Iowa Geological Survey Legislative Update

Keith Schilling, Ph.D.

Director and State Geologist, Iowa Geological Survey, University of Iowa

February 10, 2025

Who We Are

Fun Facts

- Established in **1892**
- IDNR 1986-2014
- IIHR **2014**-present
- State Geologists is Keith Schilling, Ph.D.
- Currently **16** staff:
  - 13 FTE scientists
  - 2 shared/part time
  - 1 admin support

UI Main Campus:
Trowbridge Hall

UI Oakdale Research Park:
IGS Rock Library

Our Mission:
"To collect, reposit, and interpret geologic and hydrogeologic data, to conduct foundational research, and to provide Iowans with the knowledge needed to effectively manage our natural resources for long-term sustainability and economic development."

IGS Celebrates10-Years at University of Iowa

- Celebration in December 2024
- Productive move for IGS - more entrepreneurial in securing additional funding
- Change in culture, new mapping initiatives, partnerships with state and federal agencies

However, we could be doing more for the State of Iowa if we had additional state funding

Base Funding for last 10 years

Division 5 Environment First Fund General Appropriations

Sec.26. STATEUNIVERSITYOFIOWA——IOWA GEOLOGICAL SURVEY. There is appropriated from the environment first fund created in section 8.57A to the state university of Iowa for the fiscal year beginning July 1, 2022, and ending June 30, 2023, the following amounts, or so much thereof as is House File 2560, p.16 necessary, to be used for the purposes designated:
1.OPERATIONS For purposes of supporting the operations of the Iowa geological survey of the state as created within the state university of Iowa pursuant to section 456.1, including but not limited to providing analysis; data maintenance, collection, and compilation; investigative programs; and information for water supply development and protection:.....$200,000
2. WATER RESOURCE MANAGEMENT For purposes of supporting the Iowa geological survey in measuring, assessing, and evaluating the quantity of water sources in this state and assisting the department of natural resources in regulating water quantity as provided in chapter 455B, subchapter III, part4, pursuant to sections 455B.262 Band 456.14:.....$495,000

- IGS appropriation of $695,000 was constant from 2014 to 2024

Comparison of state appropriations to midwestern state geological surveys:

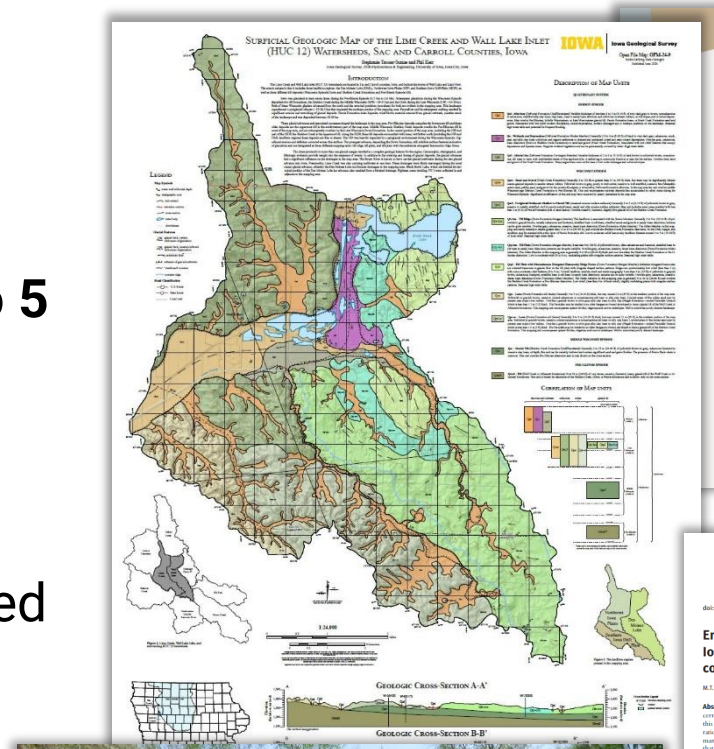
State	2022
Minnesota	$1,473,526
South Dakota	$2,450,000
Nebraska	$2,500,000
Indiana	$2,700,000
Wisconsin	$2,026,146
Kentucky	$4,181,029
Illinois	$4,492,841
Ohio	$6,082,584
Kansas	$8,800,000
Missouri	$6,512,479
Michigan (2023)	$3,000,000
Average appropriation	$4,019,873
Iowa appropriation	$695,000

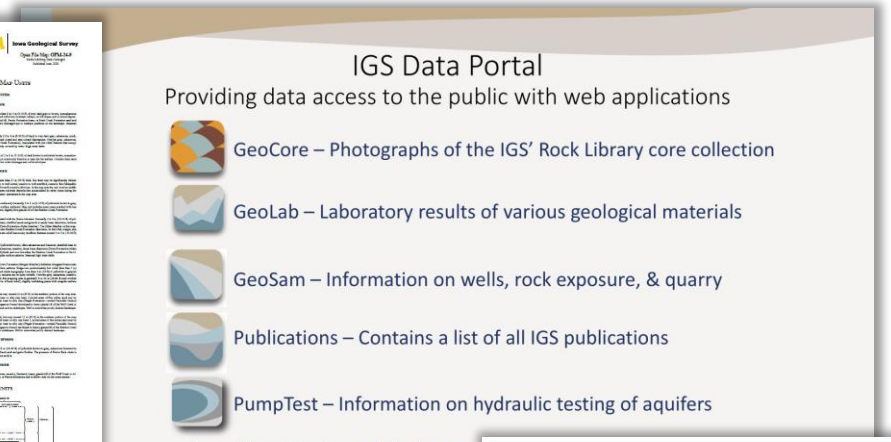
The State of Iowa appropriation is less than one-fifth (17%) of the average state appropriation provided to other geological surveys in the region

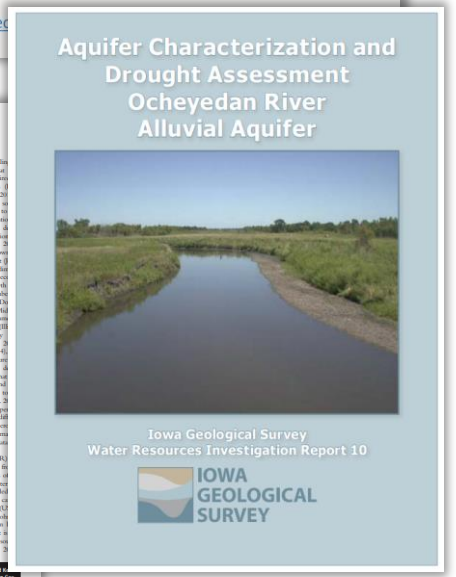
IOWA

Decade at IIHR/UI…by the numbers

- Doubled IGS staff from **8** to **16**
- Employed **>60** student interns
- Increased public databases from **1** to **5**
- Published **76** geologic maps
- Issued **11** Water Resources Investigations
- Lead or co-authored **142** peer-reviewed publications
- Countless public engagements via phone, email, STEM events, job shadows, fairs, field trips…







Groundwater resources = Economic development

Des Moines Sunday Register
SUNDAY, DECEMBER 3, 2023 | THE NEWS IOWA DEPENDS UPON | DESMOINESREGISTER.COM
PART OF THE USA TODAY NETWORK

SUBSCRIBER-EXCLUSIVE SPECIAL SECTION INSIDE

SNOW GETAWAYS YOUR BEST BETS FOR AFFORDABLE WINTER FUN

'Adding another straw to this big drink'

Parts of Iowa drier than the Dust Bowl; state preps for water shortages

Authors of banned books reject criticisms

Say they wanted to educate, not create porn

Phillip Sitter and Chris Higgins
Des Moines Register
USA TODAY NETWORK

Iowa needs a plan for using its precious groundwater

Your Turn
Keith Schilling
Guest columnist

A conversion of several factors, some natural and some self-imposed, is leading to recognition that the state of Iowa needs a plan to safeguard groundwater reserves in the future.

Droughts occur on average about once per decade in Iowa, and current drought was preceded by droughts in 2012, 2000, 1988-89 and beyond. Less rainfall during drought reduces infiltration recharge to shallow groundwater, lowers water table levels and reduces groundwater discharge as baseflow to rivers and streams. Drought conditions invariably increase the demands for agricultural crop irrigation, and many communities find that water use increases during drought from lawn watering and other outdoor water uses. In addition, new and increasing pumping demands from a rapidly urbanizing population, ethanol plants and other industrial facilities, data centers (requiring vast quantities of cooling water), animal confinements and other users are challenging urban and rural water systems to keep groundwater supplies on pace with demand.

Groundwater in Iowa is not evenly distributed, and there are water-rich and water-poor areas of the state. Northeast Iowa is relatively groundwater rich because the bedrock aquifers in the area consisting of fractured carbonate rocks are able to store, transmit and yield large quantities of groundwater for use. Groundwater in this area is rapidly replenished with rainfall and snowmelt. On the other hand, western and southern Iowa are relatively groundwater poor, as the bedrock is either too fine-textured and impermeable to yield much water, or the aquifer is capped by hundreds of feet of clay-rich glacial soils that limit precipitation recharge. In these areas, water suppliers often focus on extracting groundwater from shallow sands and gravels that occupy rivers valleys (alluvial aquifers) or pumping from deep bedrock aquifers like the Cambrian-Ordovician aquifer (aka "Jordan" aquifer). Both of these aquifer types are vulnerable to drought and overuse. Water levels in shallow alluvial aquifers are rapidly lowered during drought when pumping continues as precipitation recharge stops. Water levels in deep bedrock aquifers decline because new and increasing demands exceed recharge.

