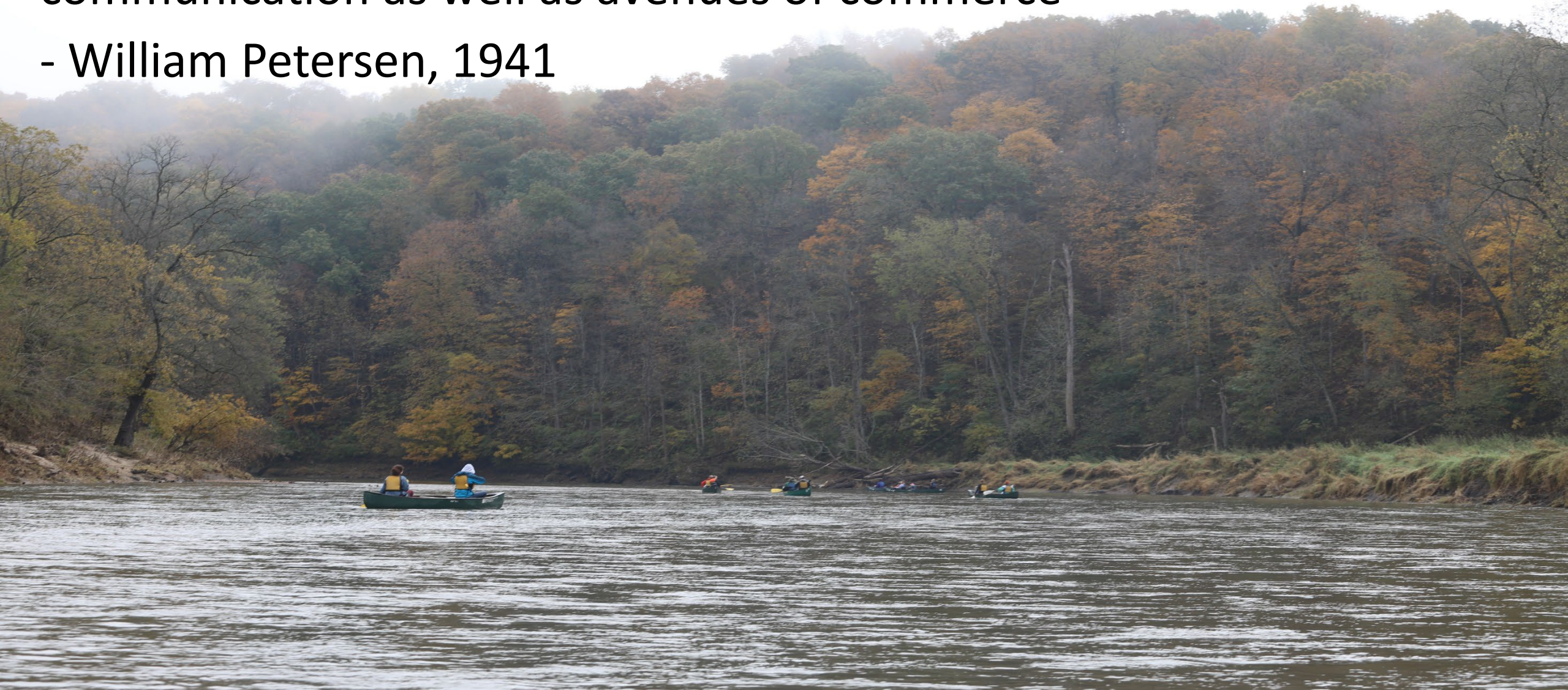




Rivers and Human History

“Iowa owes much to the streams that drain her fertile valleys. These waterways played a dramatic role as highways of exploration and communication as well as avenues of commerce”

- William Petersen, 1941



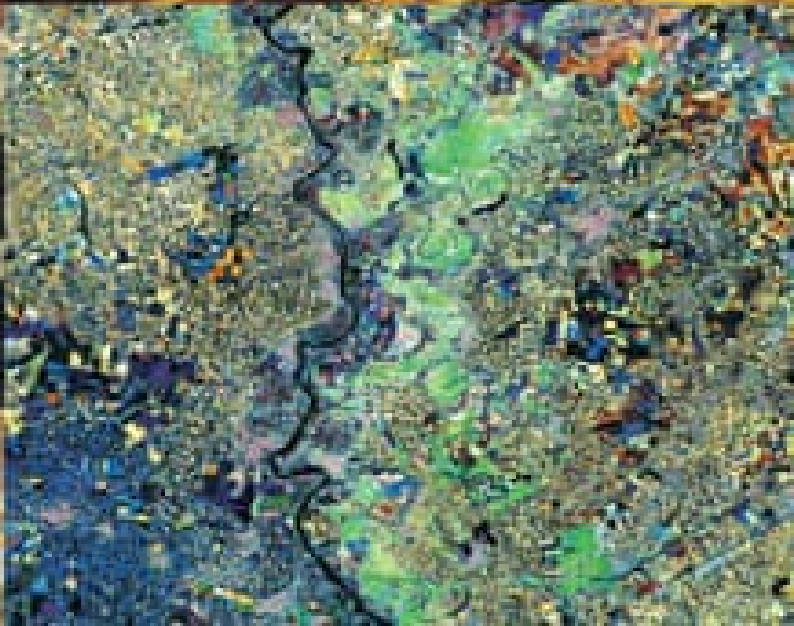
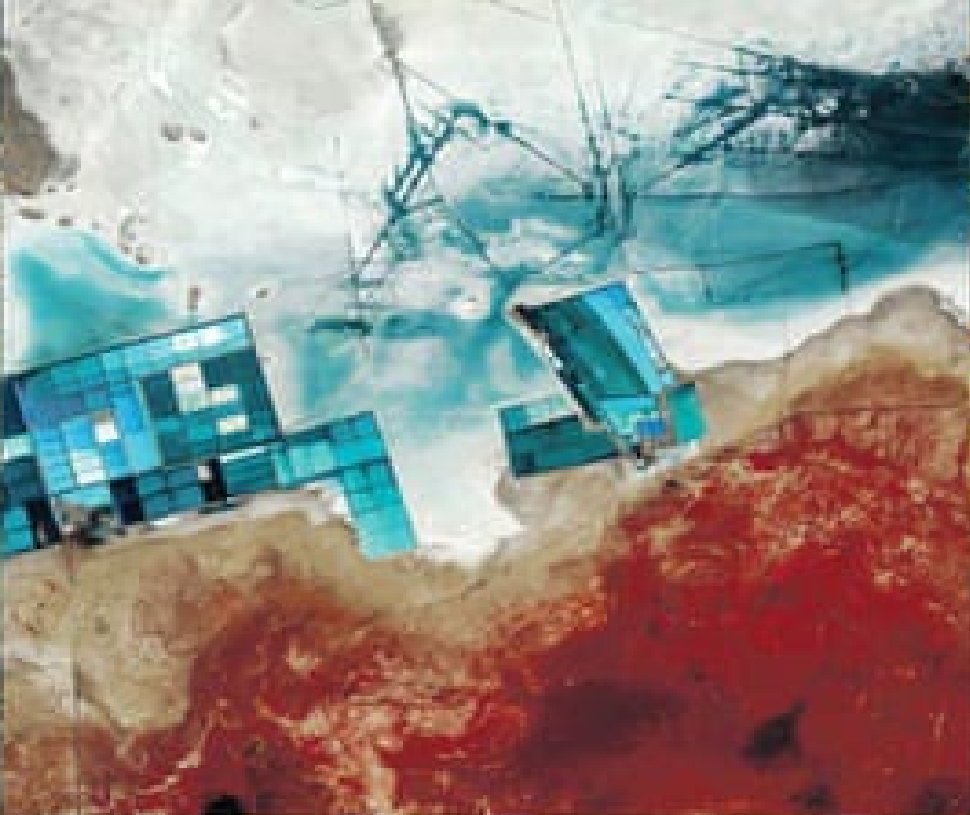
Primary questions

How do we view our streams and rivers, Today?

- Source of transportation
- Means of disposal
- Recreation
- Source of distress – Contamination, Flooding
- Possibly not at all, no connection..?

Back to lab #2 briefly

- How is stratigraphy defined?
- Geologic time?
- Anthropocene





Hieronymus Bosch, 1500

Deborah Bird Rose – Anthropologist – Double Death



- 6th Mass extinction – 75% of life on Earth
 - Mass loss of life – diversity of and within species
 - But also the foreclosure of diversity's future possibilities.
 - Epigenetics to endosymbiosis within a lifetime will also lessen...

E.O. Wilson – Eremocene



- Greek: Kainos ‘new’ , eremos ‘isolated place’ or ‘hermit’ one who dwells alone and apart.
- The Age of Loneliness
 - Not human to human loneliness
The solitude of one species which is left, as a consequence of its own actions, isolated on Earth. It is the silence of a mute planet on which the speech, song and stories of other beings have become inaudible because extinguished.

IS A RIVER ALIVE?

Robert
Macfarlane

Best-selling author of **UNDERLAND**



Contributing to humanity's
Sense of Place & Perception of Time

**“If you love a place you have a
duty to protect it & to love a
place you must know it first!”**

Jeff Johnson – 180° South





Rivers Mystery to Mythology

Gros Ventres – Creation of the World, Creator's Tears



George Catlin

Music

- Spillville, Iowa
 - Billy Clocks Museum
- Turkey River
- #9 New World Symphony



Apollo 11 Mission
Neil Armstrong



Fascinated by Native American and African American melodies
“These beautiful and varied themes are the product of the soil”



ONE ON ONE: LAUGHING RIVER

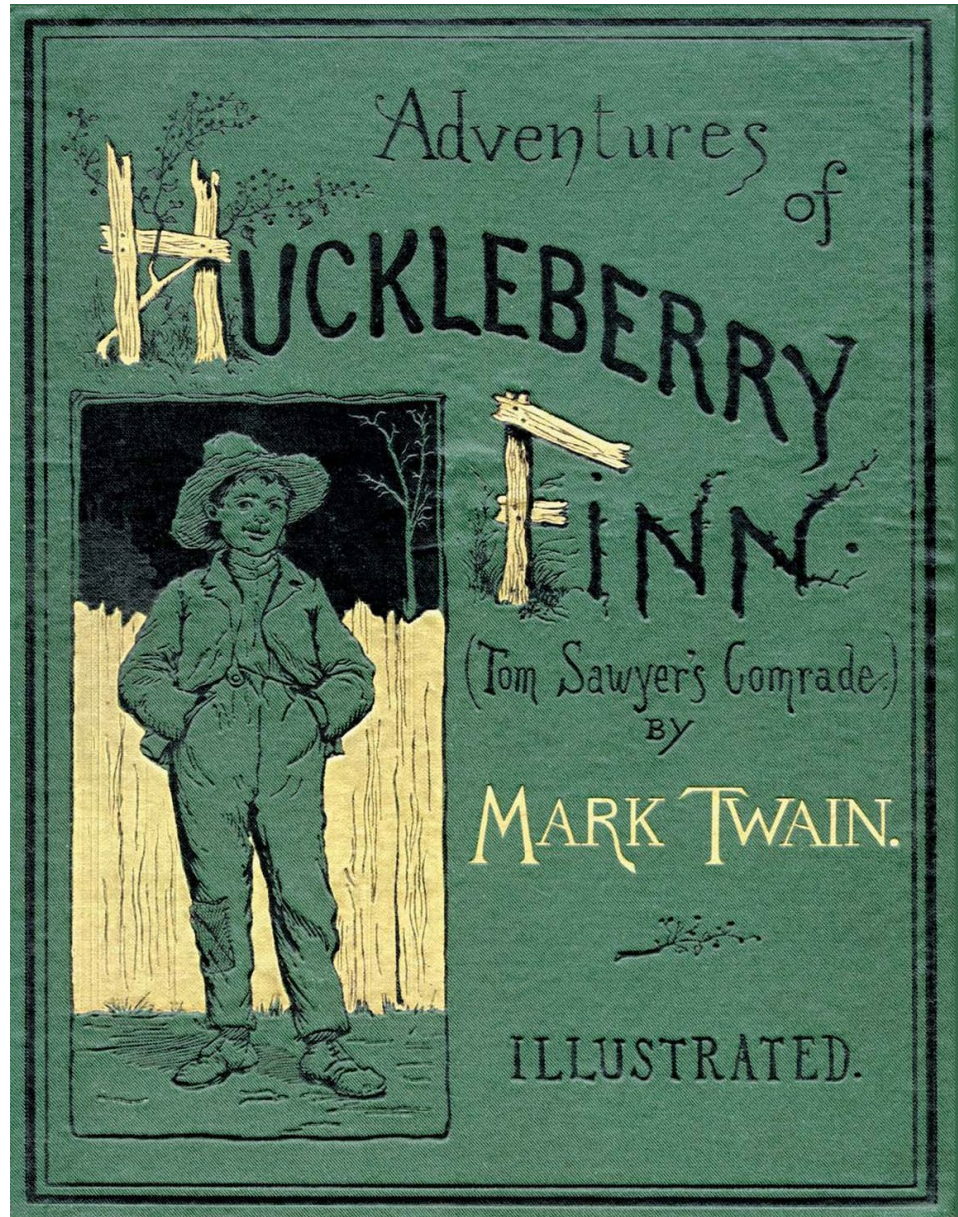


BL 99 49003



BISHOP BRIGGS
“River”

Literature, Novels and Poetry



Emily Dickinson

My River runs to thee –
Blue Sea – Wilt welcome me?

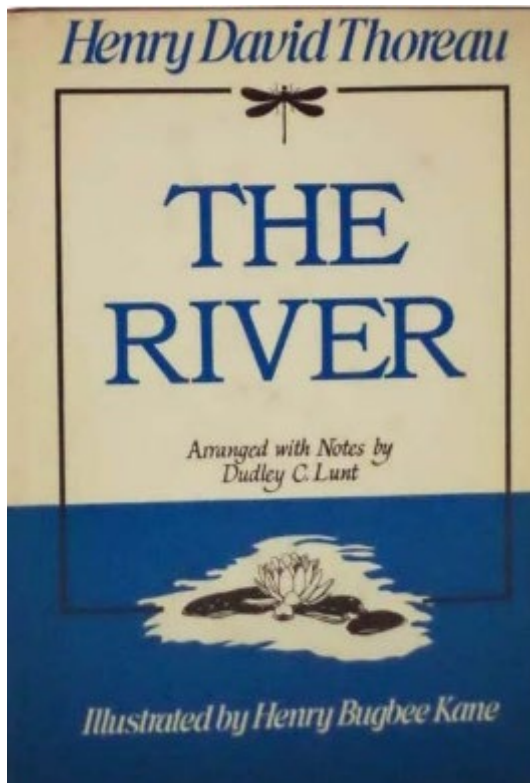
My River wait reply.
Oh Sea – look graciously!

I'll fetch thee Brooks
From spotted nooks –
Say Sea – take Me?

