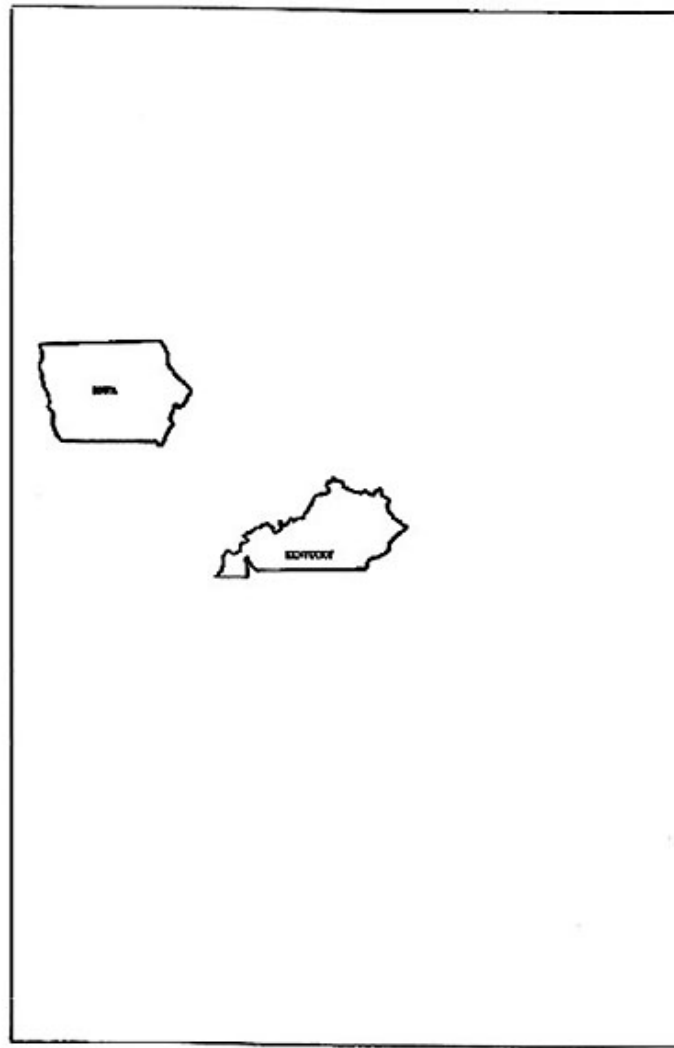


# *Techniques in Cartographic Design*

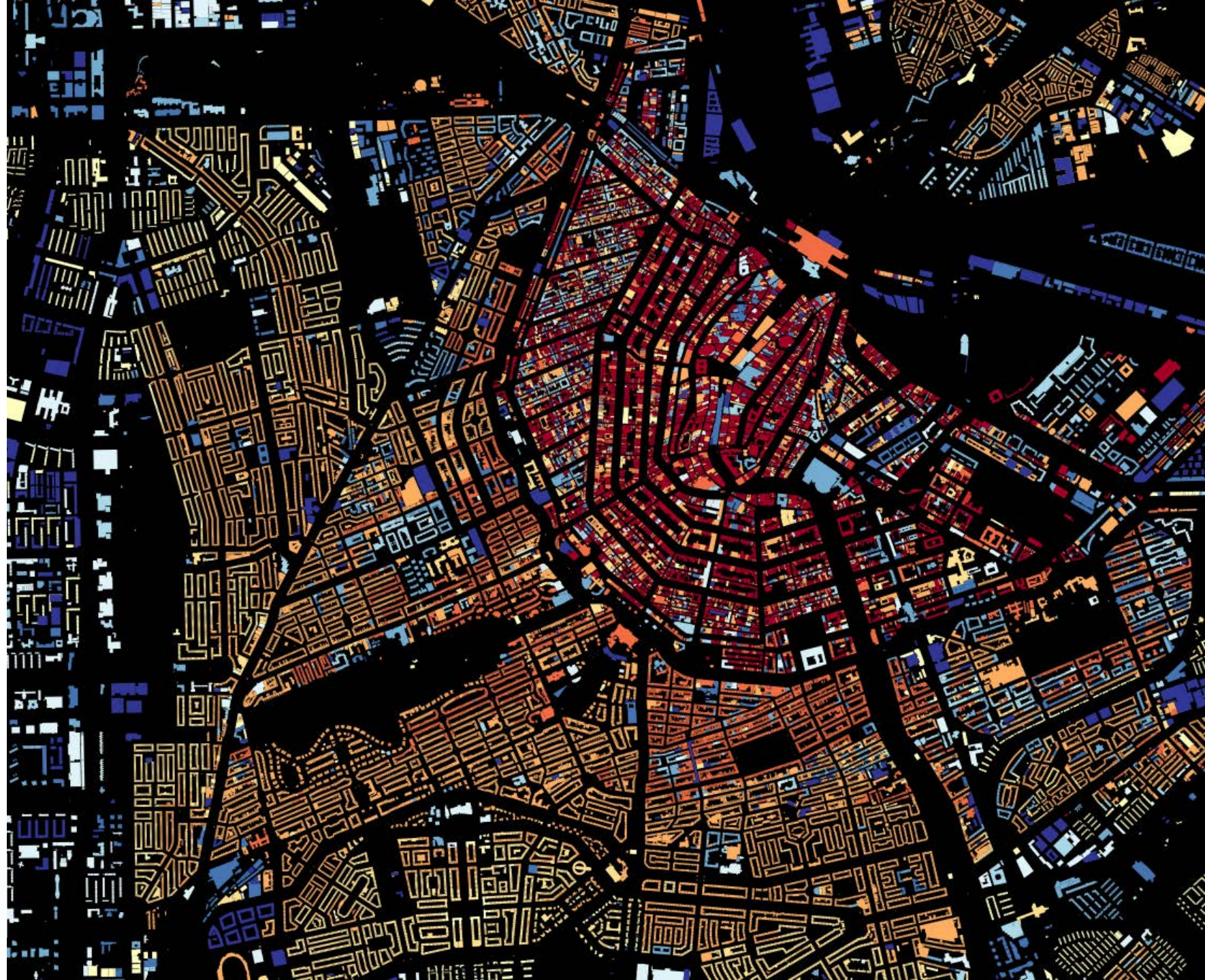
*SynerGIS  
Ithaca, NY  
April 28, 2015*

*Elaine “At least it’s not Arial” Guidero*



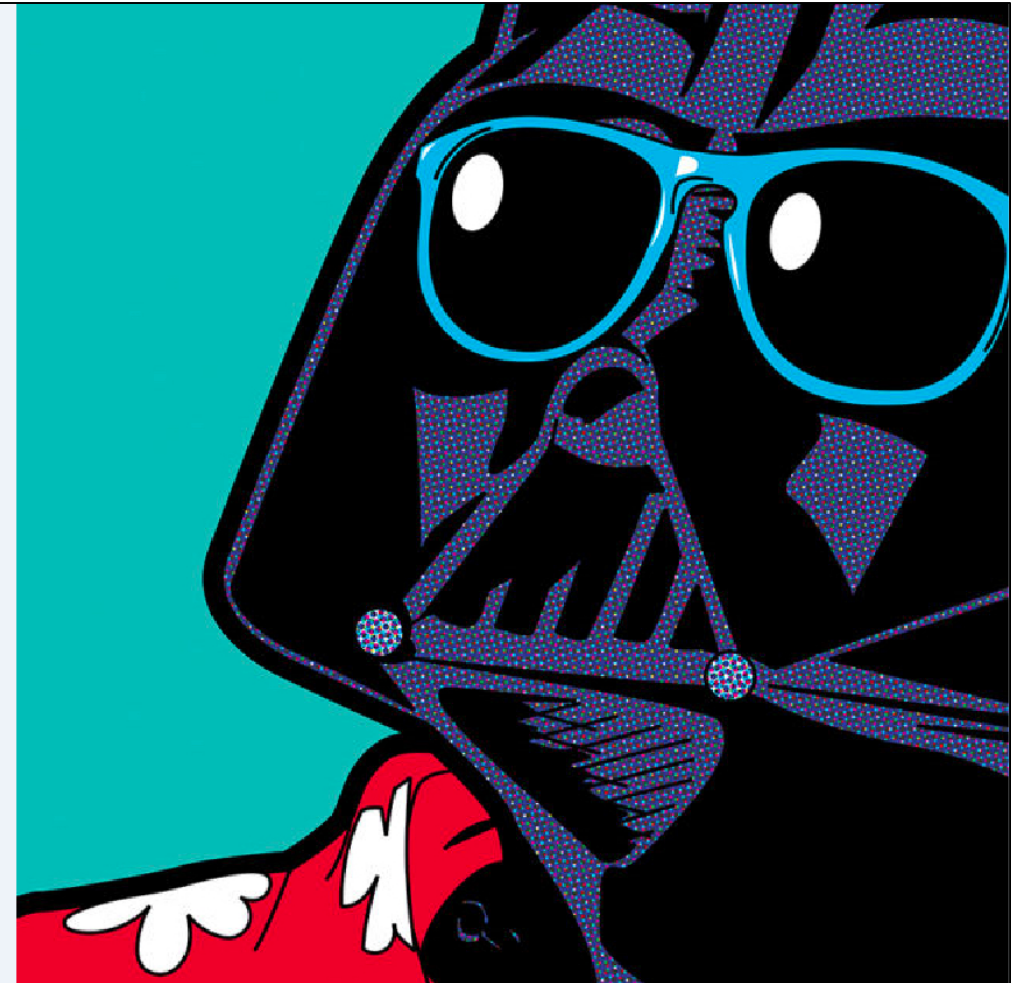
Map to not indicate: CANADA, JAMES BAY, ONTARIO, QUEBEC, ST. LAWRENCE RIVER, NEW BRUNSWICK, MANITOBA, AKIMISKI ISLAND, LAKE WINNIPEG, LAKE OF THE WOODS, LAKE NIPIGON, LAKE SUPERIOR, LAKE HURON, LAKE MICHIGAN, LAKE ONTARIO, LAKE ERIE, MAINE, NEW HAMPSHIRE, MASSACHUSETTS, VERMONT, CONNECTICUT, RHODE ISLAND, NEW YORK, NEW JERSEY, PENNSYLVANIA, DELAWARE, MARYLAND, WEST VIRGINIA, VIRGINIA, OHIO, MICHIGAN, WISCONSIN, MINNESOTA, EASTERN BORDERS OF NORTH DAKOTA, SOUTH DAKOTA, NEBRASKA, KANSAS, OKLAHOMA, TEXAS, MISSOURI, ILLINOIS, INDIANA, TENNESSEE, ARKANSAS, LOUISIANA, MISSISSIPPI, ALABAMA, GEORGIA, NORTH CAROLINA, SOUTH CAROLINA, FLORIDA, CUBA, BAHAMAS, ATLANTIC OCEAN, ANDROS ISLANDS, GULF OF MEXICO, STRAITS OF FLORIDA.





