

# Designing for Scientists

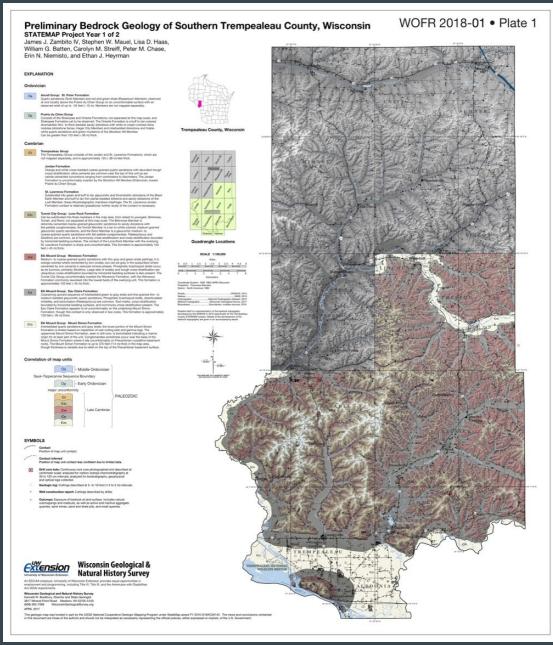
Caroline Rose

Wisconsin Geological and Natural History Survey

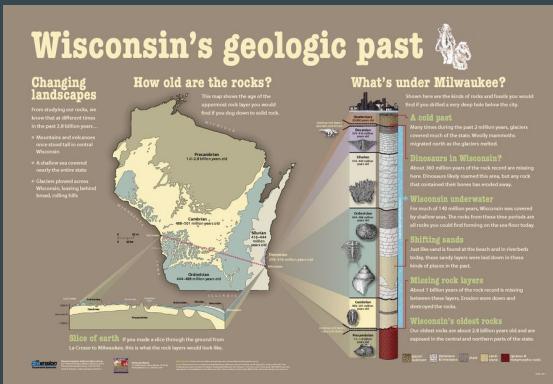
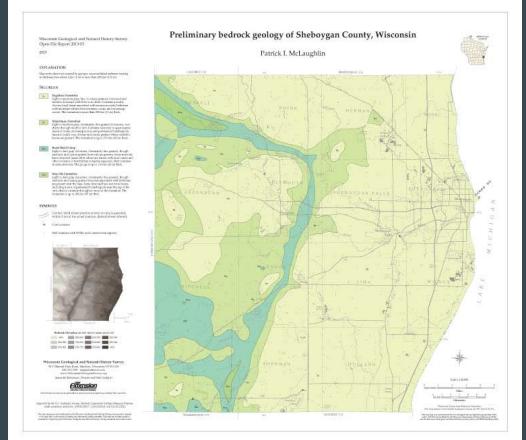
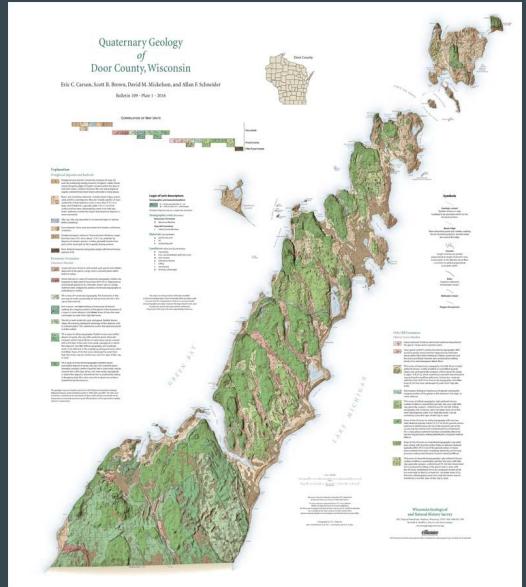
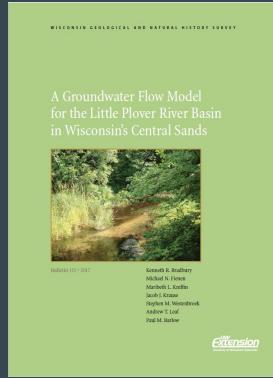
[caroline.rose@wgnhs.uwex.edu](mailto:caroline.rose@wgnhs.uwex.edu)

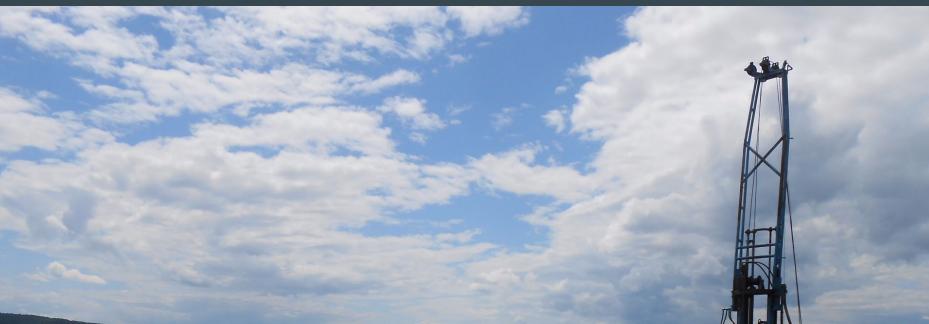
@cmrRose

[github.com/cmrRose/talks](https://github.com/cmrRose/talks)

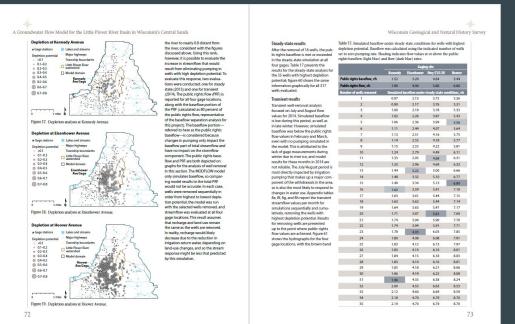
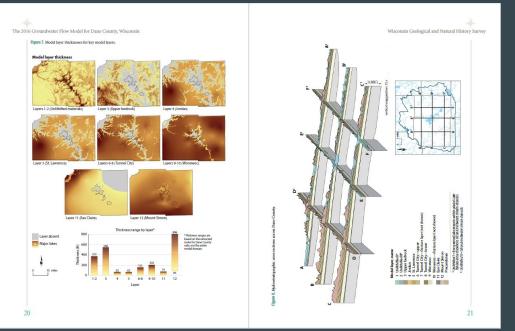
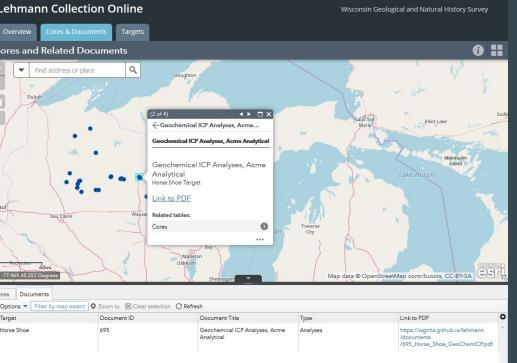
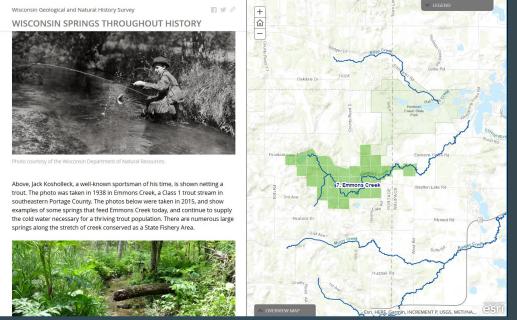
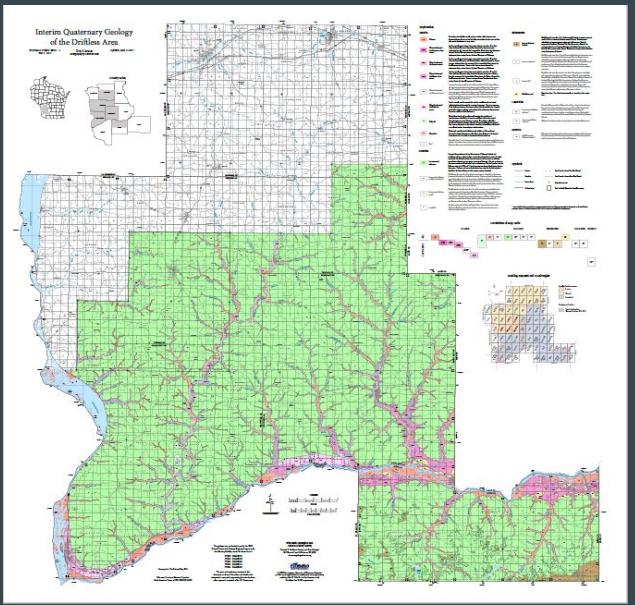
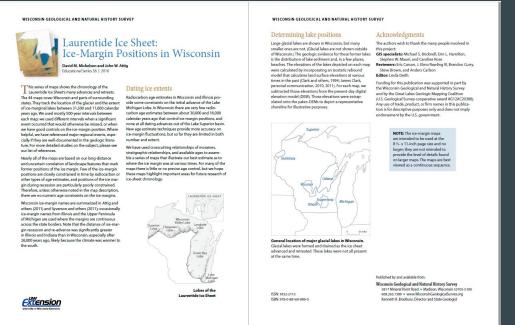
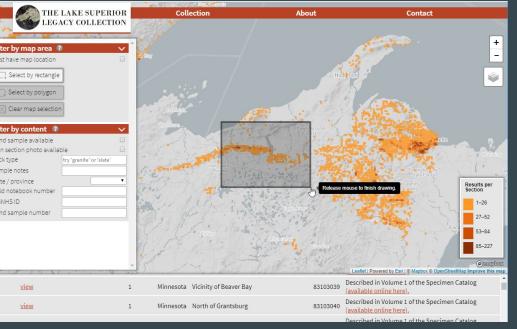
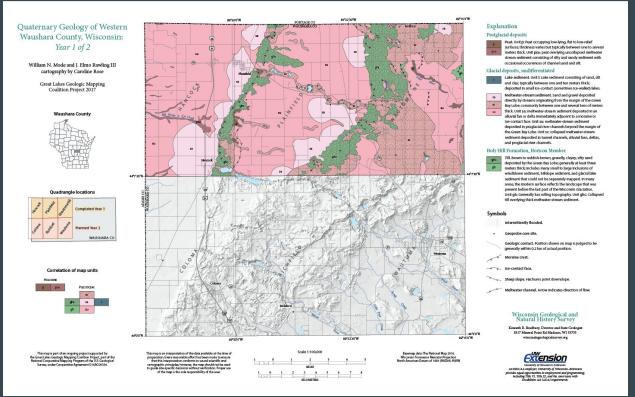


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## A Groundwater Flow Model for the Little Plover River Basin in Wisconsin's Central Sands



Bulletin 111 • 2012

Kenneth R. Bradke  
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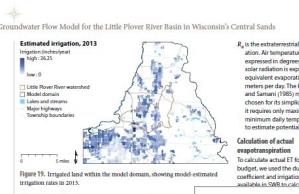


Figure 19. Irrigated land within the model domain, showing model-estimated irrigation rates in 2013.



Figure 20. Hydrologic and groups in the SWB model domain.

### Calculation of potential evapotranspiration

The SWB model calculates potential ET in one of five ways chosen by the user. One option is to use "Volumetric" or "SWB" potential ET using the Hargrove and Samani (1985) method, which estimates potential ET based on maximum and minimum air temperatures and solar radiation (equation 5).

$$ET_p = 0.0135(K_f + 17.97)(T_m - T_{m1})^{\frac{1}{2}}$$

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where:  
 $K_f$  is an empirical coefficient used to correct for "virtual" net ET over coastal regions.  
 $T_m$  is the average daily temperature in degrees Celsius.  
 $T_{m1}$  and  $T_{m2}$  are the mid-minimum daily air temperatures and solar radiation (equation 5).

A Groundwater Flow Model for the Little Plover River Basin in Wisconsin's Cen-

### Methodology

The example simulates the impact of a new high-capacity irrigation well along the northern boundary of the Little Plover River (fig. 51). This well is the only major well in the large model domain. This hypothesis is used to examine groundwater pumping with the steady-state and transient models with their associated calibration and validation.

Simulated steady-state drawdown, with and without irrigation return



Figure 51. Simulated steady-state drawdowns with and without irrigation return for a hypothetical new well. (Source: see text)

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**1 Change in soil moisture ( $S_m$ )**  
Infiltration on the control plot is simulated as the soil moisture on the research site, if no irrigation is applied. The change in soil moisture is obtained when water is being removed from the soil layer. The change in soil moisture is simulated by a rainfall capacity factor.

Rainfall generates runoff with equal flow to which infiltration is added. This process results in completely saturated soils and prevents further infiltration. For a more detailed description of the methodology see

Gratwick and others (2009), Driscoll and Bradford (2009), and Kavadas and Samani (1985).

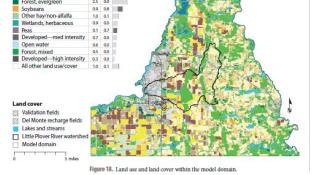
### Land use

Land use is a critical component of the SWB approach because it defines the control plot and the contiguous area of the Little Plover River. Land uses in 2013, 26 percent of the land area within the Little Plover River basin sand and gravel surface sediments greater than 50 feet thick, which is the depth to bedrock. Many areas within the basin are located in the Department of Natural Resources (DNR) Small, Rural, personal communally-owned land. The basin in this region consists of sandy outwash and eolian dune deposits that are relatively low and flat areas. These areas are characterized by shallow aquifer that supplies water for major row crops, vegetable packing industries, cranberry production, and dairy and hog production communities. The aquifer is approximately 100 feet thick and lies on less than 20 percent of the region, includes more than 80 lakes and more than 600 miles of headwater streams (Kraft and others 2012). The basin is an area of great importance for important recreational and ecological resources. Irrigated land, which increased from 2,000 acres in 1990 after 1990, currently covers about 183,000 acres. Irrigation supports production of corn, soybeans, snap beans, and other vegetables. The main source of the irrigation water is groundwater pumping from relatively shallow wells. This is because the sandy aquifer. The number of wells has increased every year for the past several decades.

Groundwater and surface water are well-connected in the Central Sands region, and concerns over the possible impacts of irrigated agriculture

### 2 Irrigation water budgeting

Driscoll and Bradford (2009) describe the irrigation water budgeting approach. The irrigation water budgeting approach is a tool to calculate the amount of irrigation water required to supply a crop with its required water needs. The irrigation water budgeting approach is a tool to calculate the amount of irrigation water required to supply a crop with its required water needs. The irrigation water budgeting approach is a tool to calculate the amount of irrigation water required to supply a crop with its required water needs.



21

in Wisconsin's Central Sands re-

gion. Land use types were sepa-

rately mapped to determine irrigated land. The seven most prevalent land uses in the basin are agricultural land, forest, field, corn, alfalfa, grass/grasses, sweet corn, potatoes, and other. The land use data for 2013 is from the 2013 USDA National land-use database (USDA 2013). Land use categories represent 23 land use categories represented in the model.

Land surface-water resources and groundwater levels first appeared in the mid-1960s and early 1970s (Holt, 1965; Weeks, 1969; Weeks and others, 1971). Groundwater levels became more acute during the 2000s, with the occurrence of extensive surface-water drawdowns in lakes and eutrophication in local streams (Bradbury and others, 1992; Faust, 1985). Kraft and others (2012) developed an extensive summary and assessment of groundwater use in the region and summarized the results of numerous previous studies.