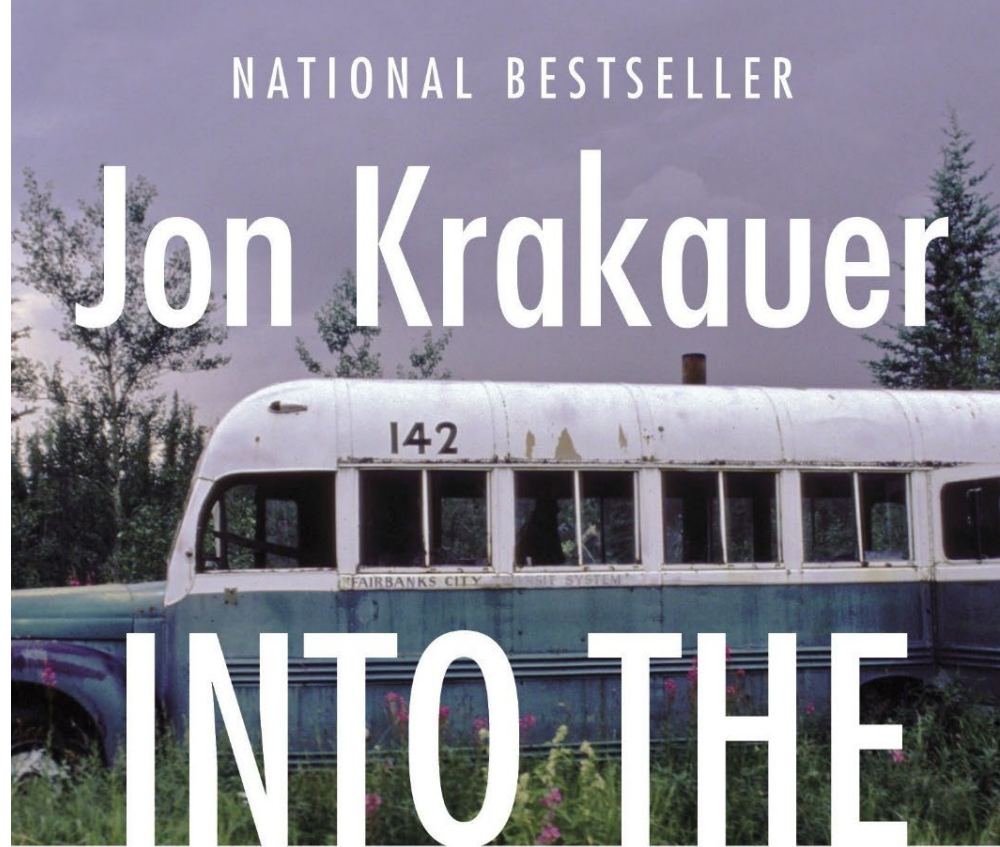
“The river is my own highway,
then only wild and unfenced
part of the world hereabouts.”

30 May 1852

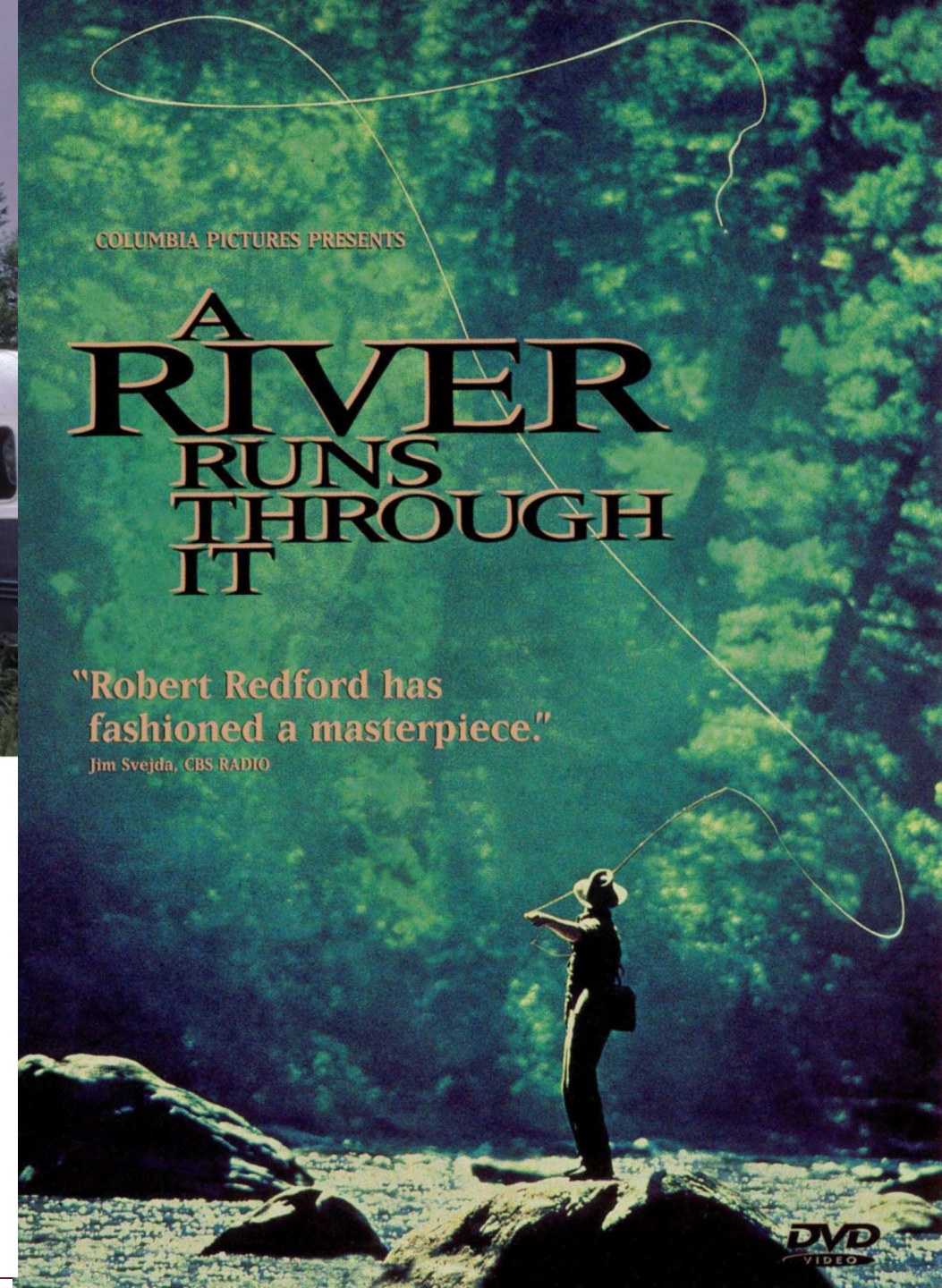
Henry David Thoreau



Films



In April 1992 a young man from a well-to-do family hitchhiked to Alaska and walked alone into the wilderness north of Mt. McKinley. His name was Christopher Johnson McCandless. He had given \$25,000 in savings to charity, abandoned his car and most of his possessions, burned all the cash in his wallet, and invented a new life for himself. Four months later, his decomposed body was found by a moose hunter. . . .



“Loch water rushing over rocky falls, barley malted over moorland peat slow distillation and long maturation in oak casks; all help us to shape Lagavulin’s robust and smoky character. “Time”, say the islanders TAKES OUT THE FIRE but LEAVES IN THE WARMTH.”

The Strange Horse of Suinabhal by William Black

I hef been in Isa more as three or tow times myself, and I hef been close to the Lagavulin Distillery and I know that it is the clear water of the spring that will make the Lagavulin Whisky just as fine as new milk’





Historical Timeline

Along the river's side

Rivers of Babylon

- Psalm 137
- Song that depicts the Jewish people fleeing Jerusalem, in 586BC after the Babylonian conquest
- By the rivers of Babylon, there we sat down, yea, we wept, when we remembered [Zion](#) ... They carried us away in captivity requiring of us a song ... Now how shall we sing the LORD's song in a strange land?



Tigris & Euphrates Rivers

- Two of the Four Rivers of biblical Eden
- Fertile Crescent
- Start of the Neolithic – Agricultural expansion