Dutch building age map,  
<http://code.waag.org/buildings>





Student Pop Art-inspired maps, <http://pennstategeog467.github.io/pop-carte/>





*Student Pop Art-inspired maps*

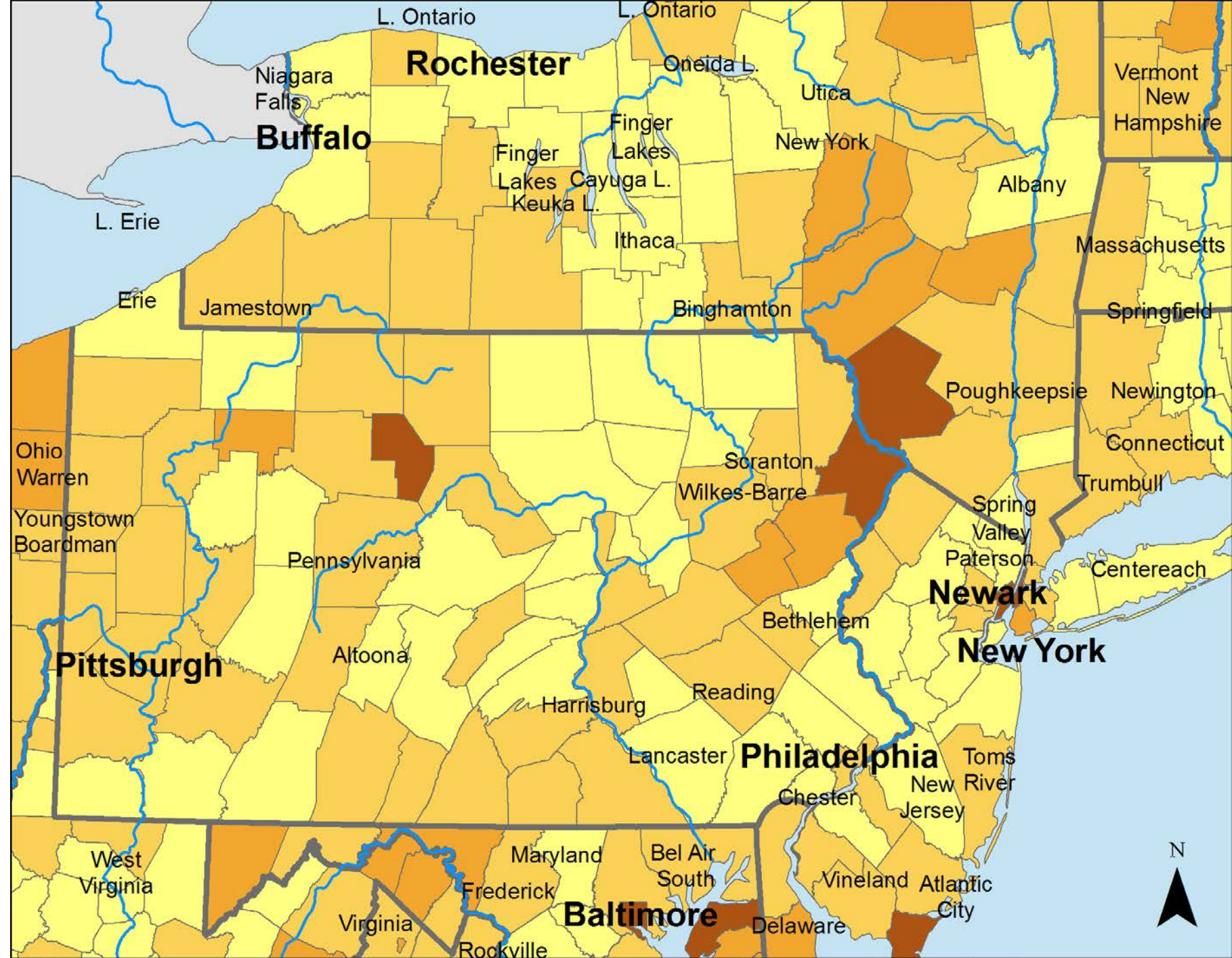
<http://pennstategeog467.github.io/pop-carte/>

# *The Basics*

- *Know your audience*
- *Design for color-blind (see [Colorbrewer2.org](http://Colorbrewer2.org))*
- *Set up a hierarchy*
- *Get away from those defaults!*

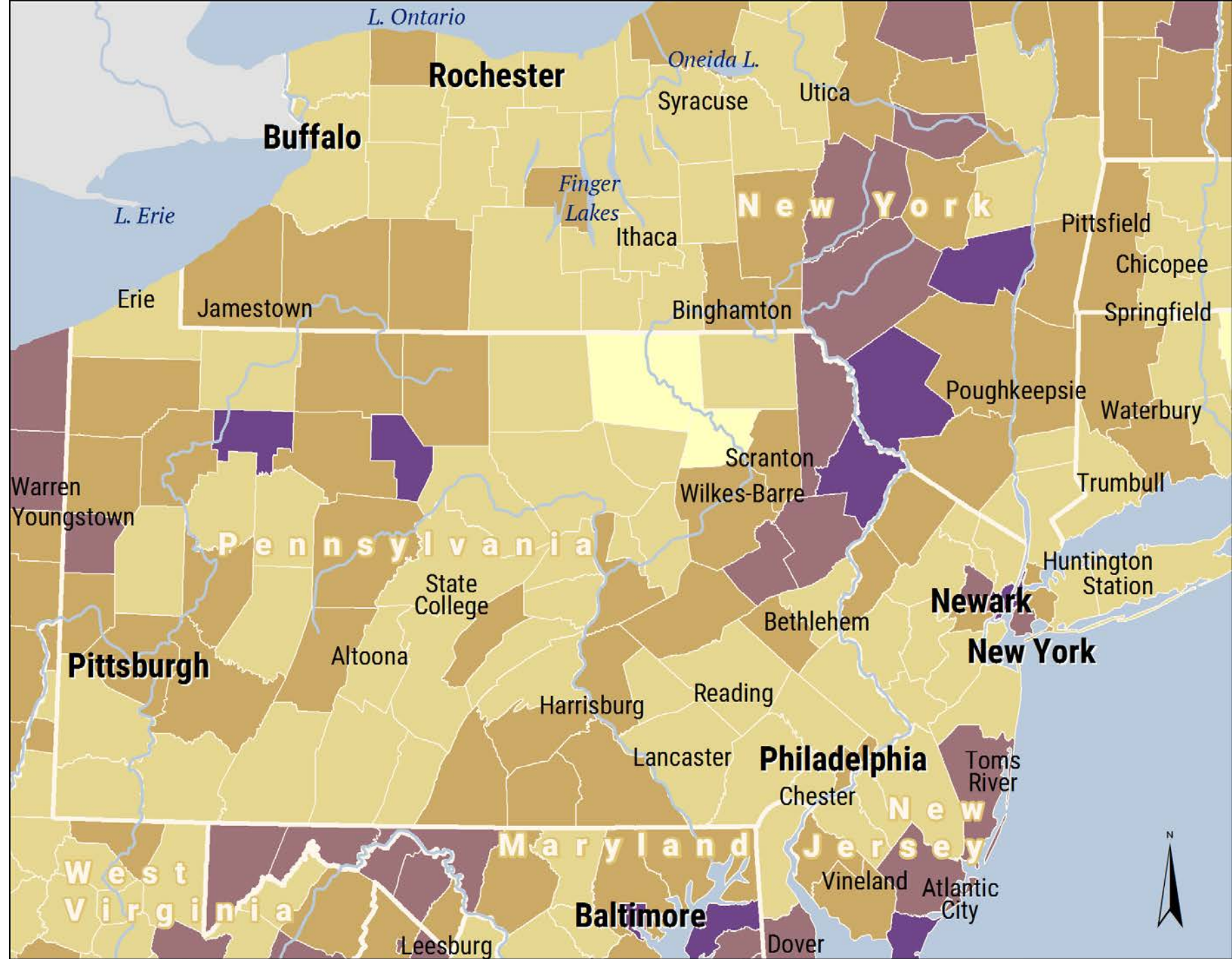


# *Defaults*





*...better*





# *Typography*

Go away, Arial.

a

But, Helvetica!

a

# *Letter anatomy*





# *Microaesthetics on screen vs. in print*

Phasellus quis porttitor neque. Ut ligula justo, egestas a malesuada eget, interdum sit amet neque. Morbi adipiscing lacinia nisi volutpat tempus. Curabitur viverra auctor lorem. In fermentum velit vel diam volutpat aliquet. Nam faucibus lobortis dui ut mattis. Proin nunc nulla, interdum quis dictum vitae, dictum vel massa.

**SEGOE UI, 14PTS**

Phasellus quis porttitor neque. Ut ligula justo, egestas a malesuada eget, interdum sit amet neque. Morbi adipiscing lacinia nisi volutpat tempus. Curabitur viverra auctor lorem. In fermentum velit vel diam volutpat aliquet. Nam faucibus lobortis dui ut mattis.

**LUCIDA GRANDE, 14PTS**

Phasellus quis porttitor neque. Ut ligula justo, egestas a malesuada eget, interdum sit amet neque. Morbi adipiscing lacinia nisi volutpat tempus. Curabitur viverra auctor lorem. In fermentum velit vel diam volutpat aliquet. Nam faucibus lobortis dui ut mattis.

**UBUNTU, 14PTS**

Phasellus quis porttitor neque. Ut ligula justo, egestas a malesuada eget, interdum sit amet neque. Morbi adipiscing lacinia nisi volutpat tempus. Curabitur viverra auctor lorem. In fermentum velit vel diam volutpat aliquet. Nam faucibus lobortis dui ut mattis.

**HELVETICA NEUE, 14PTS**

Phasellus quis porttitor neque. Ut ligula justo, egestas a malesuada eget, interdum sit amet neque. Morbi adipiscing lacinia nisi volutpat tempus. Curabitur viverra auctor lorem. In fermentum velit vel diam volutpat aliquet. Nam faucibus lobortis dui ut mattis.