## Introduction

### Background

The region known as Wisconsin's Central Sands parts of several counties in central Wisconsin (fig. 1). This report defines the Central Sands as the contiguous area of the Little Plover River basin sand and gravel surface sediments greater than 50 feet thick, which is the depth to bedrock. Many areas within the basin are located in the Department of Natural Resources (DNR) Small, Rural, personal communally-owned land. The basin in this region consists of sandy outwash and eolian dune deposits that are relatively low and flat areas. These areas are characterized by shallow aquifer that supplies water for major row crops, vegetable packing industries, cranberry production, and dairy and hog production communities. The aquifer is approximately 100 feet thick and lies on less than 20 percent of the region, includes more than 80 lakes and more than 600 miles of headwater streams (Kraft and others 2012). The basin is an area of great importance for important recreational and ecological resources. Irrigated land, which increased from 2,000 acres in 1990 after 1990, currently covers about 183,000 acres. Irrigation supports production of corn, soybeans, snap beans, and other vegetables. The main source of the irrigation water is groundwater pumping from relatively shallow wells. This is because the sandy aquifer. The number of wells has increased every year for the past several decades.

Groundwater and surface water are well-connected in the Central Sands region, and concerns over the possible impacts of irrigated agri-

The Little Plover, Lost Creek, and Springline creeks discharge into the Wisconsin River between the Villages of Plover and Whiting (figs. 2 and 3). Ant upstream of the confluence of the three streams, a series of drainage basins have been removed. Creek and finally to the Wisconsin River, discharge to the river at 100 years old, and range from 5 to 10 feet deep and 100 to 500 feet wide. The basins are contained non-contiguous area of clayey interbedded with sandstone and dolomite. The basins are artificially impounded by a dam, forming Springline Pond. About 100 years ago, a series of ditches in the Buena Vista basin were dredged and they have major influence on

3



Figure 1. Location of the Central Sands with the model domain and Little Plover River watershed.

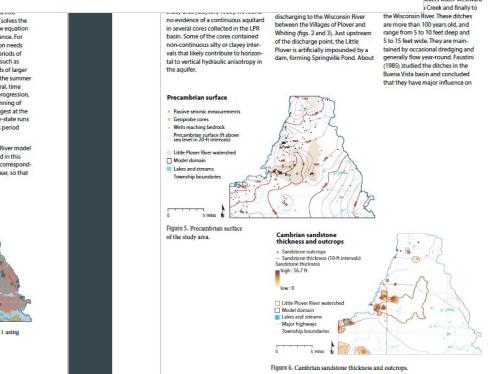


Figure 5. Percentage of Cambrian sandstone thickness and outcrops.

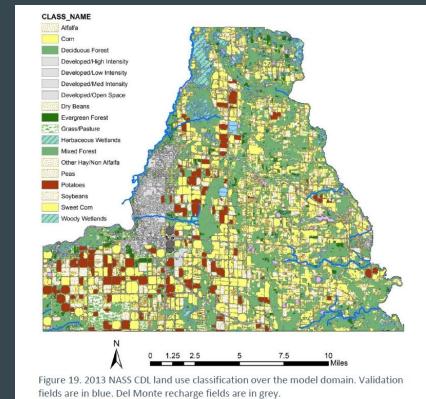
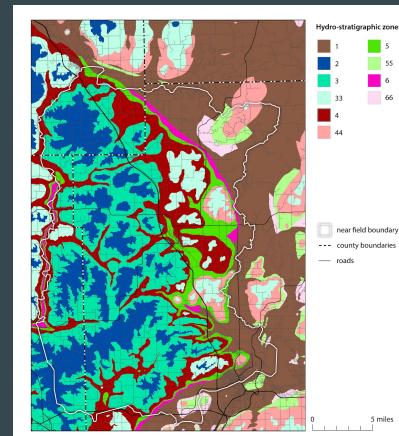
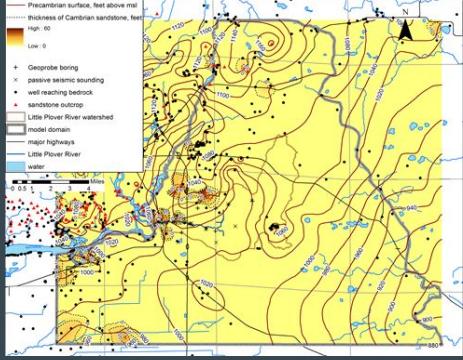
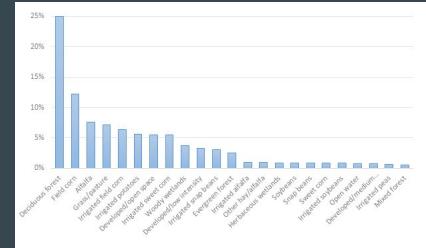
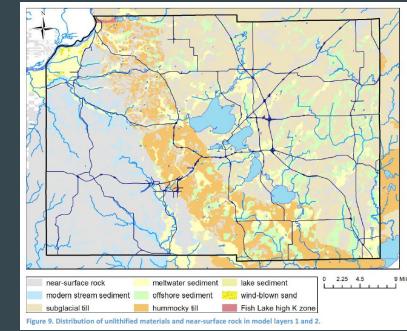
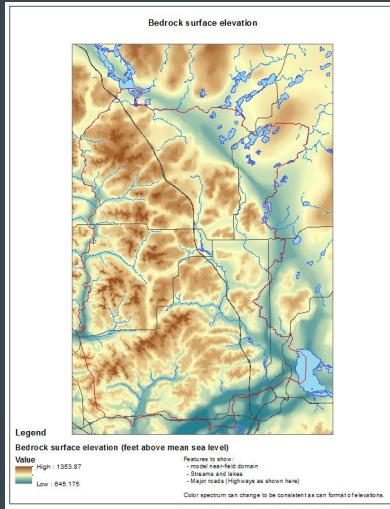
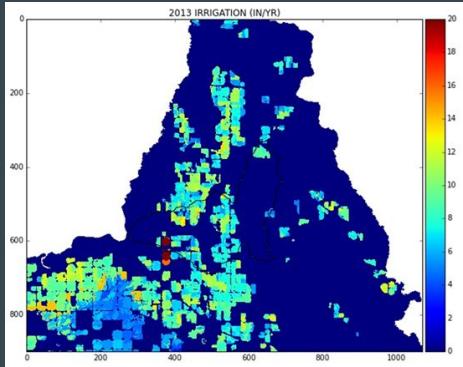
discharging to the Wisconsin River between the Villages of Plover and Whiting (figs. 2 and 3). Ant upstream of the confluence of the three streams, a series of drainage basins have been removed. Creek and finally to the Wisconsin River, discharge to the river at 100 years old, and range from 5 to 10 feet deep and 100 to 500 feet wide. The basins are contained non-contiguous area of clayey interbedded with sandstone and dolomite. The basins are artificially impounded by a dam, forming Springline Pond. About 100 years ago, a series of ditches in the Buena Vista basin were dredged and they have major influence on



Figure 6. Cambrian sandstone thickness and outcrops.

# design

to do or plan something with a  
specific purpose or intention in mind



what should the reader understand about this data?

a sense of the  
highs and lows?

areas of clustering  
or dispersion?

identify specific  
data values?

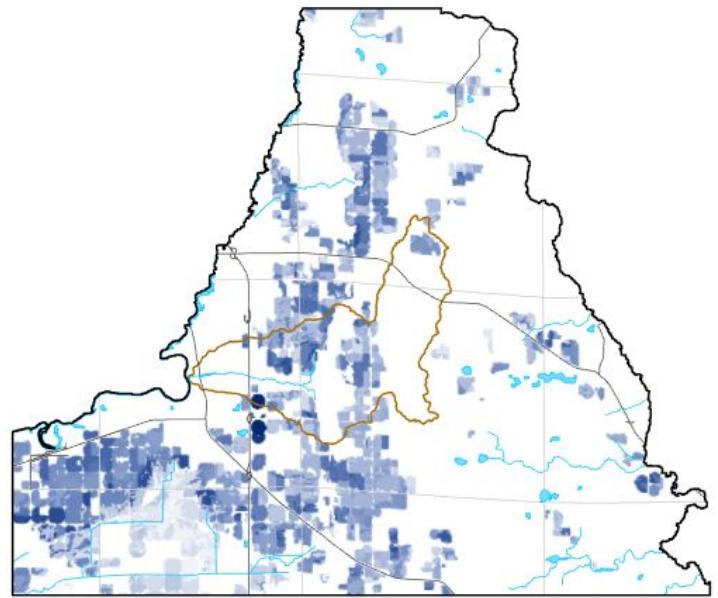
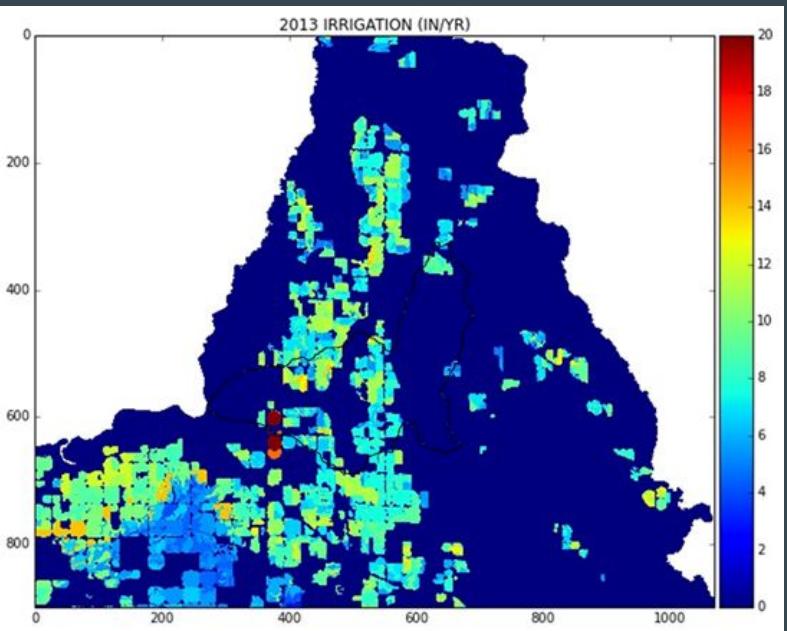
# how?

- ① focus attention
- ② illustrate data structure
- ③ facilitate comparison

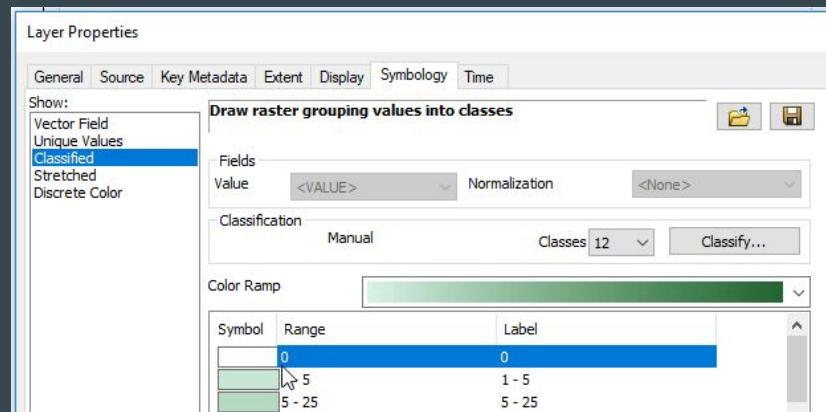
# ① focus attention

focus attention:

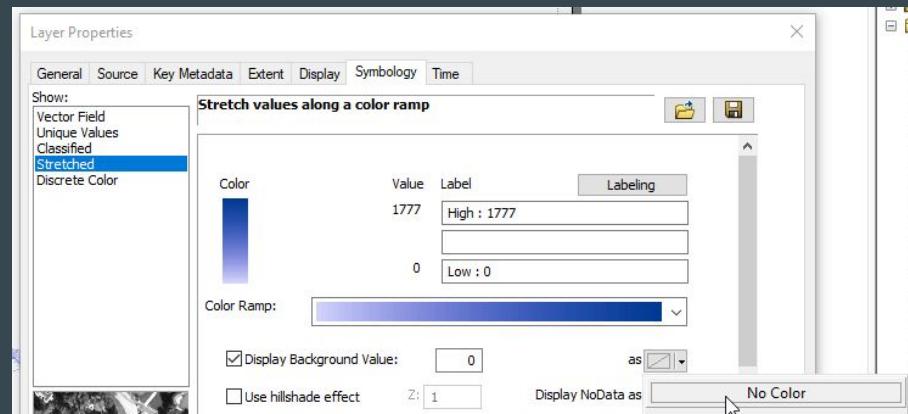
represent nothing with nothing



# Arcmap symbology



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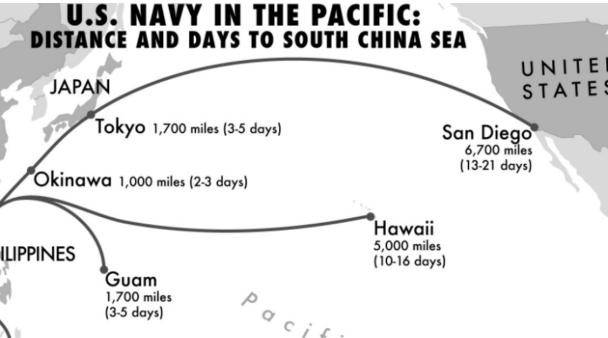
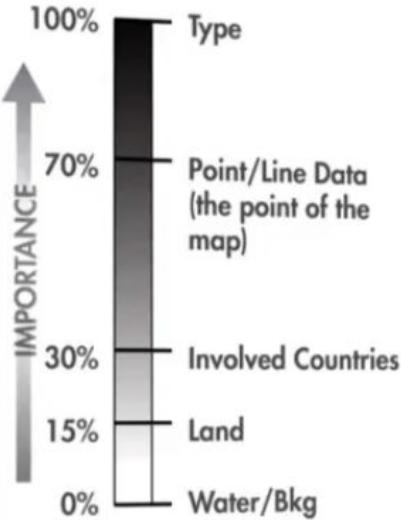
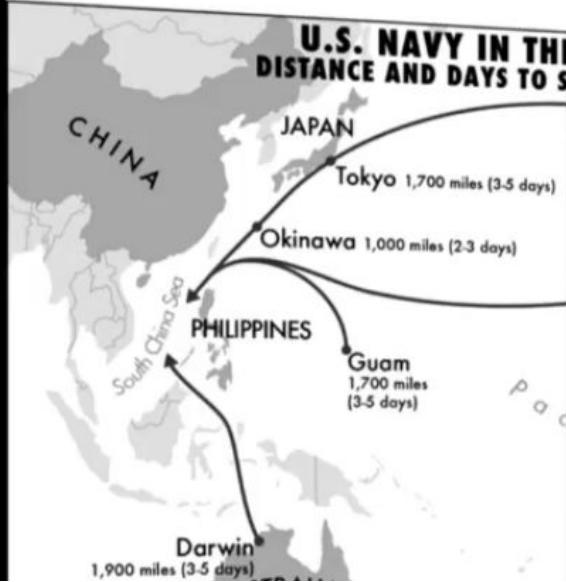


background value as no color

focus attention:

