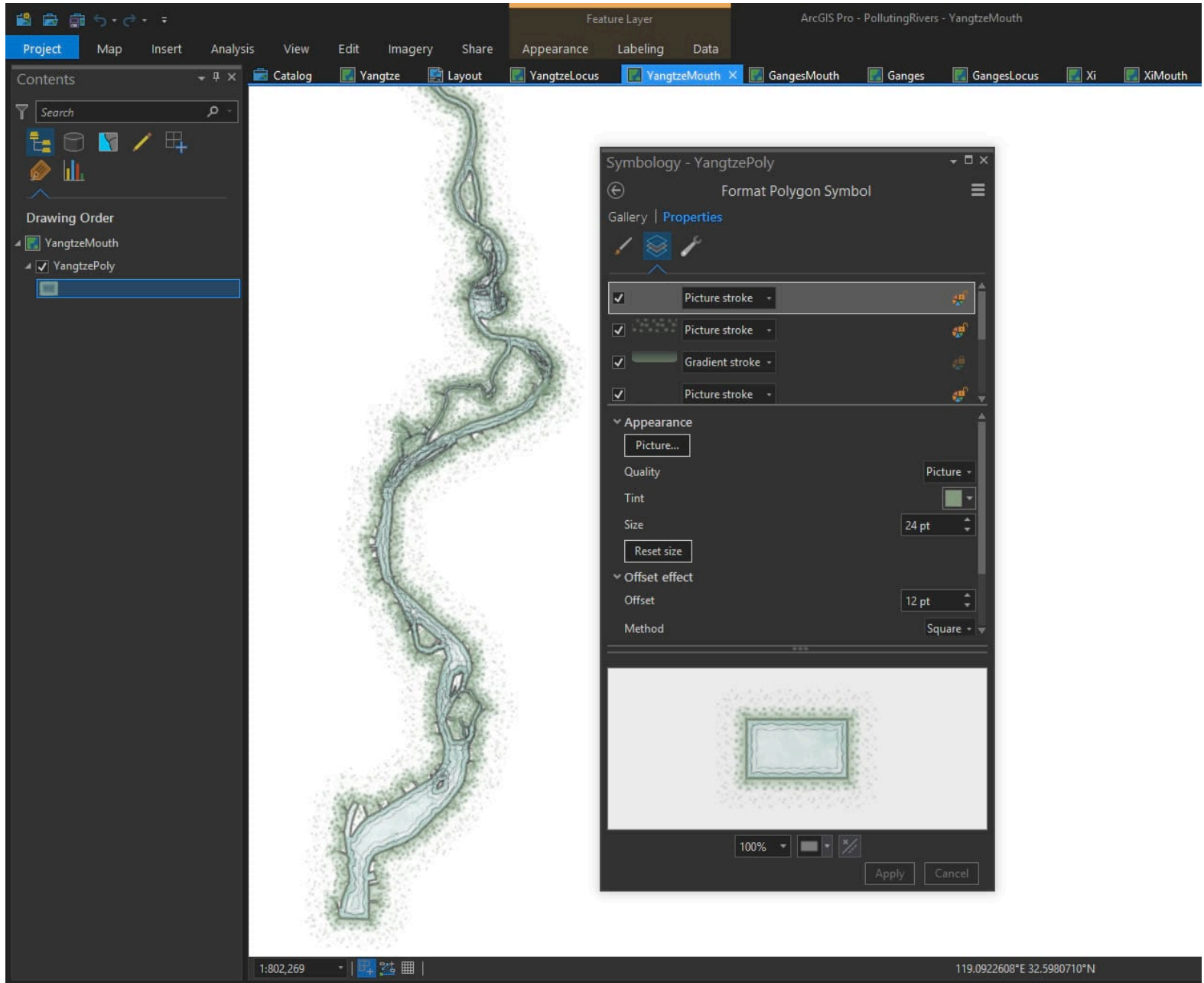
So that's how the layout assembly went. Ten maps (three river mouths, three basin tributaries, three locator maps, and one overview map), some graphics, and a ton of text. Next I'll show you about how these component maps were constructed.

River Mouths

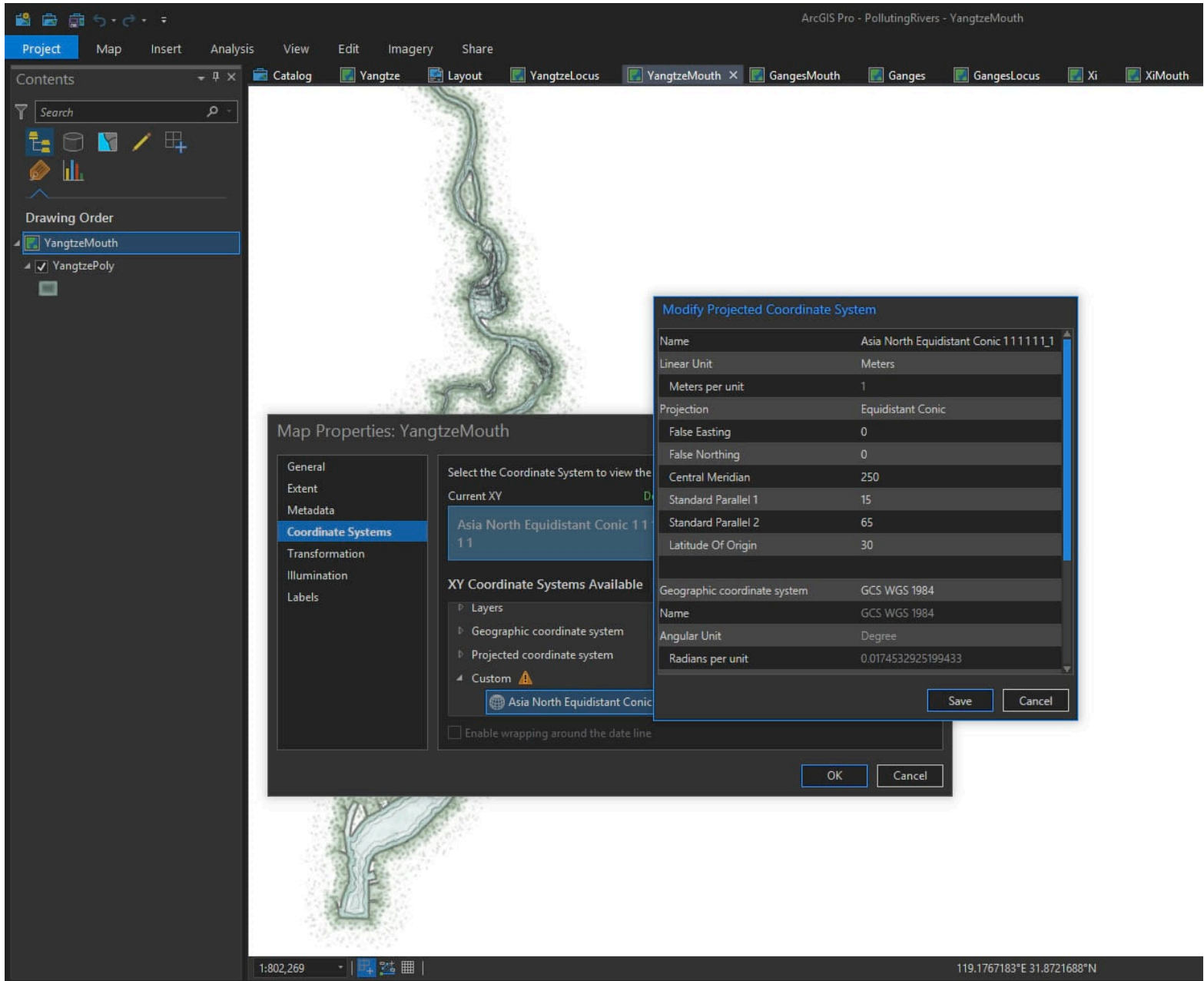
The detailed riverbank maps are just dressed up OpenStreetMap layers. I downloaded the “waterway” shapes from <https://overpass-turbo.eu/>. It’s a pretty great resource. If you’ve ever played much with OpenStreetMap data before, it’s a pretty wasteful exercise in downloading mountains of data, filtering for the bit you need, then tossing the rest out. But with overpass turbo you can just zoom to an area, search by tag for the type of feature you’re interested in, then download it. Mega handy.