A groundwater plan is needed for Iowans to sustainably balance groundwater use with recharge. Think of a groundwater supply like your checkbook at home. You get paid on a regular basis, and from this weekly "recharge" to your bank account, you pay your mortgage, bills, and occasionally go out to eat. It is important to have your checkbook balanced so that your expenses do not exceed your income and you fall into debt. The aquifers that contain our groundwater supply are similar to your checkbook. They receive recharge from precipitation or from leakage through other geologic units, they build up their water levels, and from this supply, we are able to withdraw water from the aquifer "bank" to meet societal needs.

A groundwater plan would produce a water budget for the major aquifers of Iowa. The budget would tell us how much water is recharged to the aquifers, how much groundwater they contain, how much water is discharged to streams and leaked to lower aquifers, and how much water can be sustainably withdrawn without depleting them. For alluvial aquifers, creating a water budget would include mapping the horizontal and vertical extent of the sand and gravel deposits in the state. The Iowa Geological Survey is well equipped to do this with geophysics, drilling and landscape analysis of glacial and post-glacial sedimentology. Although some mapping of alluvial deposits is done at local scales for water supply systems, there is a need to do this at a statewide basis where local interests can be put in the context of statewide needs. For example, local users of the Raccoon River alluvial groundwater rightly focus on their individual piece of the pie, but how much groundwater is available to everyone and how much can be sustainably pumped without depleting the resource and impacting flow to the Raccoon River? For bedrock aquifers where groundwater exploration can be expensive, groundwater budgets can be created using existing geospatial and rock core data available at Iowa Geological Survey.

Computer models of bedrock systems can then be developed to evaluate groundwater sustainability.

There is a need to for the state to fund the research, mapping and analyses needed to improve our understanding of Iowa's groundwater resources. A groundwater plan would balance the current and future needs for groundwater extraction with long-term sustainability for future generations.

Keith Schilling is state geologist and director of Iowa Geological Survey at the University of Iowa.

The Gazette
Eastern Iowa's independent, employee-owned newspaper
Sunday, January 5, 2025 | Slight chance of flurries. H 21 L 11 6C | www.thegazette.com | ©The Gazette

The $140.6 million Sub-Zero plant, shown last month, is being built at 10015 Sixth St. SW in Cedar Rapids near The Eastern Iowa Airport. The 614,000-square-foot factory, which is to open this fall, is part of the $1 billion in industrial development made in southwest Cedar Rapids since 2017. (Photo courtesy of James Perkins/Whirlybirds)

C.R.'s Southwest Growth Area BOOMING

City sees $1 billion-plus in industrial development since 2017

petitive land prices.
"Generally speaking, these (questions) include, is there land available, and how expensive is it?" Micheel said. "Is there water available, and is there power?"

IGS Update from 2024 Legislative Session

- New Legislative Funding – $250,000 for *groundwater planning and resource assessment*

What did we do with this new funding?

- Hired new hydrogeologist
- Supported other current IGS staff to work on aquifer mapping initiatives
- Focused on Iowa River alluvium initially
- Geophysics, mapping and installation of new nested wells
- NW Iowa bedrock aquifer and buried channel systems

DIVISION X
BLUFFLANDS PROTECTION REVOLVING FUND
PART A
APPROPRIATIONS AND TRANSFER

Sec. 29. APPROPRIATION TO SUPPORT IOWA GEOLOGICAL SURVEY.

1. Notwithstanding sections 161A.80A and 161A.80B, there is appropriated from the blufflands protection revolving fund created in section 161A.80A to the state university of Iowa for the fiscal year beginning July 1, 2024, and ending June 30, 2025, the following amount, or so much thereof as is necessary, to be used for the purposes designated:

For purposes of supporting a groundwater planning and resource assessment project to be administered by the Iowa geological survey of the state as created pursuant to section 456.1:

..... $ 250,000

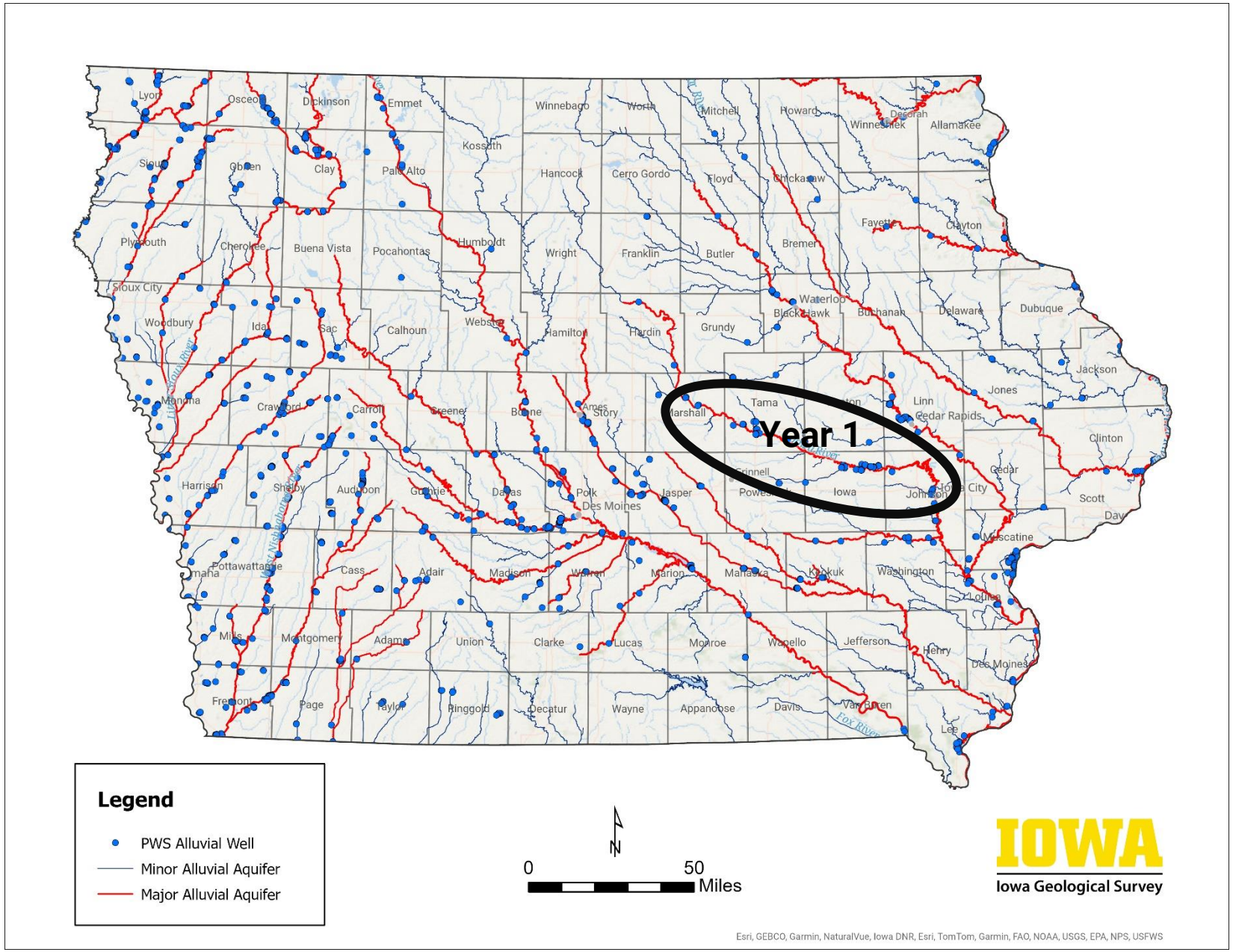
2. The moneys appropriated in subsection 1 shall be used by the Iowa geological survey to map and assess the condition of this state's aquifers. The Iowa geological survey may measure the volume of groundwater that is available for various uses, the current and predicted allocations of groundwater to support those uses, the recharge rate for the aquifers, and the development of models for budgeting this state's water resources.

3. Notwithstanding section 8.33, moneys transferred in subsection 1 shall not revert to any fund but shall remain

Alluvial Aquifers

More than 40+ other similar alluvial systems that are heavily utilized in the state

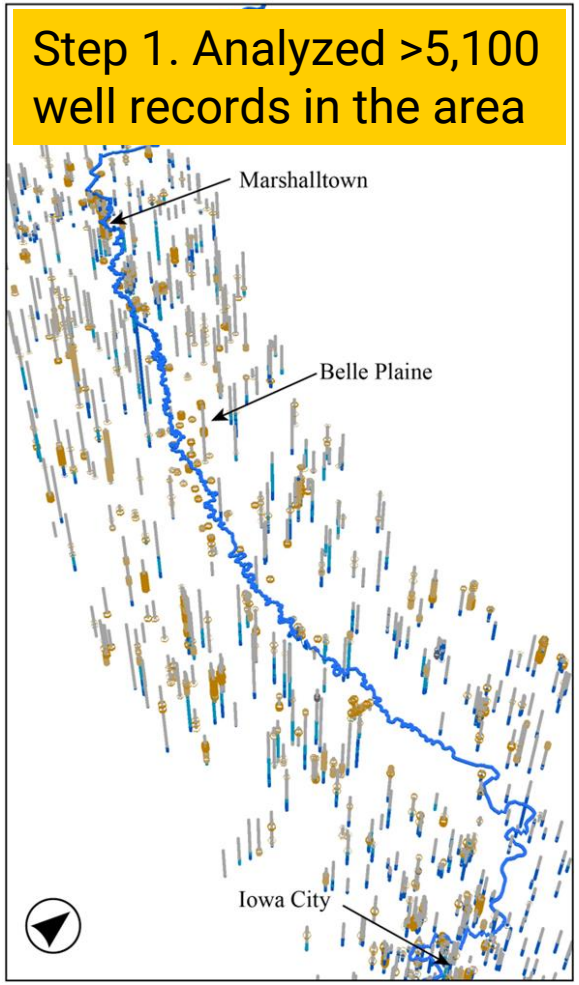
How long before they can be similarly evaluated?