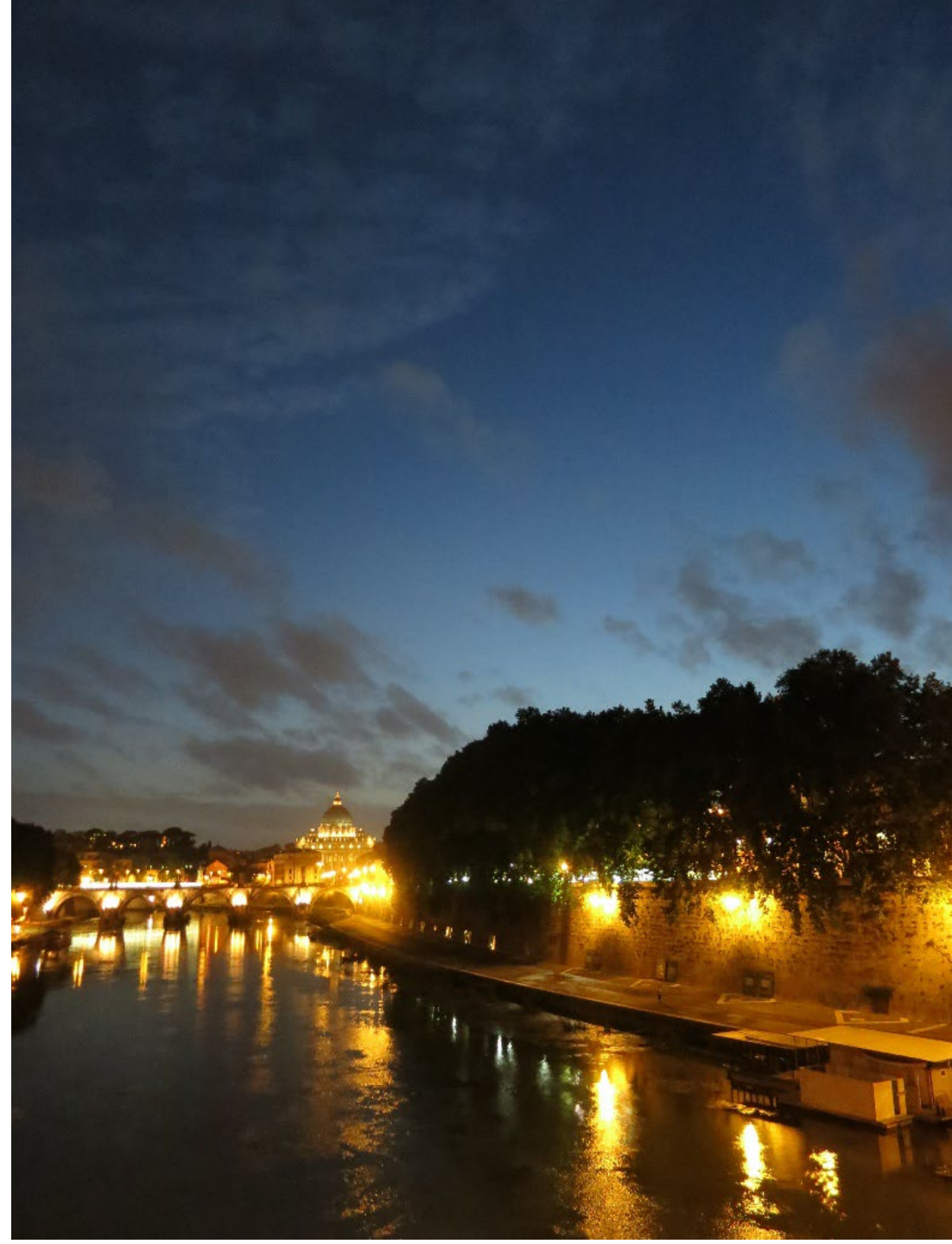


Tiber River

Expansion of Rome



Western Civilization



Fontana dei Quattro Fiumi



Nile River



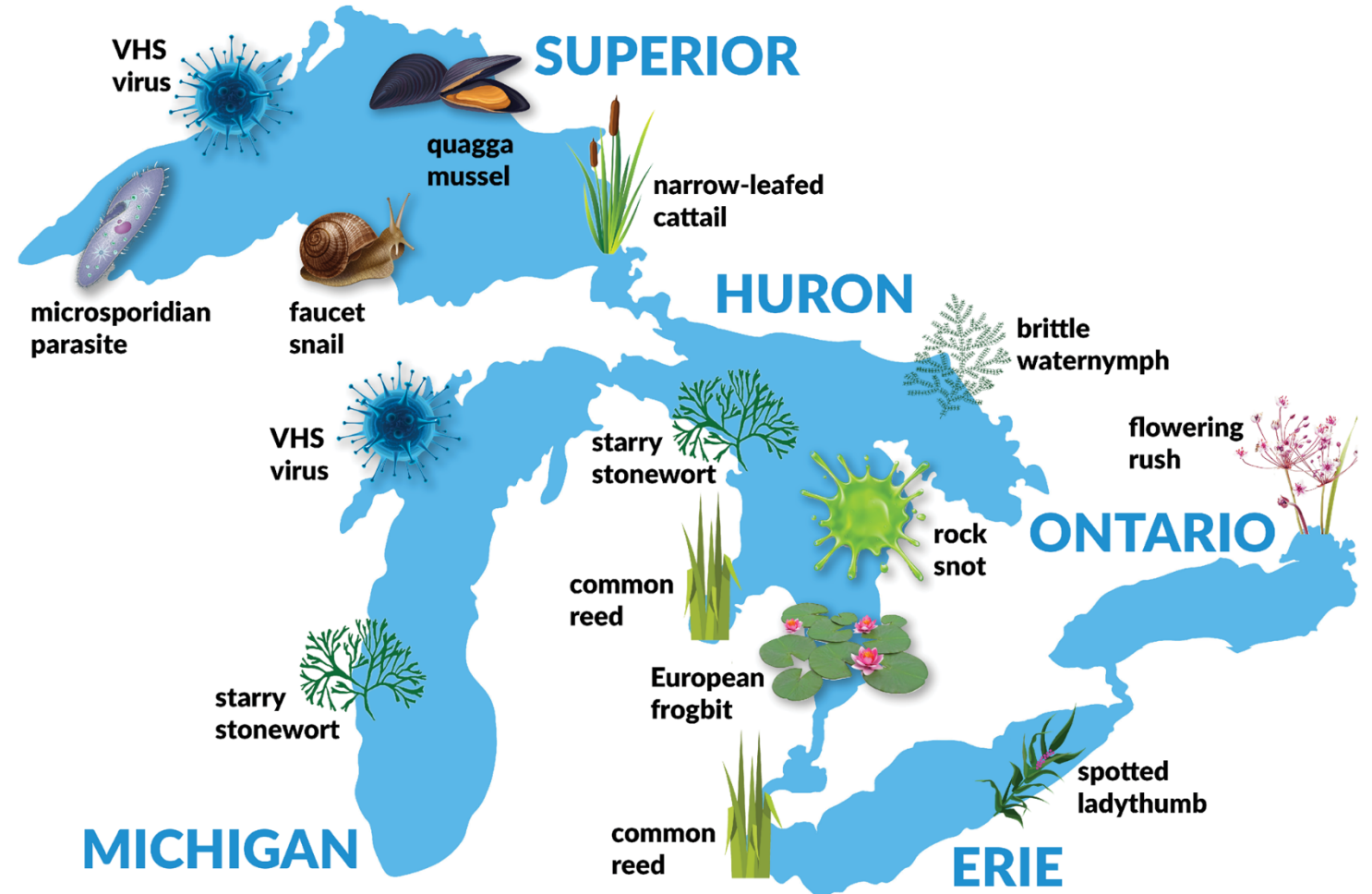


Invasive species



Invaders keep spreading

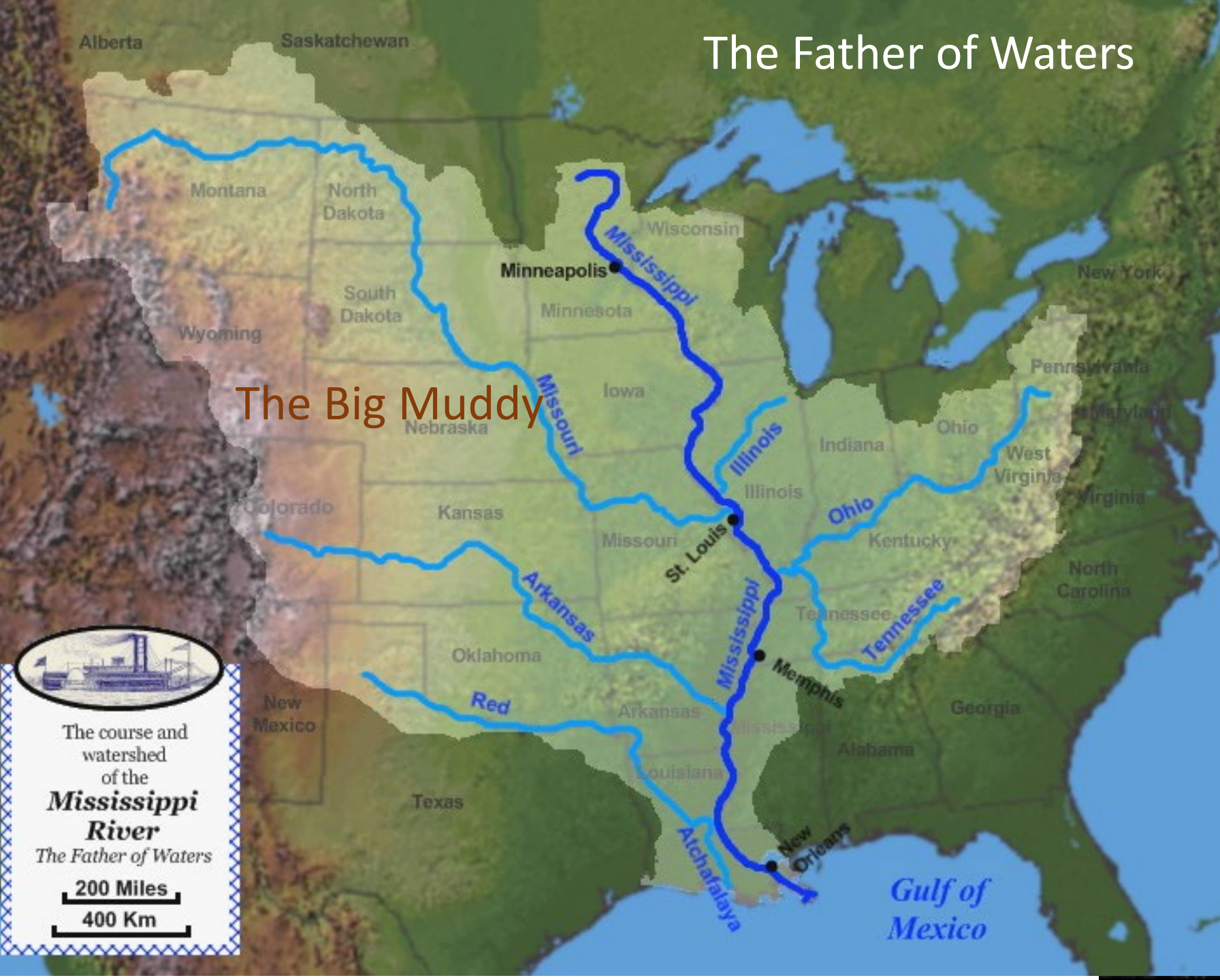
Just three new nonnative species have been detected in the Great Lakes in recent years. Their introduction has been slowed by ballast water regulations for ocean-faring ships. But scientists and regulators struggle to keep unwanted creatures from traveling between lakes. Here's a look at species that have spread to each lake over the past decade.



Source: U.S-Canadian State of the Great Lakes 2019 report

The Father of Waters

The Big Muddy



The course and watershed of the **Mississippi River**
The Father of Waters

200 Miles

400 Km

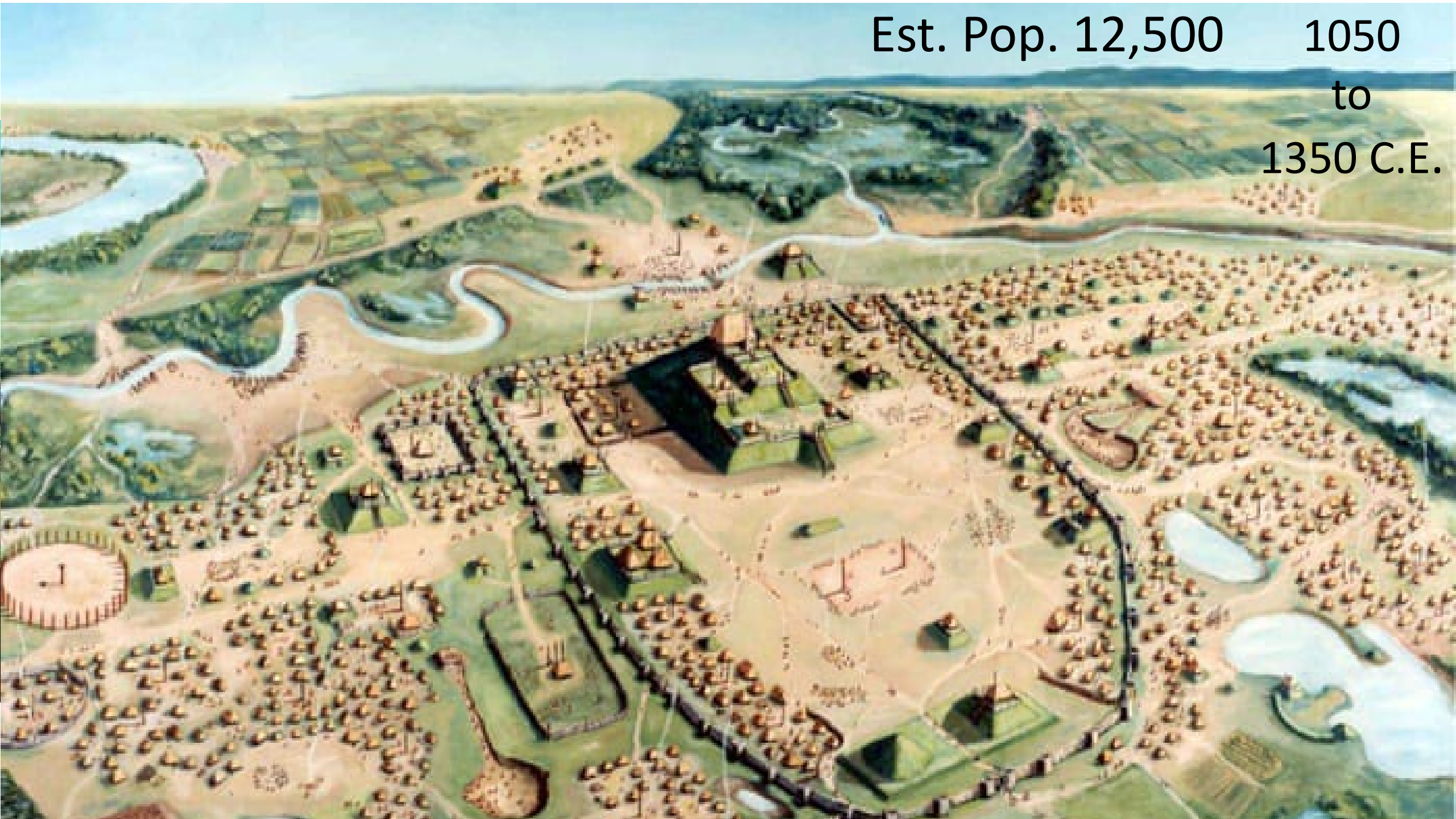


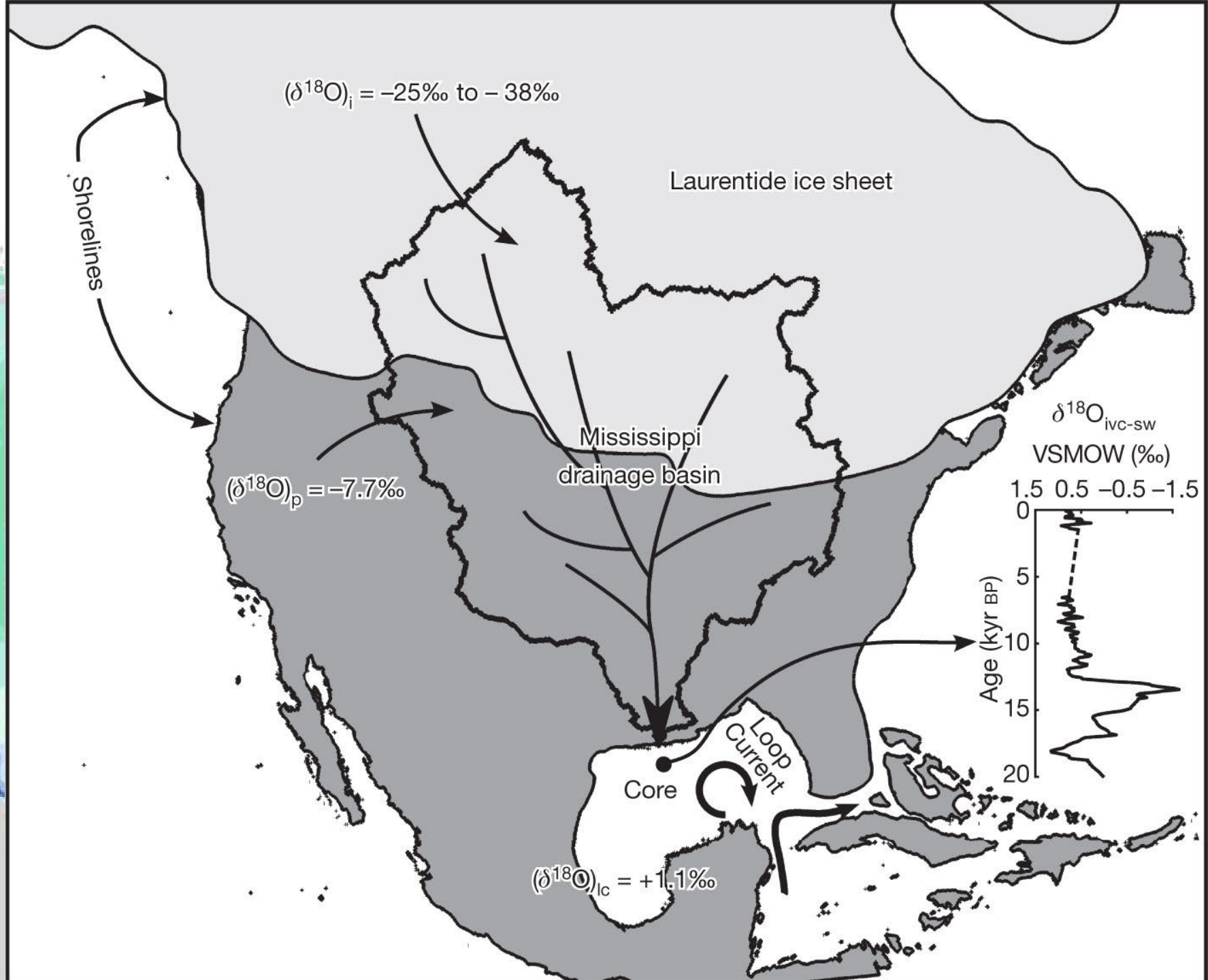
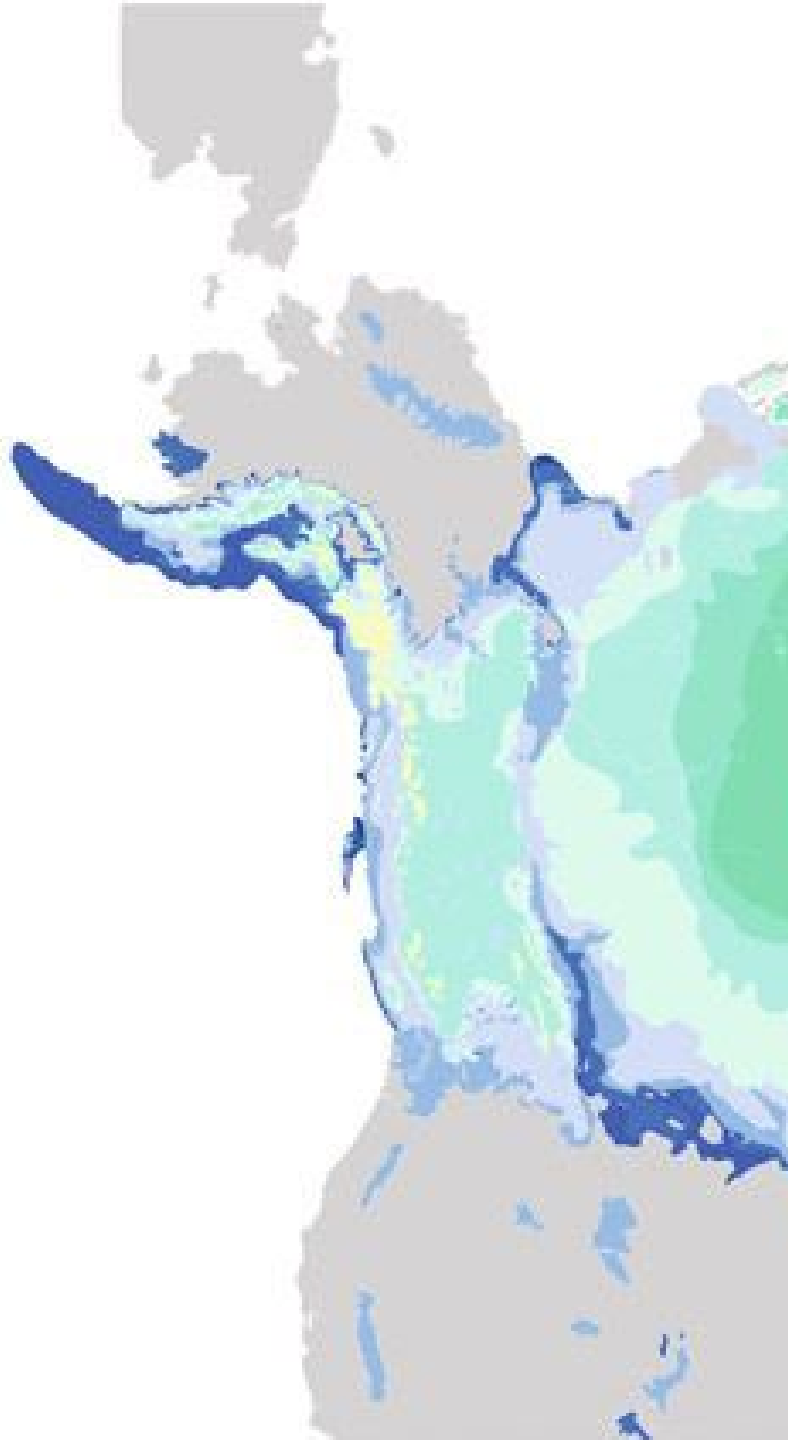
Est. Pop. 12,500