Then I applied a nice stack of picture fills and picture strokes to get the river looking all vintage-print-like. Say, would you like to steal this symbology, and all the symbologies used in this map? Then [download this handy style file!](#)

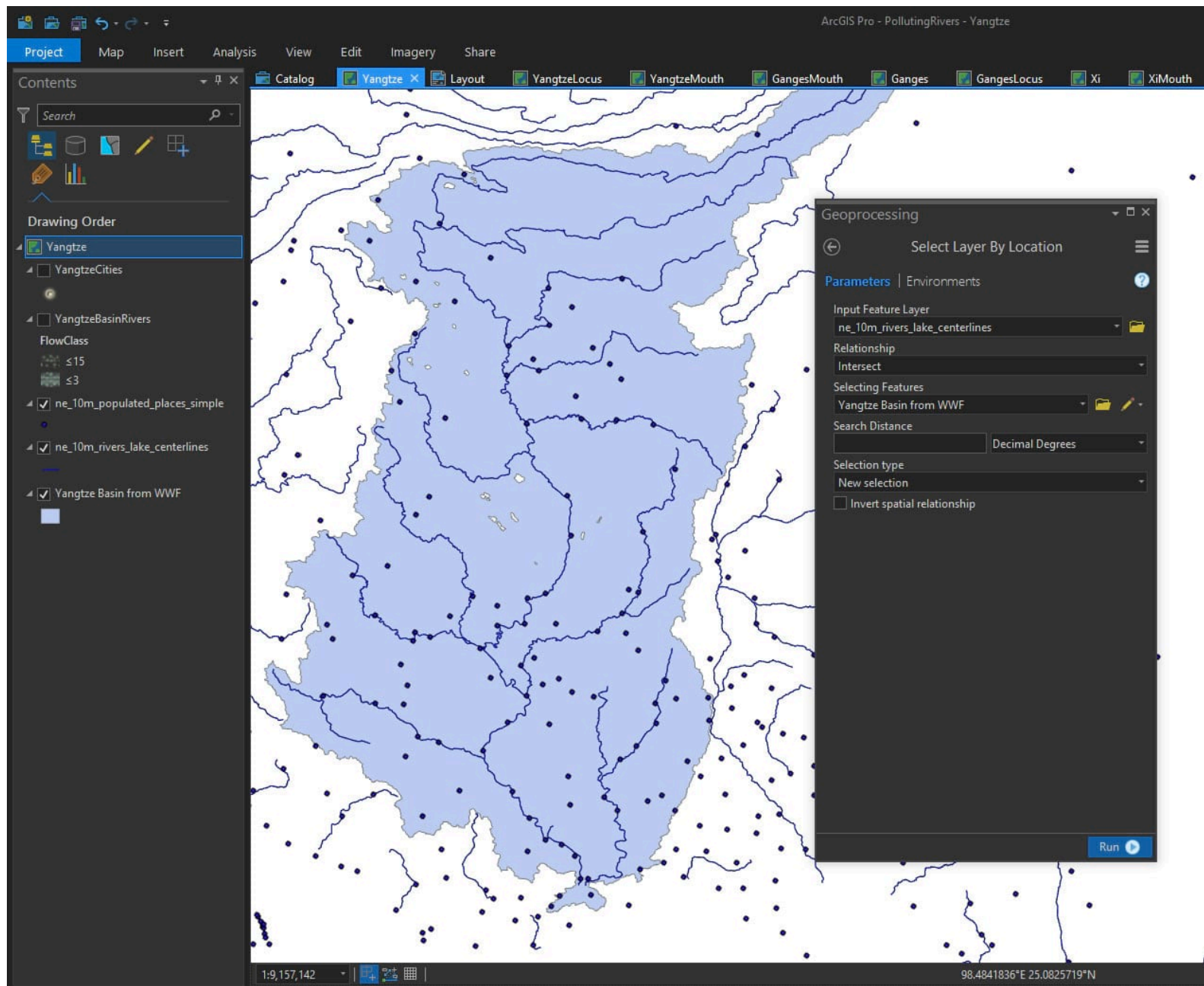


Because I was making a diagram of three rivers all neatly lined up next to each other, their E/W direction posed a bit of a layout challenge. No worries, I just monkeyed with the conic projection's center longitude until the river stood at attention.