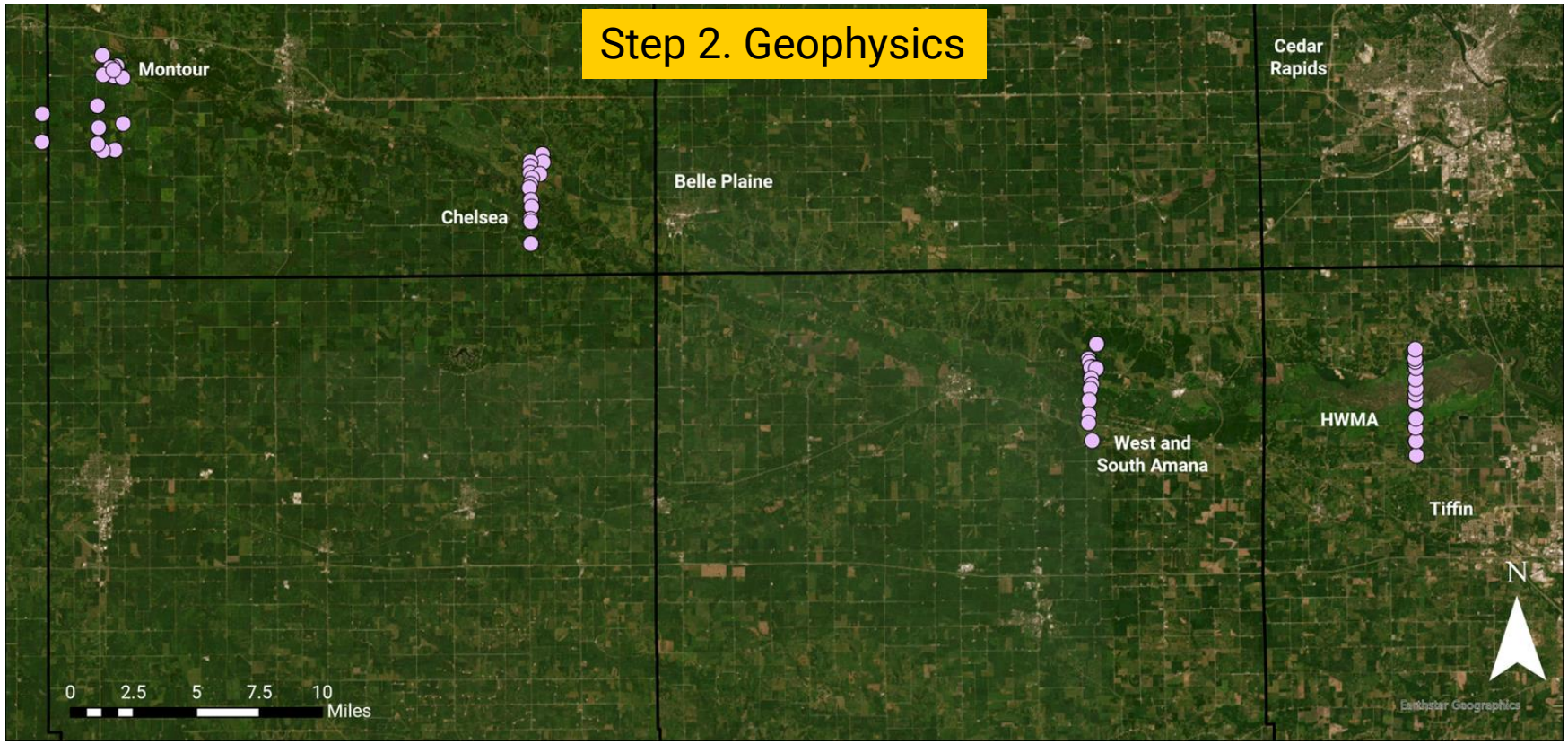
IOWA

Iowa River Alluvial Aquifer

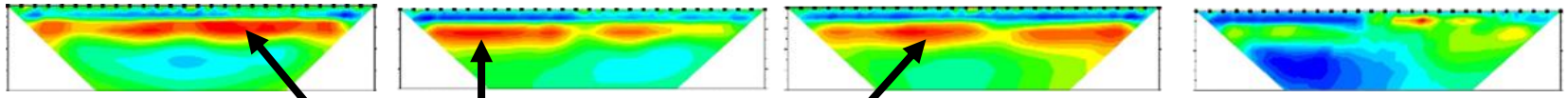
Step 1. Analyzed >5,100 well records in the area



Step 2. Geophysics



Electrical Resistivity



sand and gravel (aquifer)

BELLE PLAINE

Aquifer mapping paying dividends

Southeast Iowa Union

News ▾ Sports Community Opinion Obituaries Special Sections SEIA Live! Public Notices

MORE STORIES

Fairfield Beautification Commission honors volunteers, plans lots of projects for 2025

After passing strict ordinance, Washington County puts moratorium on wind turbines

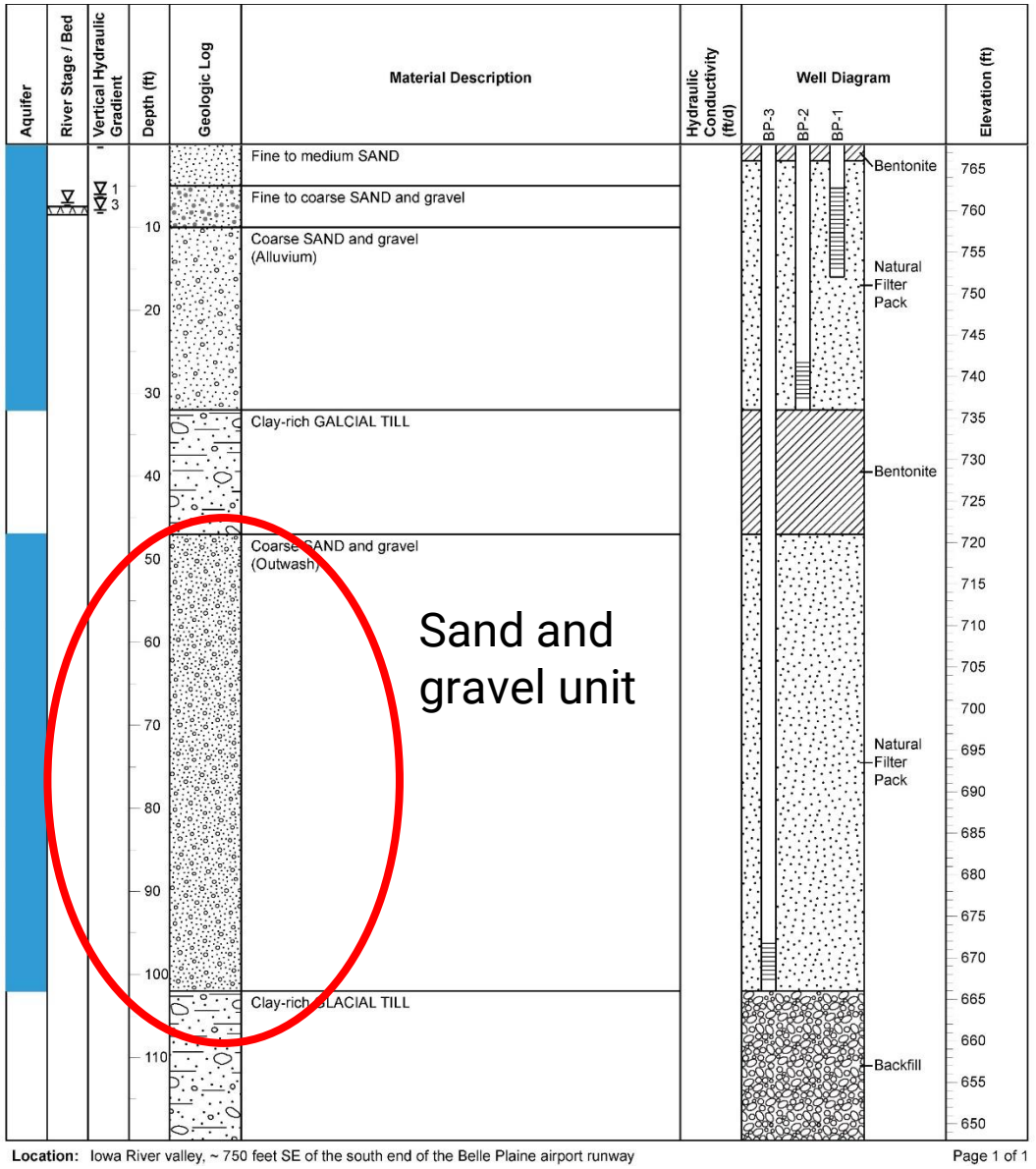
Scott Reneker reflects on 32 ye as Jefferson County Auditor

HOME / HOMETOWN CURRENT

Long-term water problems need long-term solutions

Belle Plaine tackles complaints one by one

"What put us in distress as a community was the D4 drought designation," said City Administrator Steve Beck