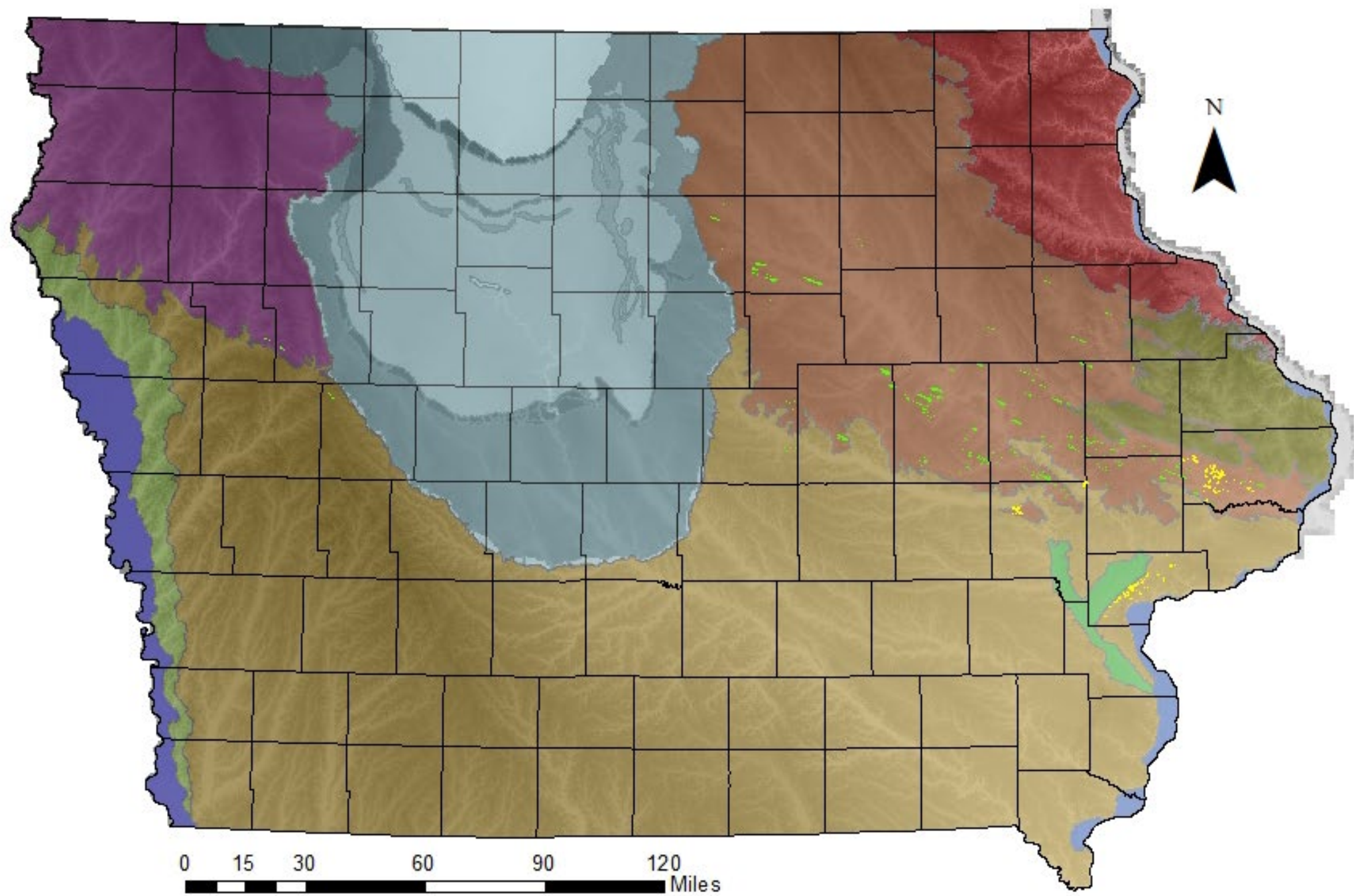
1050

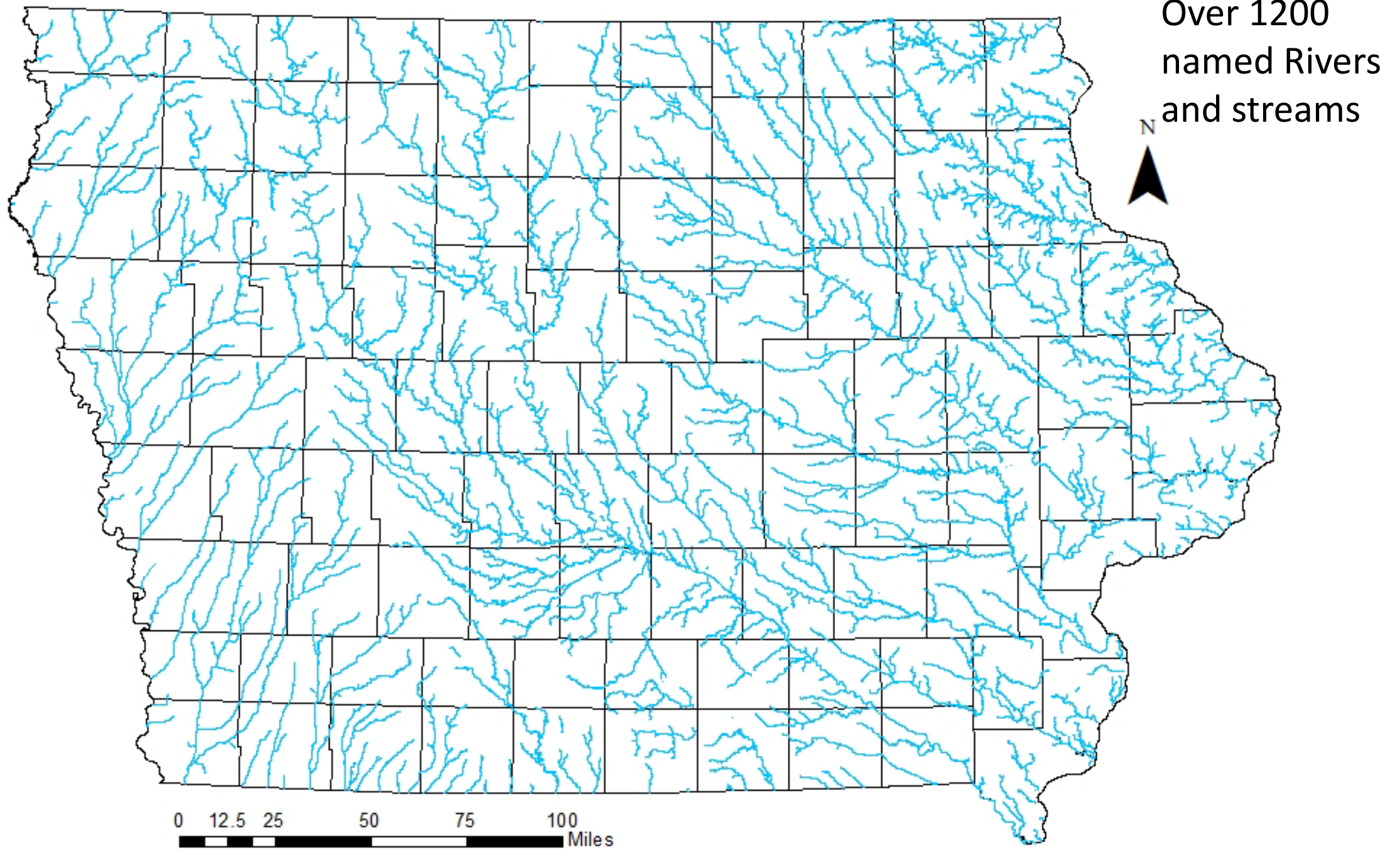
to

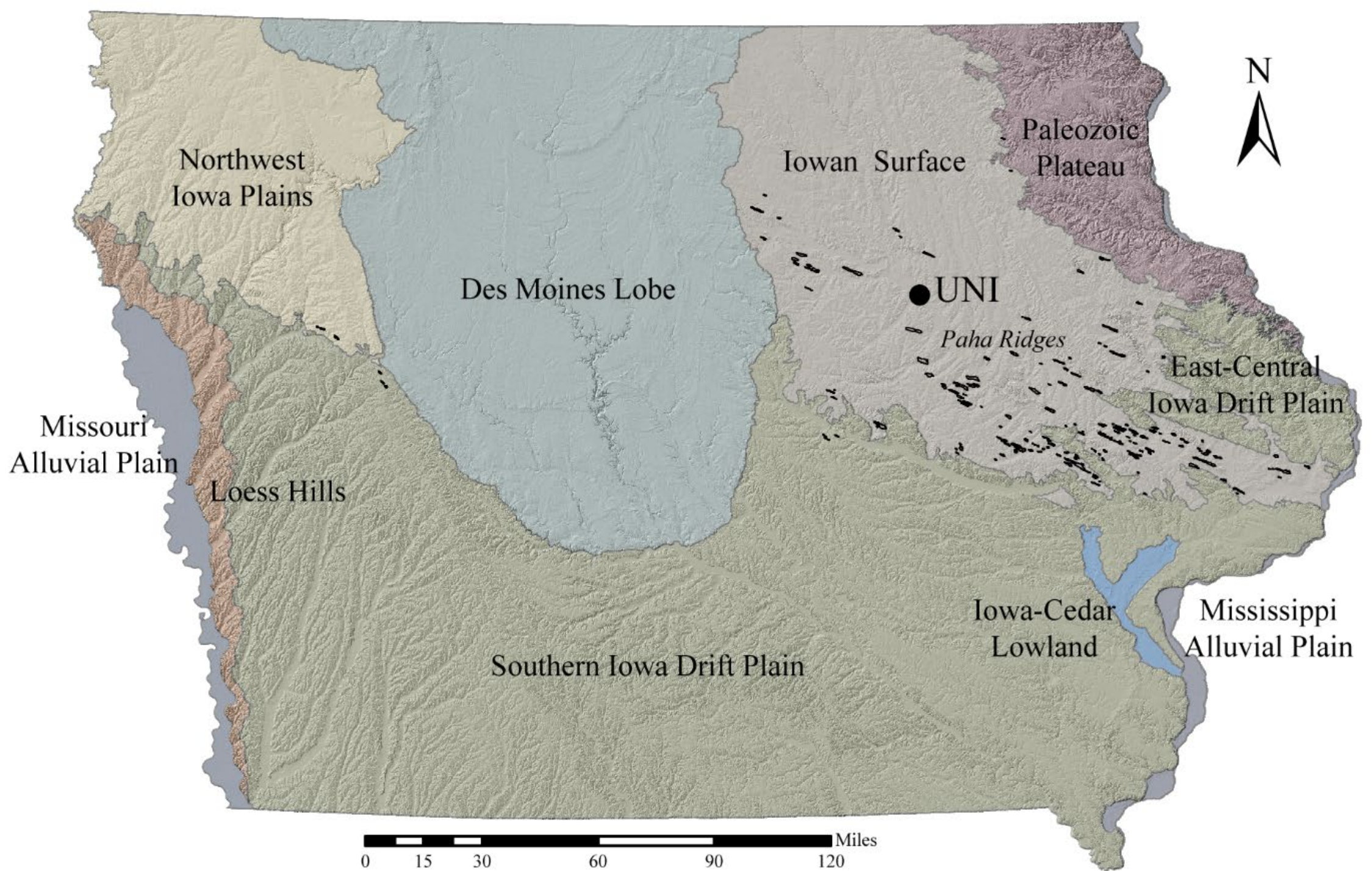
1350 C.E.



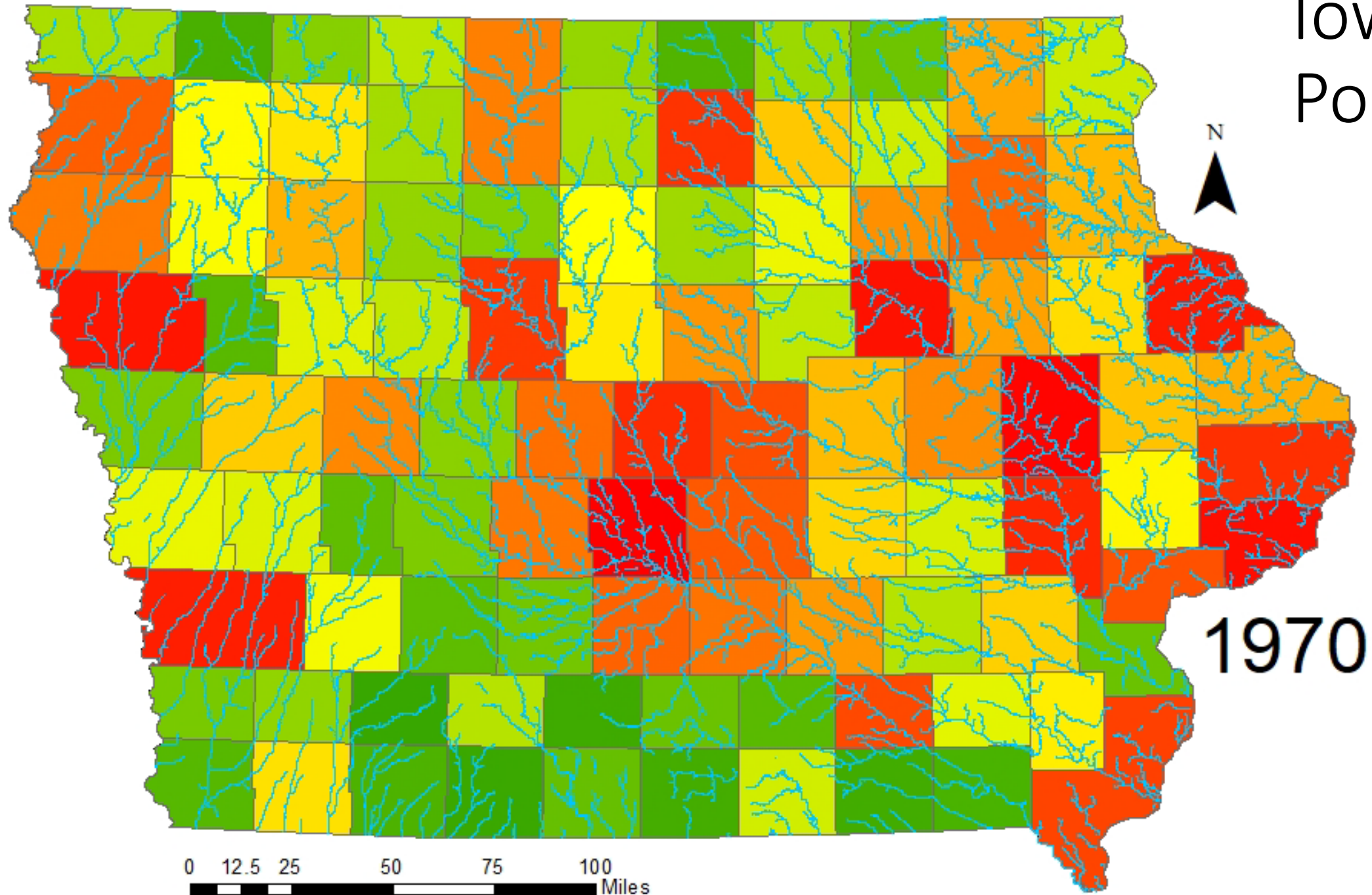








Iowa's Population



Explorers, Pioneers and Steamboats

Rivers facilitated

Migration

Trade

Pelts

Grain

Wood

Ore

Gambling

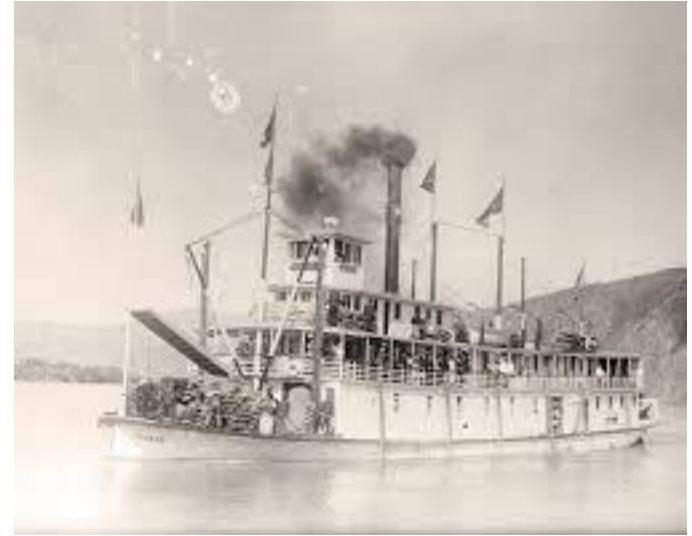
Military

Old Times on the
Upper Mississippi

The Recollections of a Steamboat Pilot 1908 from 1854 to 1863
George Byron Merrick (1908)