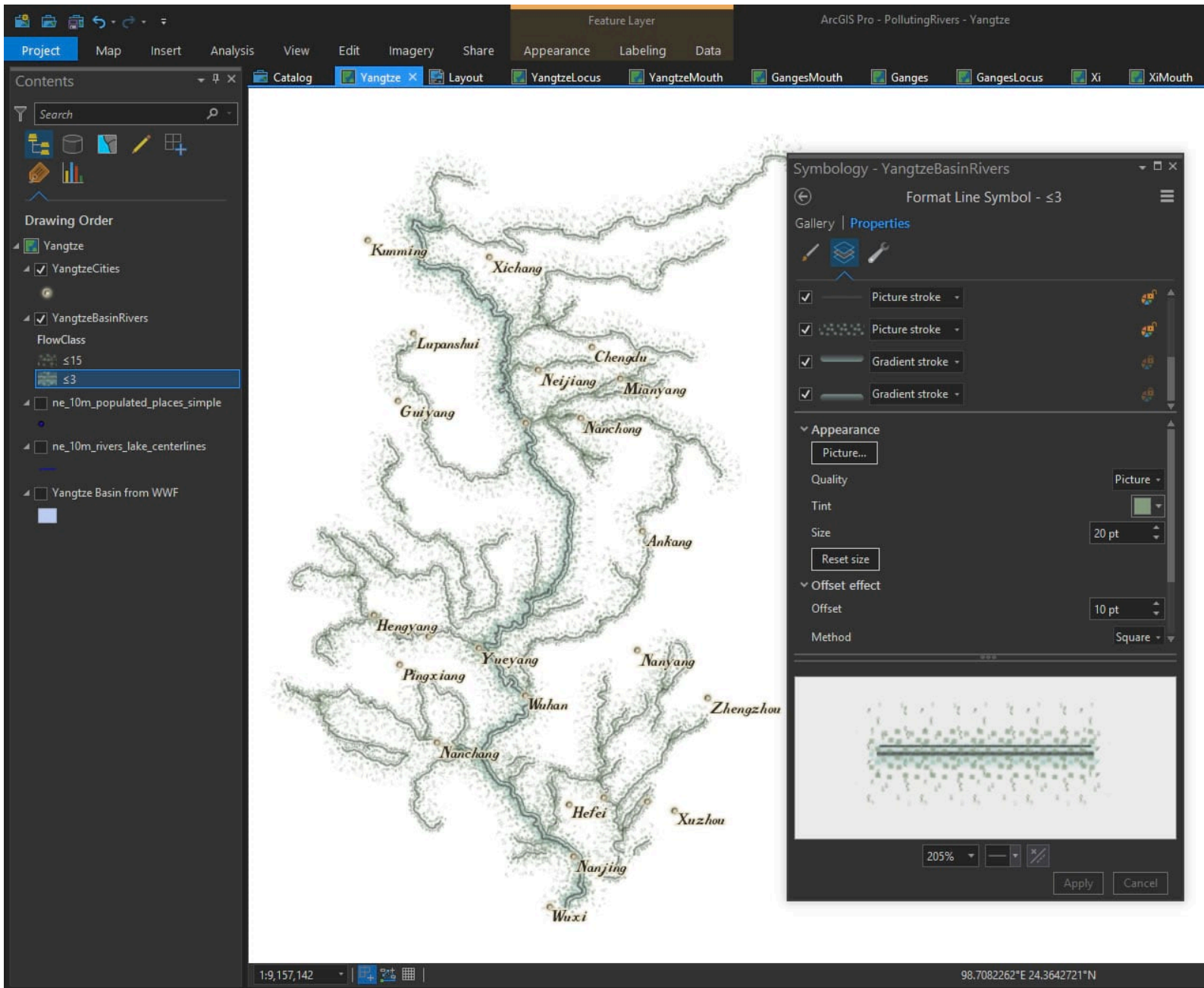


River Basins

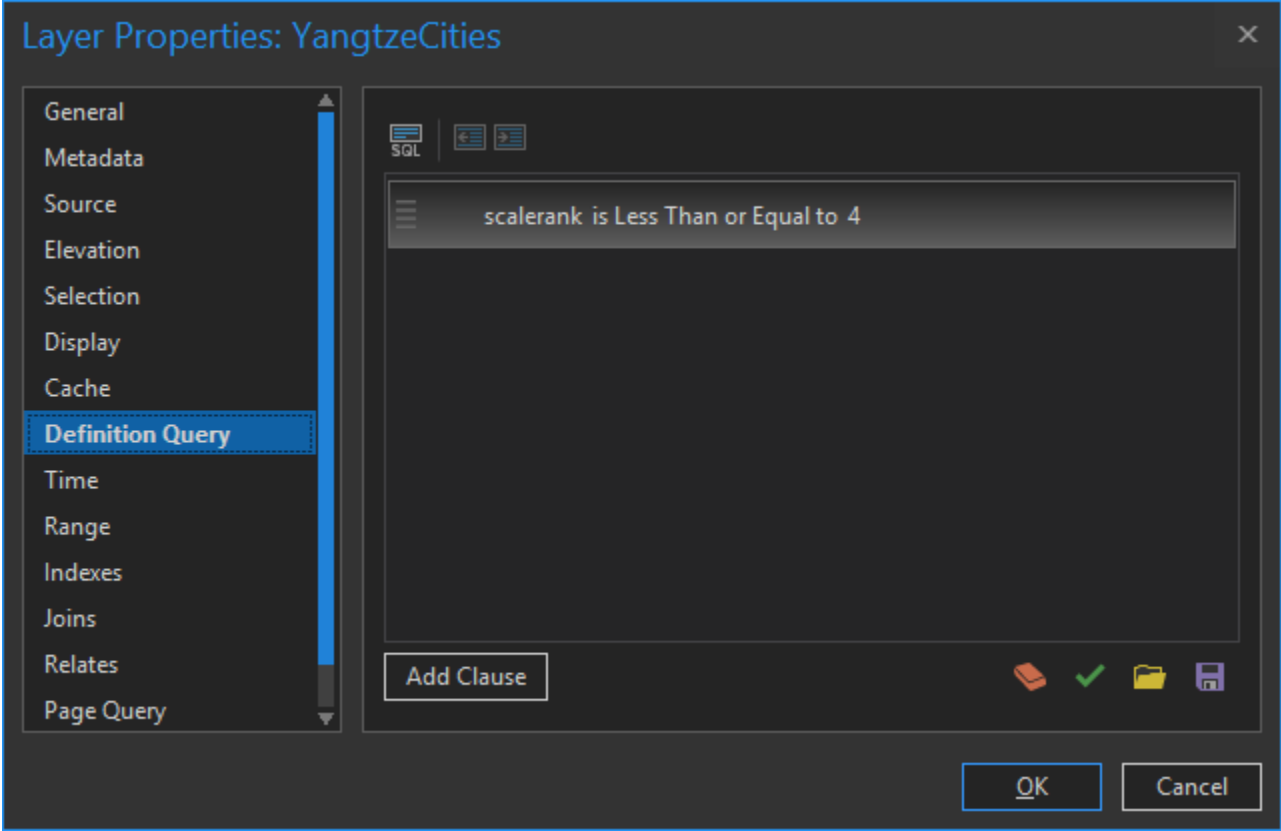
The next set of maps in the layout show the river tributaries, at a much broader scale. I found an exquisite set of [global river basins](#) created by the World Wildlife Fund (a mega-huge download of like a half gig or something). I used these basin areas to do a spatial query on rivers and cities from the insanely handy [Natural Earth](#) river data, capturing the rivers and cities that feed into the main river system cited in the article.



I did the same projection modification trick as I did with the river mouth map, so it stood up/down rather than sideways. Then I applied some river line symbology (again, feel free to steel this style for your own crafty cartographic adventures) to get these rivers looking suitably mid-19th Century.