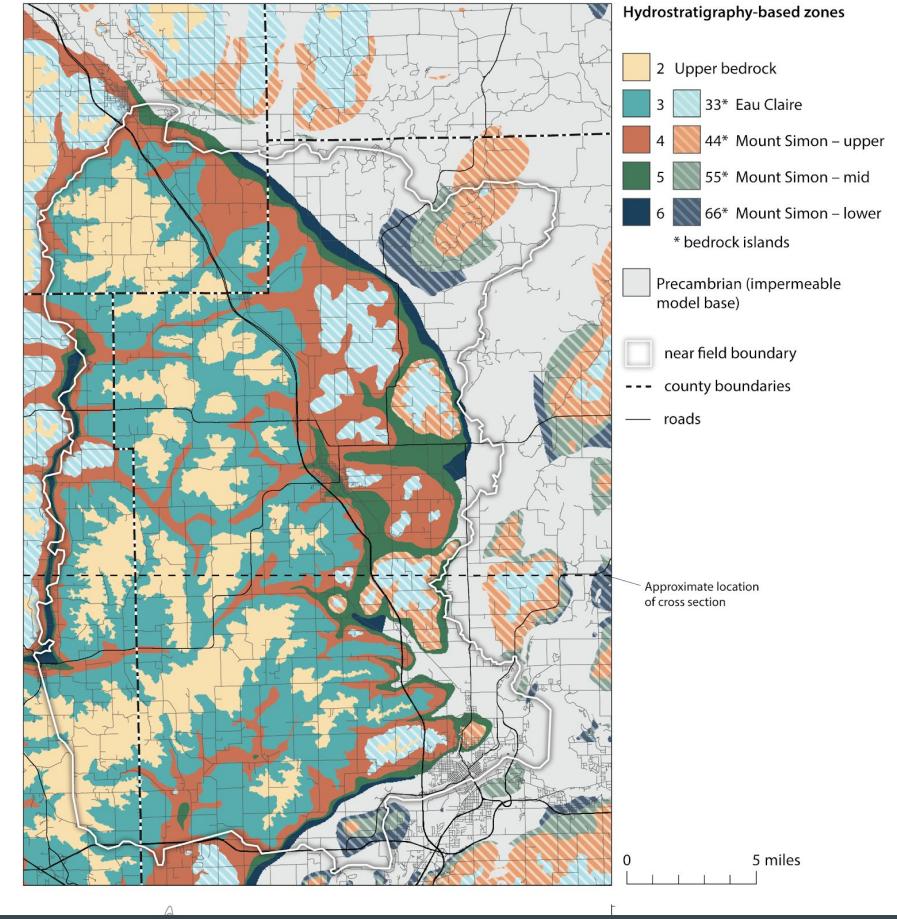
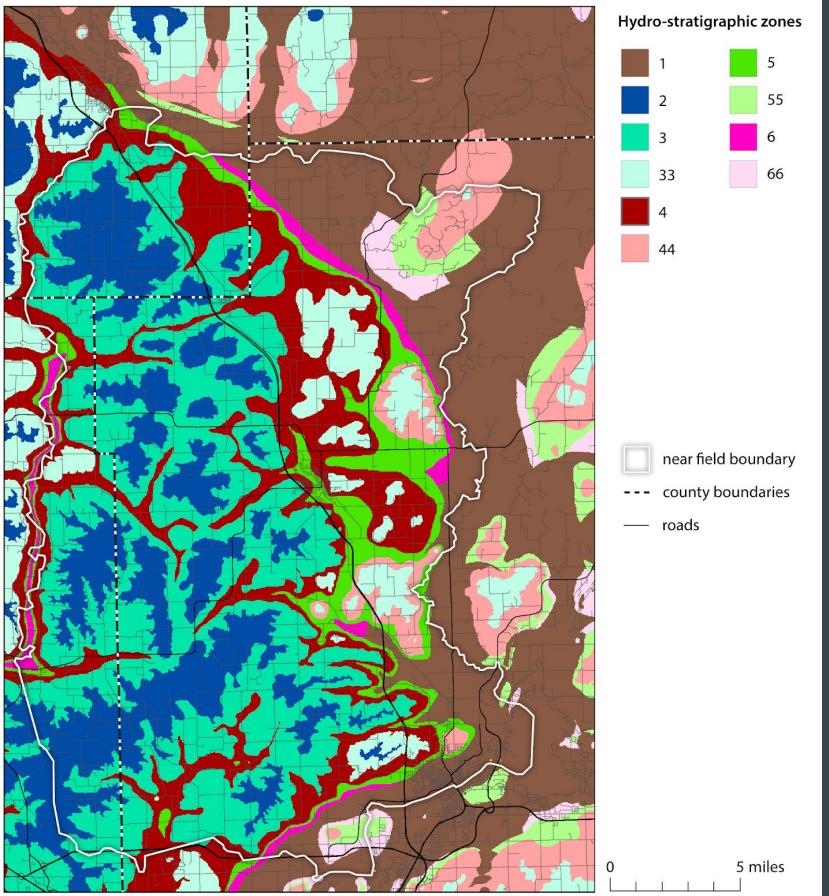
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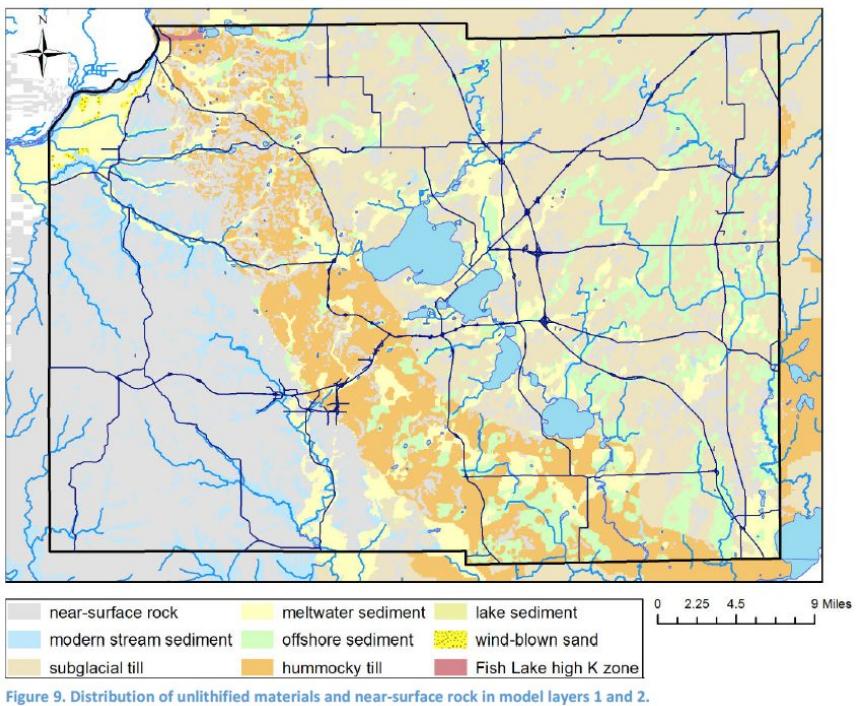
the arrangement or presentation of elements  
in a way that implies importance



nacis

Soren Walljasper  
NACIS 2017 (on youtube)





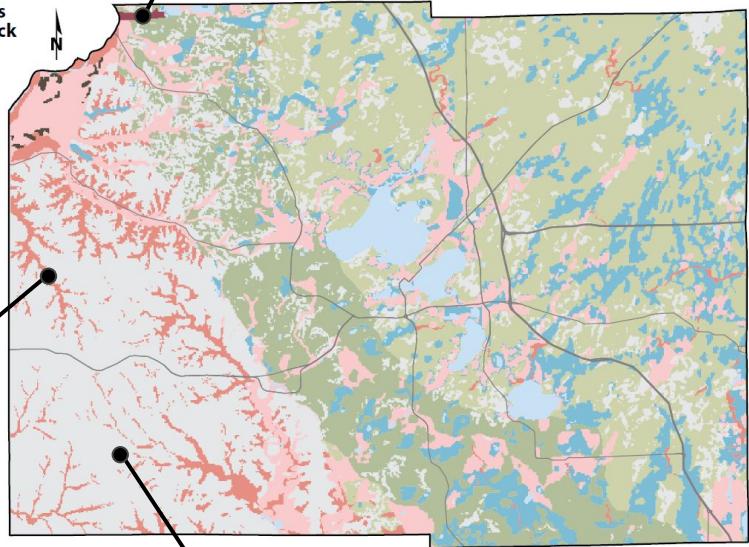
important  
contrast

small features -  
bold colors

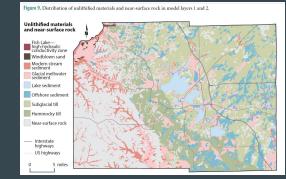
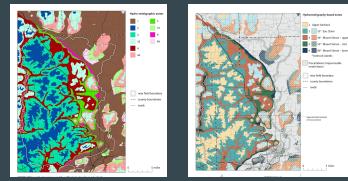
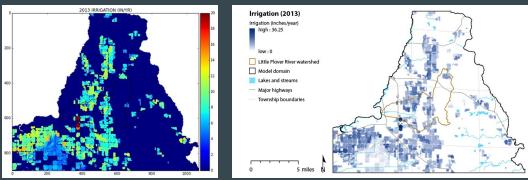
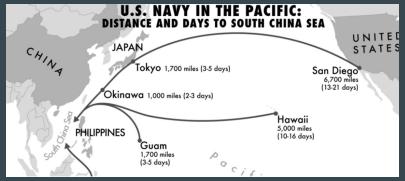
**Figure 9.** Distribution of un lithified materials and near-surface rock in model layers 1 and 2.

#### Unlithified materials and near-surface rock

- Fish Lake—high-hydraulic conductivity zone
  - Windblown sand
  - Modern stream sediment
  - Glacial meltwater sediment
  - Lake sediment
  - Offshore sediment
  - Subglacial till
  - Hummocky till
  - Near-surface rock
- Interstate highways
- US highways
- Scale: 0 5 miles



large features -  
dull, neutral colors



zoom way out, or look at it from across the room

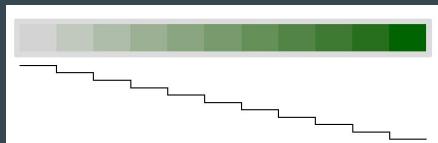
②

illustrate data structure

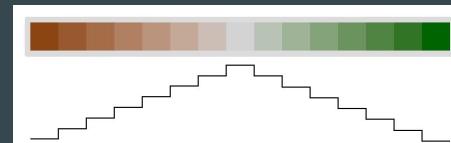
# illustrate data structure:

## color schemes

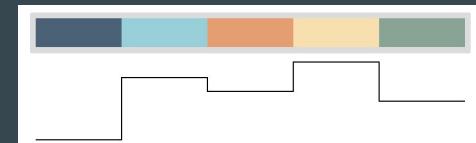
sequential



diverging



qualitative

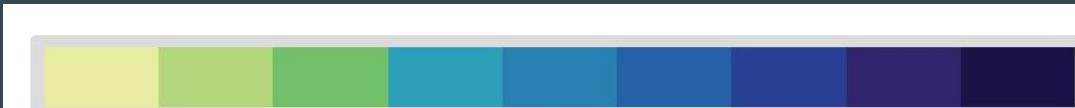


# sequential

less of  
something

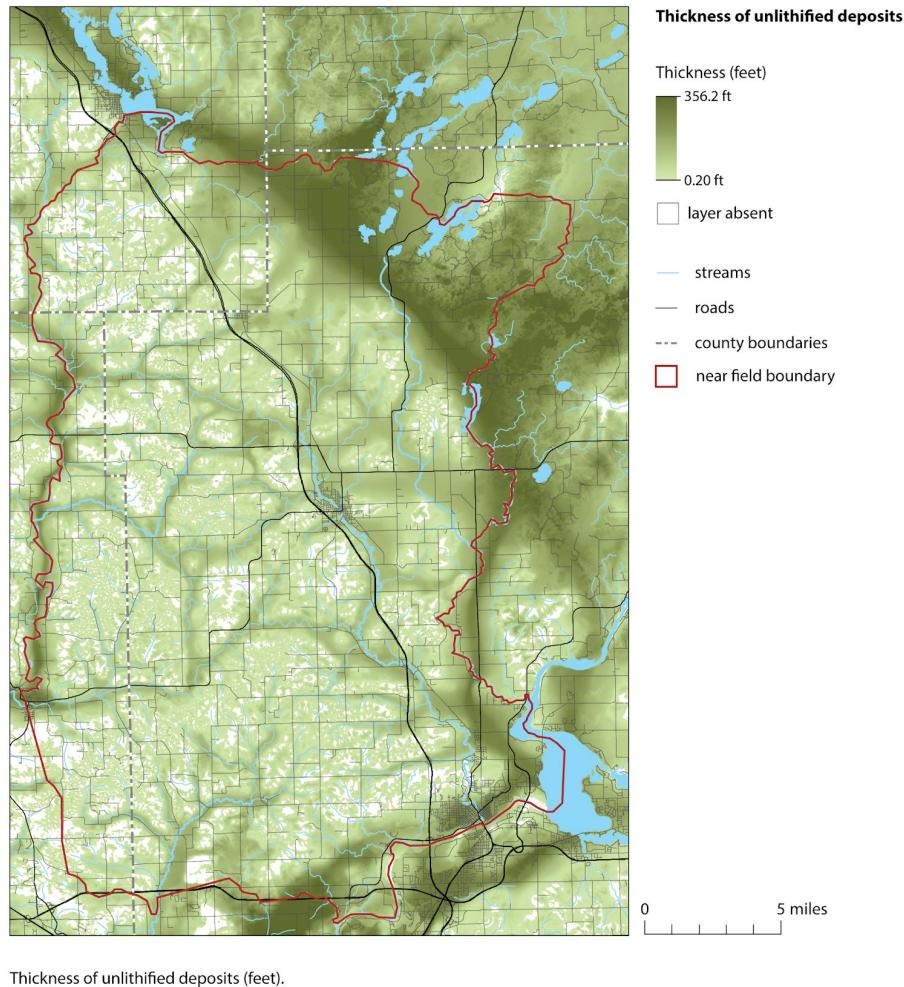


more of  
something



relative  
lightness\*

\* see further reading at the end of this presentation for a comparison of lightness, brightness/value, and luminance



# diverging

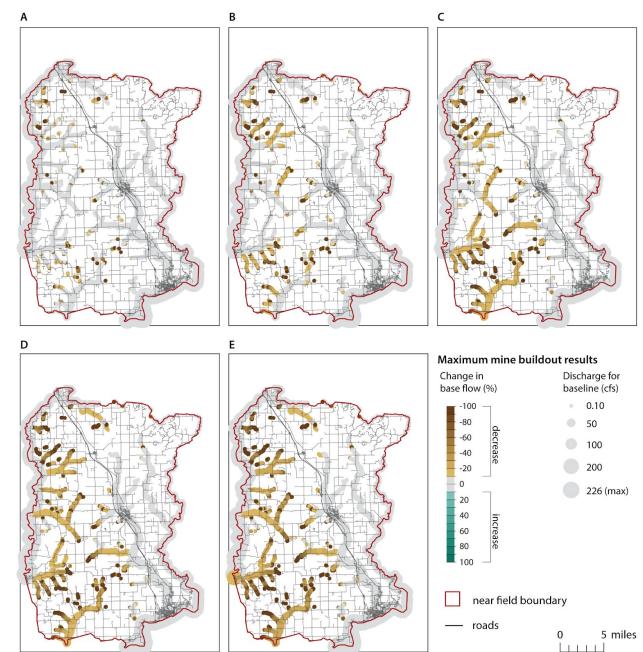
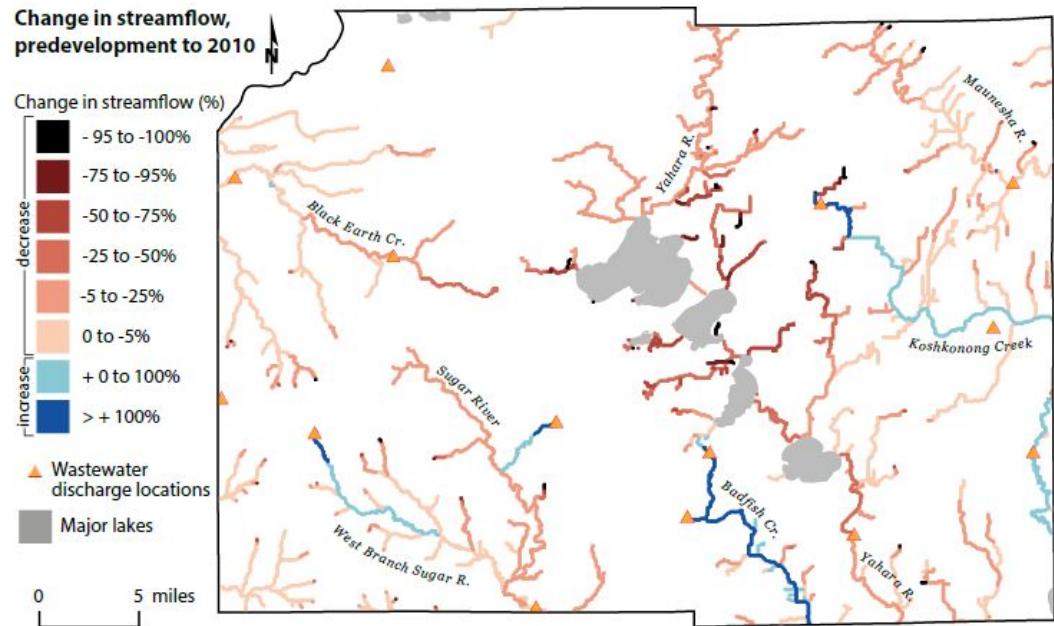
below a critical  
midpoint