<https://www.gutenberg.org/files/47262/47262-h/47262-h.htm>

1823



Virginia

1860



Chippewa

1819

[Missouri pdf](#)

Continued Immigration into and through 1900

- Steamboat 'Bills of Lading' Post 1850 show increased arrivals of..
 - Rakes, hoes, spades, grindstones
 - Farm machinery
- Major populations of
 - Dutch to Pella
 - Tappist monks to New Melleray/Ireland
 - Luxemburgers to St. Donatus
 - Swiss to New Glarus
 - Germans to Davenport, Guttenburg, Reinbeck and New Berlin/Lincoln...
 - Mecklenburgers, set up a socialist community in Elkader
 - Czech and Slovak to Cedar Rapids



Iowa's Interior – Resources, Power, Goods

- Black Hawk Purchase, 1833

- 1830s 1st Mills

- Grist

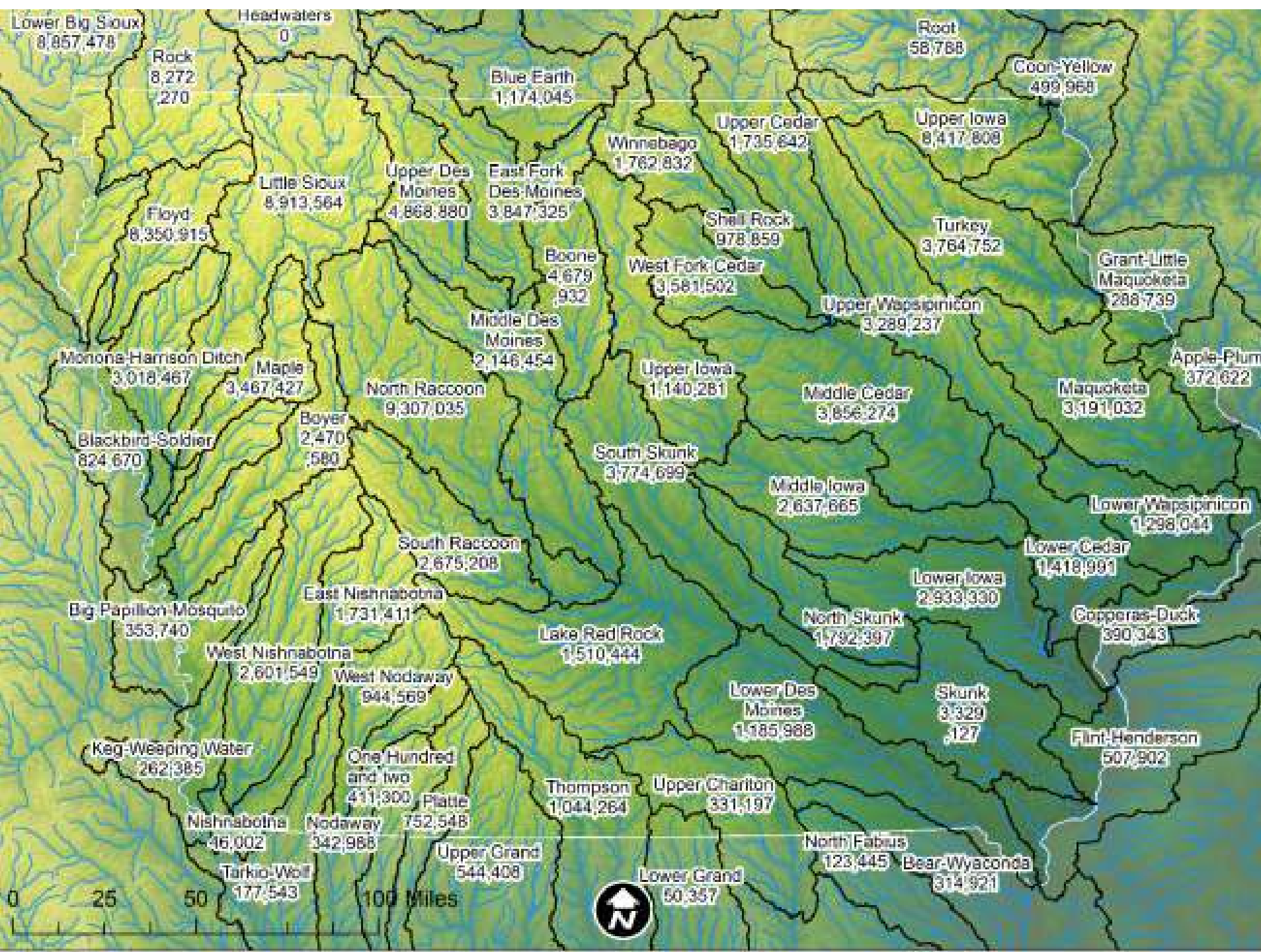
- Saw

- 1870

- 502 Gristmills

- 545 Sawmills





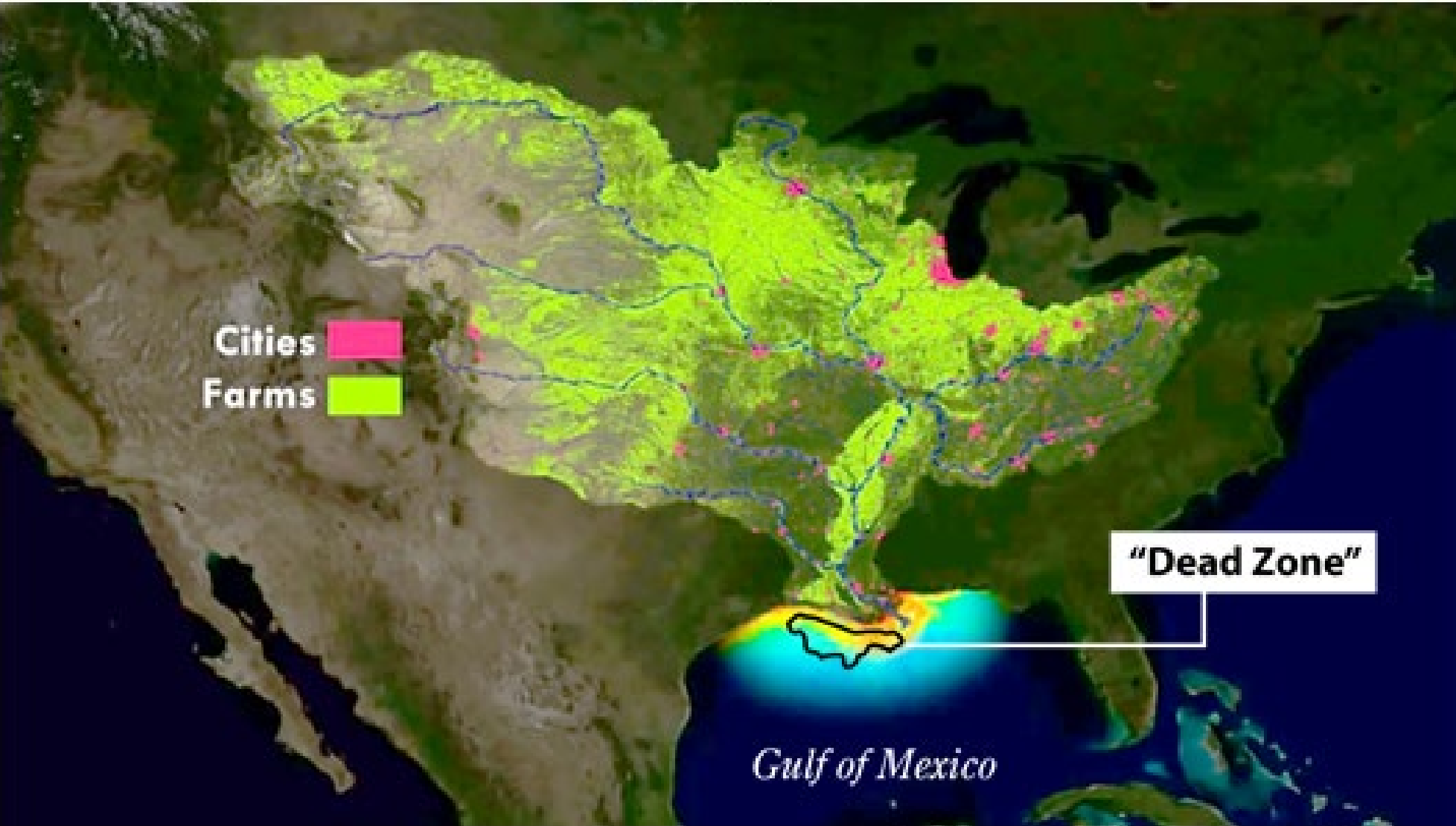
Population, from
294,122
to with animals
3,289,237

Statewide
24 million pigs
3 million people
8:1

Chris Jones
U Of Iowa
IIHR

Gulf 'Dead Zone' Chokes Marine Life

The Gulf of Mexico at the Mississippi River Delta experiences a seasonal *hypoxia*, or "dead zone," where there is not enough oxygen in the water to sustain marine life.



SOURCE: NOAA

InsideClimate News

Nitrate
equivalents

2019 – may surpass
previous record due
to record flooding

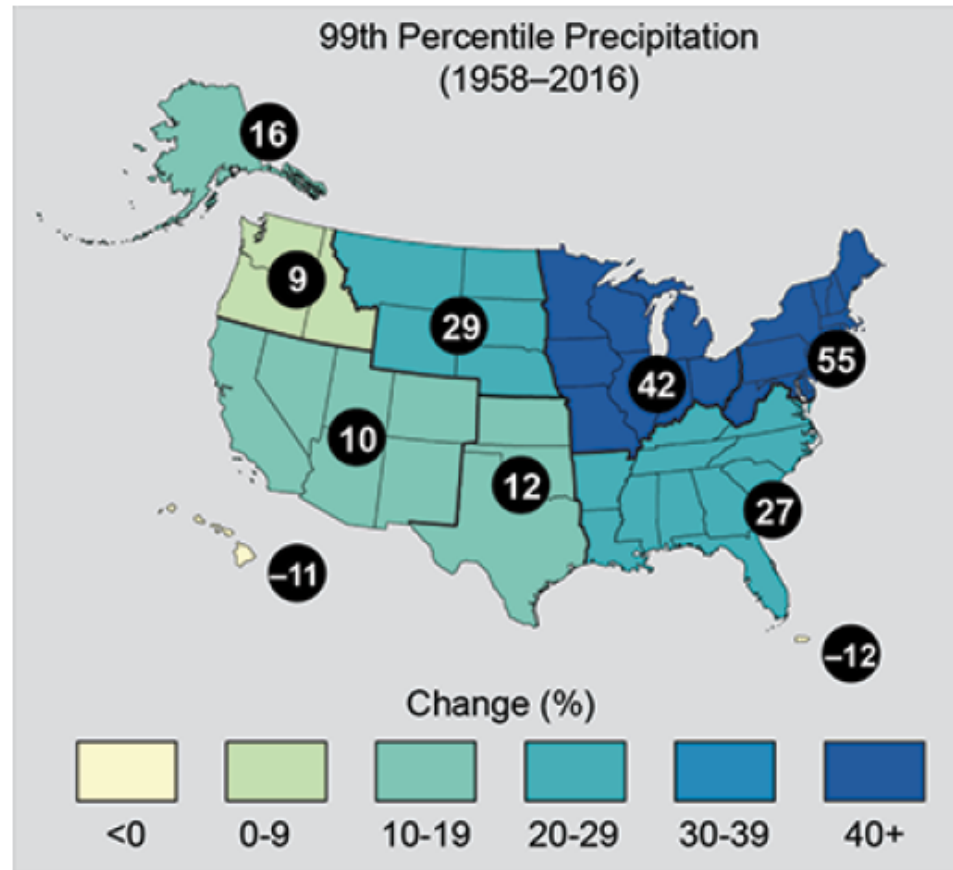
Chris Jones

U Of Iowa
IIHR

The Iowa Watershed Approach

Antonio
Arenas

U OF I
ihr



Observed change in heavy precipitation (the heaviest 1%) between 1958 and 2016. Figure taken from The Climate Science Special Report (Easterling et al. 2017) (<https://science2017.globalchange.gov/>).