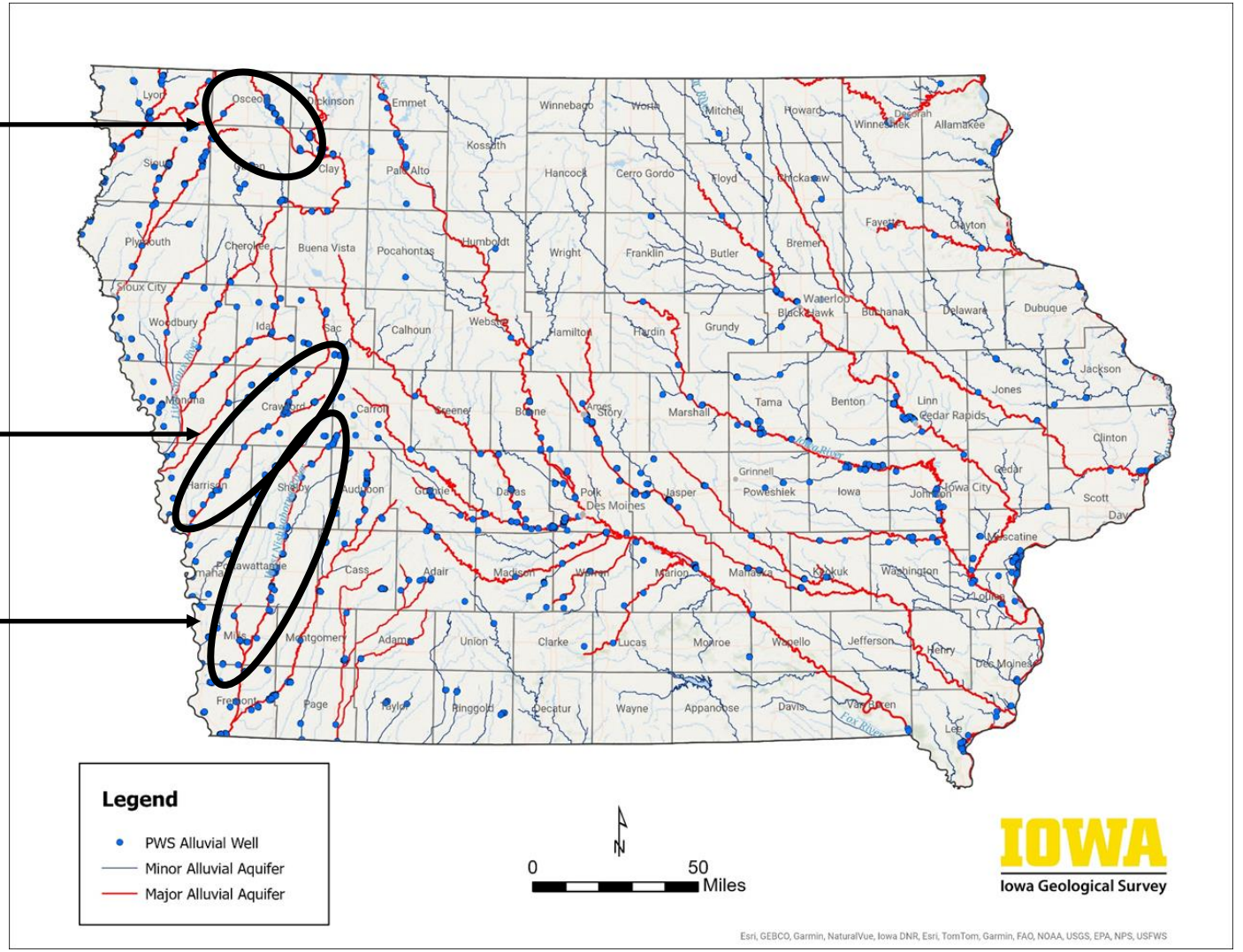


Future alluvial aquifer assessments

Ocheyedan River from headwaters to the Little Sioux River (FY26)

Boyer River from glacial margin to Missouri River (FY27)

West Nishnabotna from glacial margin to Missouri River (FY28)



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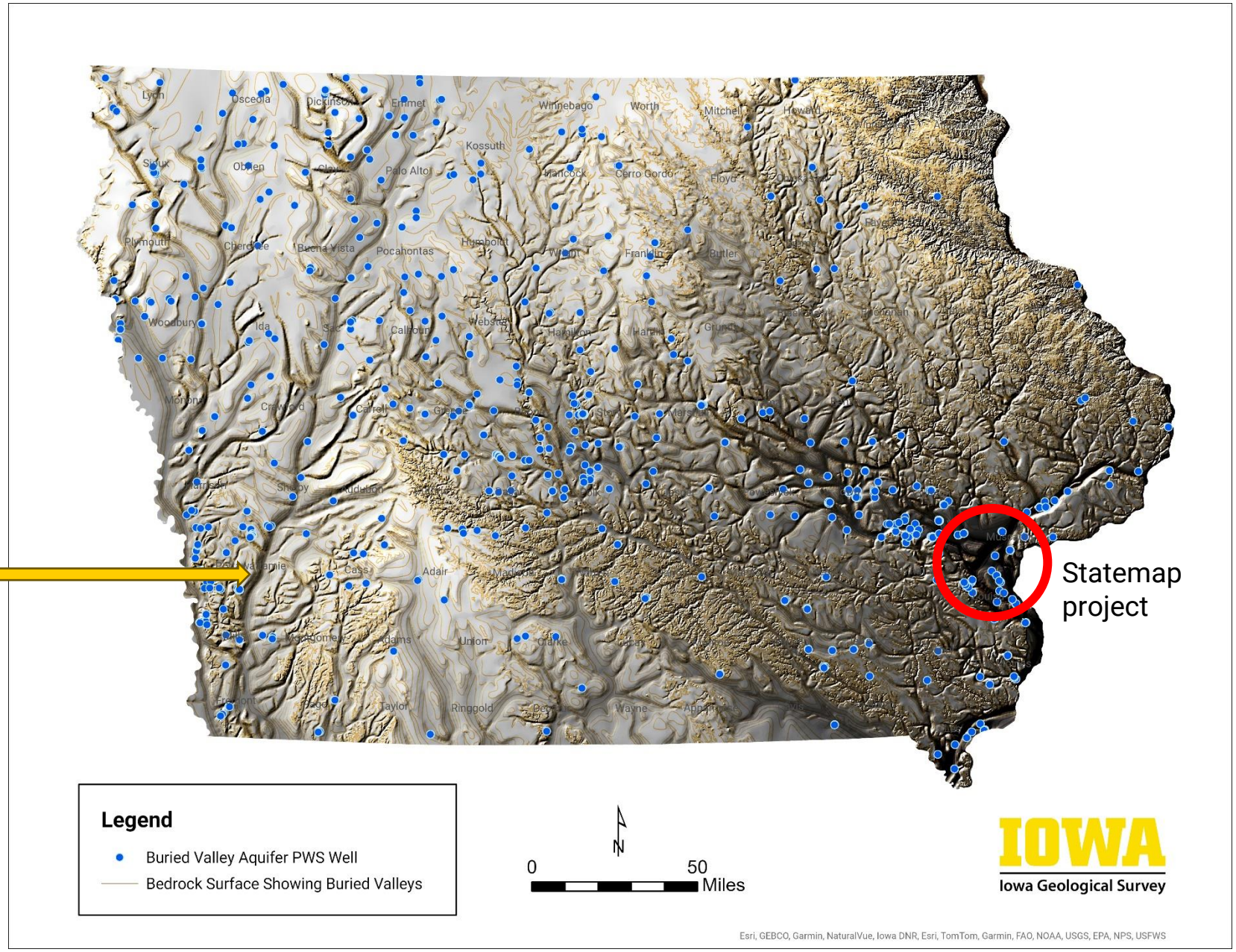
Buried Channel Aquifers

<u>Fremont Channel</u>

- >500 feet deep
- Unknown sand and gravel (aquifer) resources



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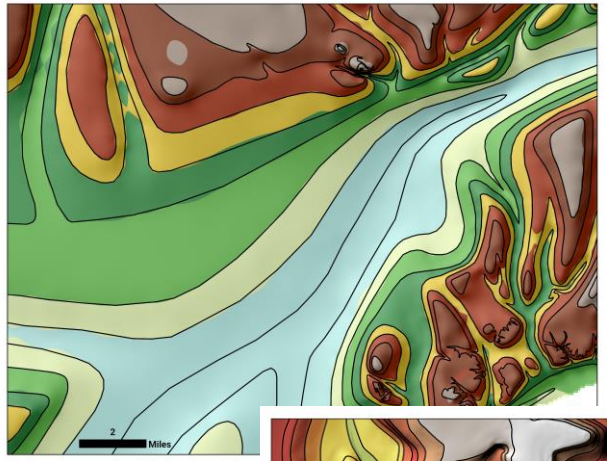
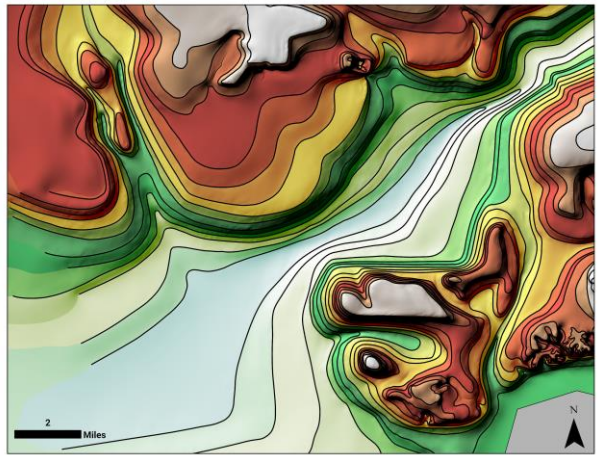
Cleona Channel in Muscatine County