above a critical  
midpoint

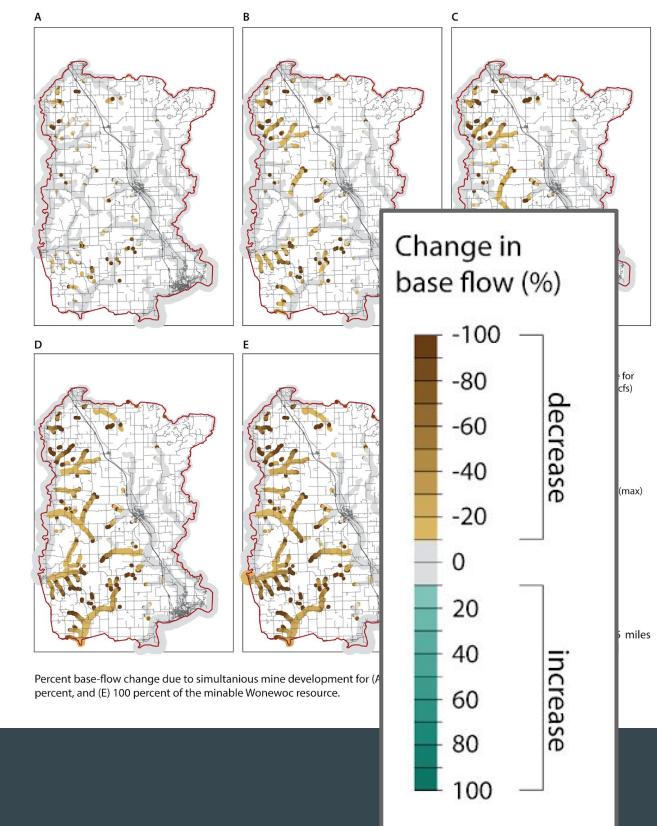
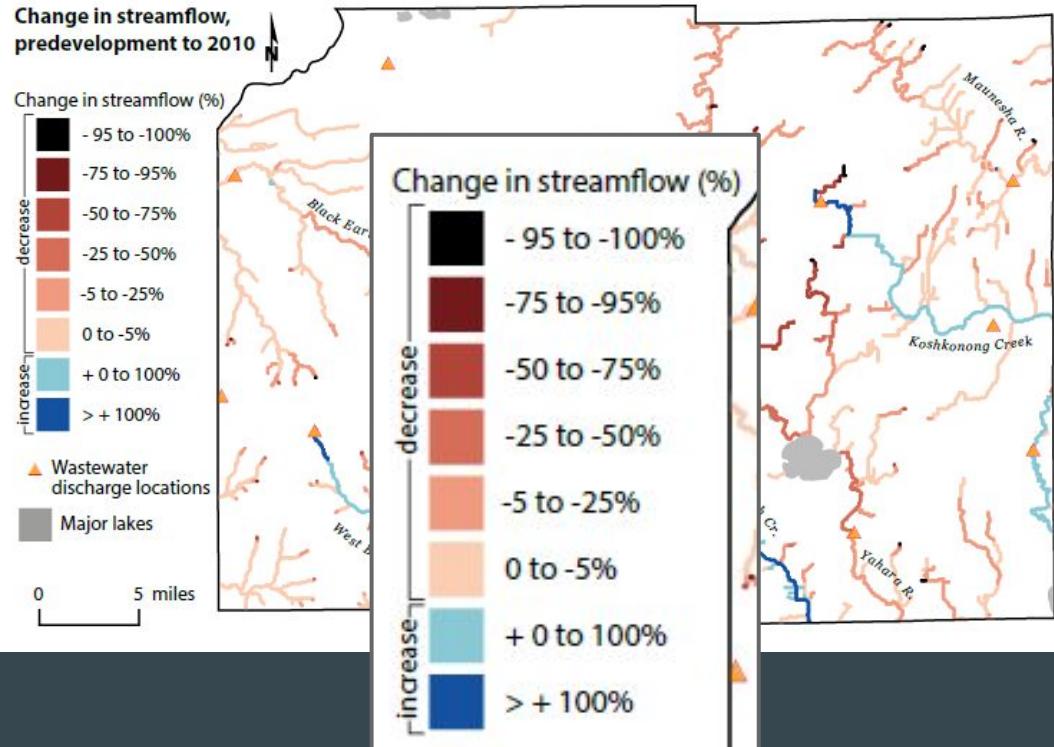
relative lightness

**Figure 25.** Comparison of changes in streamflow between predevelopment and 2010 conditions.

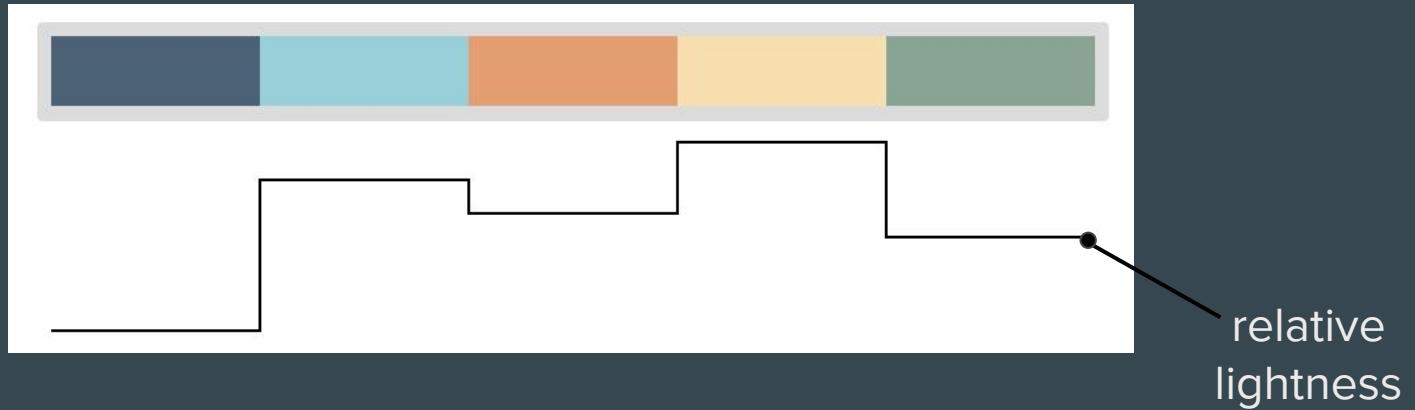


Percent base-flow change due to simultaneous mine development for (A) 10 percent, (B) 25 percent, (C) 50 percent, (D) 75 percent, and (E) 100 percent of the malleable Wonewoc resource.

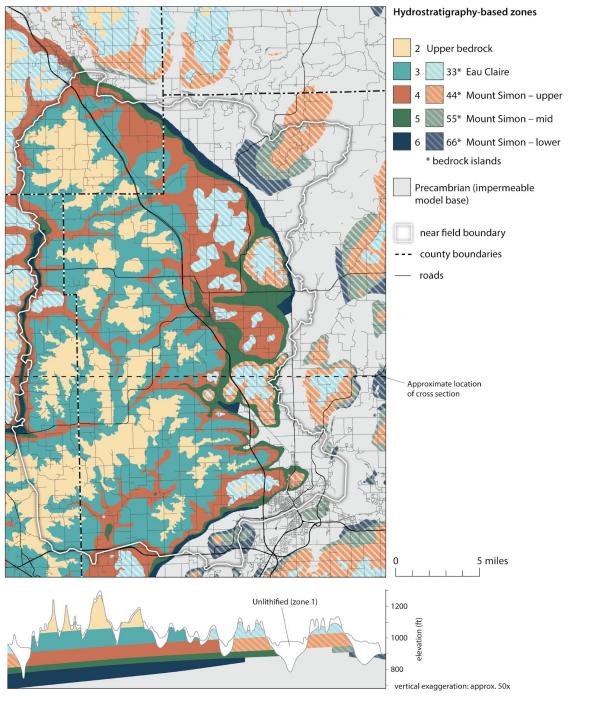
**Figure 25.** Comparison of changes in streamflow between predevelopment and 2010 conditions.



# qualitative

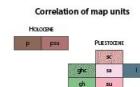


different, but no implied order

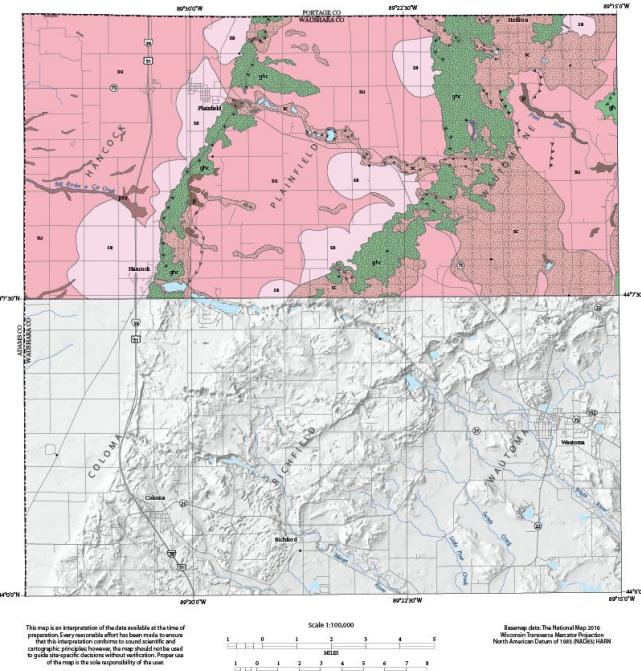


## Quaternary Geology of Western Waushara County, Wisconsin: Year 1 of 2

William N. Mode and J. Elmo Rawling III  
cartography by Caroline Rose  
Great Lakes Geologic Mapping Coalition Project 2017



This map is part of an ongoing project supported by the Great Lakes Geologic Mapping Coalition Project, part of the National Geologic Mapping Coalition, a partnership of the U.S. Geological Survey, under Cooperative Agreement G14AC0034.



## Explanation

### Postglacial deposits

P Post, till p Post occupying low-lying, flat to low-relief surfaces. Thickness varies but typically between one to several meters thick. Unit ps post overlying uncalibrated meltwater sediments. Unit pms post meltwater sand and gravel sediment with occasional occurrences of channel sand and silt.

### Glacial deposits, undifferentiated

Lake sediment, Unit L Lake sediment consisting of sand, silt, and clay, typically between one and ten meters thick. Depositional environment is lake bottom. Unit sa lake sediment deposited directly by streams originating from the margin of the Green Bay Lobe, commonly between one and several tens of meters thick. Unit su meltwater-stream sediment deposited in an alluvial plain. Unit ts trans-tectonic meltwater-stream sediment deposited in proglacial meltwater channels beyond the margin of the Green Bay Lobe. Unit gbc collapsed meltwater-channel sediment deposited in tunnel channels, channel bars, deltas, and proglacial river channels.

### Holy Hill Formation, Horizon Member

gbc Till, brown to reddish brown, gravelly, clayey, silty, and deposited by the Green Bay lobe generally fill these depressions, including the Holy Hill area. Unit ts meltwater-channel sediment, lakebed sediment, and glacial lake sediment that could not be separately mapped. In many areas, ts is the surface unit. Unit su meltwater-channel sediments present before the last part of the Wisconsin Glaciation. Unit ghs Generally has rolling topography. Unit ghs Collapsed till overlying thick meltwater-stream sediment.

## Symbols

- Intermittently flooded.
- Geologic contact. Position shown on map is judged to be generally within 0.2 km of actual position.
- Moraine crest.
- Ice-contact face.
- Slope. Hatchures point downslope.
- Meltwater channel. Arrow indicates direction of flow.

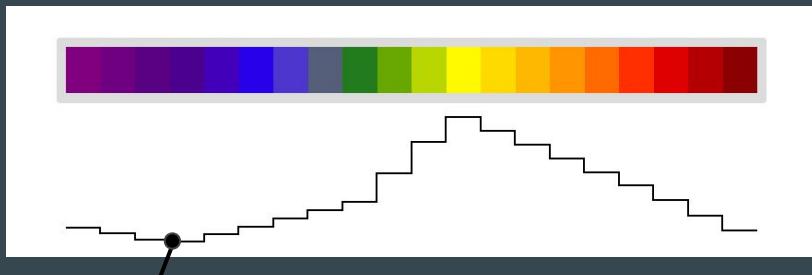
## Wisconsin Geological and Natural History Survey

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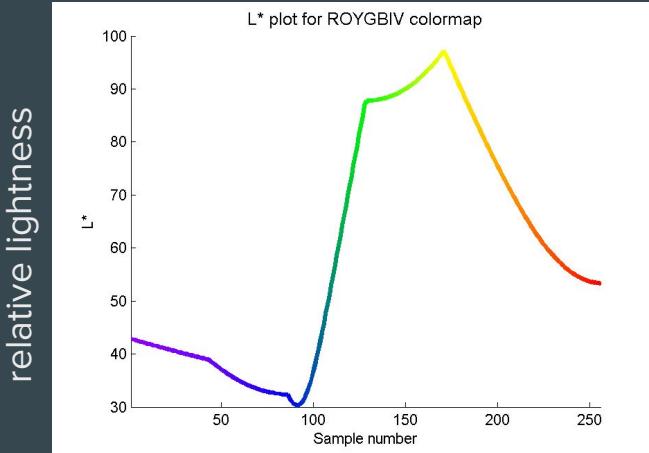


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# spectral

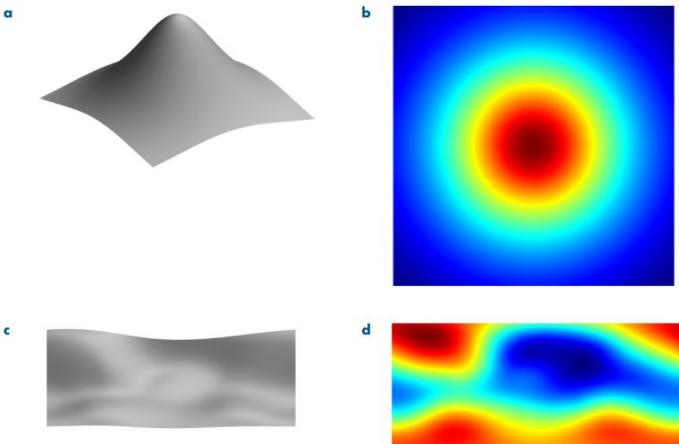


relative  
lightness



"The Rainbow is Dead... Long Live the Rainbow!" by Matteo Niccoli

Figure 5. False bands caused by the rainbow color map for smooth data: a) Synthetic surface with a single peak; b) 2D visualization with rainbow color map; c) Earth's magnetic field intensity; d) 2D visualization with rainbow color map.