**DROID SANS, 14PTS**

# The “feel” of type

## INTRODUCING

ALL **23** FLAVORS. JUST **10** MANLY CALORIES.



IT'S NOT FOR  
**WOMEN.**

THINK YOU'RE MAN ENOUGH FOR THE CAN? ►

*“for men”*  
Vs.  
*“for women”*





A NEW AND ACCVRAT MAP OF THE WORLD Drawne according to ſtrict Deſcriptions laſt Diſcoveries & beſt Obſervations & have beene made by Engliſh or Strangers

1626





*CJK (Chinese, Japanese, Korean) fonts are not for European languages*

This is Batang.

This is FangSong.

This is Dotum.

This is DokChampa.



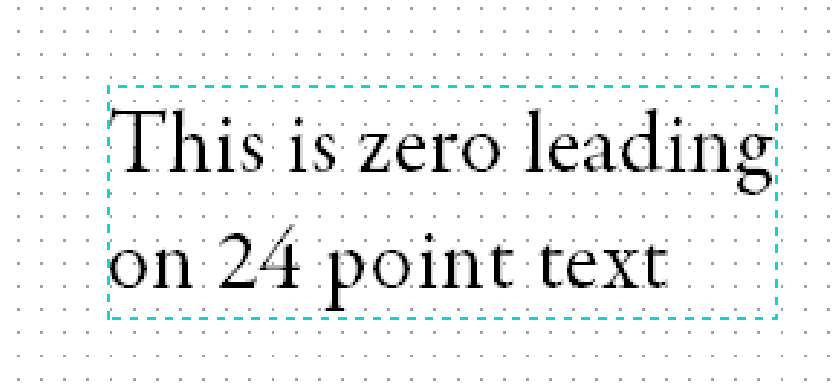
see <https://www.microsoft.com/typography/fonts/product.aspx?pid=161> for a list of western and non-western typefaces supplied in Windows 7



# *Always reduce default leading in ArcMap*

*Units are in points.*

*0 (default) = approx. 120%  
line spacing*



Loose leading  
is less legible

Tight leading  
is better!

## *Avoid faux italic*

Ten quartz sphinxes walked into a bar...

*Ten quartz sphinxes walked into a bar...*



Ten quartz sphinxes walked into a bar...

*Ten quartz sphinxes walked into a bar...*





## *Avoid faux bold*

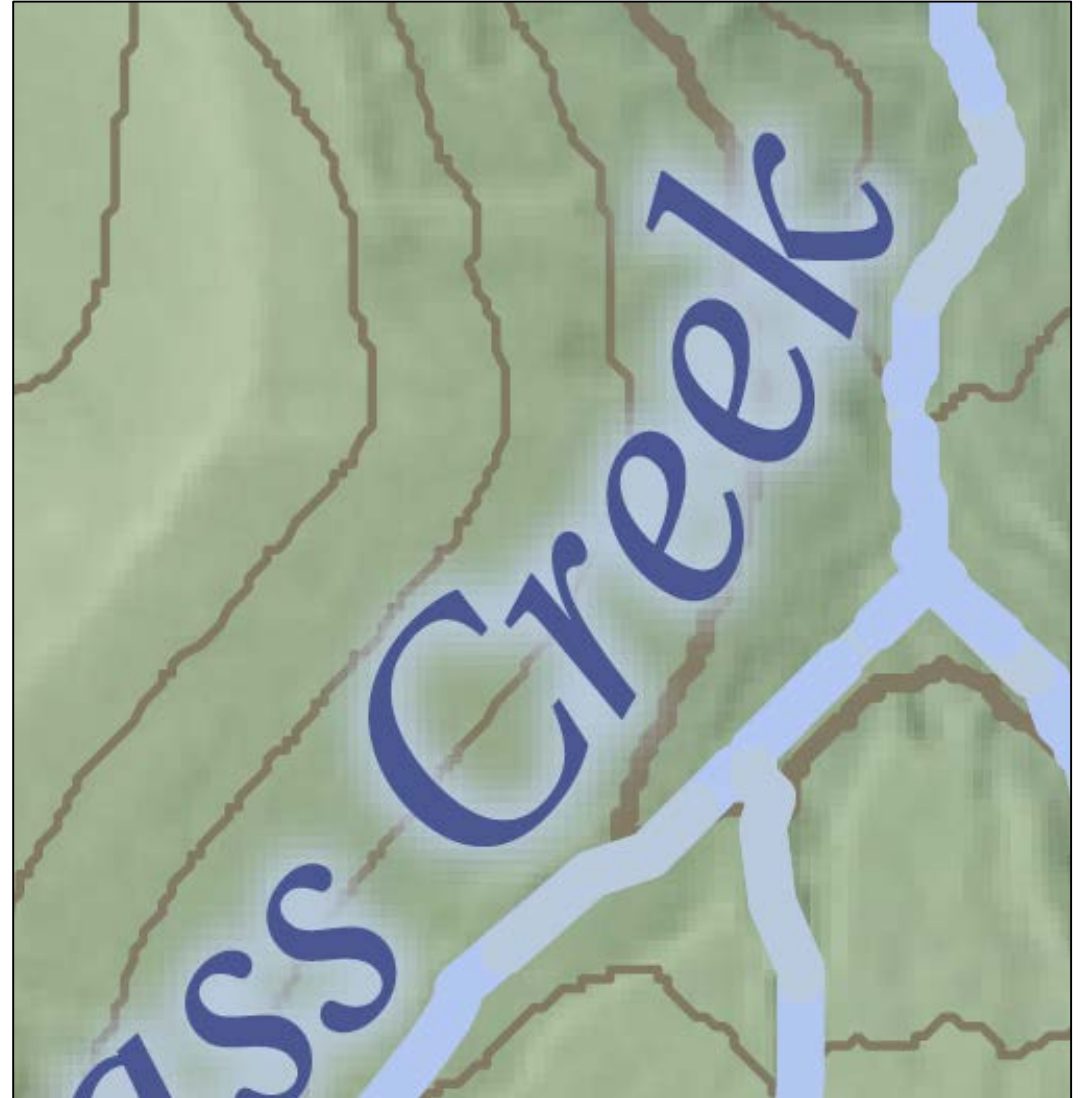
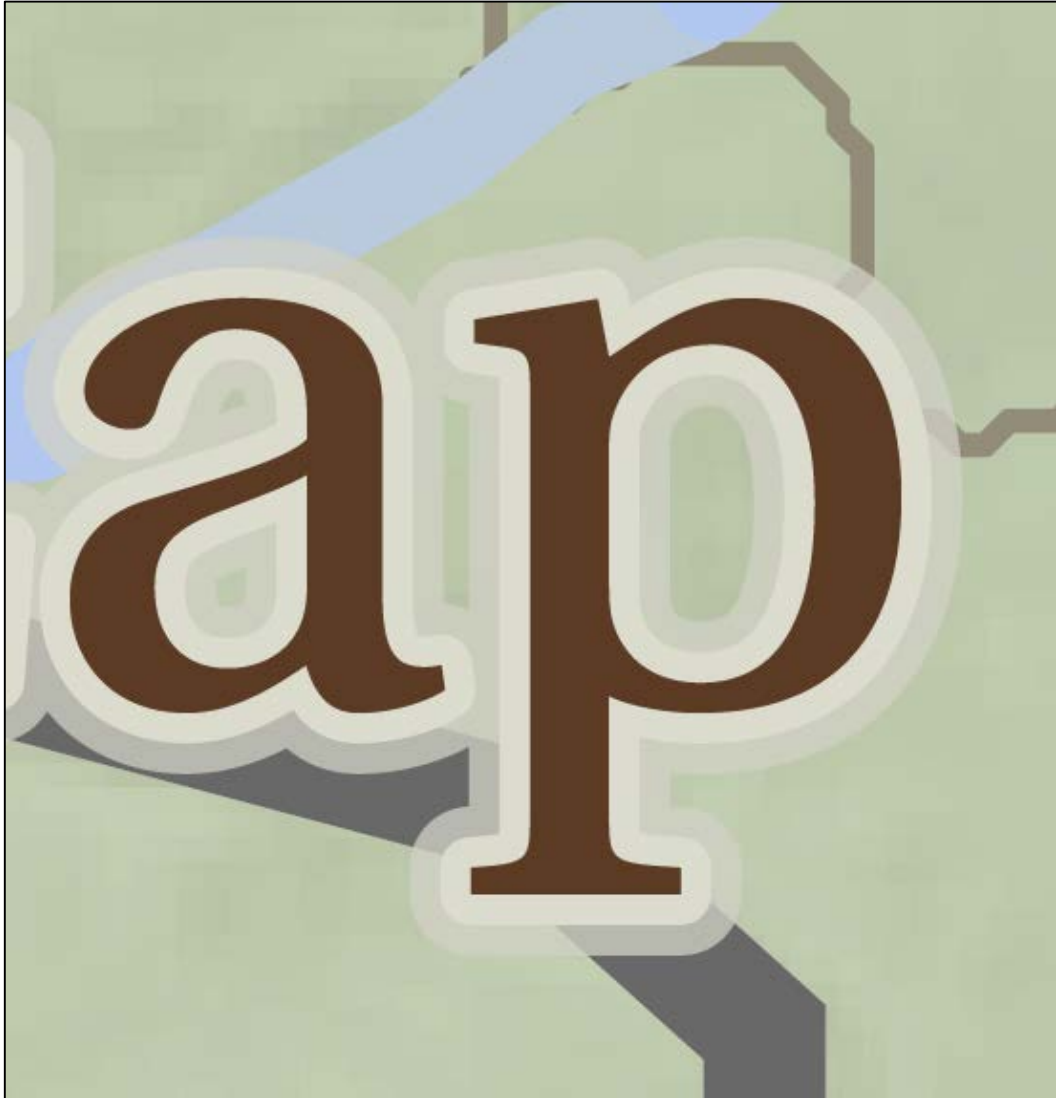
Ten quartz sphinxes walked into a bar...

**Ten quartz sphinxes walked into a bar...** 

Ten quartz sphinxes walked into a bar...