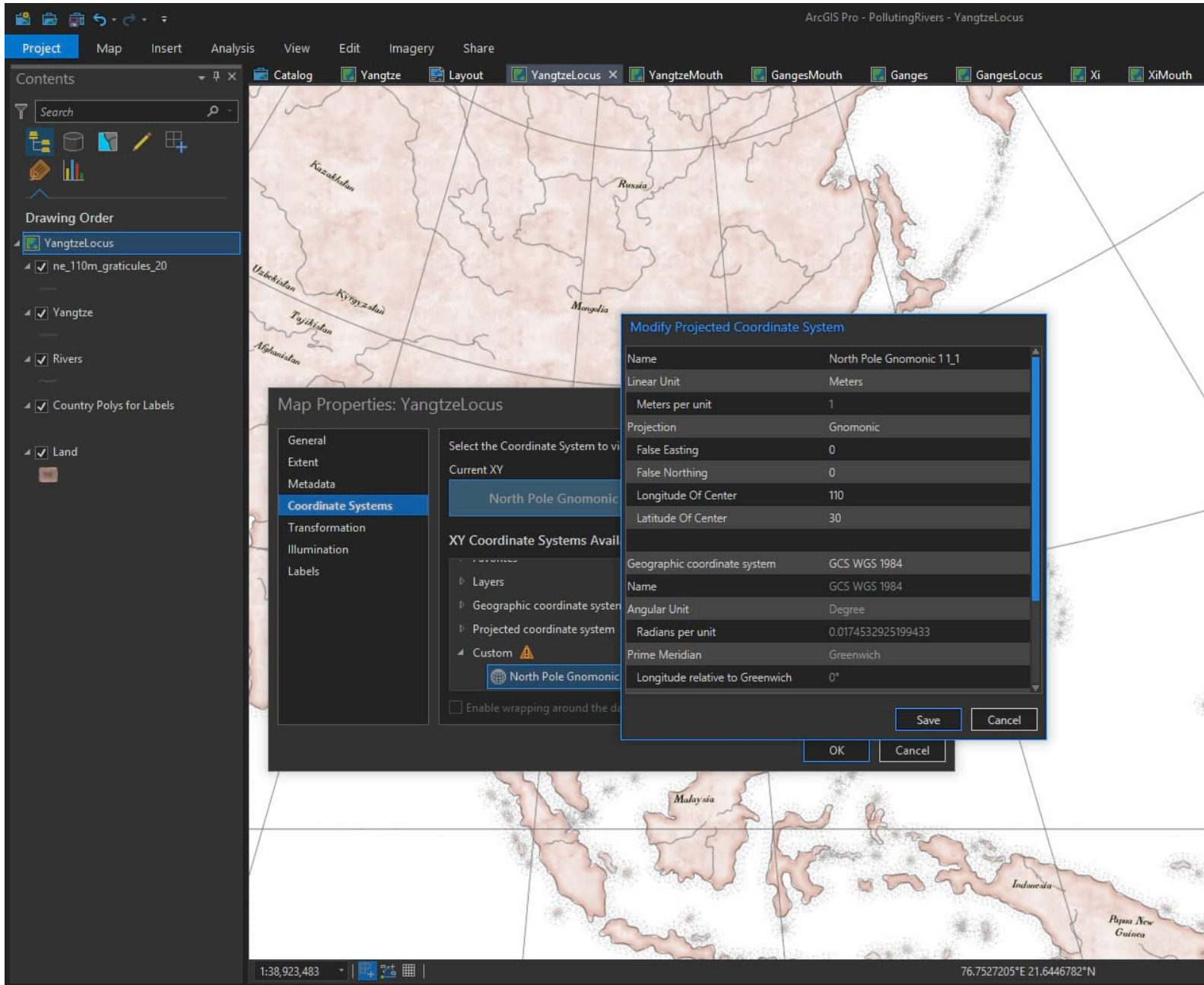


If the suspiciously keen-eyed among your are wondering where some of the cities went, it's because I used a [Definition Query](#) to show only the larger cities. This is a super handy tool and I use it all the time.

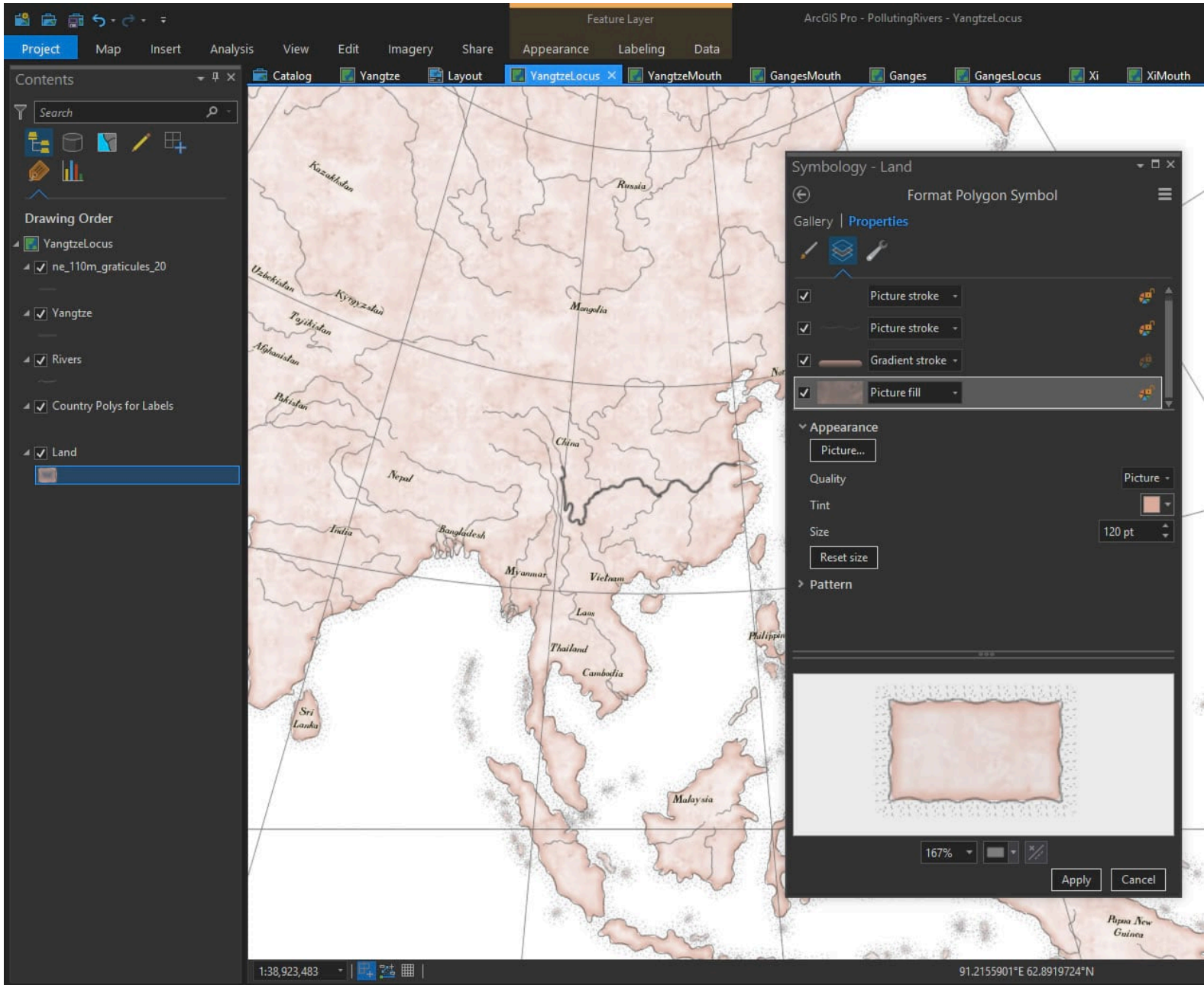


Locator Maps

There are three small locator maps and one larger overview map in the layout. The three locator maps were given a gnomonic projection, centered over the river in question, because that seemed to look like how they rolled them back in the day.