“Rainbow Color Map Critiques: An Overview and Annotated Bibliography” by Steve Eddins

SANFORD AND SELNICK

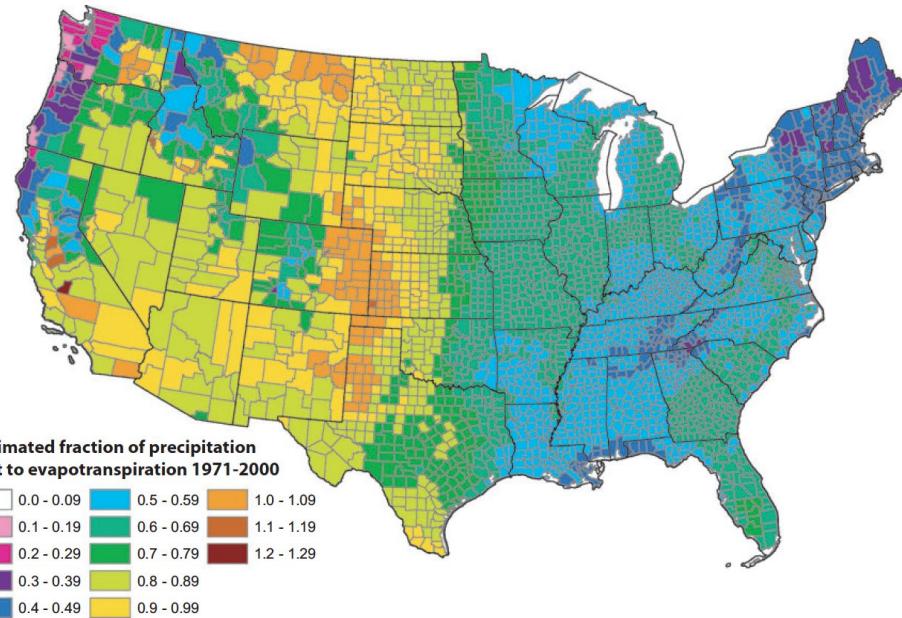
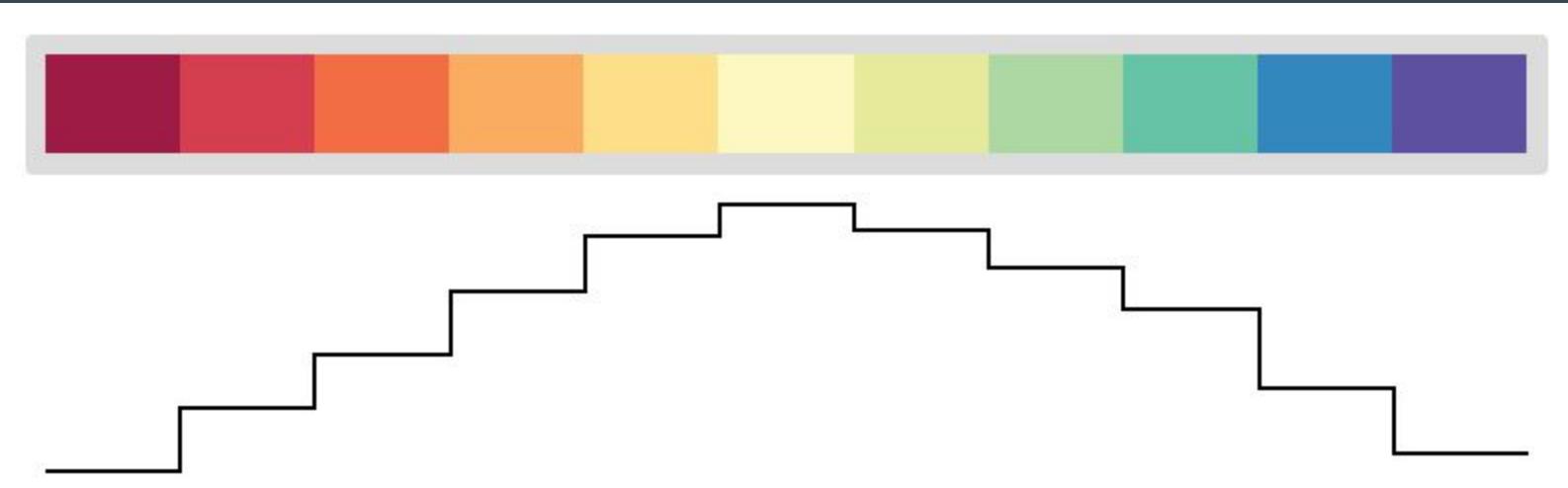
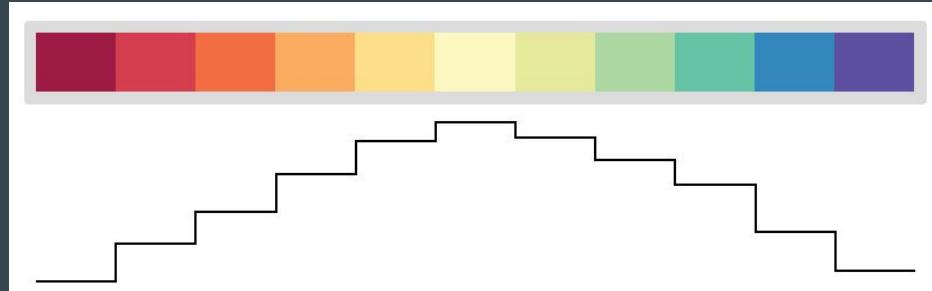


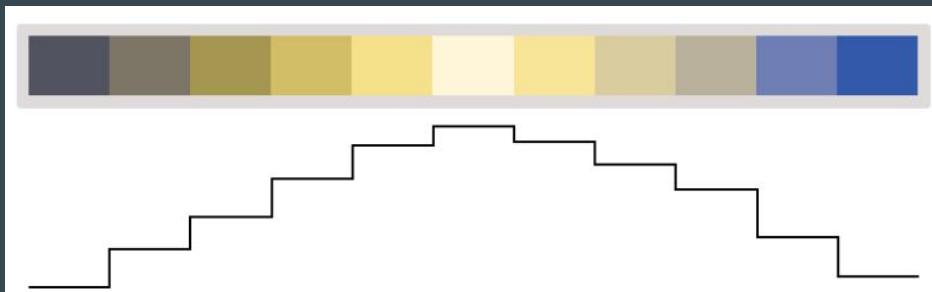
FIGURE 13. Estimated Mean Annual Ratio of Actual Evapotranspiration (ET) to Precipitation (P) for the Conterminous U.S. for the Period 1971-2000. Estimates are based on the regression equation in Table 1 that includes land cover. Calculations of ET/P were made first at the 800-m resolution of the PRISM climate data. The mean values for the counties (shown) were then calculated by averaging the 800-m values within each county. Areas with fractions >1 are agricultural counties that either import surface water or mine deep groundwater.

“How The Rainbow Color Map Misleads” by Robert Kosara

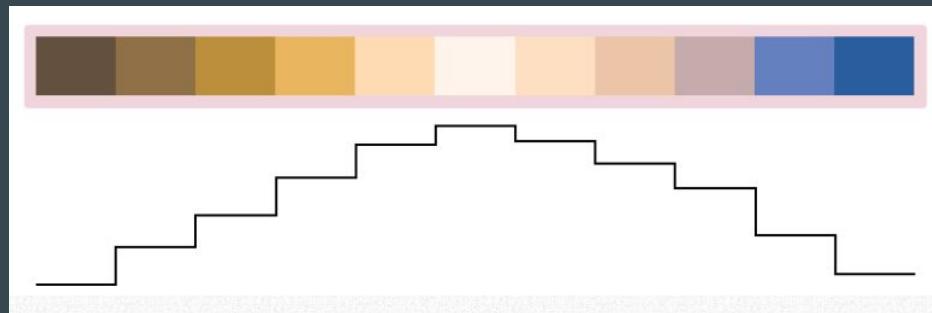




Protanopia

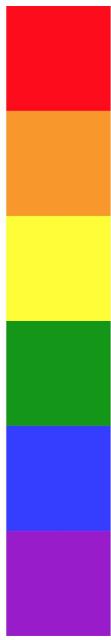


Deutanopia





**CAUTION**



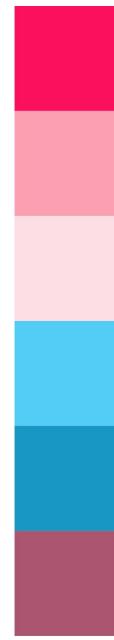
tritanomal



deuteranope



protanope



tritanope



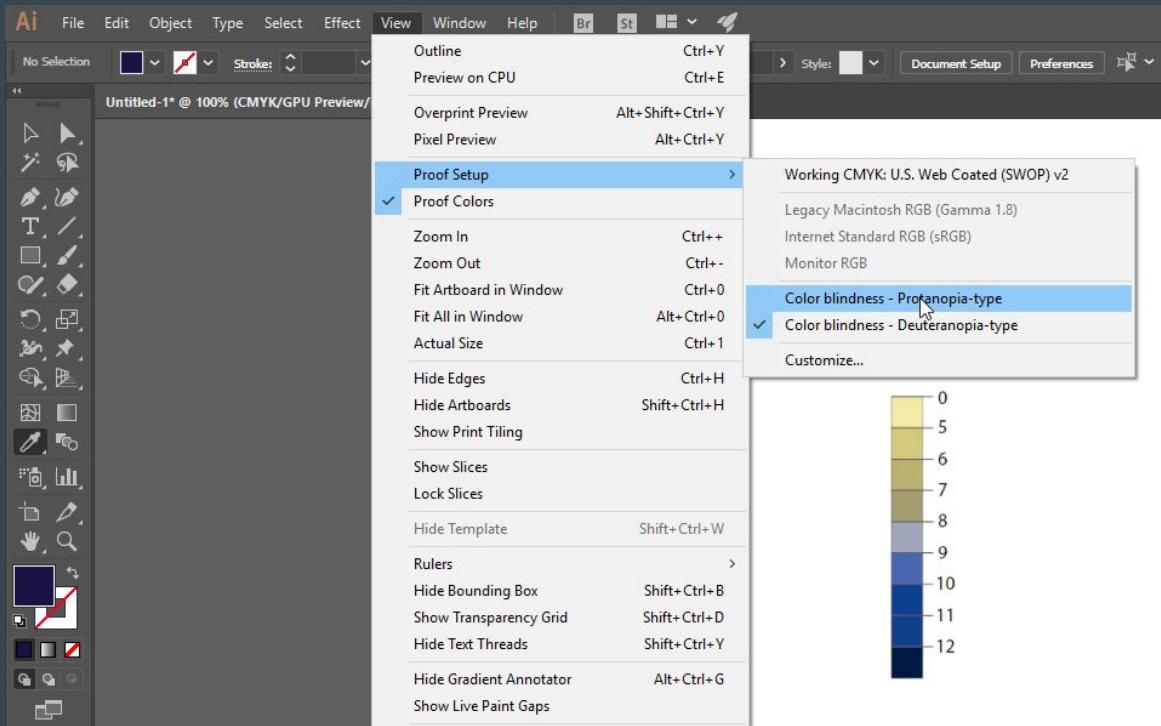
normal dichromat



dichromats

8% of men (1 in 12)

0.5% of women (1 in 200)



View > Proof Setup in Adobe Illustrator or Photoshop

### Coblis — Color Blindness Simulator

If you are not suffering from a color vision deficiency it is very hard to imagine how it looks like to be colorblind. The Color BLindness Simulator can close this gap for you. Just play around with it and get a feeling of how it is to have a color vision handicap.

As all the calculations are made on your local machine, no images are uploaded to the server. Therefore you can use Images as big as you like, there are no restrictions. Be aware, there are some issues for the "Lens feature" on Edge and Internet Explorer. All others should support everything just fine.

So go ahead, choose an image through the upload functionality or just drag and drop your image in the center of our Color BLindness Simulator. It is also possible to zoom and move your images around using your mouse – try it out, I hope you like it.

Drag and drop or paste your file in the area below or:  Dane-Fig8-Geology.png

Trichromatic view:	Anomalous Trichromacy:	Dichromatic view:	Monochromatic view:
<input type="radio"/> Normal	<input type="radio"/> Red-Weak/Protanomaly	<input type="radio"/> Red-Blind/Protanopia	<input type="radio"/> Monochromacy/Achromatopsia
<input checked="" type="radio"/> Green-Weak/Deutanomaly	<input type="radio"/> Green-Blind/Deutanopia	<input type="radio"/> Blue-Blind/Tritanomaly	<input type="radio"/> Blue Cone Monochromacy
<input type="radio"/> Blue-Weak/Tritanomaly	<input type="radio"/> Blue Cone Monochromacy		

Use lens to compare with normal view:  No Lens  Normal Lens  Inverse Lens

Figure 9. Distribution of un lithified materials and near-surface rock in model layers 1 and 2.

**Unlithified materials and near-surface rock**

- Fish lake
- high-hydraulic
- Windblown sand
- Modern stream
- Glacial meltwater
- Lake sediment
- Lake sediment
- Offshore sediment
- Subglacial till
- Hummocky till
- Near-surface rock

Interstate highways    US highways

0    5 miles

[color-blindness.com/coblis-color-blindness-simulator/](http://color-blindness.com/coblis-color-blindness-simulator/)

# tools for color schemes

# colorbrewer2.org

Number of data classes: 3 ▾ [i](#) [how to use](#) | [updates](#) | [downloads](#) | [credits](#)

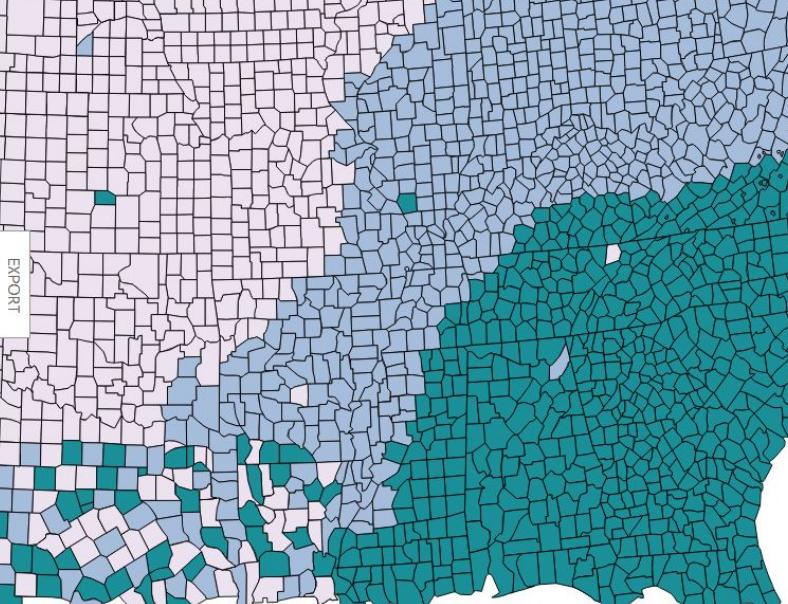
Nature of your data: [i](#)  
 sequential  diverging  qualitative

Pick a color scheme:  
Multi-hue:  Single hue: 

Only show:  
 colorblind safe  
 print friendly  
 photocopy safe

Context:  
 roads  
 cities  
 borders

Background:  
 solid color  
 terrain  
  
 color transparency

**3-class PuBuGn**  
  
EXPORT 

HEX ▾  
[#ece2f0](#) [#a6bddb](#) [#1c9099](#)



# carto.com/cartocolors

### SEQUENTIAL SCHEMES

Variations in lightness make these schemes ideal for mapping orderable or numeric data that progress from low to high using colors that range from light to dark (or vice versa).



### DIVERGING SCHEMES

Highlight values above and below an interesting mid-point in quantitative data with these schemes. The middle color is assigned to the critical value with two sequential type palettes at either end assigned to values above or below.



### QUALITATIVE SCHEMES

Demonstrate categorical differences in qualitative data with these color schemes that use different hues with consistent steps in lightness and saturation.