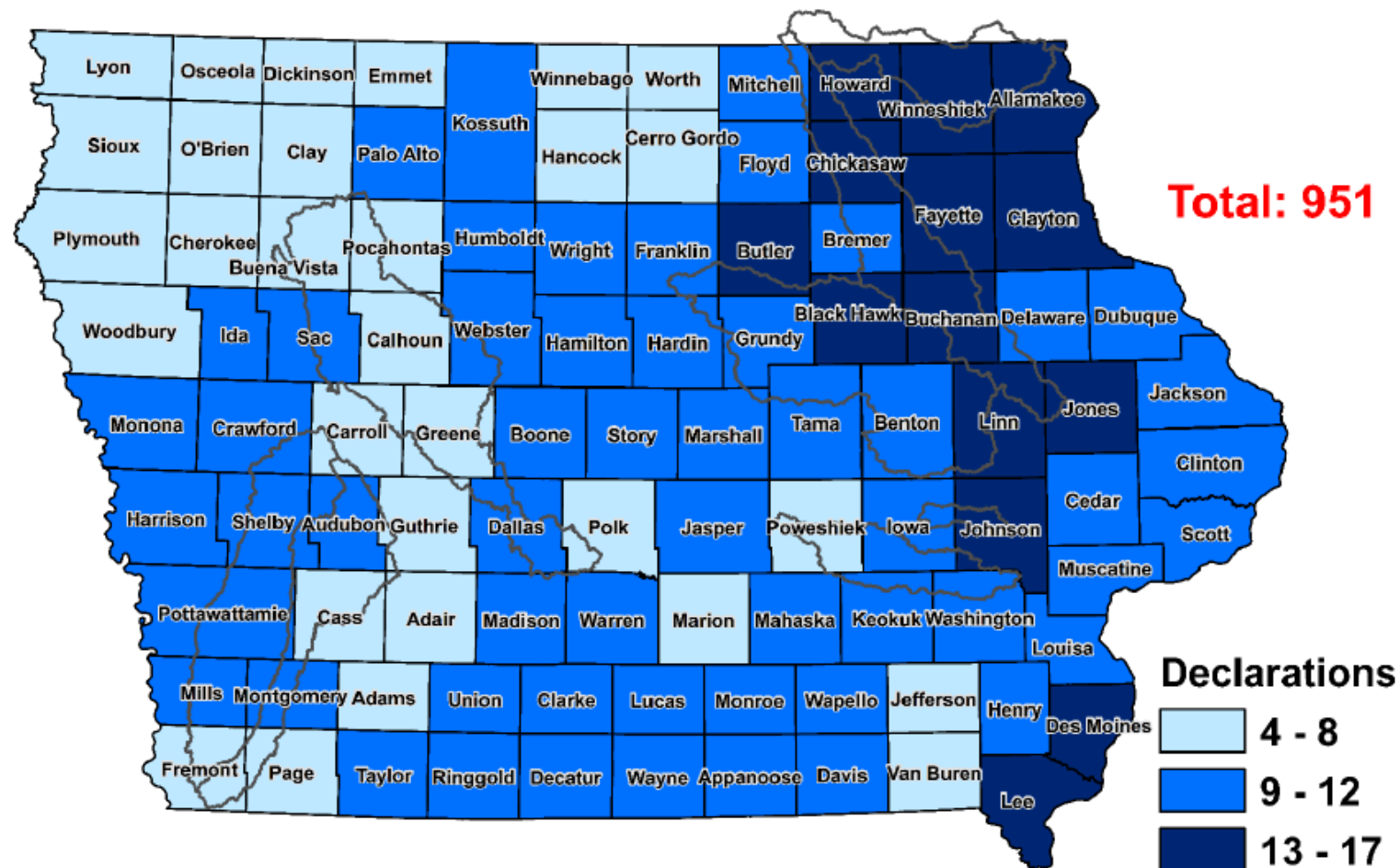
Date	Grundy Center ppt (inches)	Date	Vinton ppt (inches)
7/10/2000	5.91	8/12/2016	6.04
4/25/2008	4.35	5/30/2008	4.15
8/29/2015	4.11	6/15/1982	3.98
9/4/2018	3.98	6/12/2015	3.8
8/6/2018	3.76	11/4/2003	3.49
5/30/2013	3.56	7/1/2014	3.33
9/11/2006	3.36	7/9/1993	3.29
7/27/1990	3.22	6/17/1990	3.25
7/1/2018	3.17	8/8/1991	3.18
9/13/1991	3.16	4/18/2013	2.93

Date	Cedar Rapids ppt (inches)
6/17/1990	4.42
8/12/2016	4.14
7/17/2007	3.85
6/12/2015	3.75
4/18/2013	3.66
6/10/2018	3.36
8/26/1987	3.28
4/14/2014	3.16
6/15/1982	3.11

(Data source:
<http://www.prism.>

The Iowa Watershed Approach

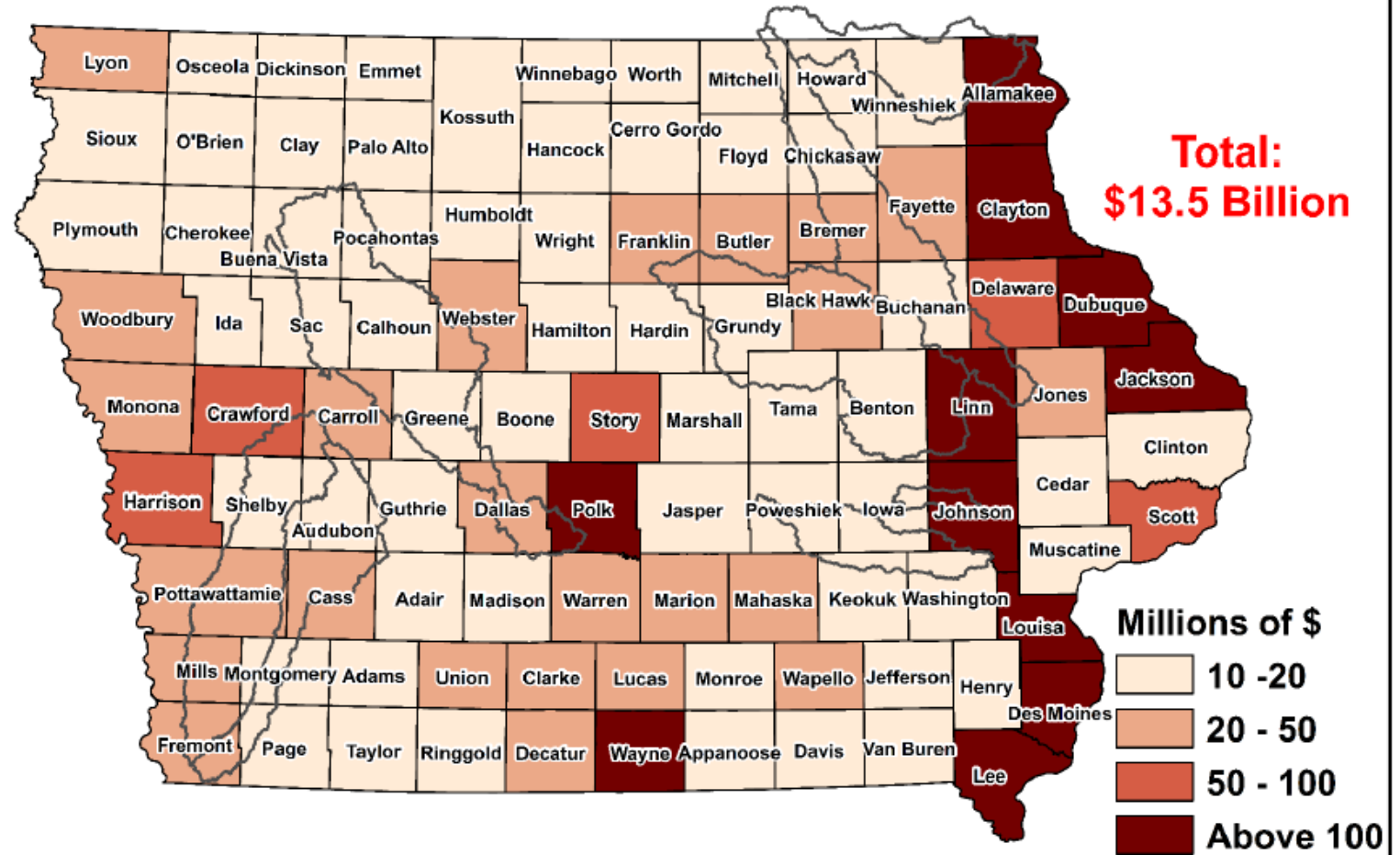
Flood-related FEMA Disaster Declarations 1988-2016



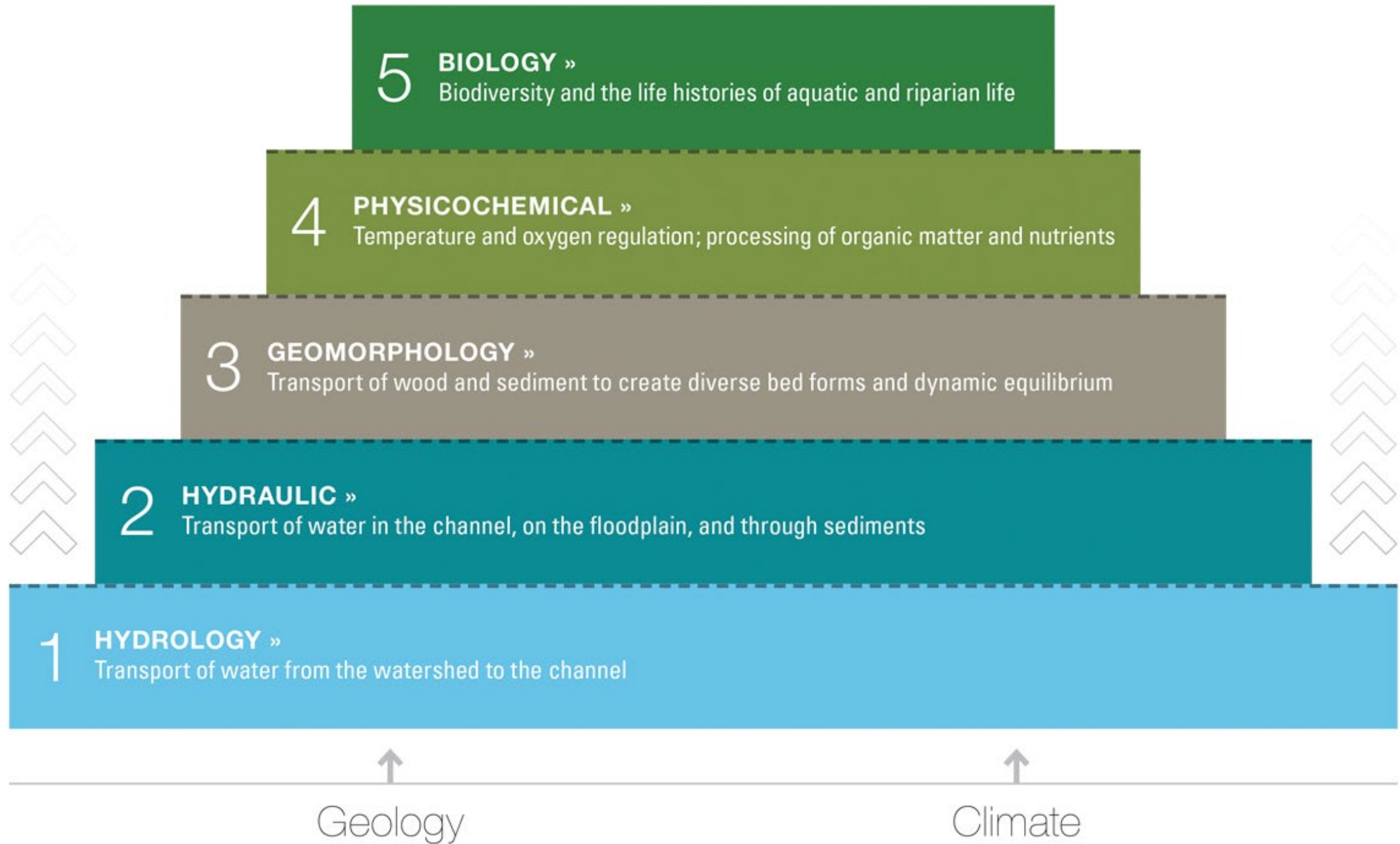


The Iowa Watershed Approach

Direct Property Losses from Flooding 1988-2015 (Adj. \$2016)