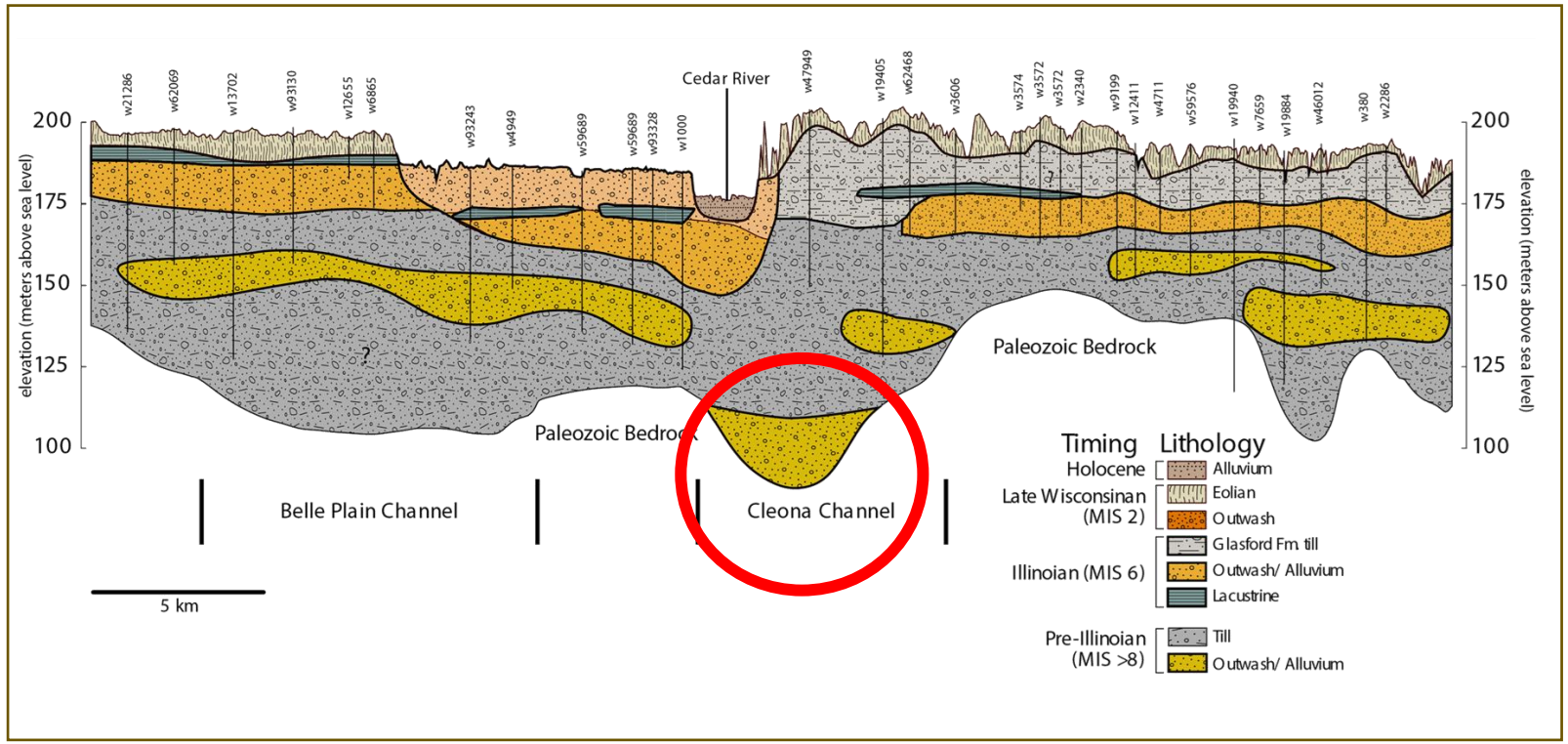
Before



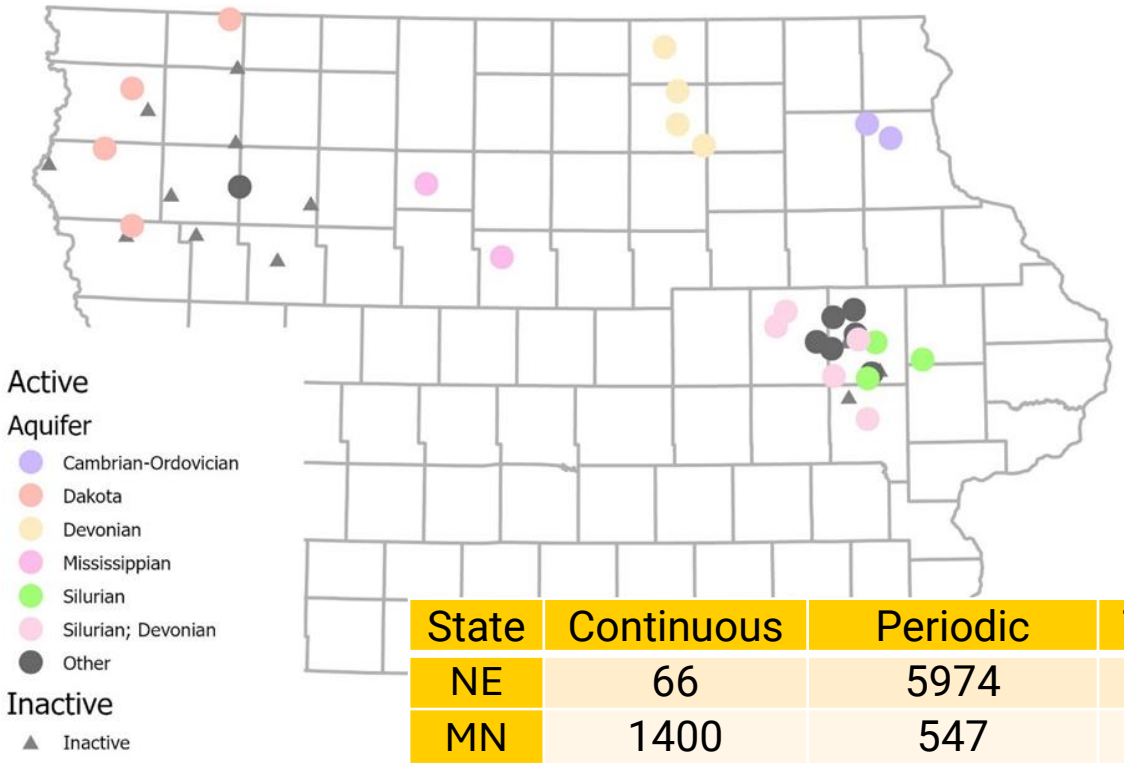
After



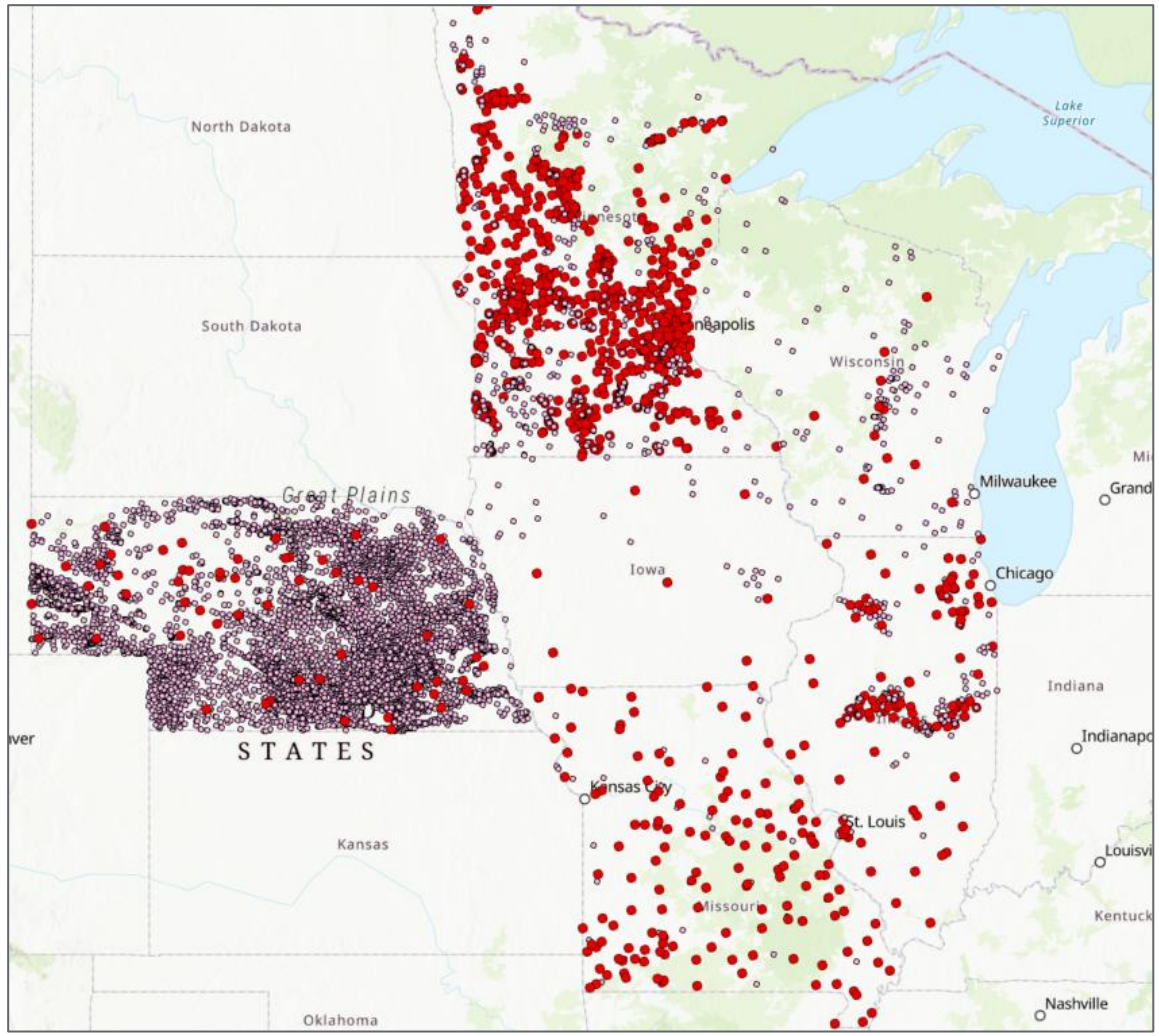
Massive water quantity potential in buried channel aquifers in Iowa – <u>understudied and untapped</u>