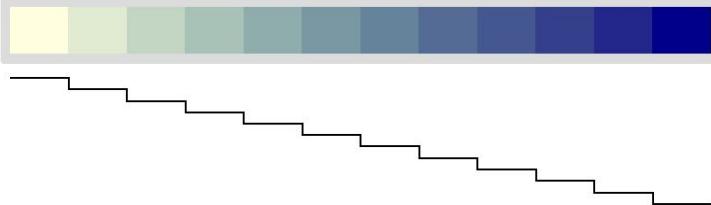


# gka.github.io/palettes

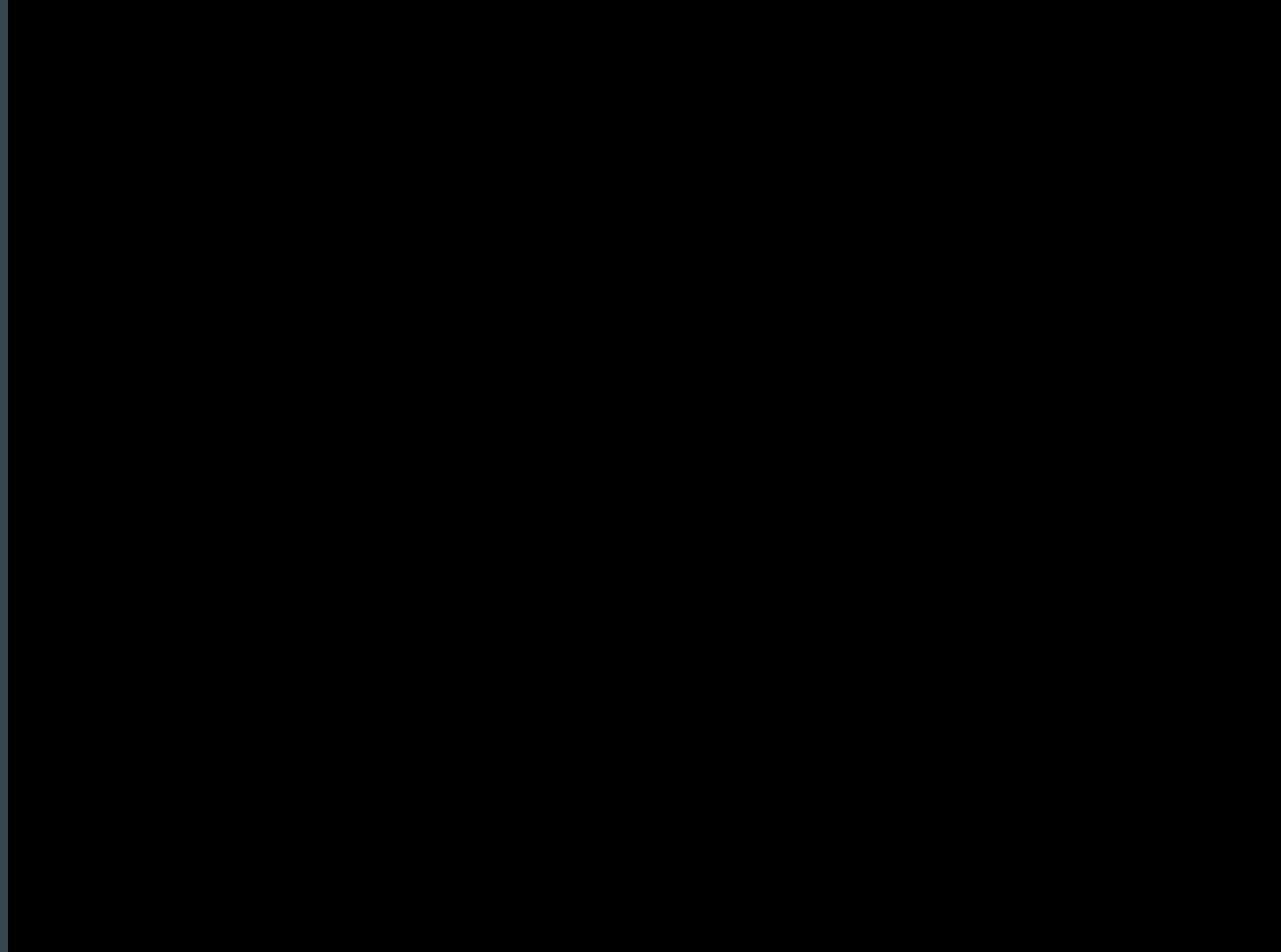
Chroma.js Color Scale Helper

This chroma.js-powered tool is here to help us mastering multi-hued, multi-stops color scales.

Enter named colors or hex codes:  Step count:   
 Bezier interpolation  Correct lightness gradient



```
#ffffe0 #e0ebd1 #c3d6c4 #a8c2b8 #8fadad #7a98a4 #66839c #546c95 #455790 #35408d #23278b #00008b  
'#ffffe0','#e0ebd1','#c3d6c4','#a8c2b8','#8fadad','#7a98a4','#66839c','#546c95','#455790','#35408d','#23278b','#00008b'  
  
d3.scale.threshold()  
.range(['#ffffe0','#e0ebd1','#c3d6c4','#a8c2b8','#8fadad','#7a98a4','#66839c','#546c95','#455790','#35408d','#23278b','#00008b']);  
  
function palette(min, max) {  
    var d = (max-min)/12;  
    return d3.scale.threshold()  
.range(['#ffffe0','#e0ebd1','#c3d6c4','#a8c2b8','#8fadad','#7a98a4','#66839c','#546c95','#455790','#35408d','#23278b','#00008b']);  
    .domain([min+1*d,min+2*d,min+3*d,min+4*d,min+5*d,min+6*d,min+7*d,min+8*d,min+9*d,min+10*d,min+11*d,min+12*d]);  
}
```



coolors.co/app

The screenshot shows the coolors.co/app web application interface. At the top, there is a navigation bar with the coolors logo, a Skillshare promotion for 2 months free, and links for Generate, Explore, iOS App, Add-on, Chrome Extension, More, Login, and Sign Up. Below the navigation bar, a message says "Press the spacebar to generate color schemes!". The main area features a color palette with five primary colors: a dark blue square on the left, followed by four horizontal bars in light green, orange, light blue, and yellow-orange. A cursor is hovering over the second bar from the left. Below the palette, the hex codes for each color are displayed: #4A6176, #9EB3A7, #E59E72, #99CFD8, and #F8DFAF.

coolors + SKILLSHARE 2 months free ➤

Generate Explore iOS App Add-on Chrome Extension More Login Sign Up

Press the spacebar to generate color schemes!

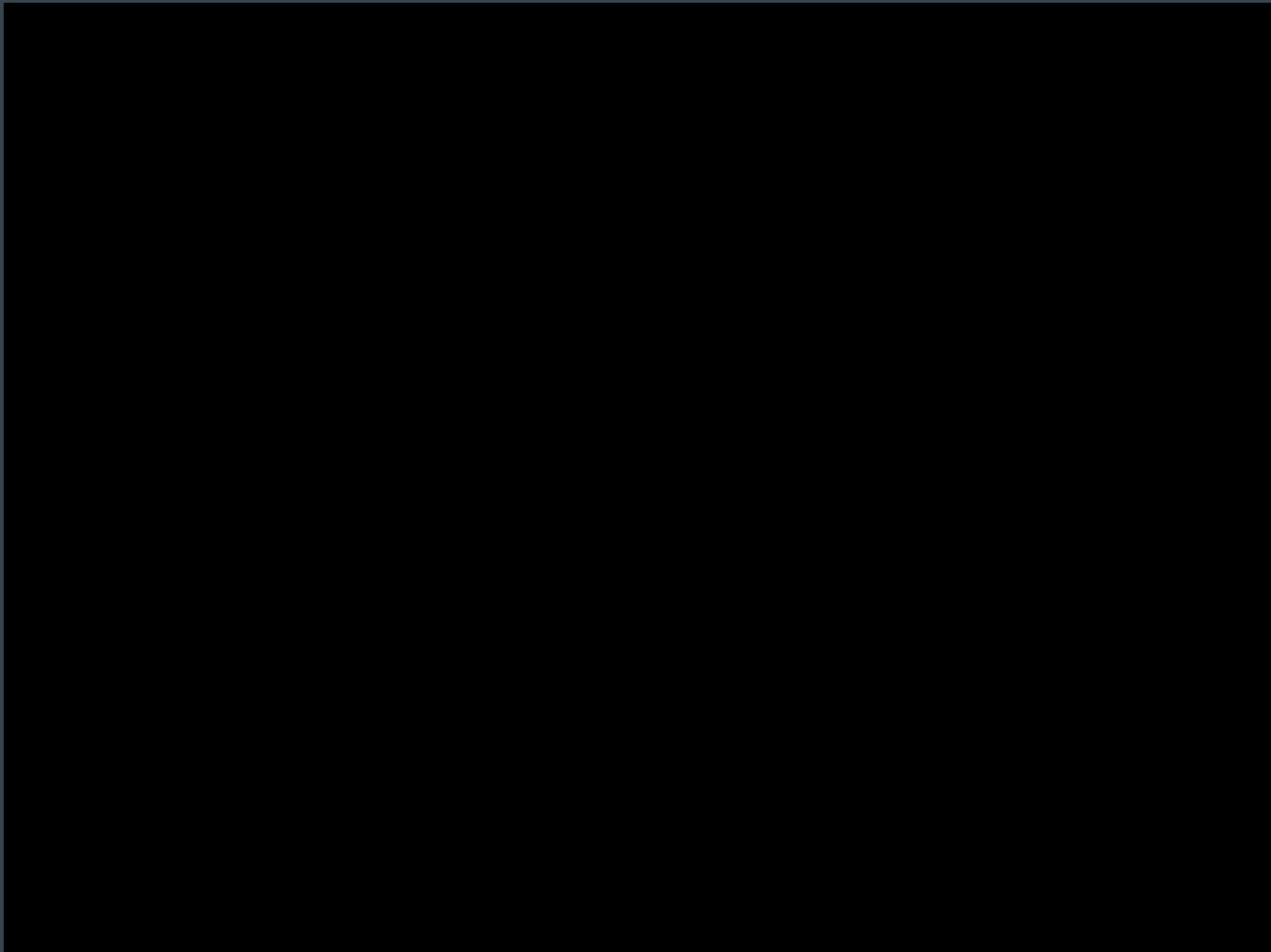
#4A6176

#9EB3A7

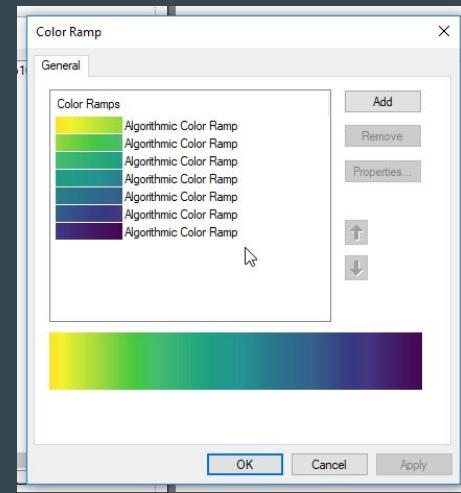
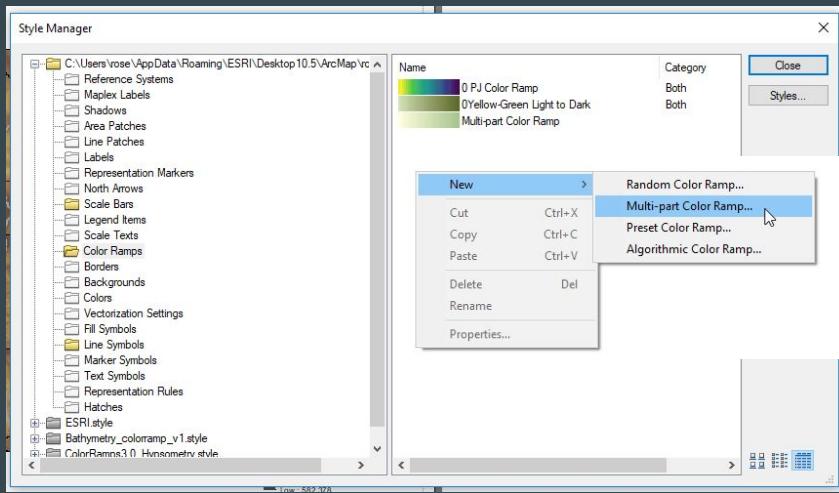
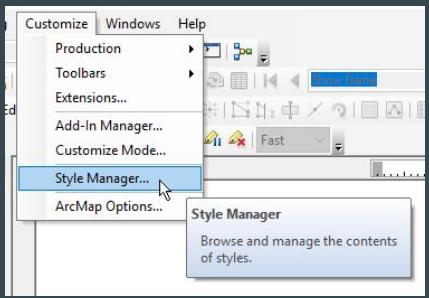
#E59E72

#99CFD8

#F8DFAF



# ArcMap: Style Manager



illustrate data structure:

use other visualizations

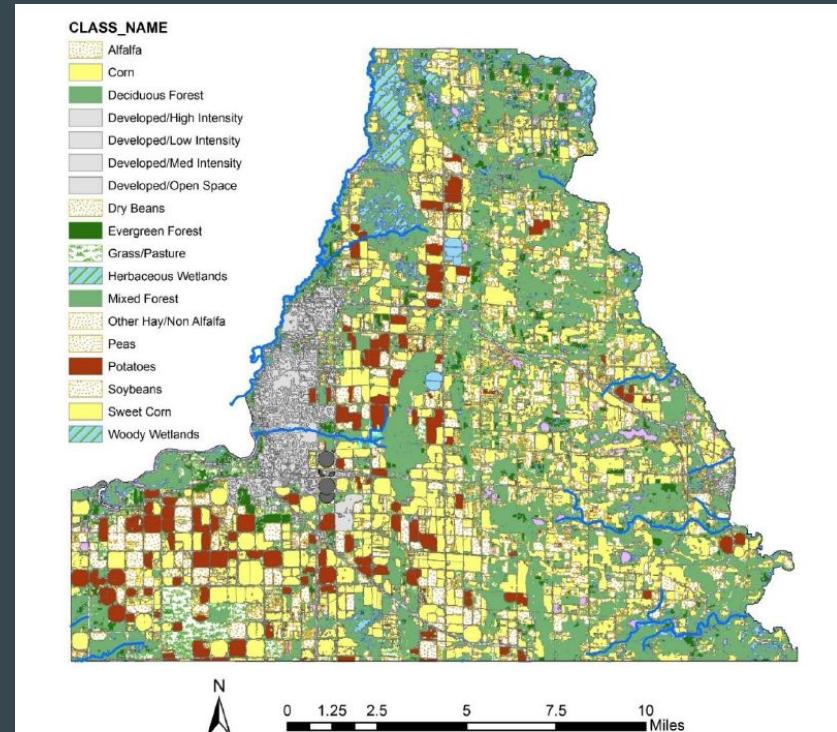
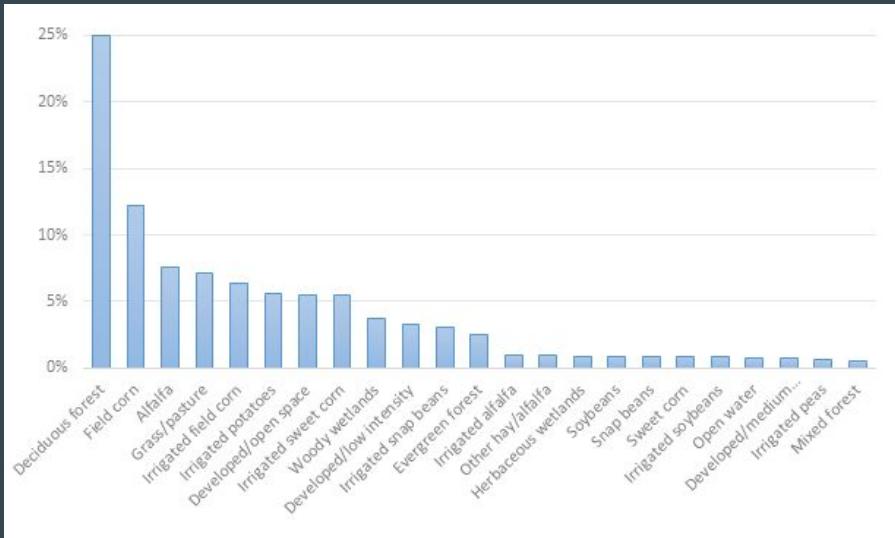


Figure 19. 2013 NASS CDL land use classification over the model domain. Validation fields are in blue. Del Monte recharge fields are in grey.