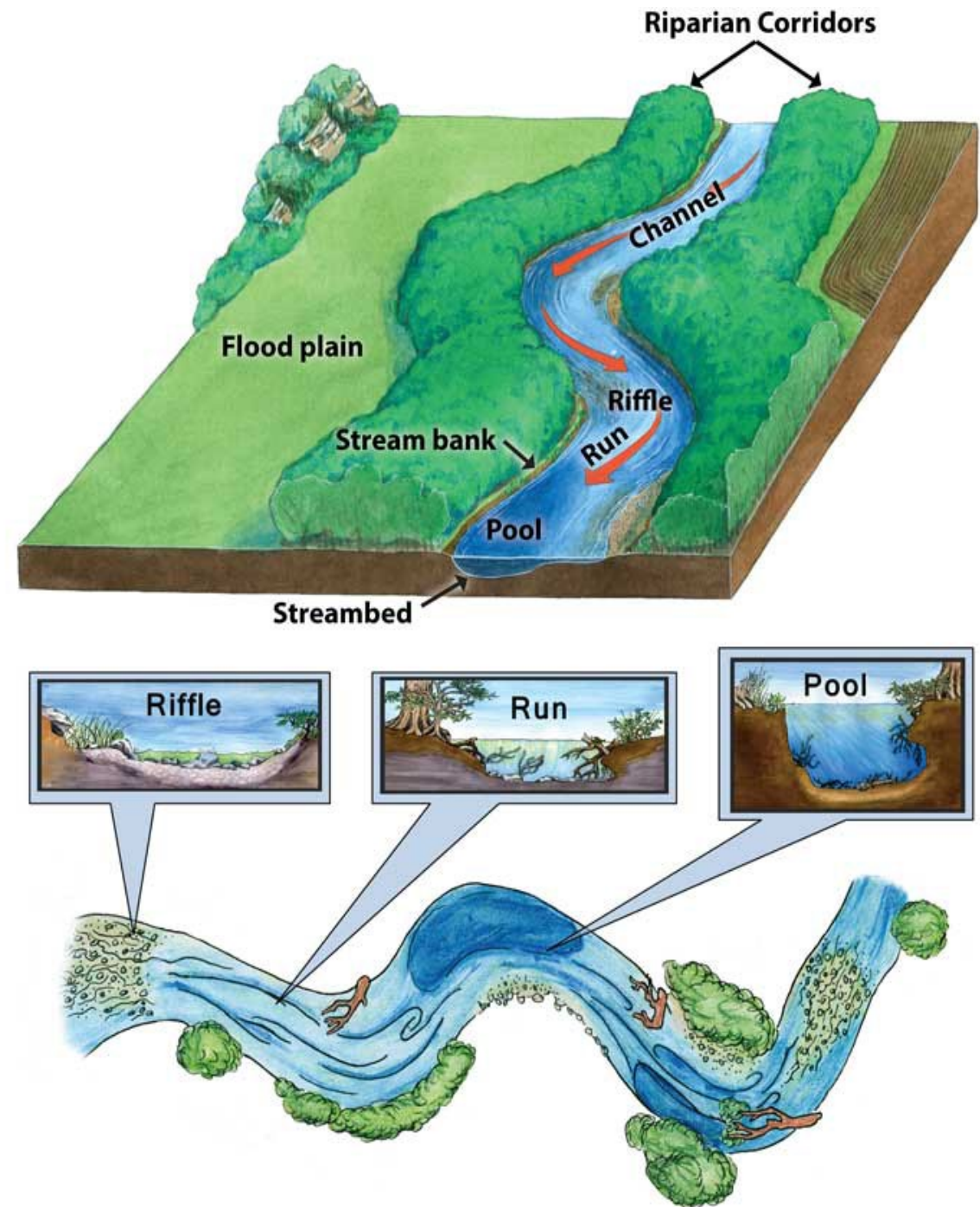


Stream Function Pyramid



Variables to a Properly Functioning Stream

- Stable form
- Limited erosion
- Water quality
- Diverse aquatic habitat



Environmental Characterization of Dry Run Creek Bank Sediments

Most populated of Iowa's
56 HUC 8 = 294,122

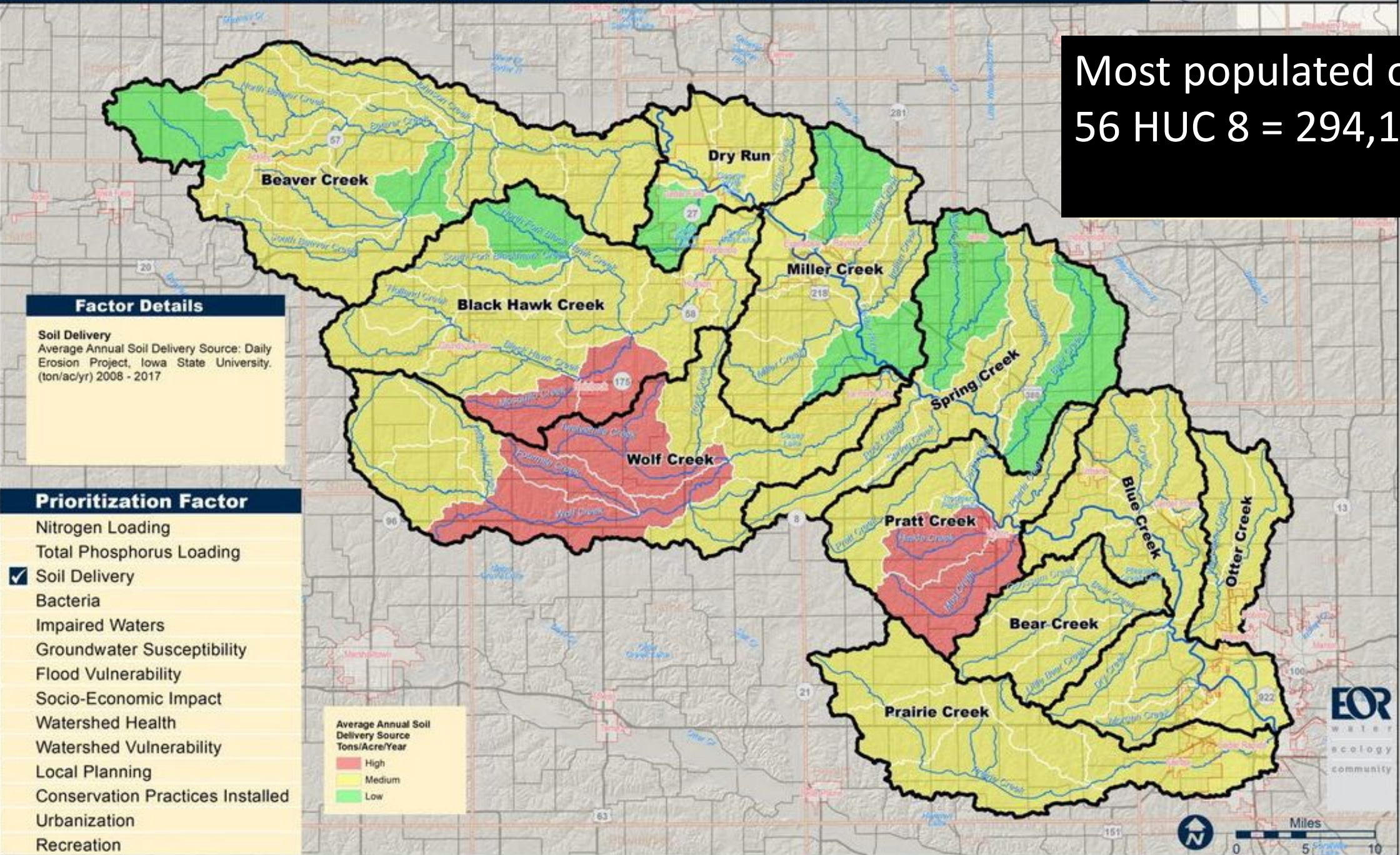
Factor Details

Soil Delivery
Average Annual Soil Delivery Source: Daily Erosion Project, Iowa State University. (ton/ac/yr) 2008 - 2017

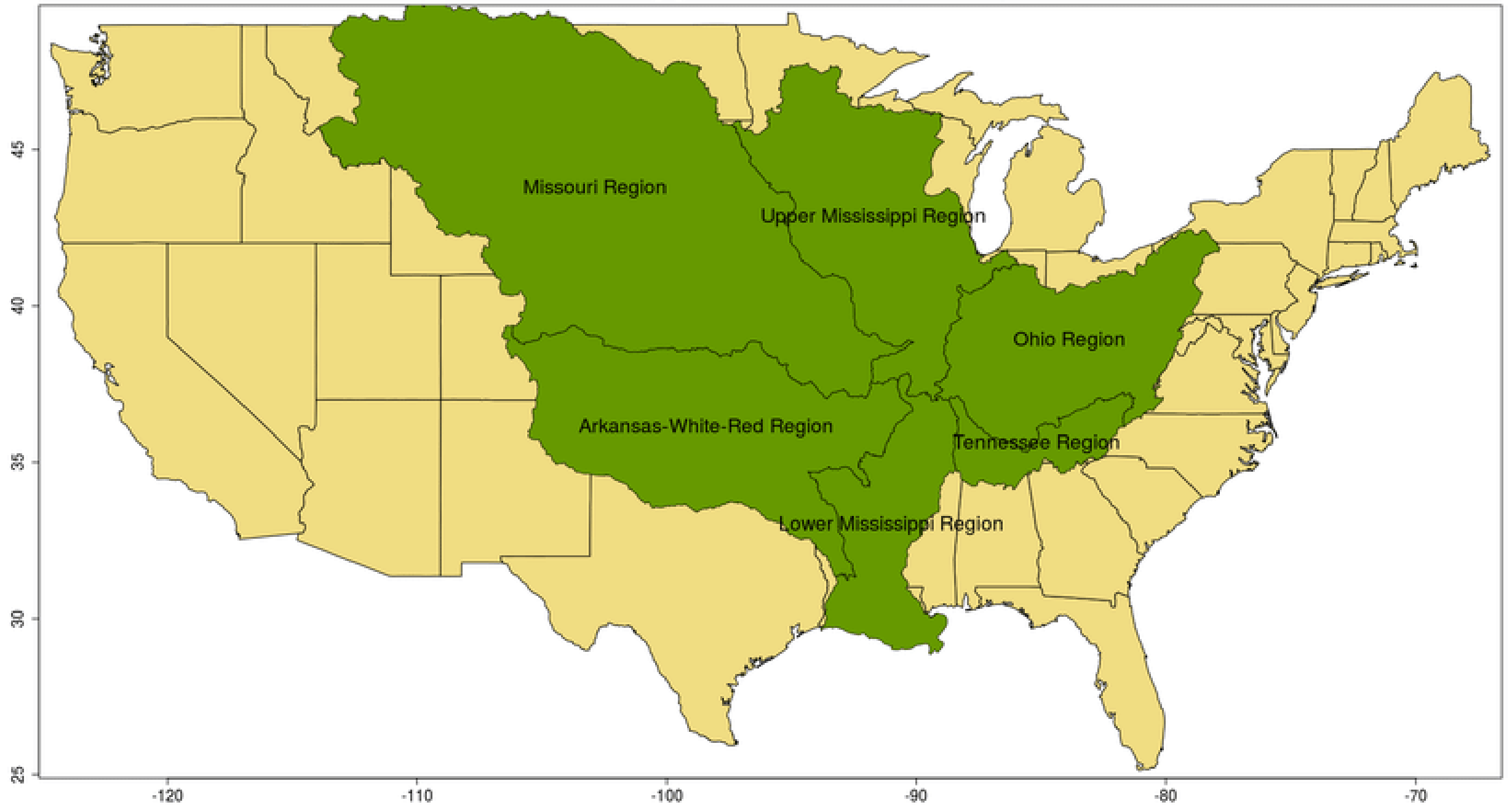
- Prioritization Factor**
- Nitrogen Loading
 - Total Phosphorus Loading
 - ☒ Soil Delivery
 - Bacteria
 - Impaired Waters
 - Groundwater Susceptibility
 - Flood Vulnerability
 - Socio-Economic Impact
 - Watershed Health
 - Watershed Vulnerability
 - Local Planning
 - Conservation Practices Installed
 - Urbanization
 - Recreation

Average Annual Soil Delivery Source
Tons/Acre/Year

- High
- Medium
- Low

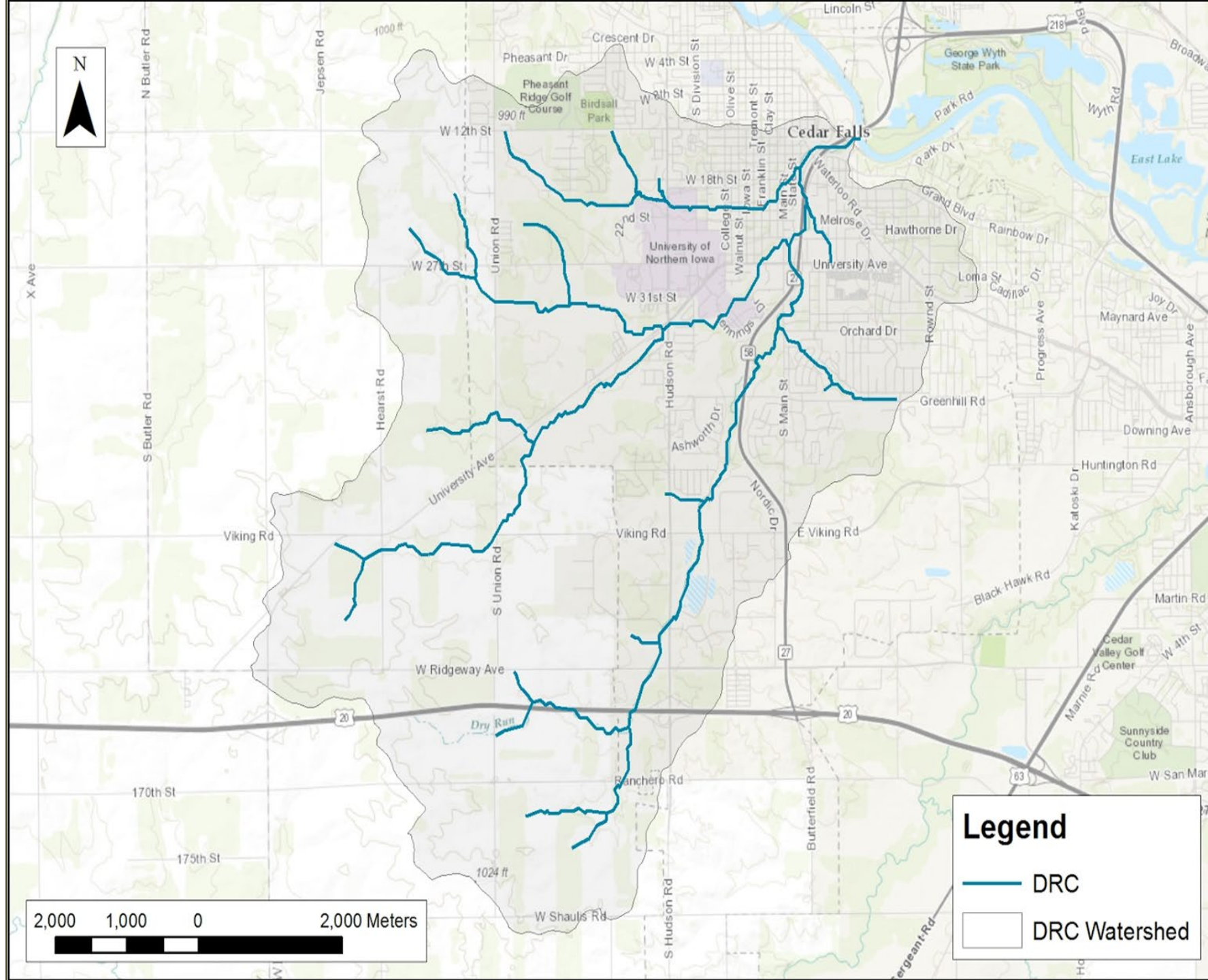


Mississippi River Basin (HUC-2)



Dry Run Creek

- 15, 177 acres
- Four main branches
- 30 miles total/12 urban
- Max. Relief = 150 ft
- Bacteria Impairment
- Biological Impairment



