



# **Shared Waters, Shared Future**

Northeastern Illinois Regional Water  
Supply Sustainability Workshops

# Workshop logistics

- Today's workshop will be recorded.
- Closed captioning is enabled.
- We will be using the chat to hear from you throughout the workshop.
- We will be using a live polling tool called Mentimeter.
- Following today, we will share the slides with you and post the recording and materials to the **Shared Waters, Shared Future** website: [cmap.is/water-workshops](https://cmap.is/water-workshops)

# **Strengthening Illinois' high-capacity well impact review process**

**September 10, 2026**



**Shared Waters,  
Shared Future**  
Northeastern Illinois Regional Water  
Supply Sustainability Workshops

**Using the chat,  
please share your:**

- Name
- Title
- Organization



# Partners



Chicago Metropolitan  
Agency for Planning

The Chicago Metropolitan Agency for Planning (CMAP) is our region's comprehensive planning organization. For decades, CMAP has conducted water supply planning to advance efforts that promote sustainable use of our water supplies.



Illinois-Indiana Sea Grant (IISG) is a federal-university partnership (NOAA, U of I, Purdue) focusing on research, education, and outreach for 104 miles of southern Lake Michigan shorelines.



**Funding acknowledgment:** *Shared Waters, Shared Future* is funded by the Illinois Department of Natural Resources Office of Water Resources. We appreciate Wei Han, P.E., Ph.D., Water Supply Program Manager, and the department's commitment to water supply planning.

# Workshop series



**Collaborating with water utilities and local governments (February 18)**



**Creating a water sustainability plan (April 23)**



**Addressing utility climate and drought preparedness (June 3)**



**Strengthening Illinois' well impact review process (September 10)**



**Understanding water governance and management in Illinois (November 12)**



**Shared Waters,  
Shared Future**

Northeastern Illinois Regional Water  
Supply Sustainability Workshops

# Workshop 3 summary

- Explored how climate change may affect northeastern Illinois' water supplies and how communities can incorporate changing conditions into water supply planning.
- Scan the QR code to:
  - Read the recap blog
  - Watch the recording
  - Access materials



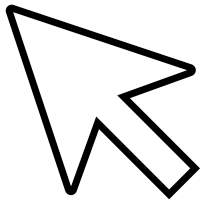
# Today's agenda

- Understanding Illinois' high-capacity well review process
- Break
- Learning from other states: Iowa and Michigan
- Applying lessons to Illinois: panel discussion
- Wrap-up and what's next

# Which best describes your primary role?

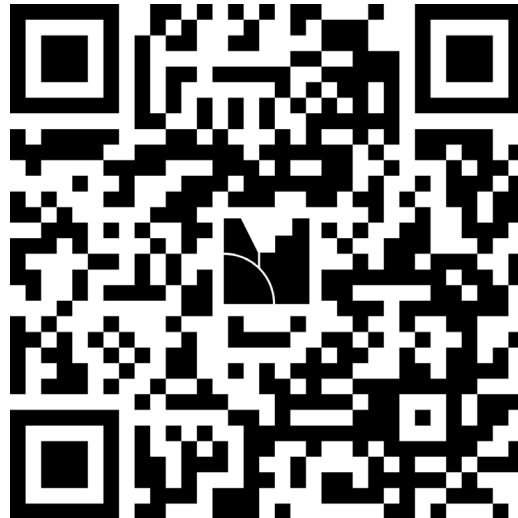
Respond via Mentimeter:

**Click the link in  
the chat**



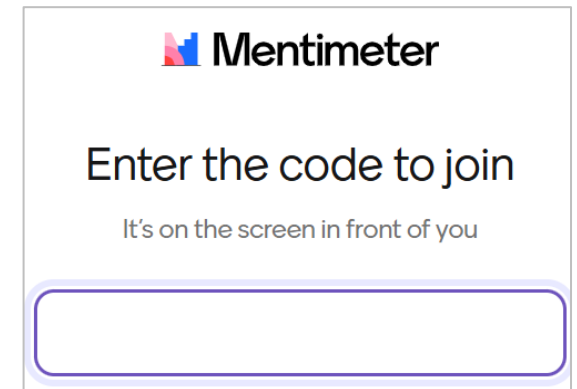
or

**Scan the QR  
code**



or

**Join at menti.com  
code 4368 1595**



# Understanding Illinois' high-capacity well impact review process

# Featured speaker



**Nora Beck**

Principal policy analyst  
Regional Policy and Implementation  
Chicago Metropolitan Agency for Planning  
(CMAP)