**Ten quartz sphinxes walked into a bar...** 

# *Dual halos and halo “glow” (Illustrator)*





# *Step by step dual halos and glow*

## **Dual halos:**

*Add stroke to text, round joins, size 0.5 point. Place under “Characters” in Appearance Panel. This is your initial “basic” halo. Add second stroke, behind first stroke. Increase this stroke to 5 point. Add Gaussian Blur effect and change blur size to 0.2 to 4 (depending on background). Change opacity of stroke as desired.*

## **Halo glow:**

*Add stroke behind characters, round joins, size 0.8 pt. Add Gaussian Blur 1.7 (adjust as necessary). For more aggressive blur, increase stroke size to 1, Gaussian Blur to 6.2.*

*OpenType features (Illustrator)*

*Avast ye swashes!*

*Avast ye swashes...♦♦♦*



# *What if you only have Windows fonts?*

*I recommend*

- *Segoe/Segoe UI*
- *Lucida Sans*
- *Trebuchet MS*
- *Franklin Gothic Book and Condensed*
- *Sylfaen*
- *Rockwell (sparingly)*
- *TW Cen MT Condensed*

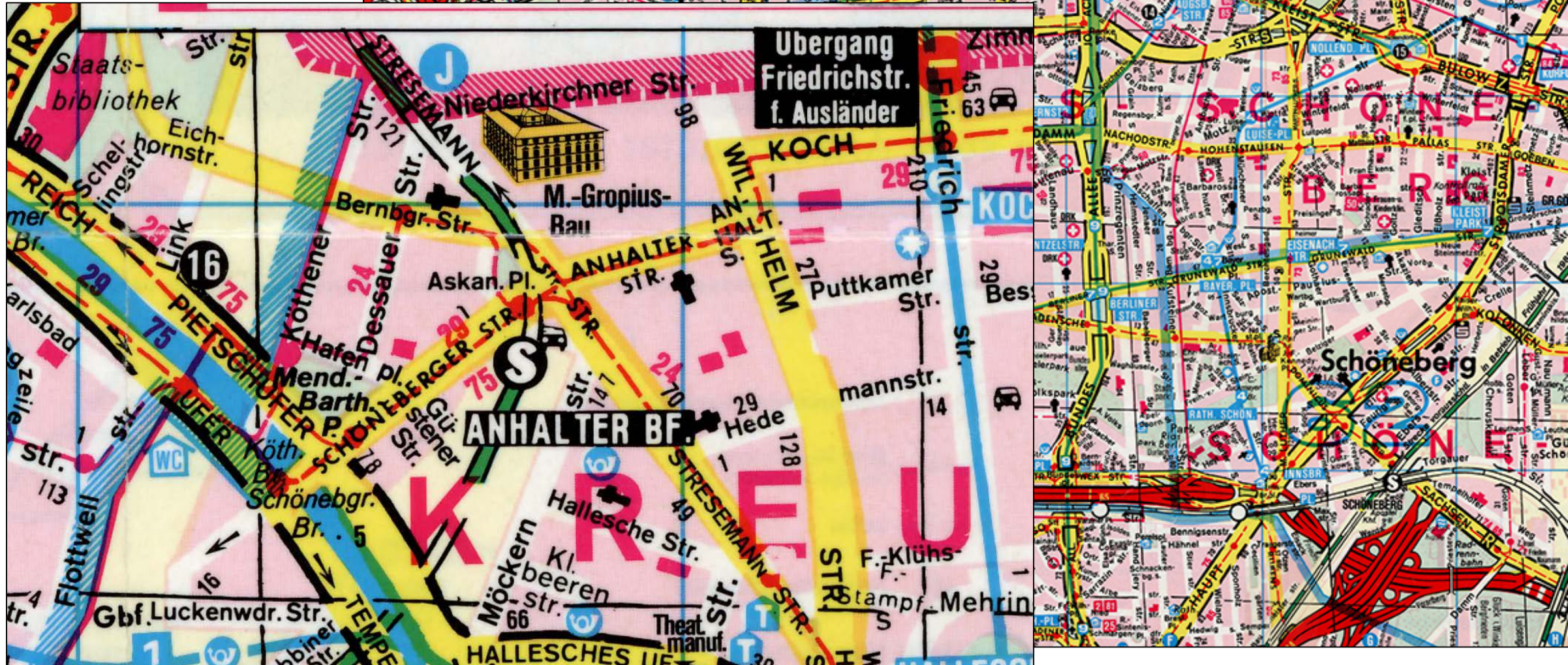
See <https://www.microsoft.com/typography/fonts/> for fonts supplied with other MS products and Windows versions

# *Max 2 typefaces*



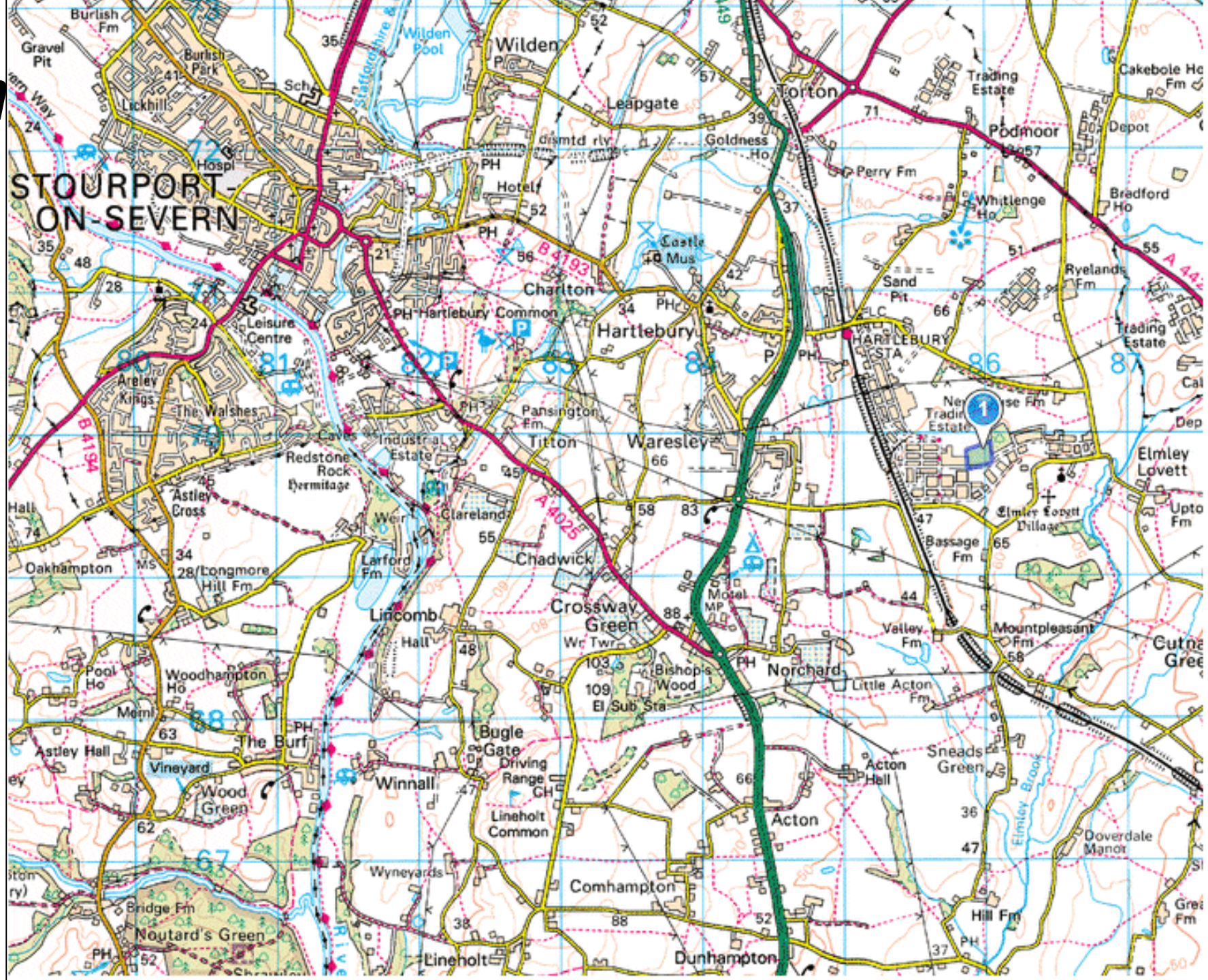
*Portal Publications  
(via [cartastrophe.wordpress.com](http://cartastrophe.wordpress.com))*