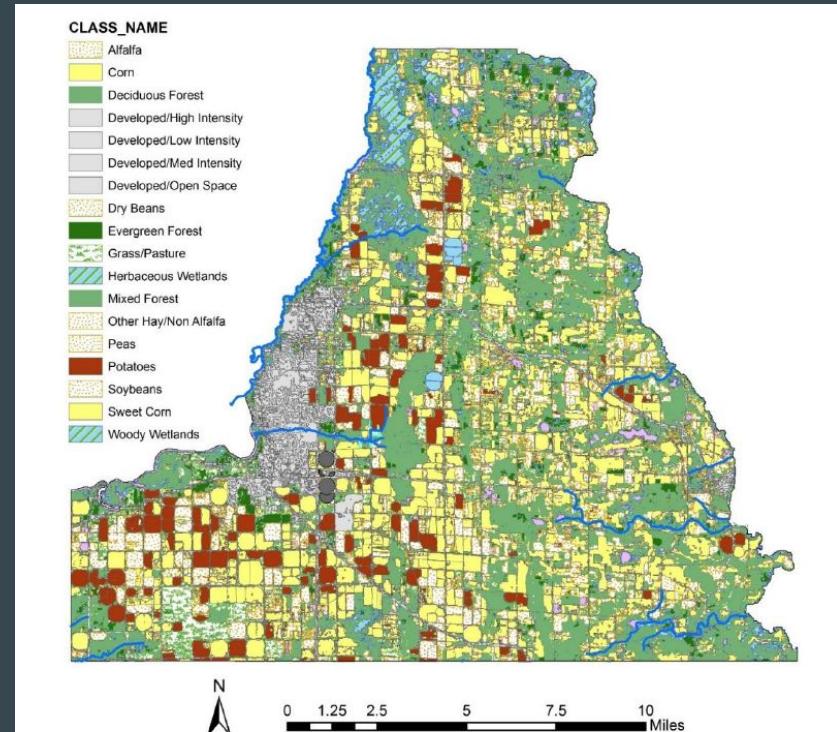
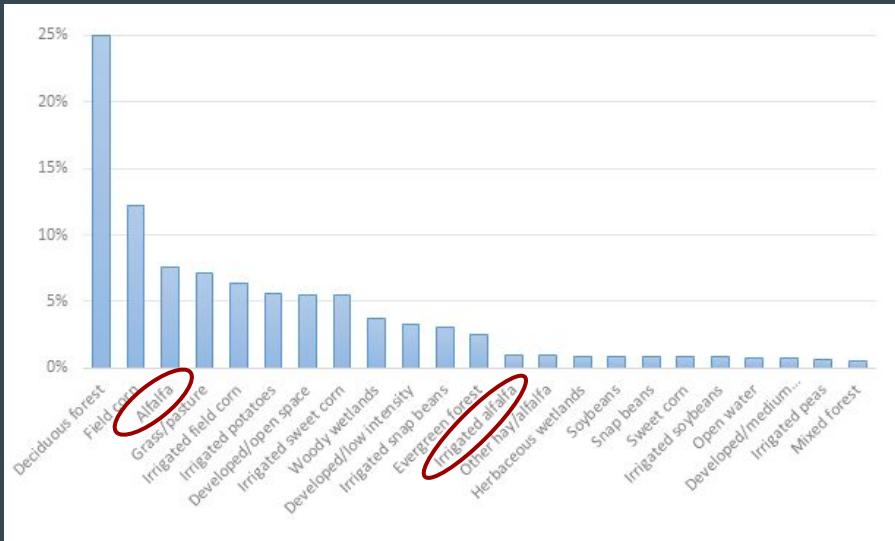
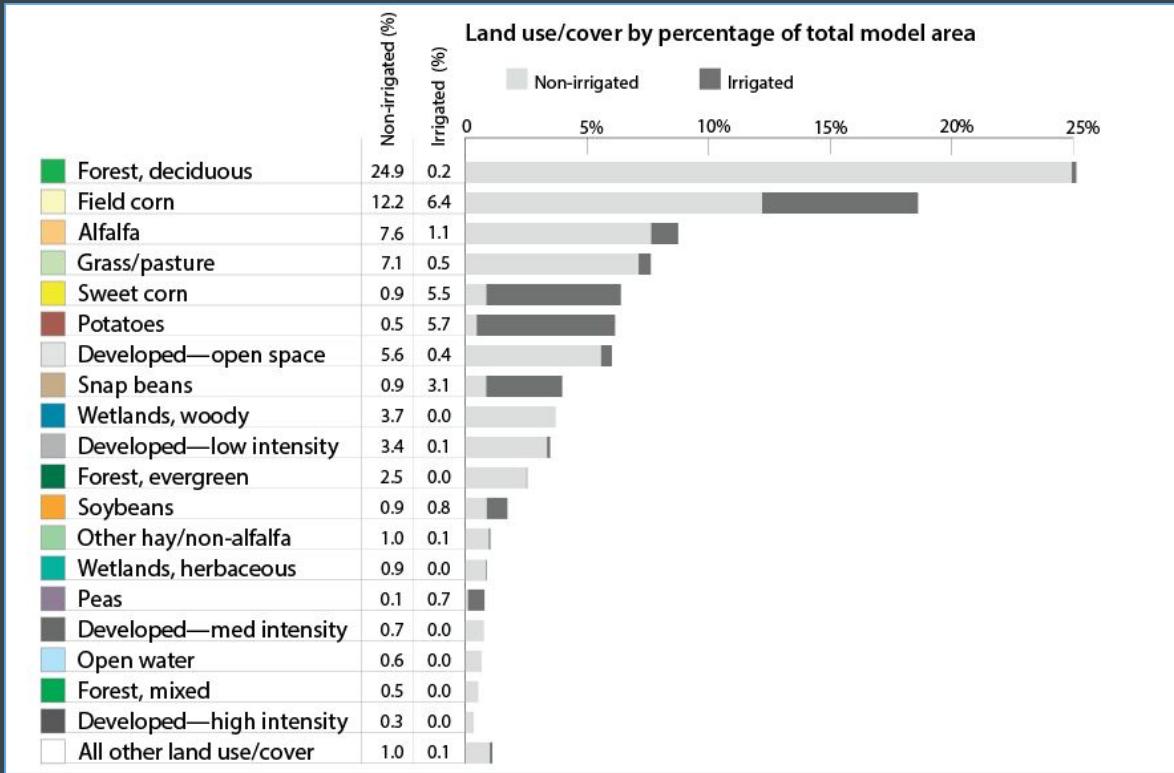
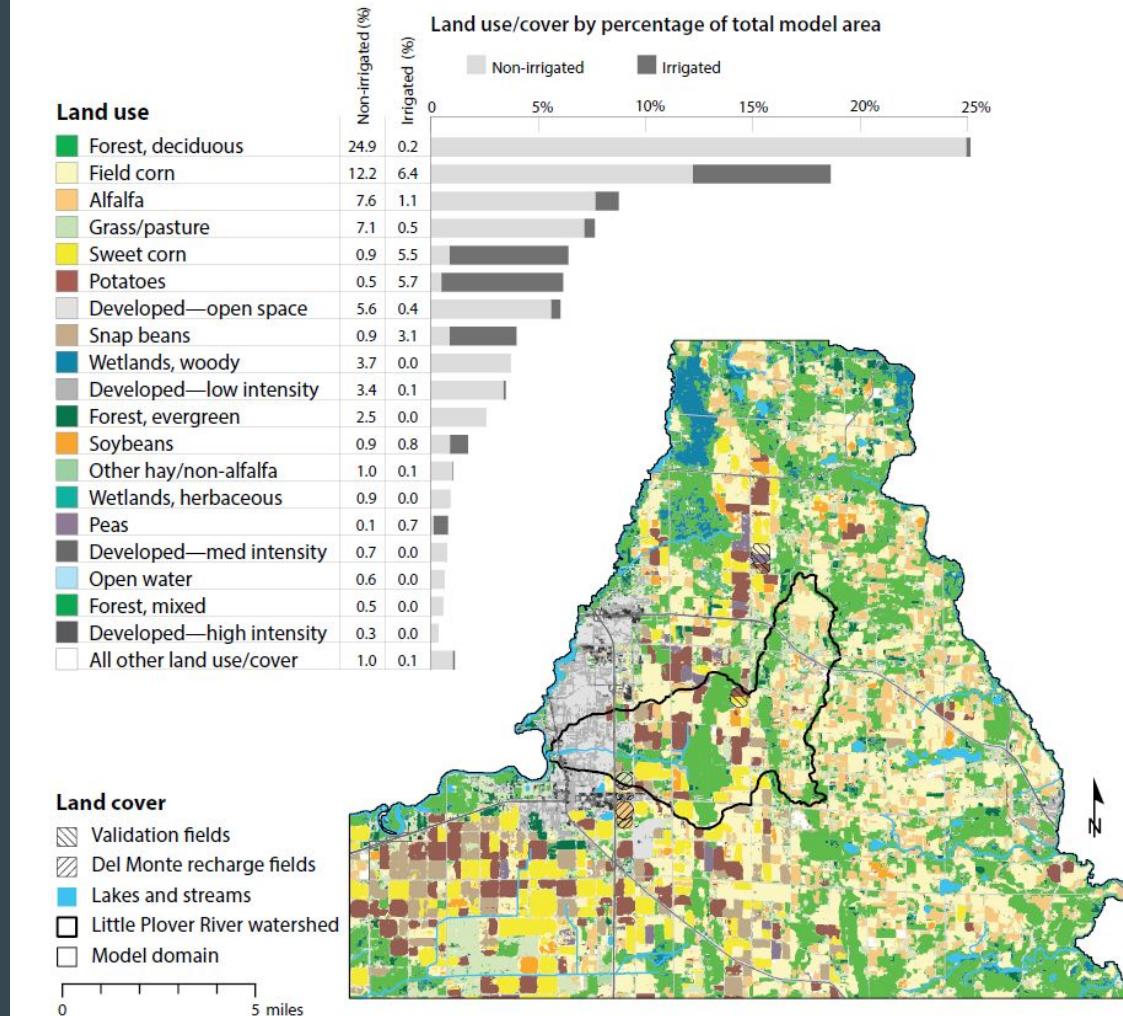
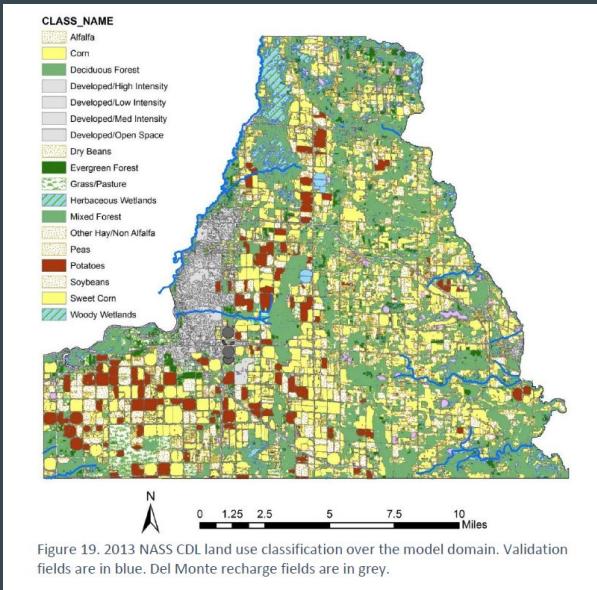
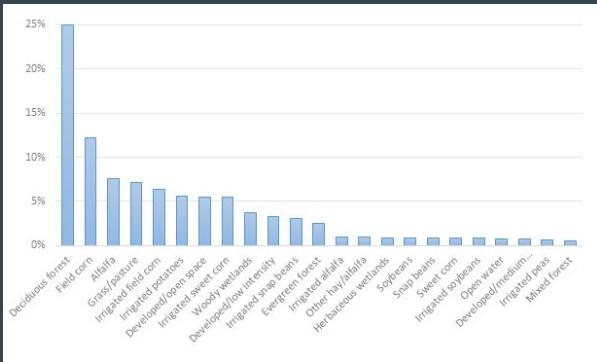
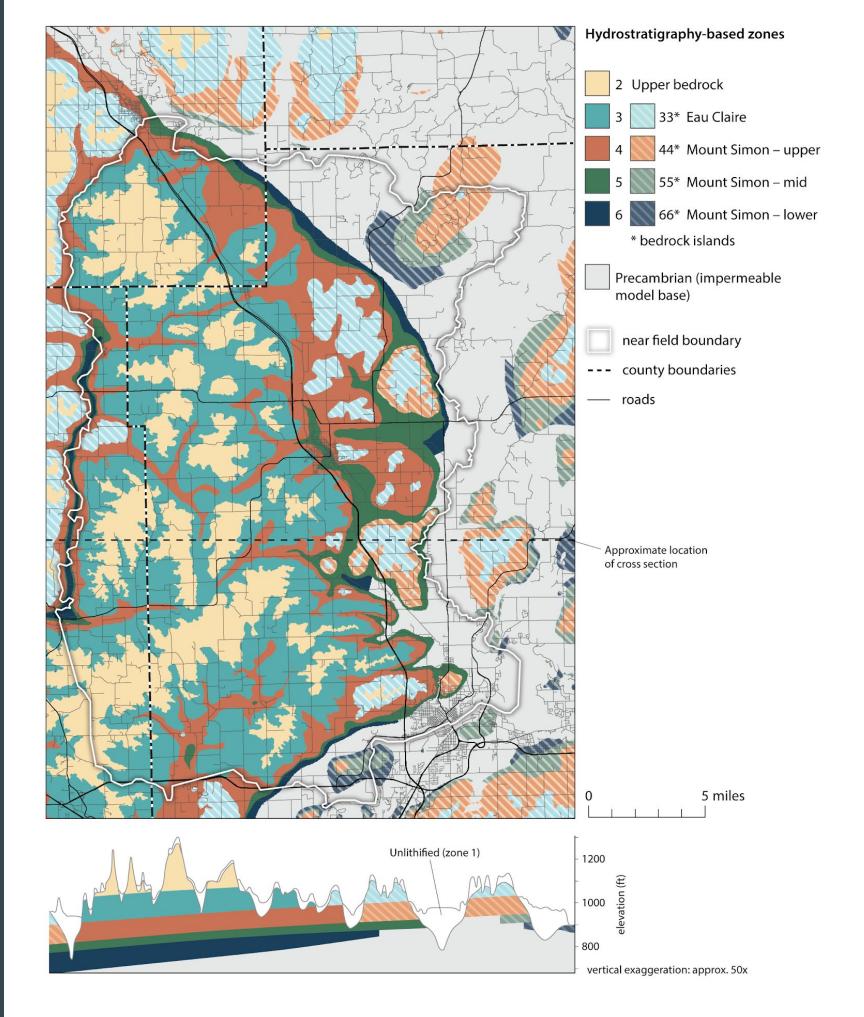


Figure 19. 2013 NASS CDL land use classification over the model domain. Validation fields are in blue. Del Monte recharge fields are in grey.