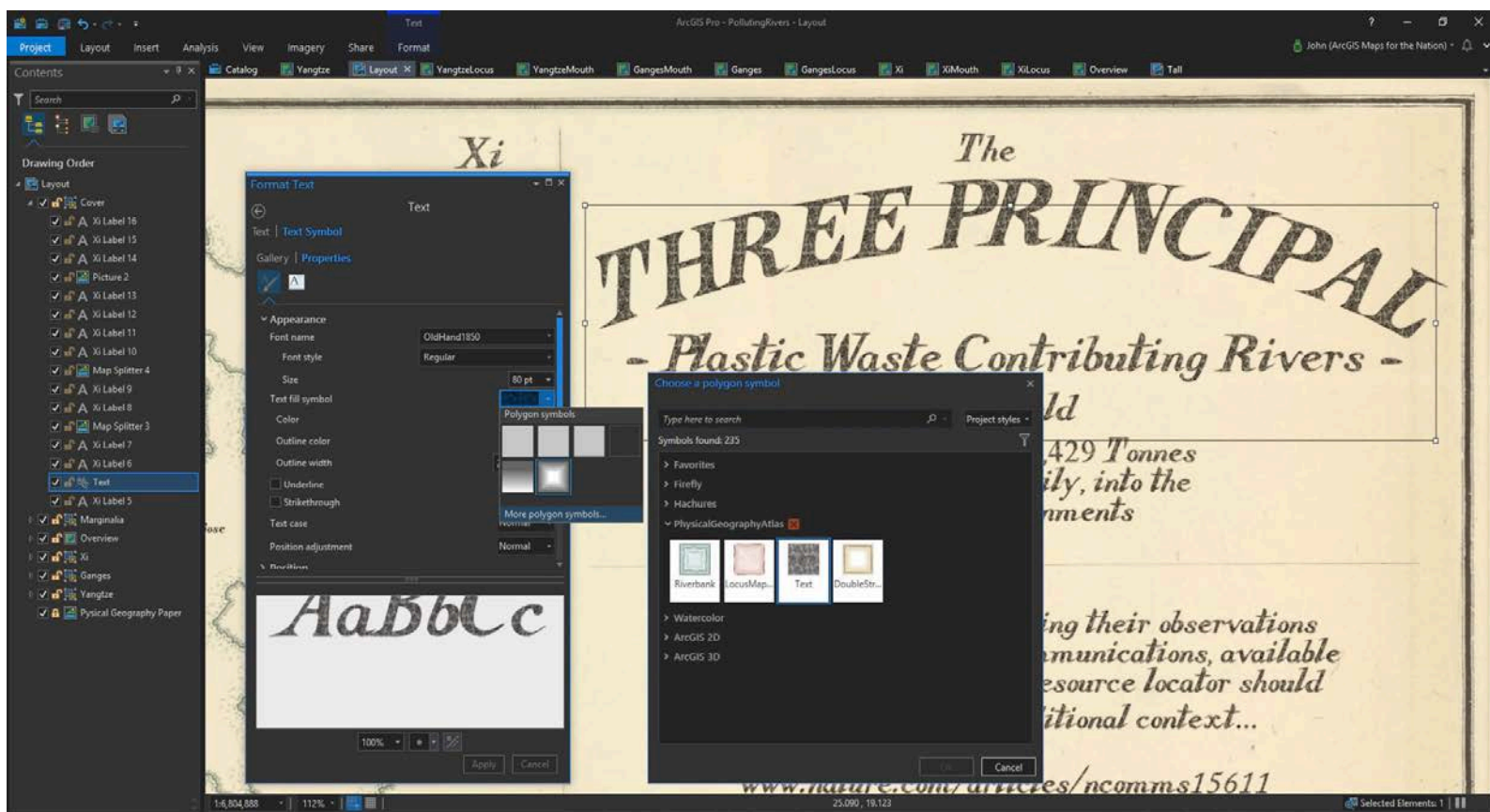


And I gave the geography (coasts drawn by Dylan Moriarty, and available at [Project Linework](#)) that trusty old pink tint that they seemed to love so much back in the 1850s. Also available in [this style](#) (seriously, just download it already).