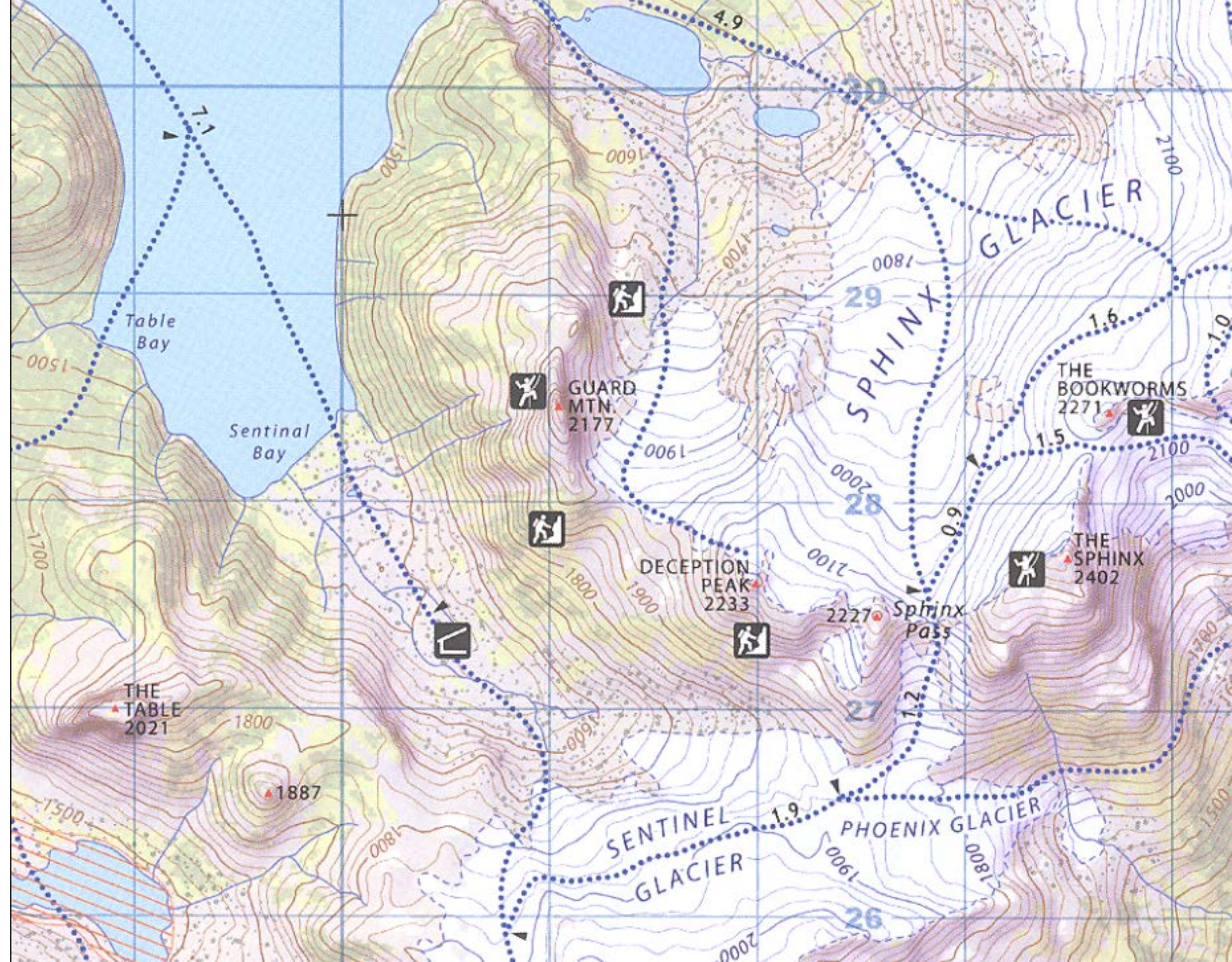
*But you can  
break the  
rules...*



*Ordnance Survey UK*



*...or just  
keep it  
simple*





# *Pair fonts with similar structure/x-height*

## **The best section header ever**

Bacon ipsum dolor sit amet chuck tempor laboris, chicken deserunt ribeye ham t-bone magna nisi tenderloin ut dolore occaecat. Dolore ribeye swine, tongue ground round commod shank. Andouille aliqua adipis ullamco consectetur leberkas e ribeye ball tip consectetur, tong venison sed incididunt dolore k

baconipsum.com

## **The best section header ever**

Bacon ipsum dolor sit amet chuck tempor laboris, chicken deserunt ribeye ham t-bone magna nisi tenderloin ut dolore occaecat. Dolore ribeye swine, cillum esse pig spare ribs tongue ground round commodo. Pork bresaola pariatur et shank. Andouille aliqua adipisicing fugiat dolor boudin. Do ullamco consectetur leberkas exercitation voluptate. Shoulder ribeye ball tip consectetur, tongue tail brisket consequat venison sed incididunt dolore kielbasa chuck elit.

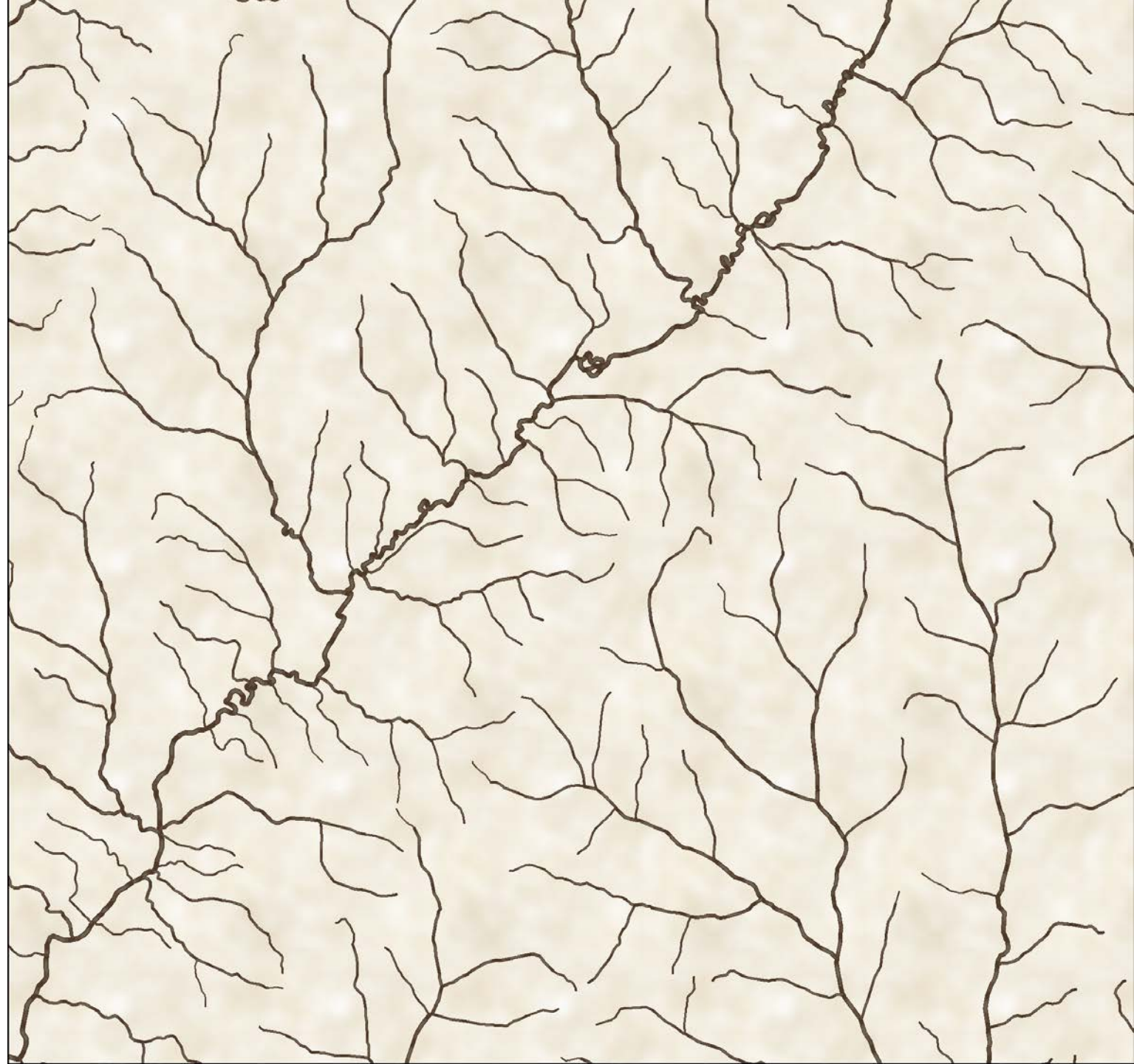
baconipsum.com

# *Other things to remember*

- *Don't stretch or compress text. Use tighter/looser kerning or extended/condensed designs.*
- *Use small caps instead of all caps if available (OpenType).*
- *Rely on different **weights**, italic, and **color** instead of separate typefaces to create hierarchy and variety.*



# *Hydrography*



# Stream tapering in ArcMap

- Use the NHDPlus dataset at <http://www.horizon-systems.com/nhdplus/>
- Join NHDFlowline to CumulativeArea.dbf based on ComID field
- Set up graduated symbology with TotDASqKm field
- Adjust classing to avoid monolinear symbology

Show:

**Features**  
**Categories**  
**Quantities**  
    Graduated colors  
    Graduated symbols  
    Proportional symbols  
**Charts**  
**Multiple Attributes**

**Draw quantities using symbol size to show relative values.**

Fields  
Value: TotDASqKm  
Normalization: none

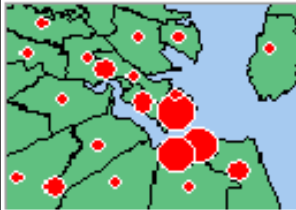
Classification  
Manual  
Classes: 10

Symbol Size from: 0.5 to: 2.5

Symbol	Range	Label
—	0.000000 - 0.515130	0.000000 - 0.515130
—	0.515131 - 1.451954	0.515131 - 1.451954
—	1.451955 - 3.487744	1.451955 - 3.487744
—	3.487745 - 7.955672	3.487745 - 7.955672
—	7.955673 - 13.900900	7.955673 - 13.900900
—	13.900901 - 37.825936	13.900901 - 37.825936
—	37.825937 - 152.840419	37.825937 - 152.840419
—	152.840420 - 3256.640788	152.840420 - 3256.640788

☐ Show class ranges using feature values

Advanced



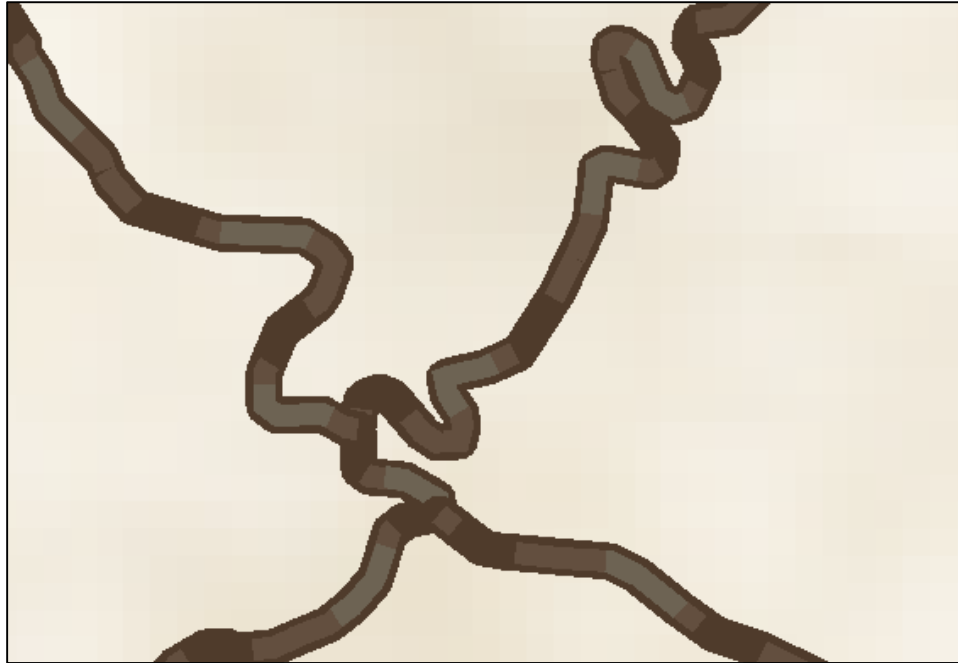
# *Stream tapering in Illustrator*

- *Dissolve hydro network on Name*
- *Classify by Name*
- *Export to Illustrator, check “Use Display Expression as Item Name” in Format tab*
- *Create a new tapered line style and save to Graphic Styles*
- *Apply to individual named rivers; reverse stroke if necessary*
- *Custom adjust width at stream joins using Width tool*