③

facilitate comparison

facilitate comparison:

consistent symbology

### Simulated transient drawdown, with and without irrigation return

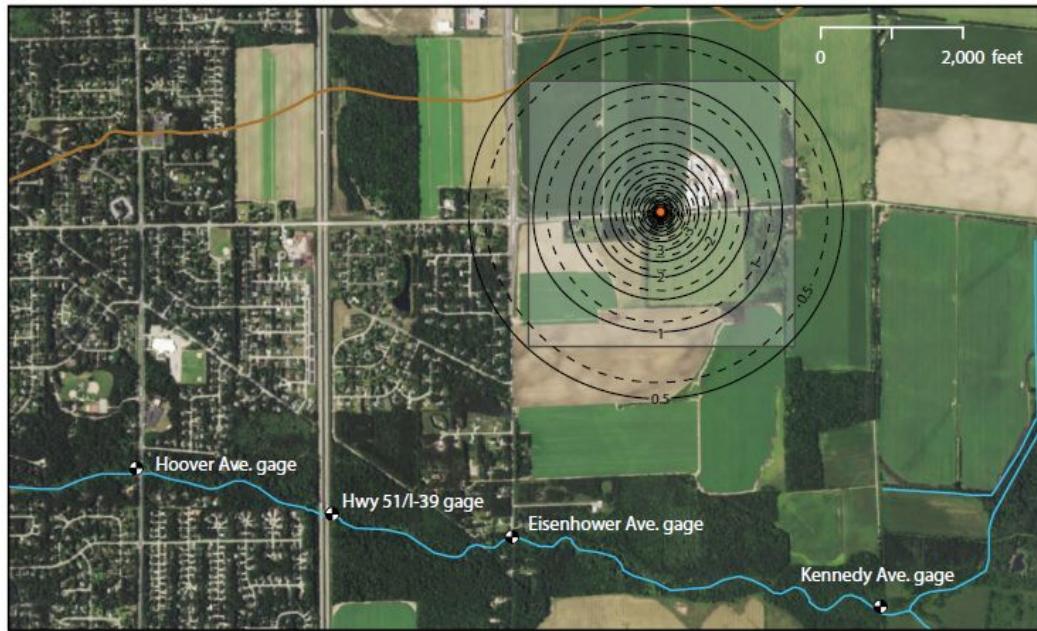
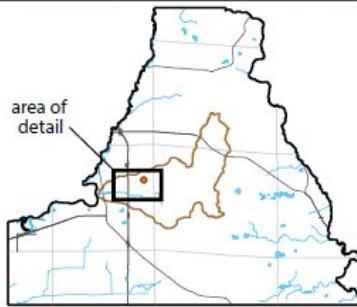


Figure 52. Simulated transient drawdown with and without irrigation return for a hypothetical new well. (Basemap source: Esri)



### Cone of depression, with and without irrigation return

Without irrigation return



July



August



September

With irrigation return



Drawdown (in 0.5-ft intervals)

Steady state      Transient

— With recharge  
— Without recharge

● Hypothetical well  
□ Area of added recharge from irrigation return

Figure 53. Expansion and contraction of cone of depression through time at the hypothetical new well, with (right) and without (left) irrigation return. (Basemap source: Esri)

facilitate comparison:

stretch to overall min/max

range of data  
for this figure

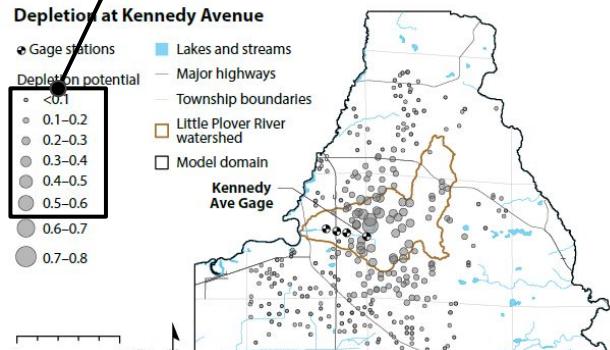


Figure 57. Depletion analysis at Kennedy Avenue.

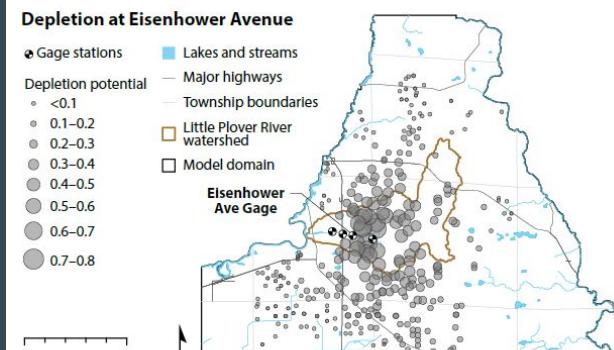


Figure 58. Depletion analysis at Eisenhower Avenue.

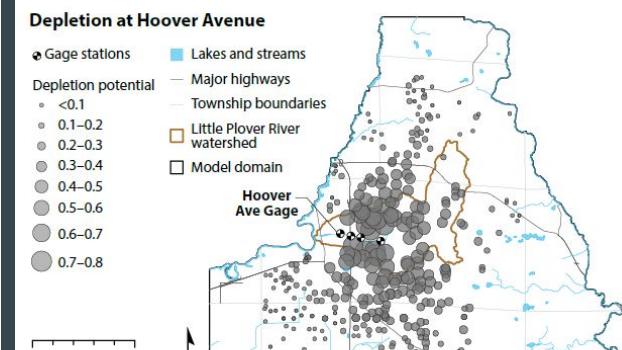


Figure 59. Depletion analysis at Hoover Avenue.

Water table,  
predevelopment

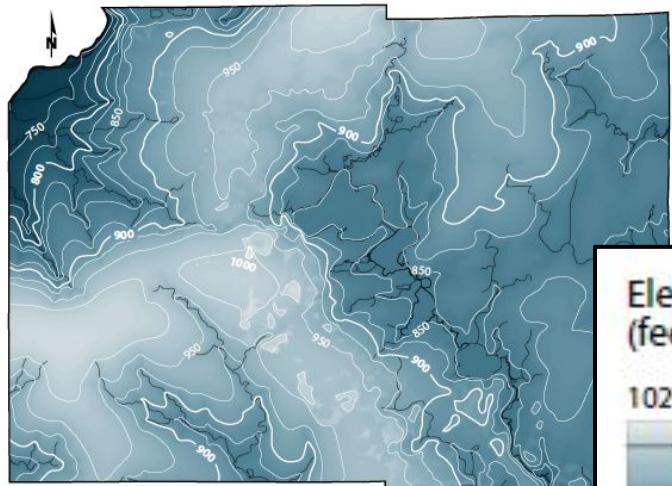
Elevation  
(feet above sea level)

1020 ft max: 1020 ft

contour interval 25 ft

720 ft min: 720 ft

Major streams  
and lake outlines



Water table,  
2010

Well pumping rate  
(mgd)

<0.1

0.1 - 0.5

0.5 - 1.0

>1.0

Elevation

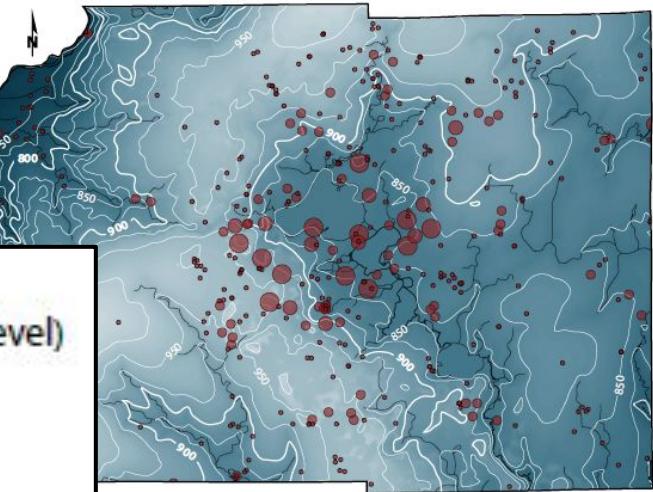
## Elevation (feet above sea level)

1020 ft

max: 985 ft

min: 730 ft

720 ft



Potentiometric surface,  
Mount Simon (layer 12),  
predevelopment

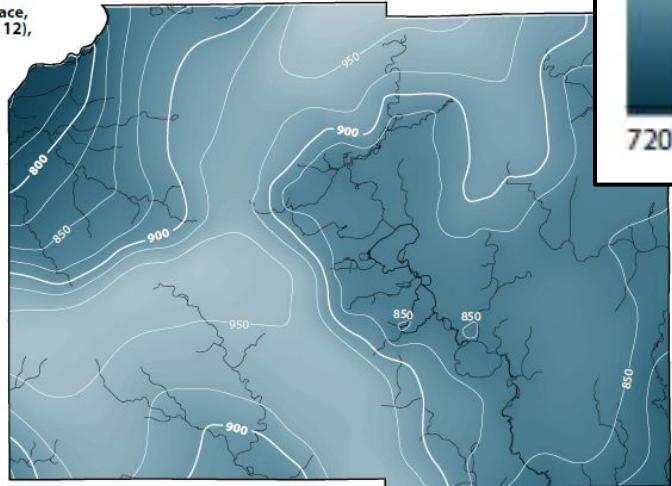
Elevation  
(feet above sea level)

1020 ft max: 986 ft

contour interval 25 ft

720 ft min: 744 ft

Major streams  
and lake outlines



>1.0

Elevation  
(feet above sea level)

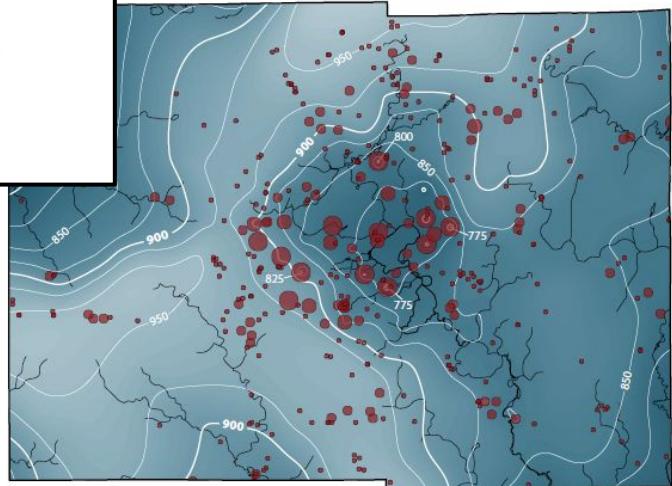
1020 ft max: 985 ft

contour interval 25 ft

720 ft min: 730 ft

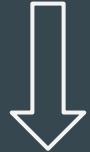
Major streams  
and lake outlines

0 5 miles



recap

what should the reader learn from this image?



design purpose

1

# focus attention

represent nothing with nothing

create a visual hierarchy

②

## illustrate data structure

choose color schemes to match data

use other visualizations

③

## facilitate comparison

use consistent symbology for the same dataset

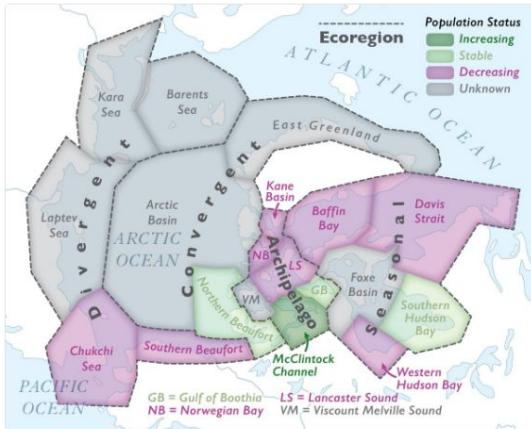
stretch different datasets to the same min/max

# learn and share

Daniel P. Huffman  
@pinakographos

Following

#PractiCarto 43: You can create a stronger association between a feature & its label by using the same or similar colors for each.



8:05 AM - 13 Jun 2017

12 Retweets 38 Likes



Hans van der Maarel @redgeographics · 30 Jun 2017

Text alignment along a path causing you grief? Try adding a thin space  
#Practicarto

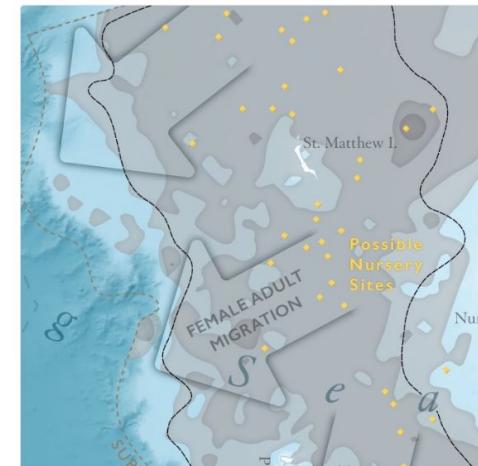


#practicarto

Daniel P. Huffman  
@pinakographos

Following

#PractiCarto 46: You can layer data clearly by making good use of negative space, such as these invisible-but-shadowed arrows.



7:55 AM - 11 Jul 2017

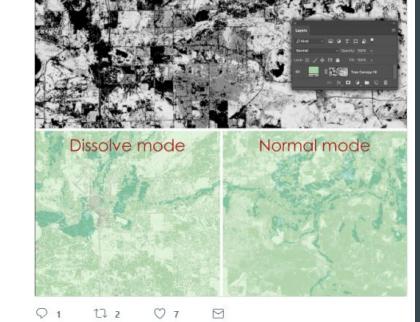
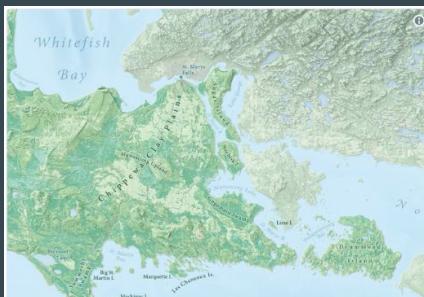
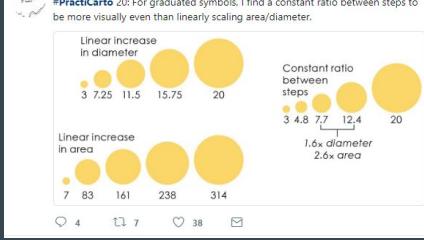
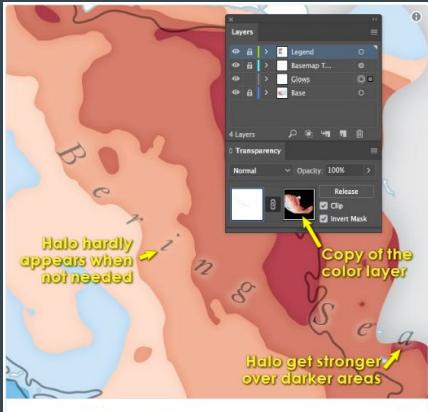
11 Retweets 55 Likes

# #practicarto

Vanessa KW @run\_for\_funner Following

Making label halos slightly transparent often (not always) can really help with legibility - especially with data underneath. #practicarto

8:08 AM - 2 Nov 2017  
5 Retweets 25 Likes

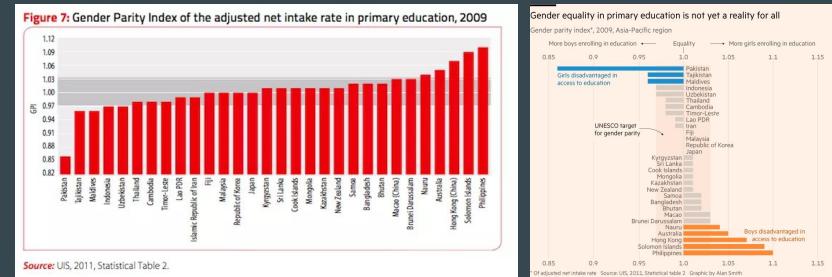


# Further reading

“Design and Redesign in Data Visualization” by Fernanda Viégas & Martin Wattenberg  
[https://medium.com/@hint\\_fm/design-and-redesign-4ab77206cf9](https://medium.com/@hint_fm/design-and-redesign-4ab77206cf9)

“Data visualisation mistakes — and how to avoid them” by Alan Smith

<https://www.ft.com/content/3b59f690-d129-11e7-b781-794ce08b24dc>



# Further reading

lisacharlotterost.github.io

“Why Do We Visualise Data?” by Lisa Charlotte Rost:

<https://lisacharlotterost.github.io/2017/03/10/why-do-we-visualize-data/>

“What to consider when creating stacked column charts” by Lisa Charlotte Rost:

<https://blog.datawrapper.de/stacked-column-charts/>

“How The Rainbow Color Map Misleads” by Robert Kosara

<https://eagereyes.org/basics/rainbow-color-map>

“Anscombe's quartet” [https://en.wikipedia.org/wiki/Anscombe%27s\\_quartet](https://en.wikipedia.org/wiki/Anscombe%27s_quartet)



# Further reading

“Why Luminance Is The Key Component Of Color” by Stephen Bradley

<http://vanseodesign.com/web-design/color-luminance/>

“The Rainbow is Dead... Long Live the Rainbow!” by Matteo Niccoli

<https://mycarta.wordpress.com/2012/05/29/the-rainbow-is-dead-long-live-the-rainbow-series-outline/>

“Rainbow Color Map Critiques: An Overview and Annotated Bibliography” by Steve Eddins

[https://www.mathworks.com/tagteam/81137\\_92238v00\\_RainbowColorMap\\_57312.pdf](https://www.mathworks.com/tagteam/81137_92238v00_RainbowColorMap_57312.pdf)

“Perceptually Driven Visibility Optimization for Categorical Data Visualization” by Sungkil Lee, Mike Sips, and Hans-Peter Seidel

<http://ieeexplore.ieee.org/document/6365630/figures>

# Thank you!

[github.com/cmrRose/talks](https://github.com/cmrRose/talks)

caroline.rose@wgnhs.uwex.edu  
@cmrRose