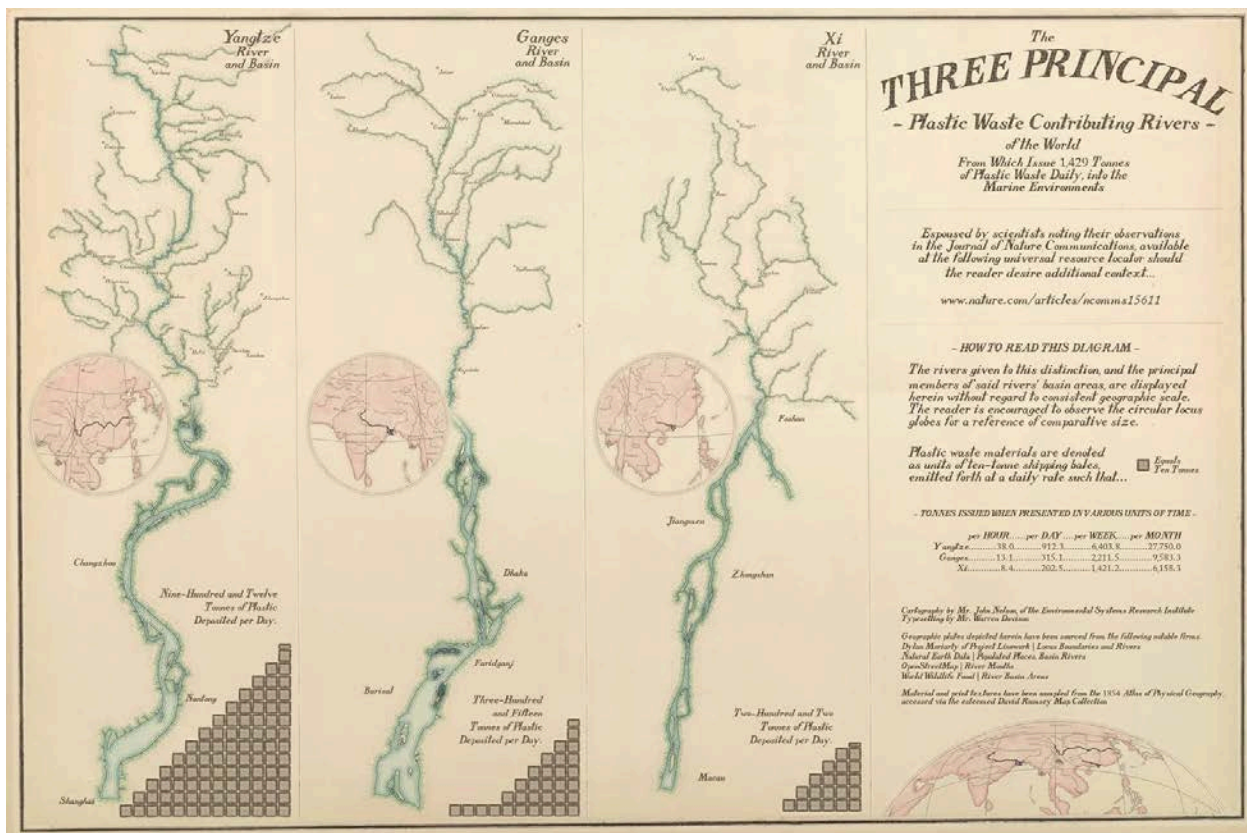
Text

Stop the presses (wink)!! Did you know that you can apply polygon symbology from styles to FONTS? This blows my mind and I wish I'd known about it sooner. Often when I'm making a map that is intended to look real, the perfectly crisp fonts break the illusion of materiality. But not any more! Here is a [fantastic font](#) (hand-forged by Warren Davison) with a textured fill and dappled edges. Just like an old inky copper plate print! I've added a special Text symbol to the [style file](#) (so help me someone is going to download this thing), so you can check it out for yourself.



Why This Look?

I think we can become inoculated to important issues by the constant typical visualizations that they manifest as. A basic grid? That's cool but doesn't grab the massive proportion of your brain that is devoted to vision cognition. A single map with rivers shown in a standard projection? Sure, but when you are talking only three rivers, and rivers with a wide range in size, you are looking at a perhaps-forgettable map that has either too much detail or not enough detail.



When my 11-year-old daughter saw this map on my monitor she said, “oh that’s cool, what’s it about?” This is perhaps the most noble purpose a map can serve. Causing another person engage with a phenomenon. When she asked what the stacks of boxes were, I told her that each one represents about the same weight in plastic garbage as five cars, and the whole stack of

boxes flows into the oceans each day from just these three rivers. She absorbed it for a moment then her eyes widened and she responded, “wait, each DAY?”

Maps can be conventional looking or weird looking. But the good ones engage and communicate to an audience that might otherwise shrug off a bit of information otherwise presented. Did this map need to look like an 1854 diagram? No. Can maps created with some eccentricity and careful craft reach a new audience with a serious message. Sure!

Happy Throwback Mapping!



[5] Hachure Style

There was a time when a cartographer would roll up their sleeve, dip their quill, and breathe topographic life onto a parchment.

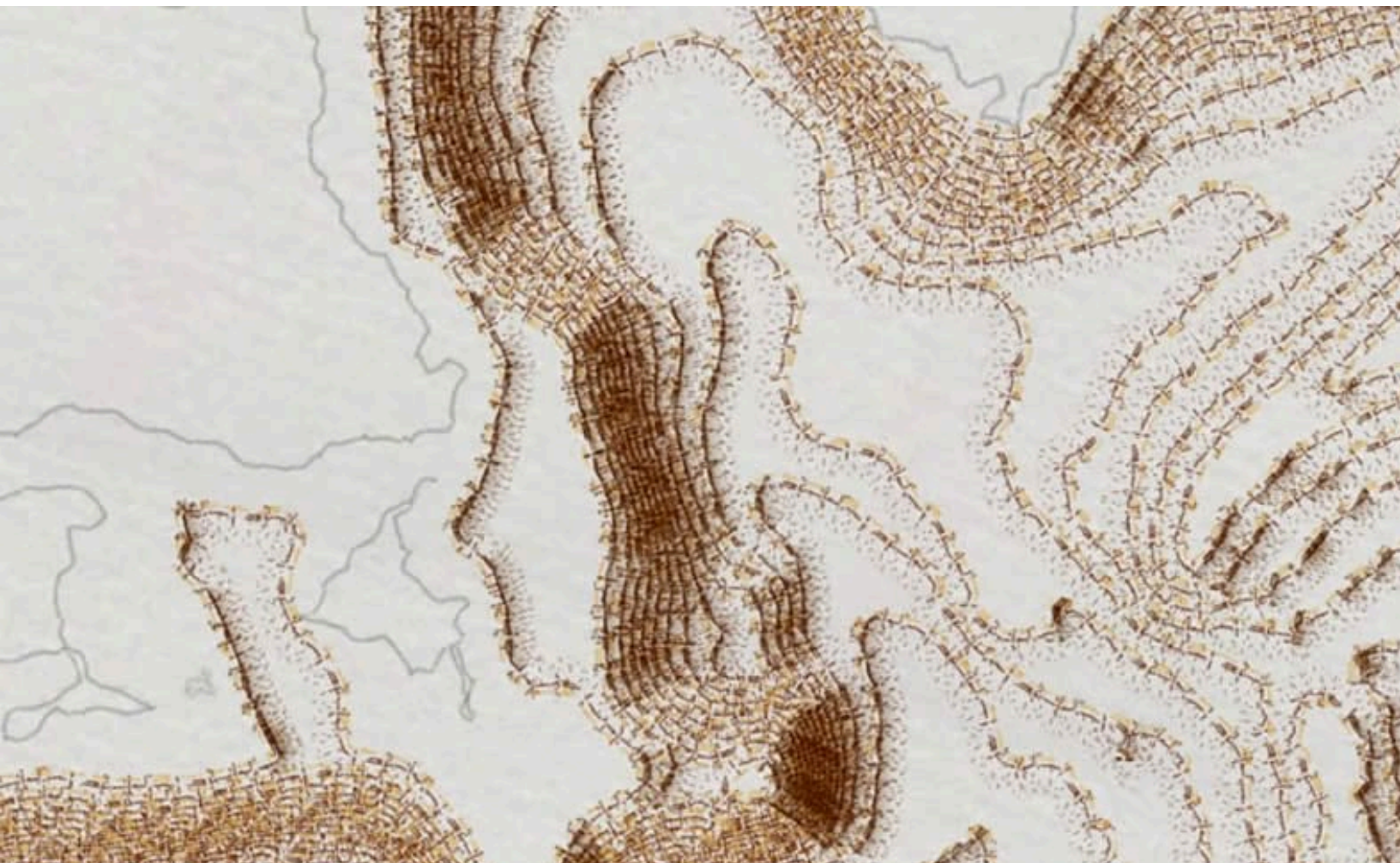
And that time is now!

[Download this ArcGIS Pro style](#)
to get hachure mapping in no time!