# Stream “pulse” symbol (ArcMap)

- *Visible against varied backgrounds*
- *Bottom line is solid*



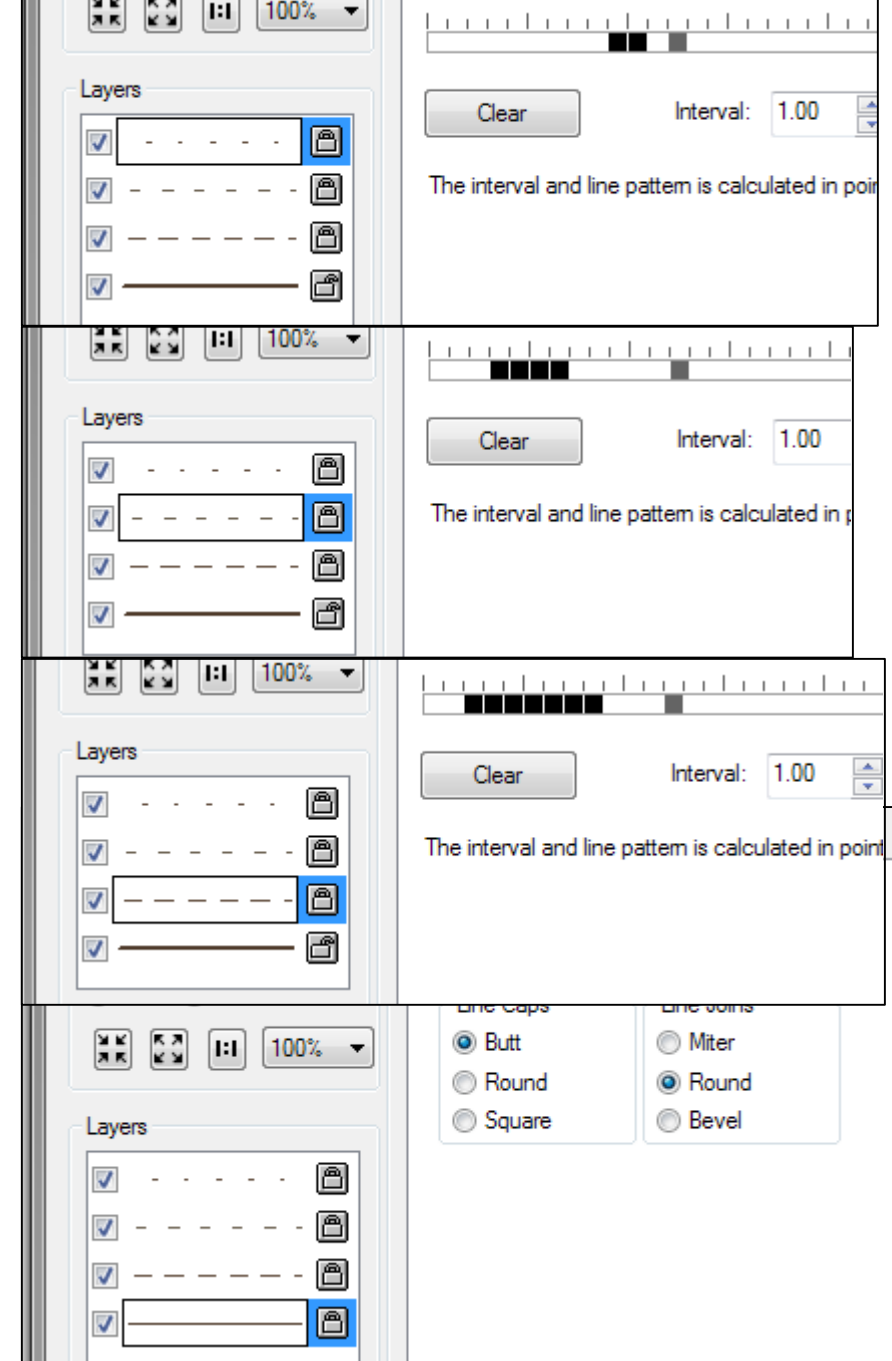
## RGB values

Top: 99, 79, 63

2<sup>nd</sup> layer: 109, 99, 83

3<sup>rd</sup> layer: 99, 79, 63

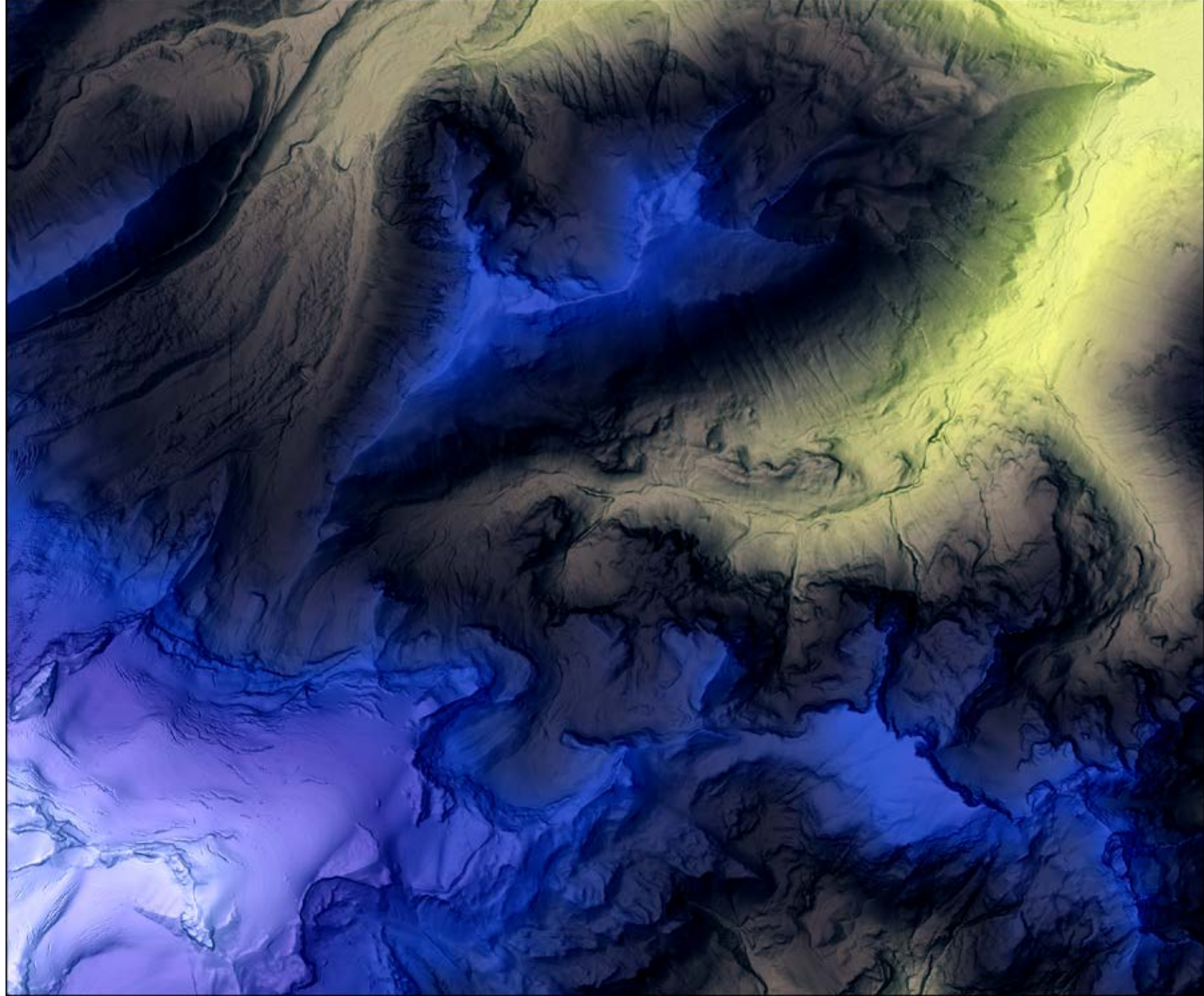
Bottom: 79, 59, 43



Courtesy of Paulo Raposo and Cindy Brewer,

[http://www.personal.psu.edu/cab38/ScaleMaster/Raposo-Brewer\\_Contrast\\_ICC2013-NACIS-redux\\_Oct-talk2013.pdf](http://www.personal.psu.edu/cab38/ScaleMaster/Raposo-Brewer_Contrast_ICC2013-NACIS-redux_Oct-talk2013.pdf)

# *Terrain*



# *Add high points back to DEM (ArcMap)*

*Do this after smoothing DEM to keep spot heights*

*Spatial Analyst > Raster Calculator*

*$Val + (Val - focMin) / (focMax - focMin) * (ogMax - focMax)$*

*focMin = post-smoothing minimum value (single number)*

*focMax = post-smoothing raster value (single number)*

*ogMax = original maximum raster value (single number)*

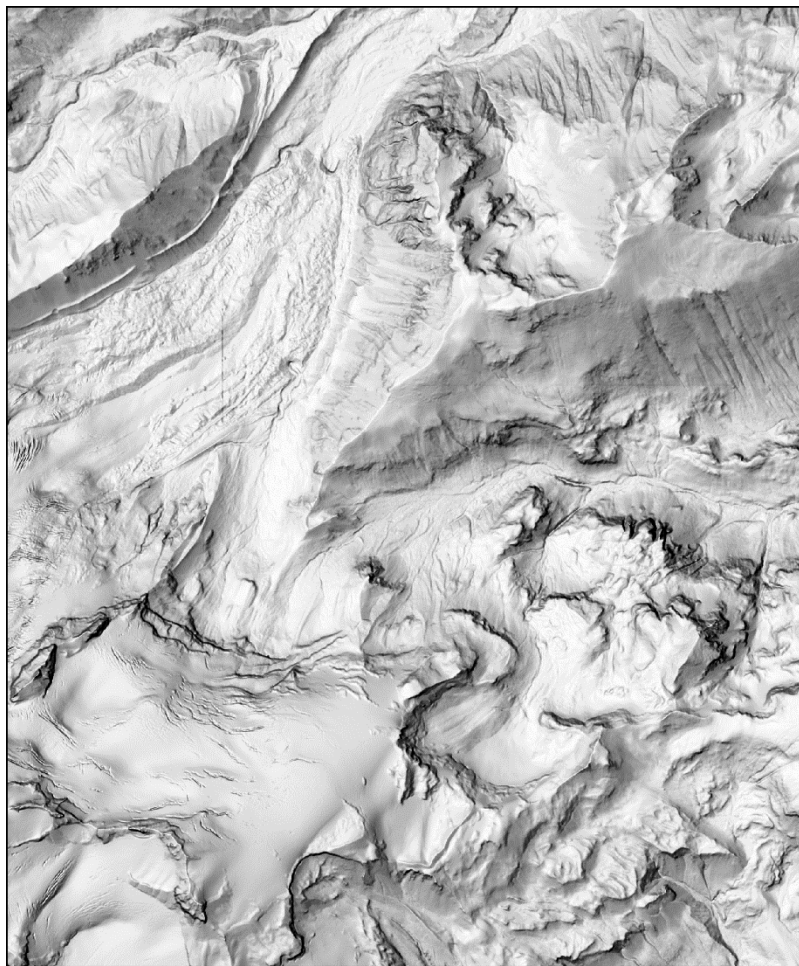
*Val = per-cell value in smoothed raster ([smoothedraster])*