Iowa Groundwater Level Monitoring Network

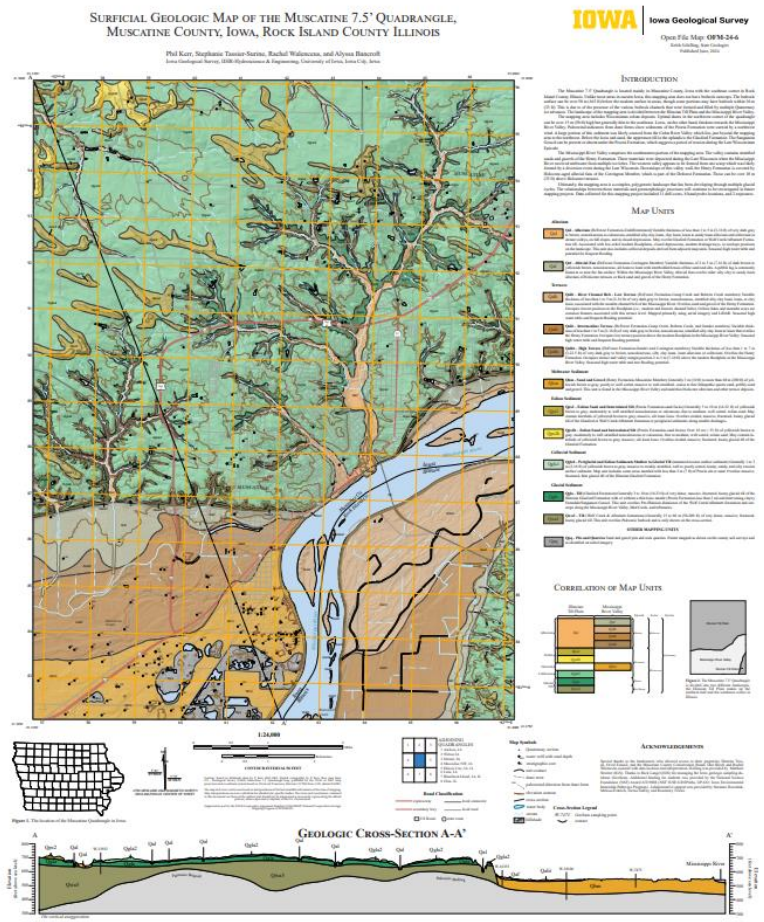


State	Continuous	Periodic	Total
NE	66	5974	6040
MN	1400	547	1947
IL	142	214	356
MO	150	32	182
WI	13	156	169
IA	**7**	**42**	**49**



Current USGS-match funded mapping initiatives

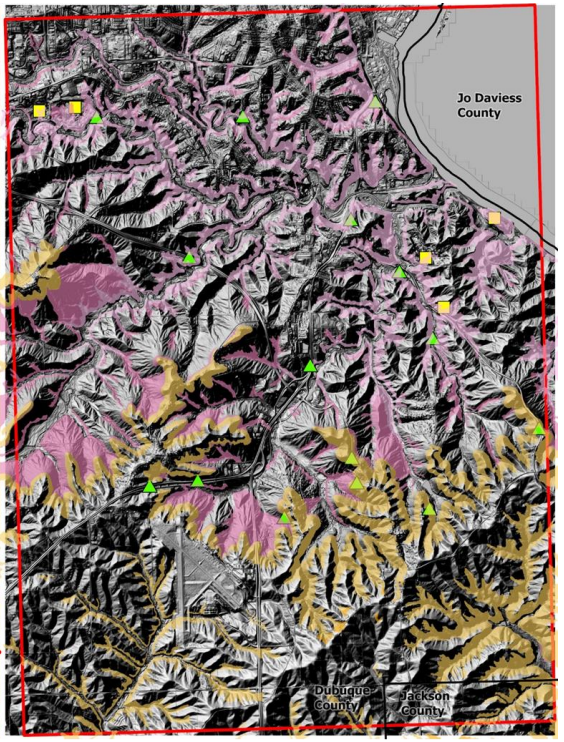
Muscatine County



Dubuque County

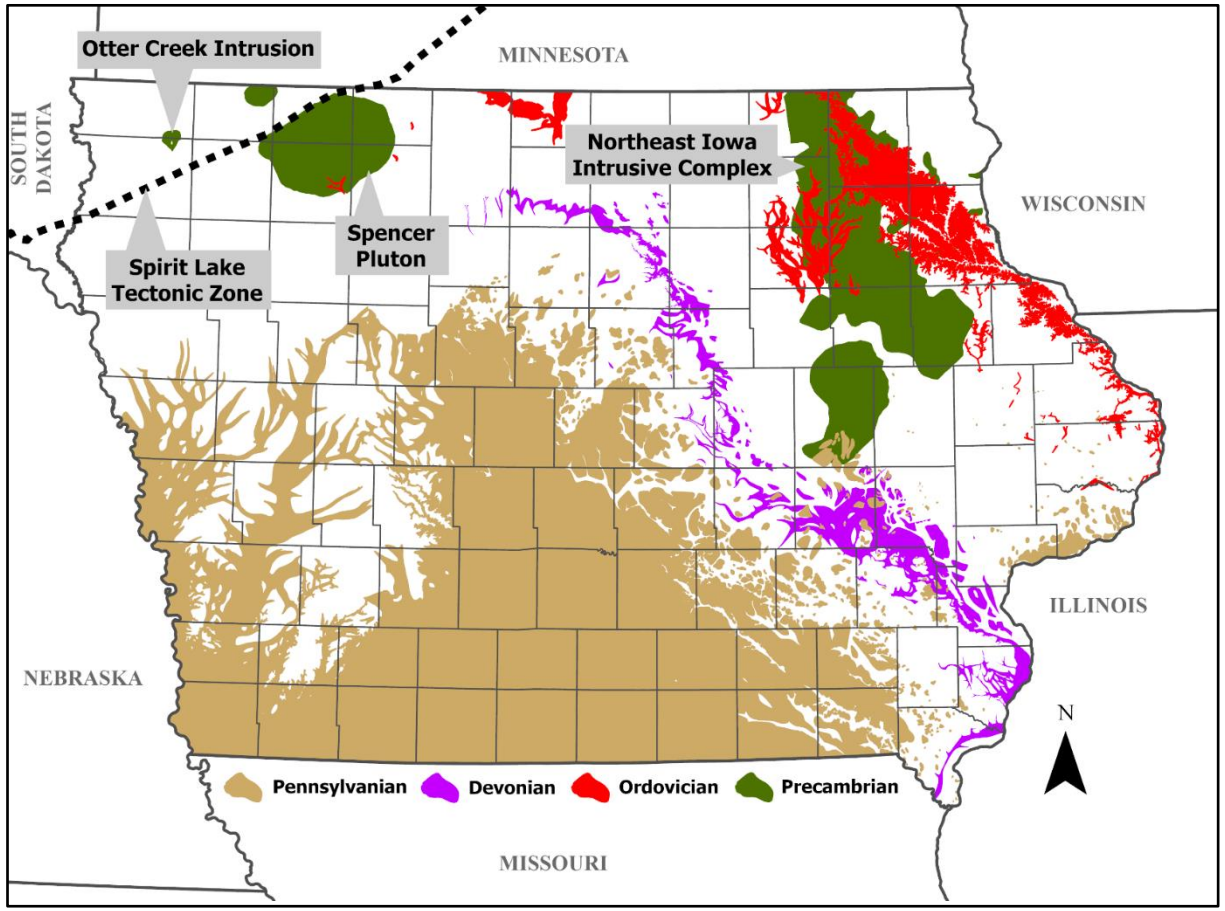
Tete des Morts / Mosalem formations

Maquoketa Formation

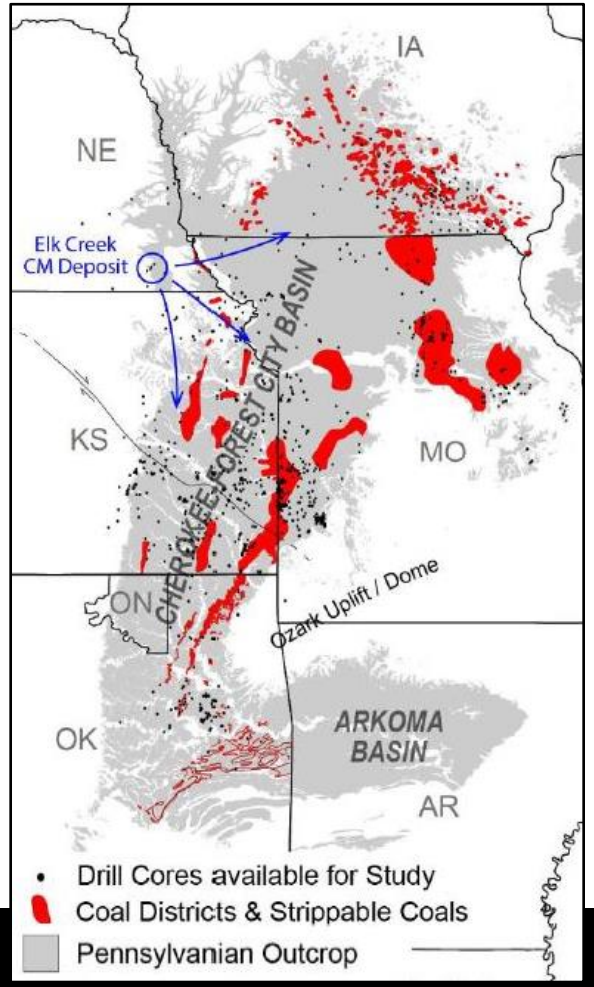


Searching for Critical Mineral Resources in Iowa

USGS: Earth Mapping Resources Initiative (Earth MRI)