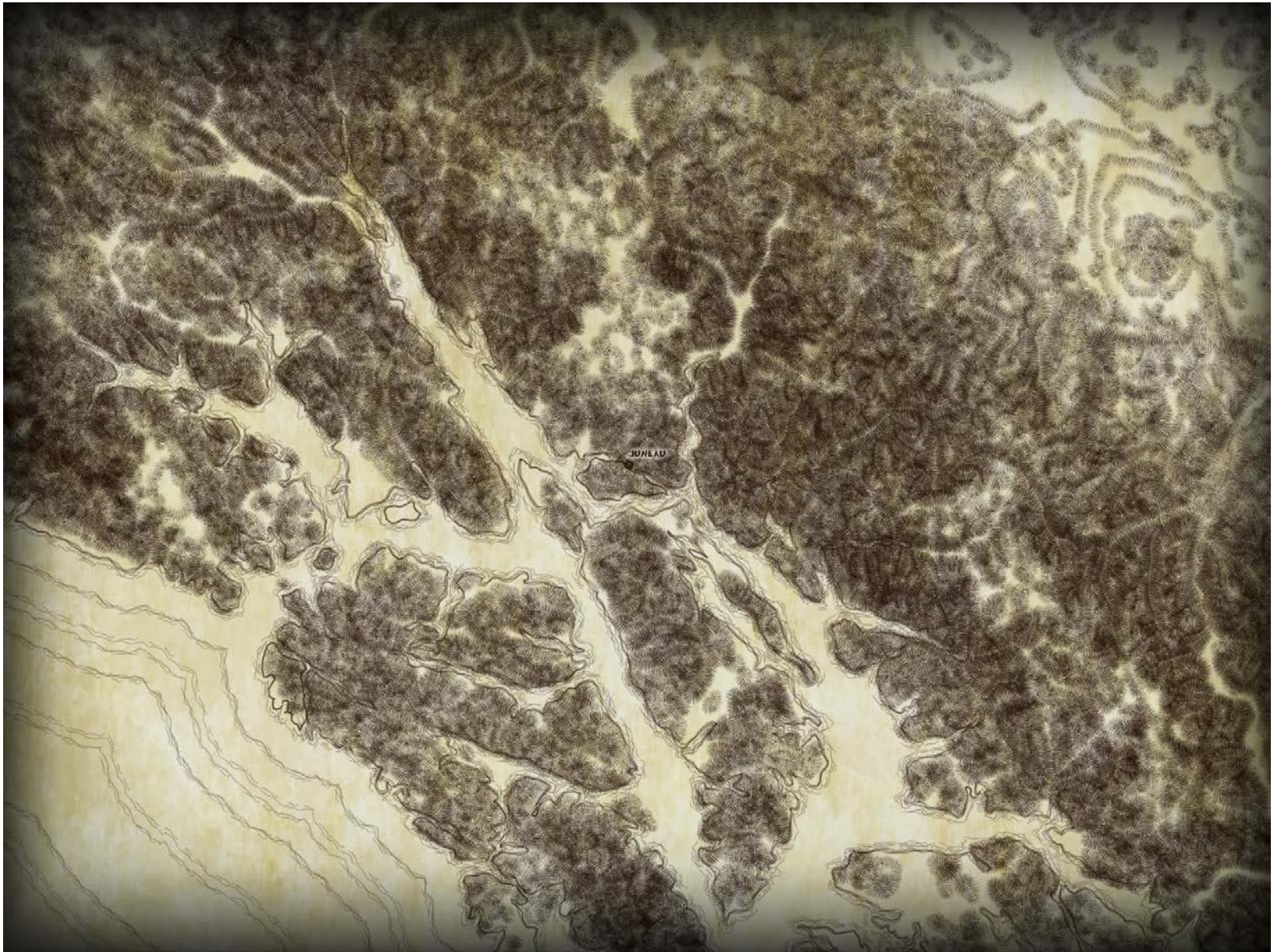
What is a hachure? Well, my friend, you are in the right place. Settle into your dimpled leather chair. Draw your whale oil lamp close and adjust your monocle. A hachure is a means of sketching downhill lines along elevation contours to create a rich pseudo-realistic topographic texture to a map, often used for field sketches of general topography but sometimes for richly precise surveyed maps too. The lines do a great job of indicating slope (*wow those mountain line-things are really packed in there!*) and aspect (*ah, that's the way this slope is facing*) and, let's be honest, they do a great job of looking cool. When coolness and practicality converge, then you know you are on to something.

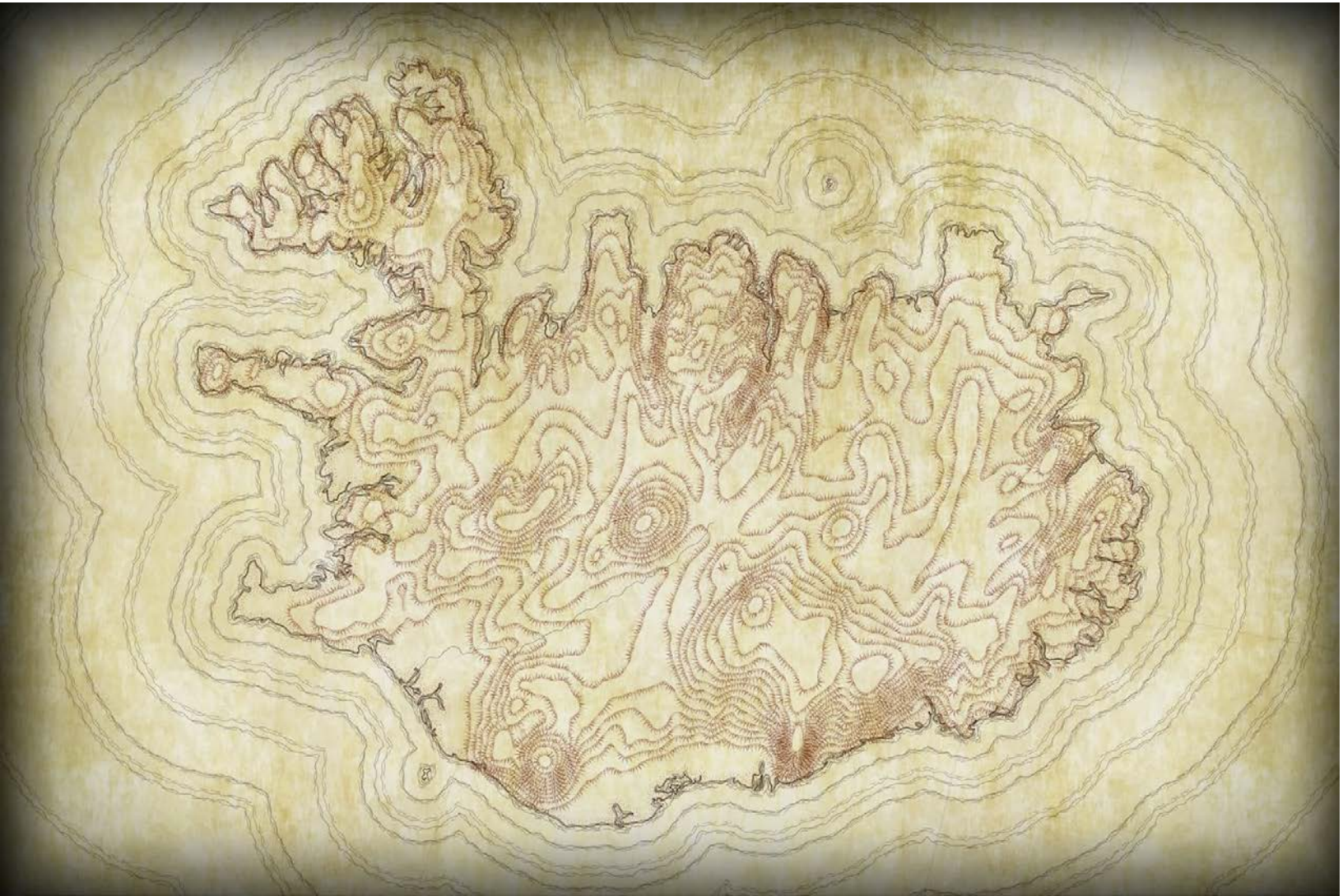
Hachures also help overcome relief inversion, or just the general *I-can't-tell-if-this-is-a-hill-or-a-depression-ism*, that can sometimes plague standard (unhached) contour lines. The hachures tell us which way is up. Which I often need.