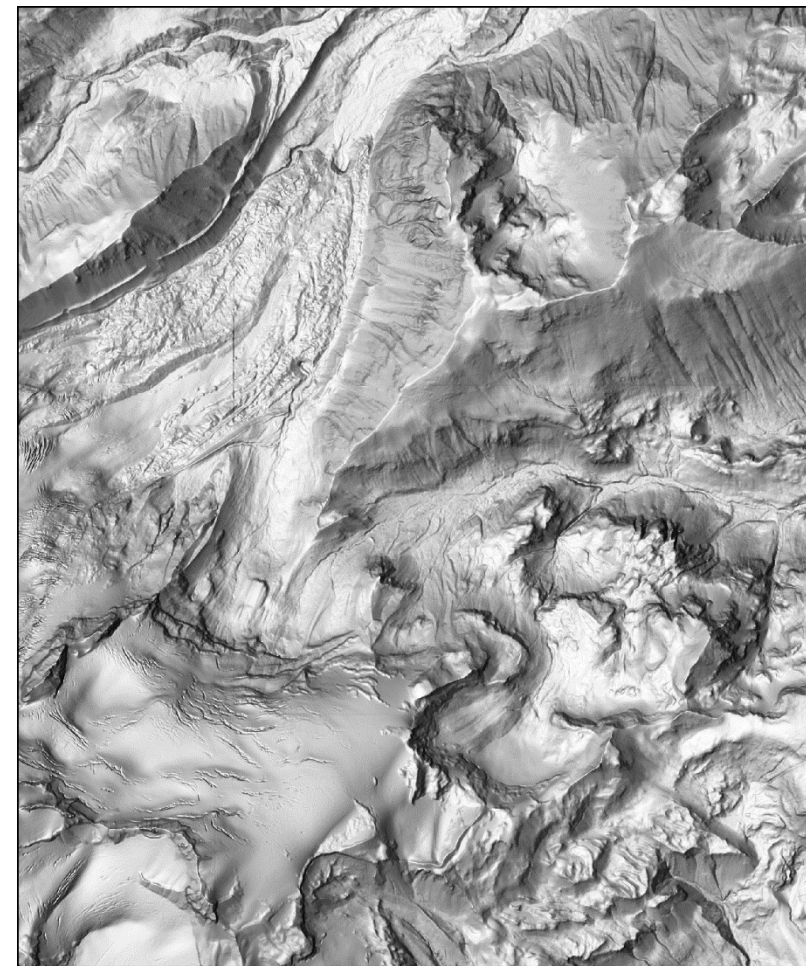
# *Multi-directional hillshades*



*Traditional 315 azimuth  
and 45° altitude*



*Raster calculator with  
6 different hillshades*



*Multi-dimensional function from ESRI:*

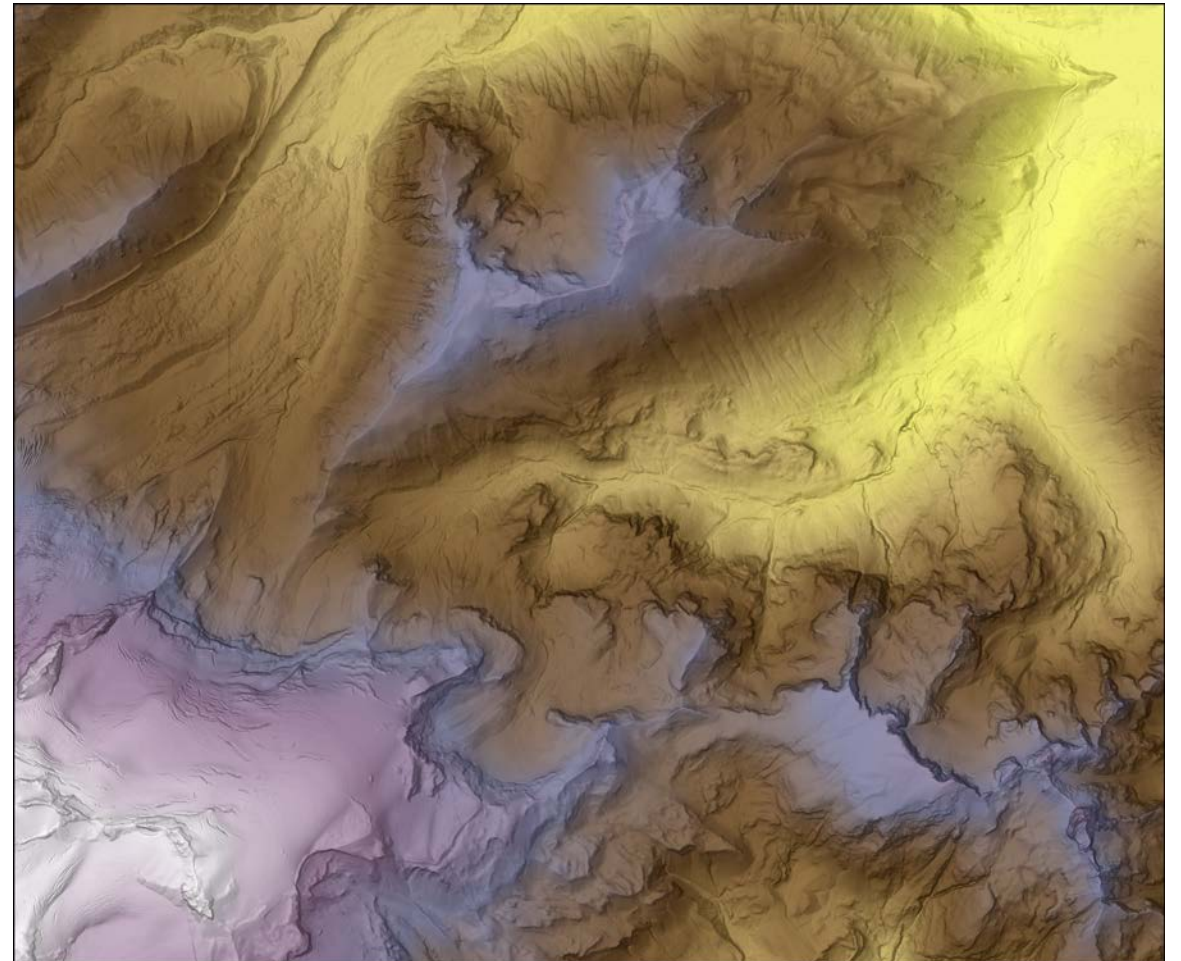
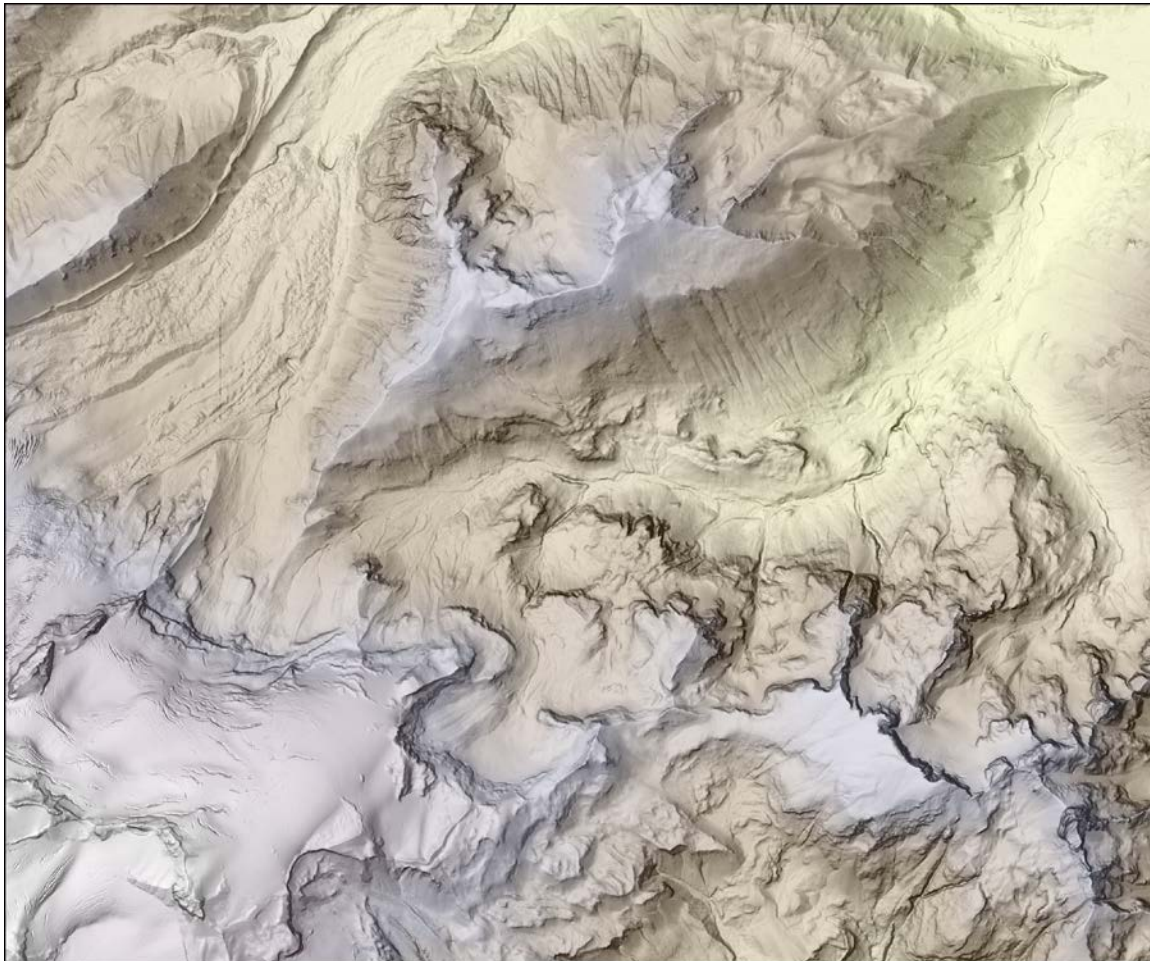
<http://blogs.esri.com/esri/arcgis/2014/07/14/introducing-esris-next-generation-hillshade/>