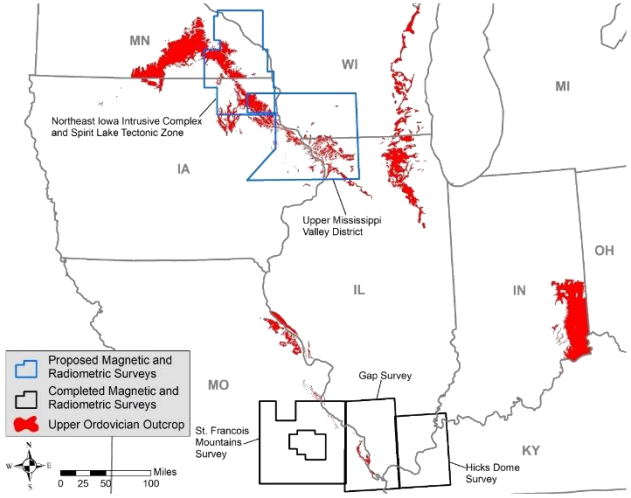
US DOE: Carbon Ore, Rare Earth, and Critical Minerals (CORE-CM)



EMRI: Rare Earth Element-Enriched Phosphate

Ordovician REE-Enriched Phosphate

- 11-state collaboration lead by the IGS
- 3-year project from FY22-FY25
- 700 geochemical samples from >100 sites
- Confirmed the basal Maquoketa Phosphorite is thicker and more enriched in Dubuque area
- Final report coming soon

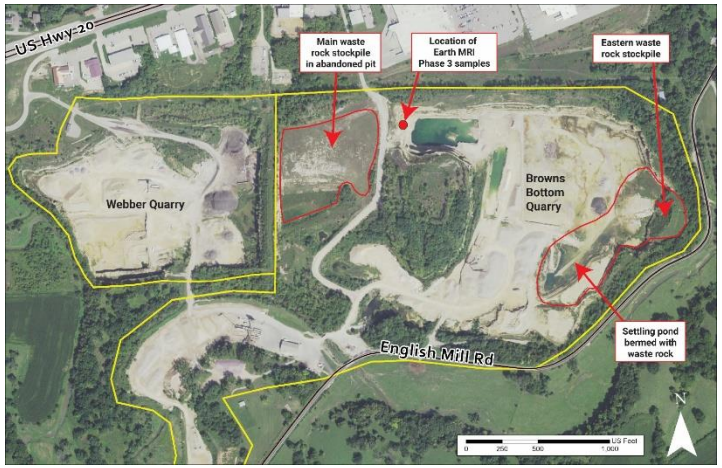


Additional EMRI projects stemmed from this:

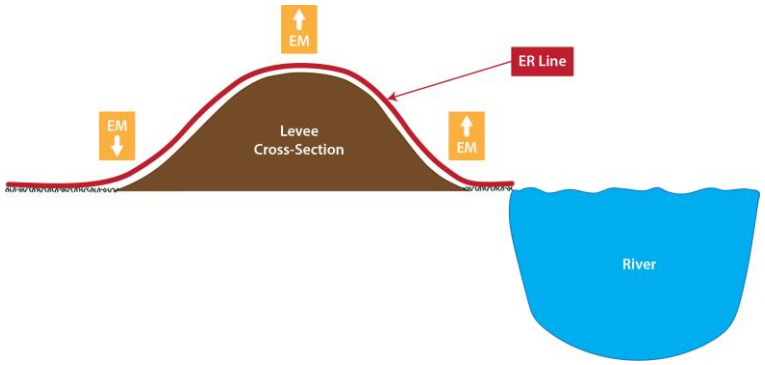
- Airborne EM survey of Dubuque Area (FY25)
- Mapping phosphorite in NE Iowa (FY25-28

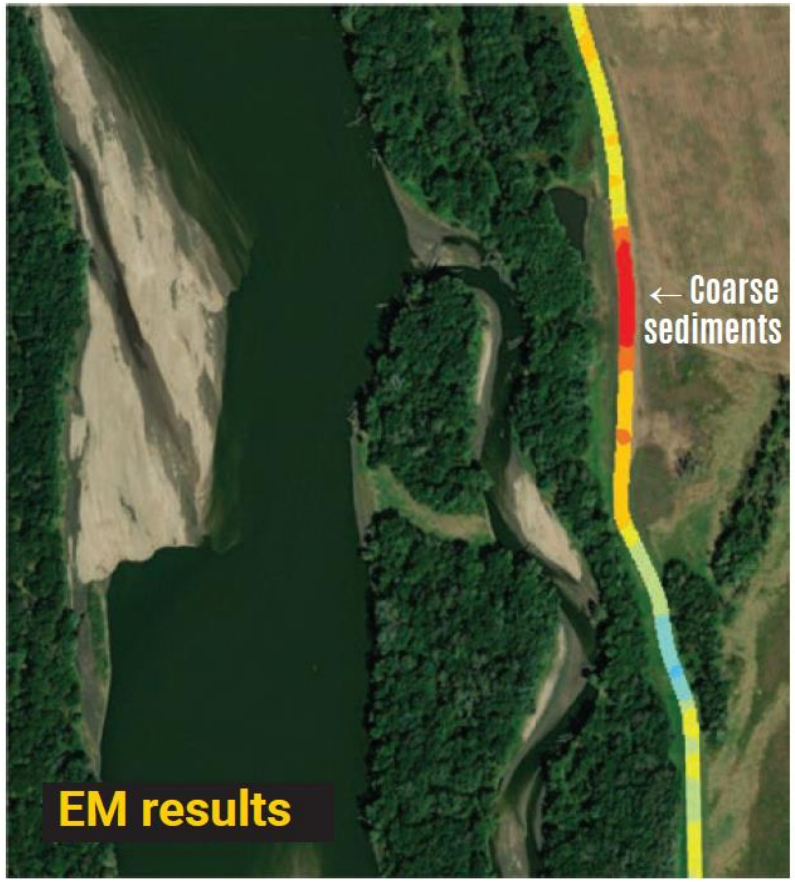
Characterization of Mine Waste at Browns Bottom Quarry

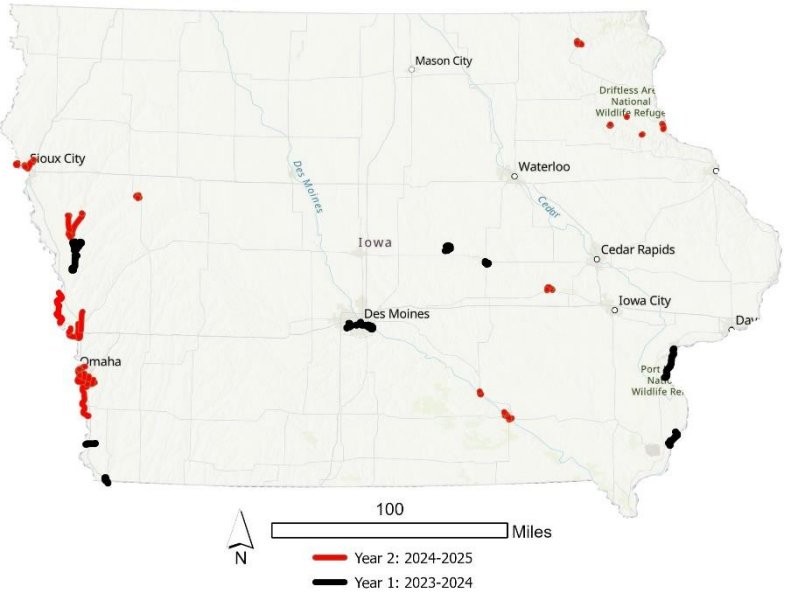
- 2-year project: 7/23 – 6/25
- Characterize CM endowment of waste rock stockpiled in old pit
- Drilling and sampling completed July 2024
- Preliminary estimates ~1,000 tons of rare earth elements (REE)



Levee mapping project funded through appropriation to HSEMD (complete 900 mi in 5 years)