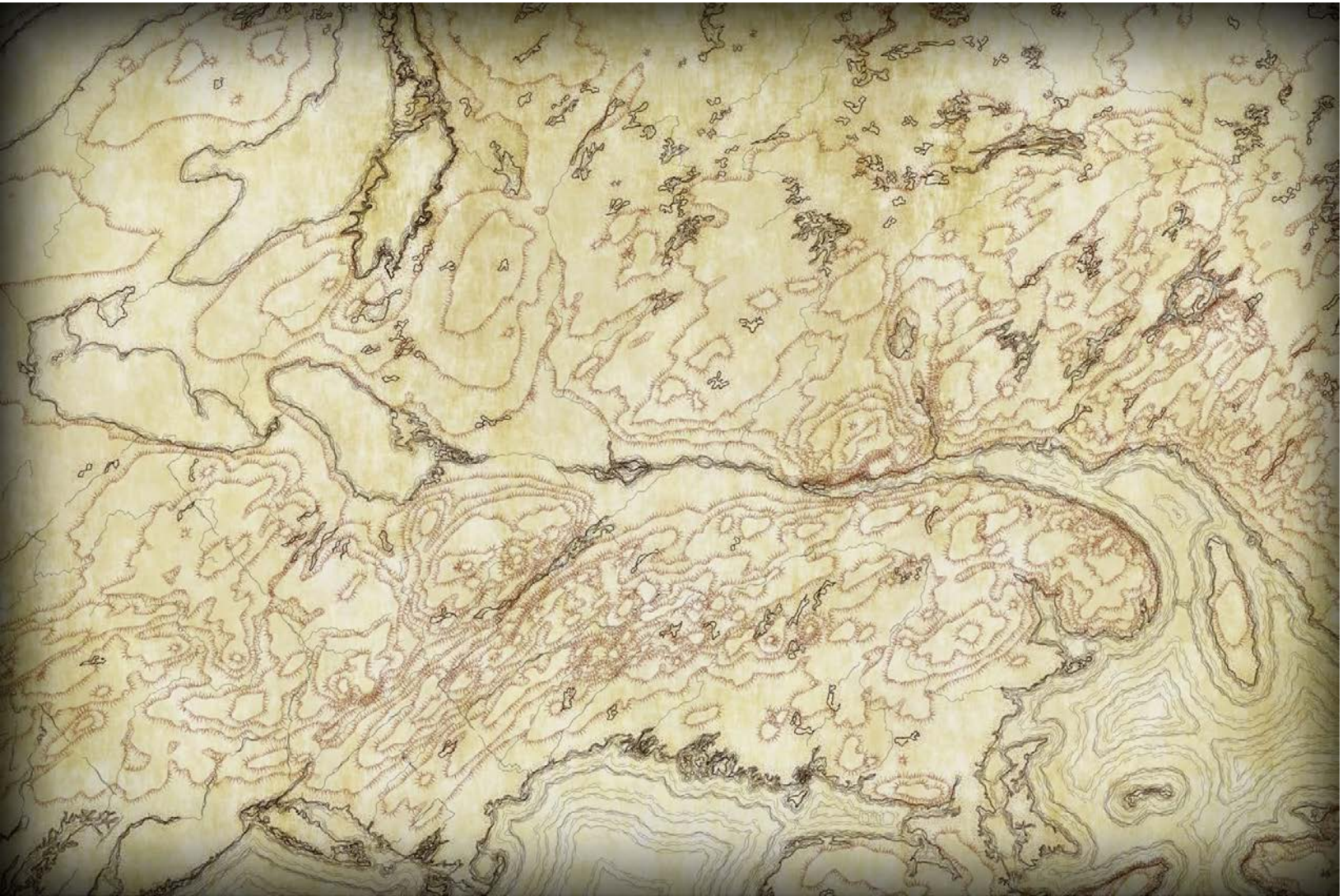
Here's an example showing the floor of the Atlantic, in the "rubble" style over archival cotton paper.



Ok, if you need any more justification for the scientific and artistic prowess of hachures than you'll have to find inspiration elsewhere. It's all examples and links from here on...

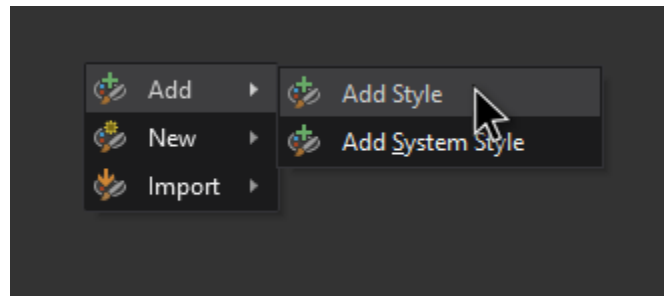








Here is the [ArcGIS Pro style](#) used to render these hachure maps. Save it to your machine (it will have a *.stylx* extension), then in your Pro project's Catalog view or panel, choose the "Styles" folder. Then right-click and choose "Add Style" then point it to the *stylx* file you saved. Thereafter it will be available in the Gallery view of your symbology panel (giving you point, line, or polygon hachure styles depending on what sort of feature you have selected).



Some other companion resources...

- [Andy Woodruff](#) at Axis maps has created an [amazing resource](#) that lets you define and download contour lines for anywhere on earth. Pretty awesome. You can crank out some cool contour raw-material there. Then hachure them up in Pro with the hachure style.
- If you have a DEM that you are working with, you can generate contours using the Contours tool in Spatial Analyst. If you want them to be smoother and more rounded, first run the Focal Statistics tool to smooth the DEM, *then* trace contours.
- Once you find yourself neck-deep in hachure maps, you are probably going to want a stylistically appropriate font to label them. [Check out this sweet throwback font](#) that Warren Davison made for everybody.
- You might enjoy using this hachure style in conjunction with the watercolor style. [Check that out here](#).
- [Waterlines pair well](#) with this style, if I may be so bold.
- You may notice some of these maps have faded edges. How can you do that? [Steal these vignettes!](#)

Happy Hachure Mapping!



I have far too much fun looking for ways to understand and present data visually, hopefully driving product strategy and engaging users. I work in the Content team at Esri, pushing and pulling data in all sorts of absurd ways—and then talking about it. I also get to spend time with the Story Maps team, working on fun and useful user experiences. When I'm not doing those things, I'm chasing around toddlers and wrangling chickens, and generally getting into other ad-hoc adventures. Life is good.

—John Nelson