# *Pansharpen hillshade/hypsometric tint*

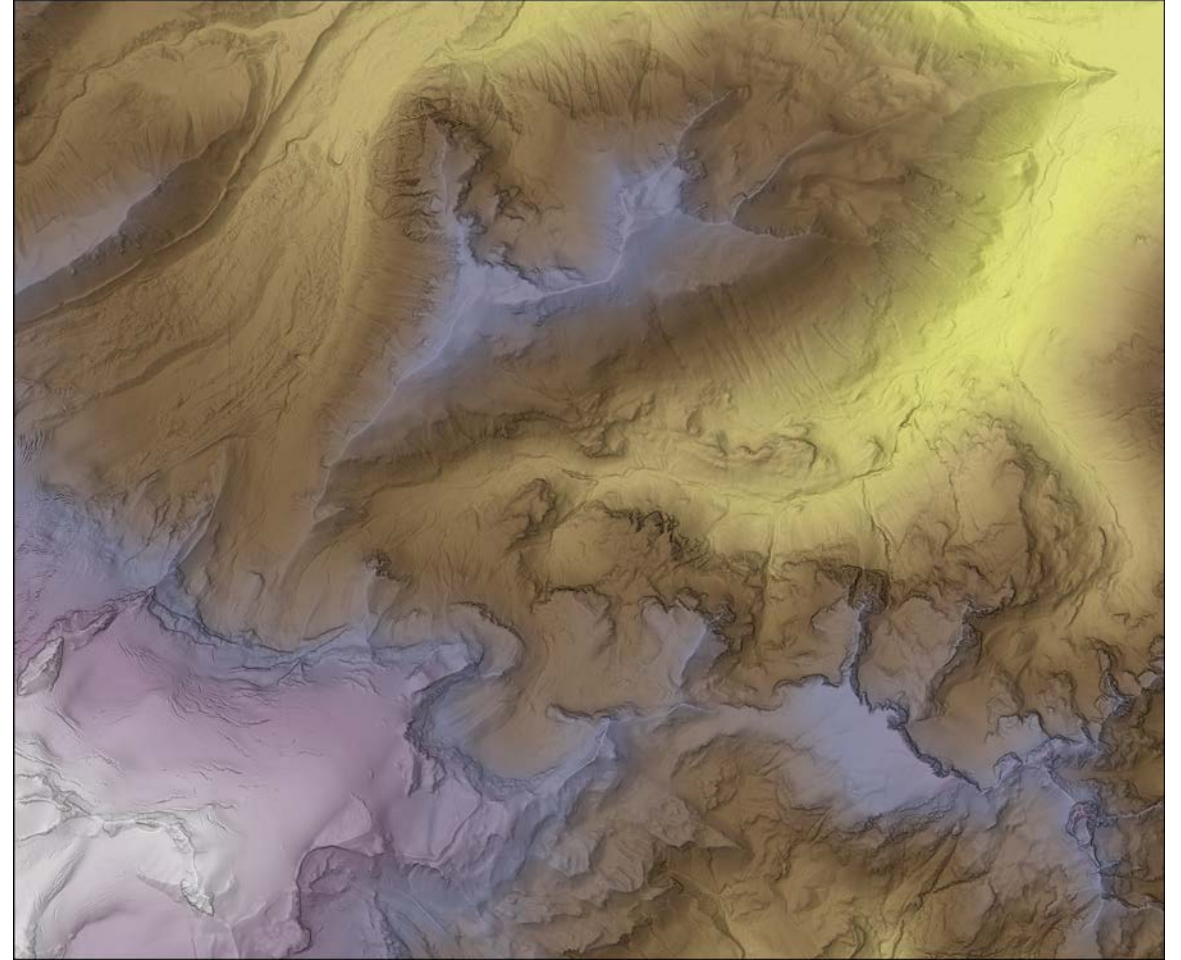
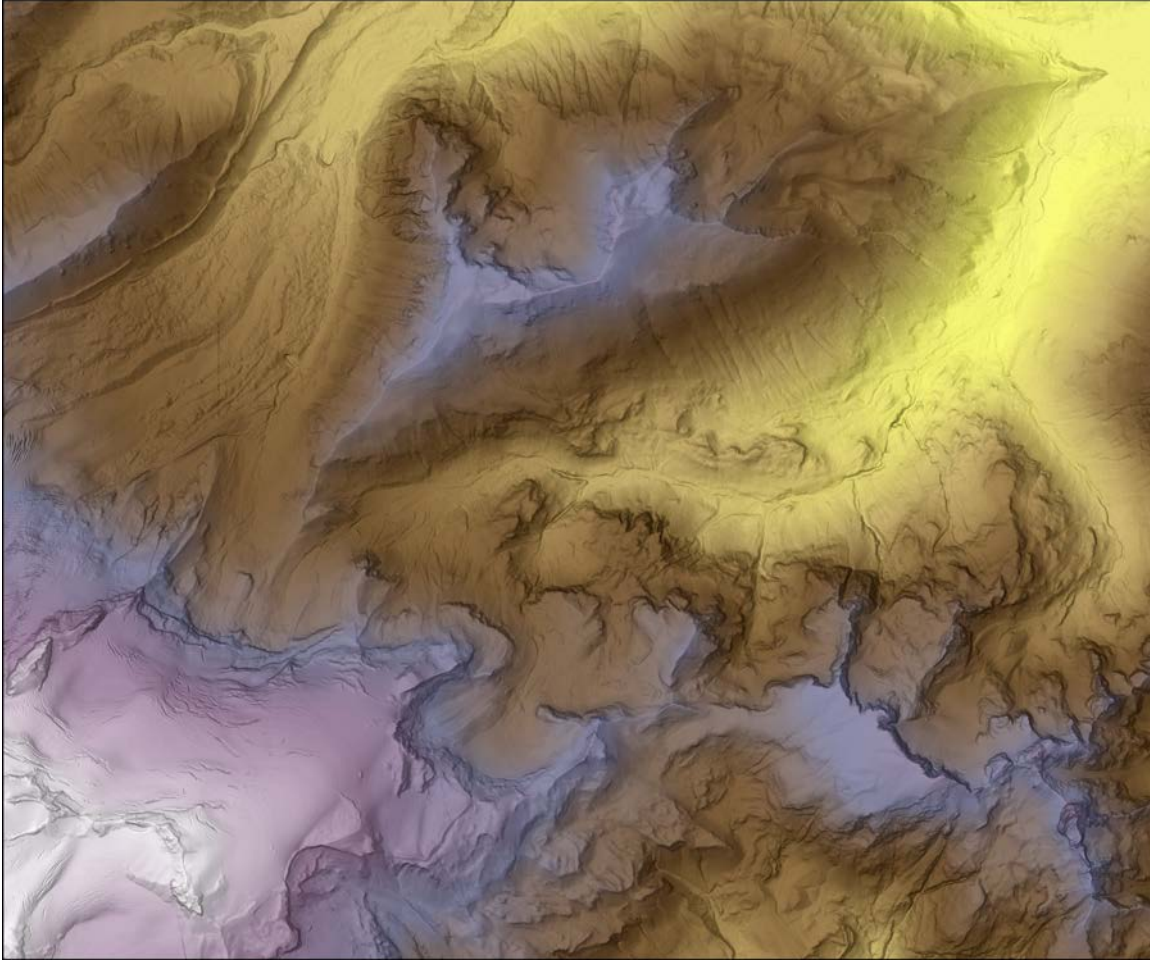
*Combines hillshade and tint without fading from transparent overlays*

<http://blogs.esri.com/esri/arcgis/2012/03/08/an-alternative-to-overlaying-layer-tints-on-hillshades/>





*Use curvature to add glints to peaks/ridges*



*80% transparent curvature overlay*

# *Masking contour lines (Arc) (requires ArcEditor level)*

- 1. Annotate contour labels*
- 2. Create feature outline masks (margin 1 pt, convex hull)*
- 3. Turn on Advanced Drawing Options in Data Frame context menu. Choose the outline mask layer on left, the contour line layer on right.*
- 4. Export contour lines to Illustrator and use Paste in place to get contour layer lined up exactly with other exported layers.*



# *Masking contour lines (Illustrator)*

- *Remove all clipping masks first, then go through a process to generate type outlines, which get turned into a clipping mask.... Tricky*
- *Delete all clipping masks before trying (Select > Object > Clipping Masks, delete)*
- <http://mappractical.blogspot.com/2011/10/width-and-profile-tools-for-tapered.html>

# *Workflow from Arc to Illustrator*

- *Dashed lines are interesting.*
- *Beware of DPI issues. Arc likes multiples of 72; Illustrator likes multiples of 90. **360 DPI***
- *Transparency will collapse everything underneath*
- *1 simple trick to delete all clipping masks in Illustrator: Select > Object > Clipping Masks. Then hit Delete key.*
- *Regenerate text and do all text styling in Illustrator*
- <http://www.bgcarto.com/some-tips-on-map-layout-exporting-a-map-to-illustrator/>
- <http://www.bgcarto.com/importing-an-arcmap-export-in-illustrator/>



# *Come to NACIS 2015!*

- <http://nacis.org/annual-meeting/current-meeting/>
- *Minneapolis, MN October 14-17*