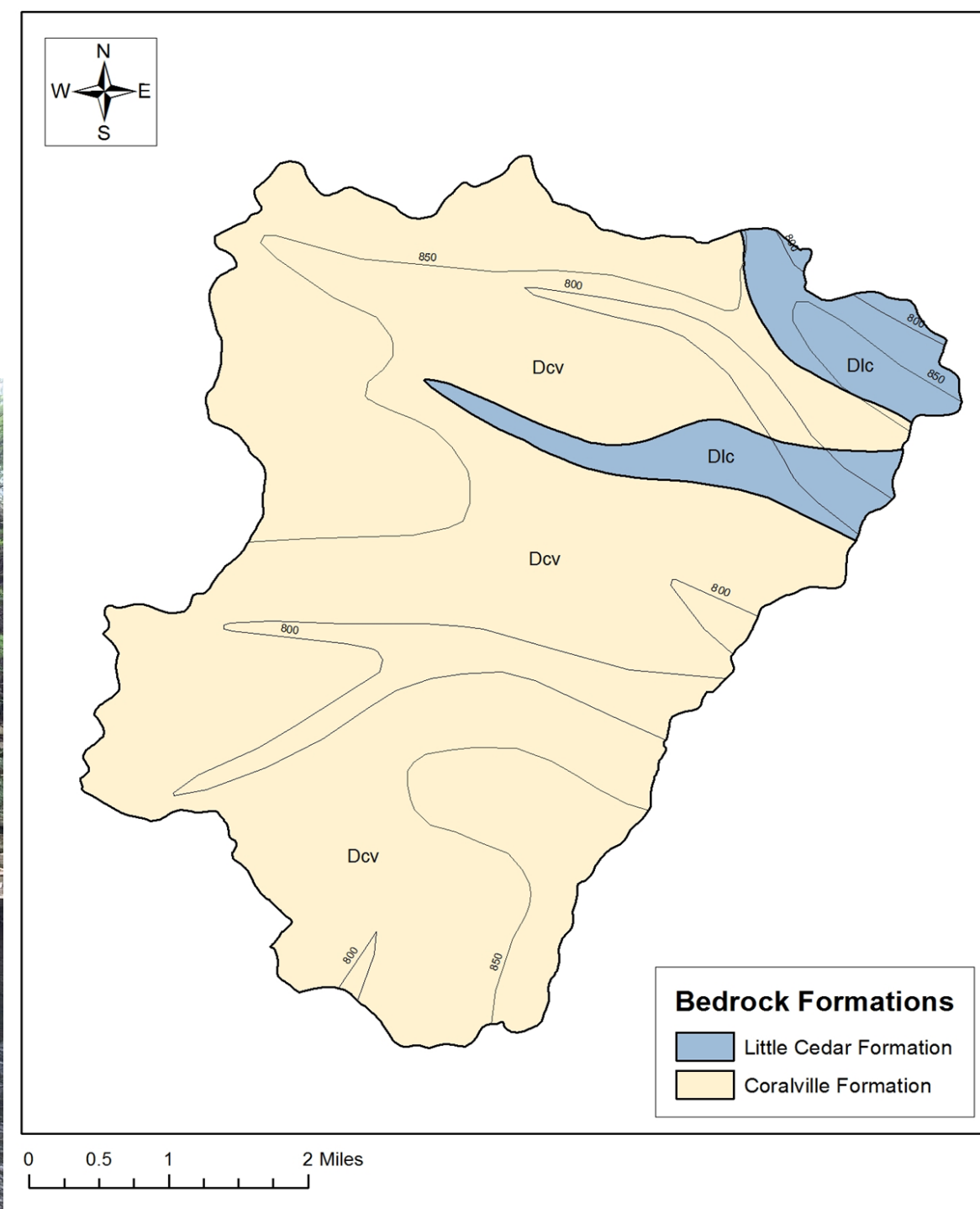
2017 UNI- Geomorphology



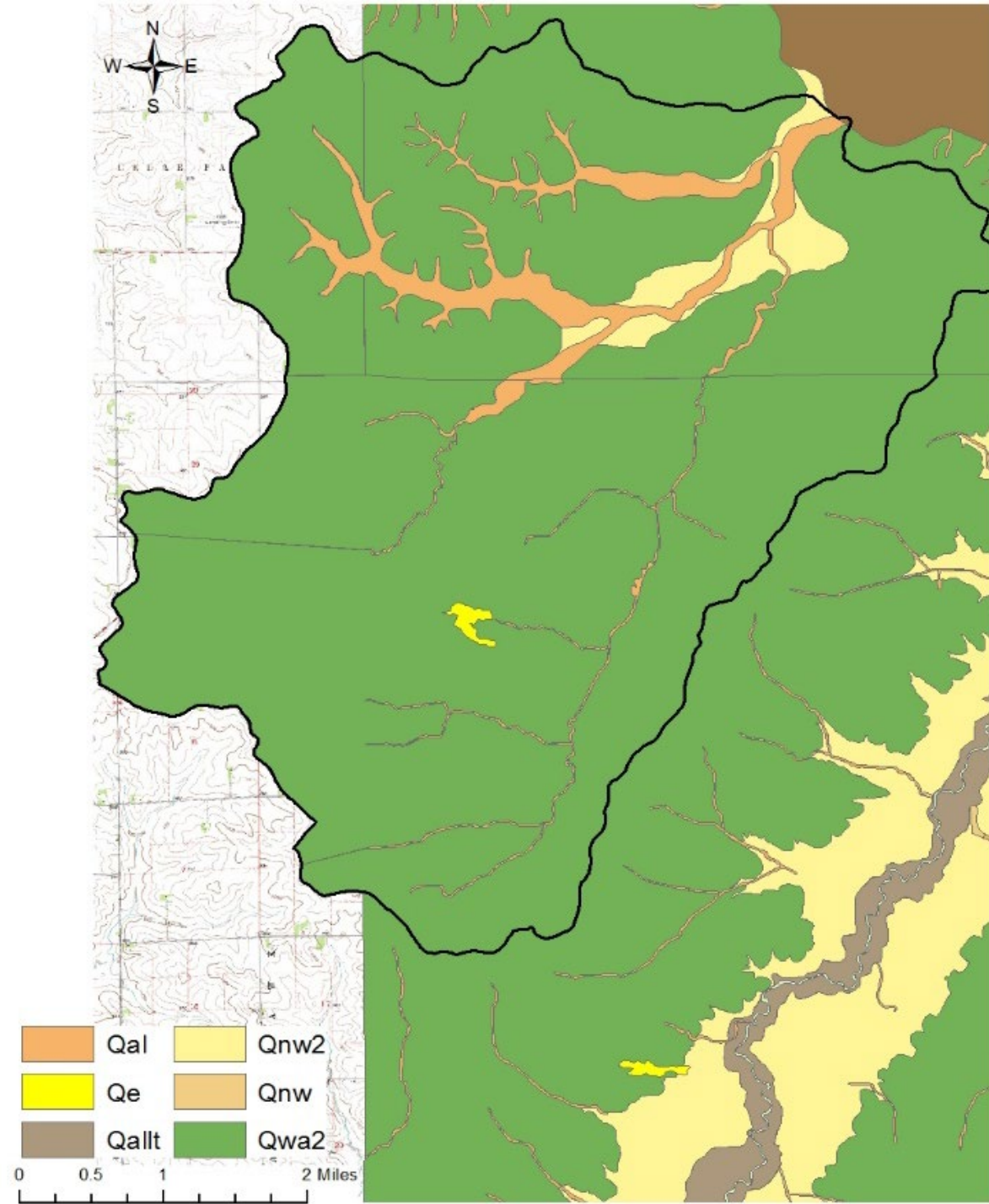
Stream Orders	1	2	3	4
Segments	23	6	2	1
Σ Lengths (ft / miles)	107328.3 / 20.33	59082.23 / 11.19	32438.98 / 6.14	6824.35 / 1.29
Σ Area (sq. ft / sq. mile)	351,748,853.40 / 12.62	462,130,703.08 / 16.58	532,115,736.44 / 19.09	662,984,015.83 / 23.78
Basin Shape (range)	0.33 to 3.75	0.29 to 3.97	0.46 to 3.75	14.24

Stream Orders	1st : 2nd	2nd : 3rd	3rd : 4th	Σ Basin
Length Ratio $RL = L_0/L_{0+1}$	1.8 : 1	1.8 : 1	4.8 : 1	
Bifurcation Ratio $RB = N_0/N_{0+1}$	4.3 : 1	3.0 : 1	2.0 : 1	
Basin shape $R_f = A_0/LB^2$ $= \text{Area}/\text{Length}^2$				0.73
Drainage Density $D = \Sigma L/A$				1.38 miles
Relief Ratio $R_h = H/L_0$				$= 180 / 42600$ $= 0.0004$
Ruggedness # $R = DH$				$= 1.38 * 0.03$ $= 0.47$

Bedrock



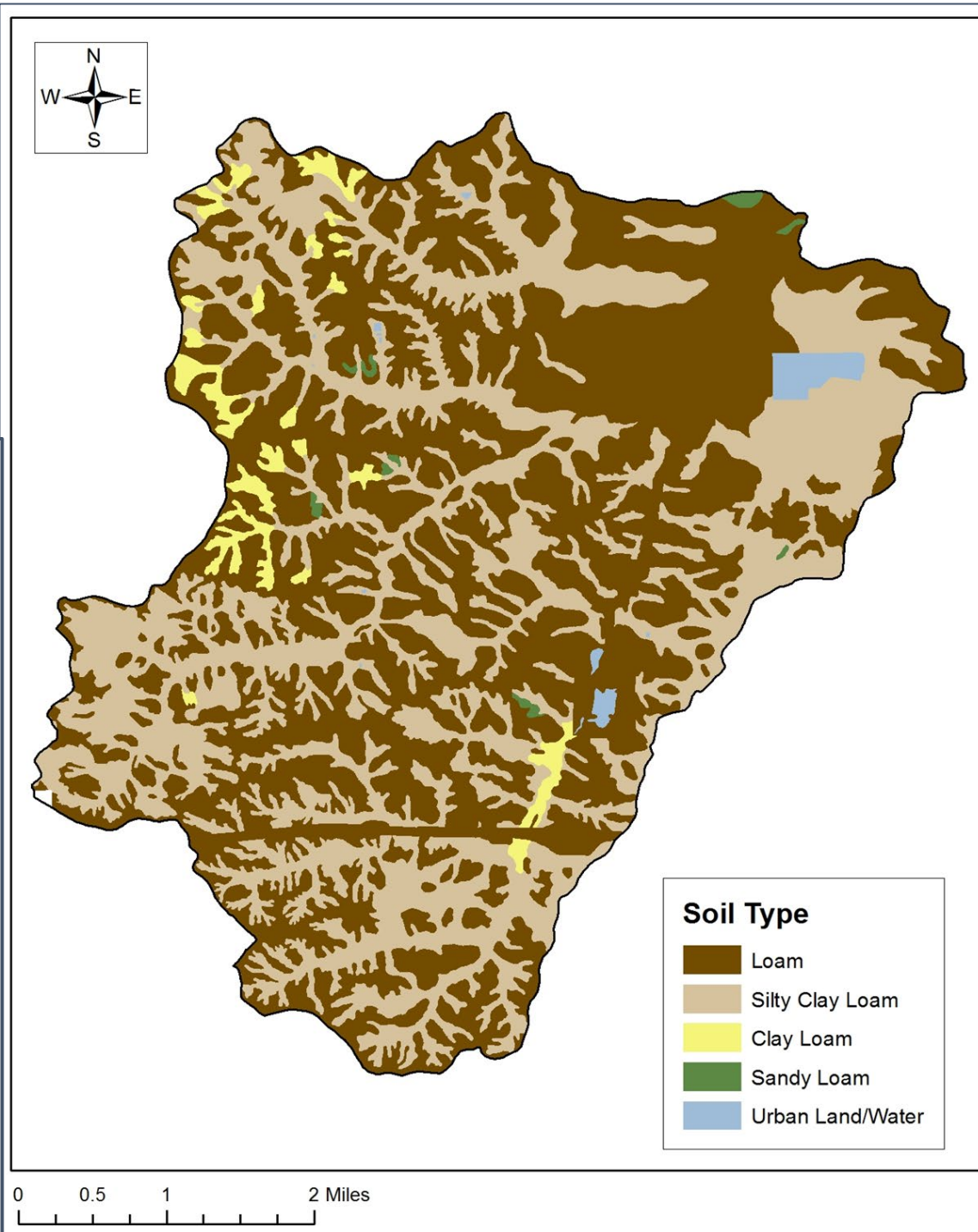
Surficial Geology



Soil

Soil Classification Tabulation

Parent Materials	Soil Classification	Area (Acres)	Percent of Watershed
Loam	Aredale, Bassett, Donnan, Floyd, Kenyon, Lawler, Marquis, Orthents, Readlyn, Sparta, Spillville-Coland, Saude, Waukee	8503.12	55.87%
Silty Clay Loam	Clyde, Clyde-Floyd, Colo, Colo-Ely, Dinsdale, Klinger, Klingmore, Maxfield, Maxmore, Nevin, Sawmill, Wiota	6142.69	40.36%
Sandy Loam	Burkhardt, Dickinson, Finchford, Lilah, Olin	384.44	2.53%
Clay Loam	Marshan, Tripoli	51.77	0.34%
Urban Land/Water	NA	137.98	0.9%



Stressors

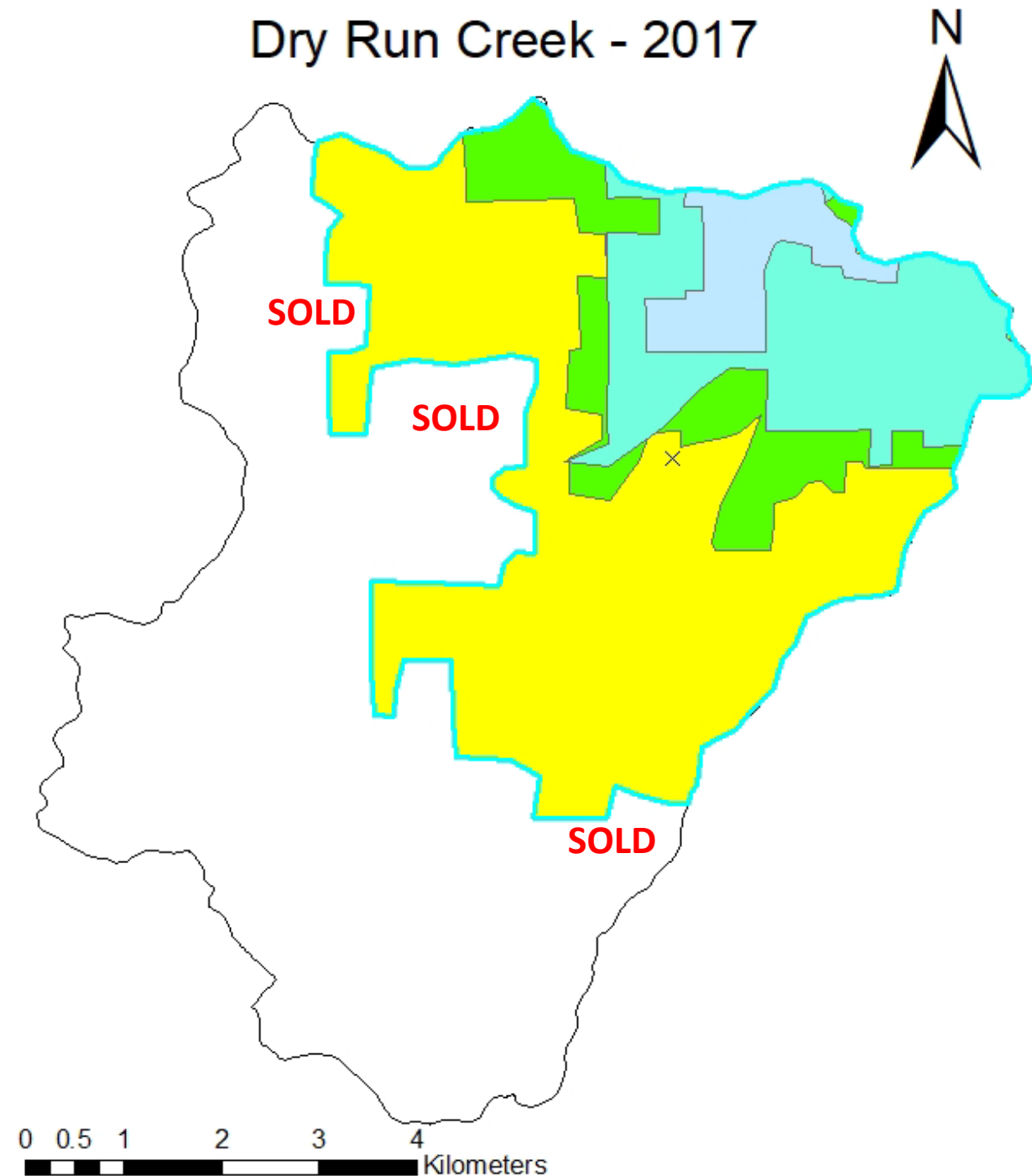
Urbanization of Cedar Falls, Iowa

2024 – 40,748

1990 – 34,298

1960 – 21,195

1930 - 7,632



HANSEN GRASSED WATERWAY

Josh Balk...
Now???

DRC
Watershed
Coordinator



- Subwatershed 7
- 42 acre drainage area
- 1.2 acre grassed waterway
- 25 tons of sediment reduced annually
- 32 lbs. of TP reduced annually
- Construction delayed from fall 2018 to spring 2019
- \$5,513.85 in WSPF set aside



Local groups

- Cedar River Watershed Coalition
- Iowa Northland Regional Council of Governments
 - Water Trails Master Plan
- Dry Run Creek Advisory Board
- Middle Cedar River Advisory Board
- Cedar Falls White Water Park
- Iowa-Cedar Interagency Coordination Team
 - http://iowacedarbasin.org/?page_id=14