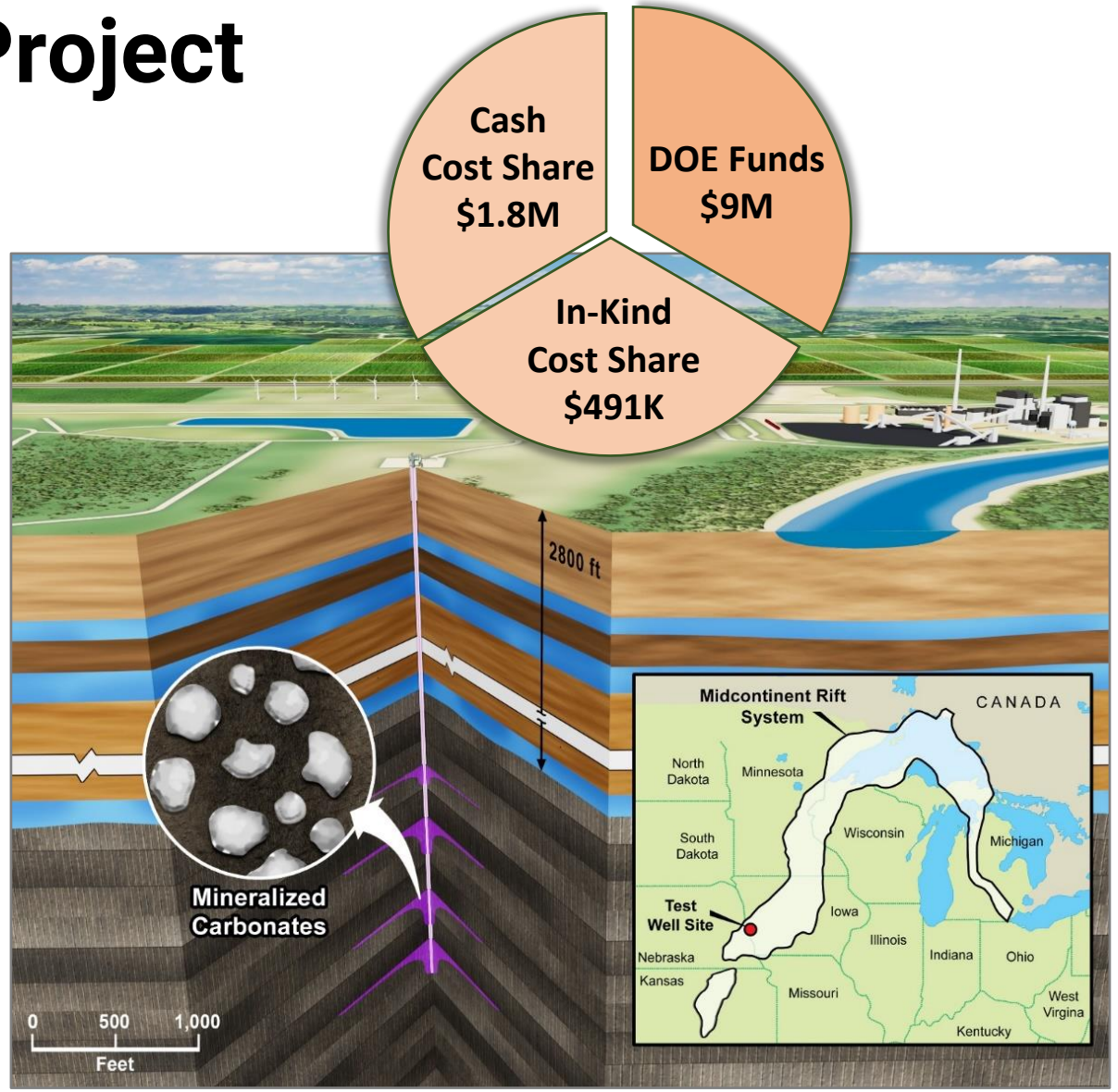
Year 2 - 200 levee miles completed

- 38 levees
- 16 levee sponsors
- >500,000 conductivity measurements

New Carbon Sequestration Project

Southwest Iowa Carbon Storage (SICarbS) Project

- DOE CarbonSAFE – Phase II Feasibility Study
- Selected for award negotiation Oct. 2024
- 2-year project with $11.3M budget
- $1.8M cost share from MidAmerican Energy
- Characterize basalts of the ***Midcontinent Rift System*** for CO_2 mineralization/storage beneath power plant in Council Bluffs
- *Recent executive order halted negotiations*

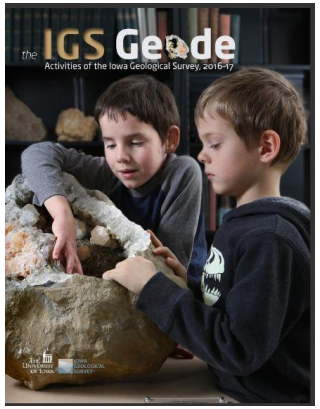


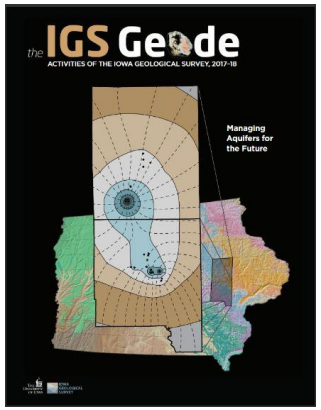
Funding request

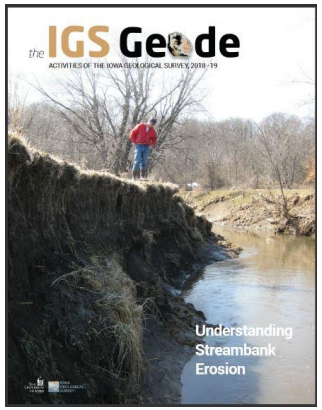
- Additional funding support for aquifer mapping ($250K/yr)
  - Full time hydrogeologist to focus on aquifer mapping and assessment
  - Additional support for wells, geophysics and water level recorders
- Funding for new IGS drilling rig capable of penetrating into deeper alluvial and buried channel aquifers ($300K/one time)
  - Current rig has insufficient power and capability
  - Drilling rig from Simco Drilling Equipment - Iowa company based in Osceola
- Funding to support installation of bedrock monitoring wells to evaluate static water levels and future trends ($100K/yr)

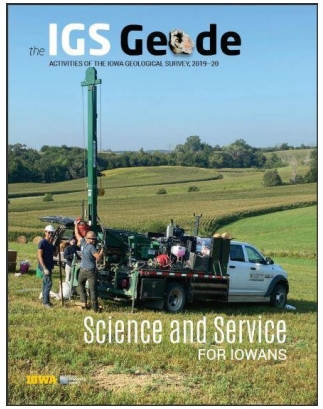
Geode Annual Report

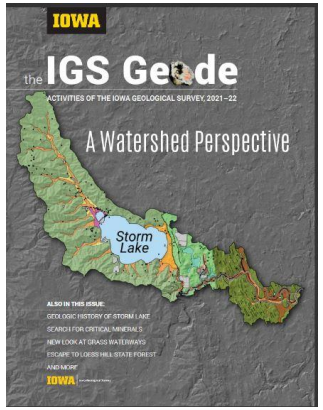
- Began in 2016-17 with new State Geologist appointment
- Annual issues highlight IGS activities

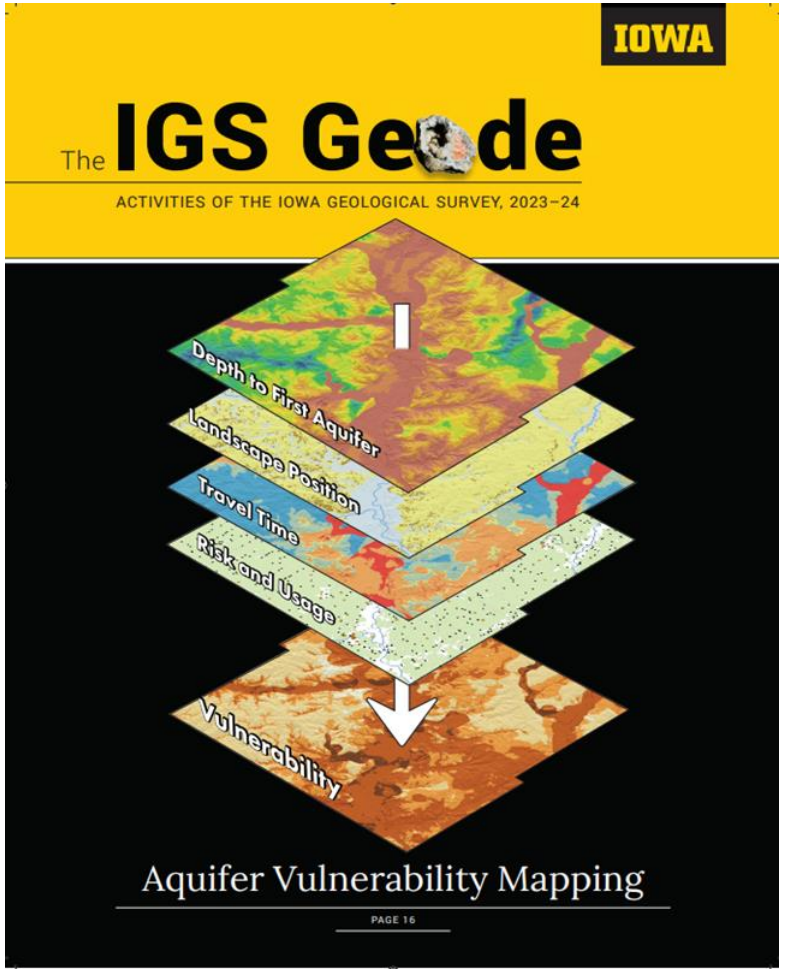












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