# Supporting perspectives on Illinois' process

- **Gary Clark, PE**  
Retired director, Illinois Department of Natural Resources, Office of Water Resources
- **Chris Johnston, PE**  
Permit section manager, Illinois Environmental Protection Agency
- **Dan Hadley, PE**  
Section lead and associate hydrogeologist, University of Illinois' State Water Survey



Chicago Metropolitan  
Agency for Planning

# High-capacity well review process

Nora Beck, principal

Chicago Metropolitan Agency for  
Planning



# Securing Illinois' Groundwater Future

- Reviews the Water Use Act of 1983 and the high-capacity well review process
- Compares Illinois process with neighboring states
- Identifies opportunities to strengthen information, coordination, and long-term groundwater management

## Securing Illinois' Groundwater Future

A review of the 1983 Water Use Act and  
high-capacity well review process



Chicago Metropolitan  
Agency for Planning

# What is a high-capacity well?

Under the Water Use Act:

Combined pumping capacity of all wells  
on a parcel:

At least 100,000 gallons per day  
(approximately 70 gallons per minute)



# How common and who operates them?

| Facility type                                                                                                                                                                | Northeastern Illinois<br>(# of distinct wells) |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------|
| <b>Public water supplies:</b> Municipalities, water districts, and other systems providing drinking water to communities.                                                    | 681                                            |
| <b>Industrial and commercial users:</b> Manufacturers, food processors, mines, golf courses, nurseries, power generation, and other facilities with their own water sources. | 967                                            |
| <b>Agricultural irrigation:</b> Farms withdrawing water to irrigate crops.                                                                                                   | 44                                             |
| <b>Total</b>                                                                                                                                                                 | <b>1,692</b>                                   |



Chicago Metropolitan  
Agency for Planning

# What happens when someone proposes a well?

Example of a pump and plumbing configuration used by public water systems. Credit: Roland Tollett, USGS



# A proposed well may be subject to several separate processes

| Process                                                                                                                                                                                       | To determine:                                                                                                                 |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------|
| <b>High-capacity well review</b>                                                                                                                                                              | Could the proposed withdrawal affect other water users?                                                                       |
| <b>Construction and public health oversight</b><br>May include construction permitting, approval to operate, water-quality monitoring and compliance reporting, depending on the system type. | Is the well and water system properly designed, constructed and operated, and does the water meet public-health requirements? |
| <b>Water use reporting</b>                                                                                                                                                                    | How much water is being withdrawn and used?                                                                                   |

# Which processes depends on system, well's capacity

| Process                           | Community water-supply | Non-community public water-supply | Private, industrial, agricultural, or other      |
|-----------------------------------|------------------------|-----------------------------------|--------------------------------------------------|
| High-capacity well review         | If high capacity       | If high capacity                  | If high capacity                                 |
| Construction permit               | Illinois EPA           | Illinois DPH                      | IDPH/local health department                     |
| Ongoing drinking water compliance | Illinois EPA           | Illinois DPH                      | Generally not regulated as a public water system |
| Water use reporting to IWIP       | Required               | Required                          | If high capacity                                 |

# Water Use Act of 1983: Original framework

**Purpose:** Review potential water conflicts before damage occurs and establish mechanisms for addressing groundwater shortages.

## The act established:

- **Reasonable use:** Groundwater users may not use water wastefully or maliciously
- **Advance notice and review:** Process for reviewing substantial proposed withdrawals and their potential effects on other users
- **Water-conflict framework:** Foundation for identifying and addressing groundwater-use conflicts

# Water Use Act of 1983: Updates

- **1987–88:** Added groundwater-emergency provisions and expanded the act's implementation framework
- **1988:** Exempted the six-county Chicago metropolitan region from the notice and review provisions
- **2010:** Removed that exemption, making the statutory review statewide
- **2010:** Defined high-capacity wells on a parcel-wide basis, required notice before construction, and added mandatory water-use reporting

# Water Use Act of 1983: In full

**Purpose:** Review potential water conflicts before damage occurs and establish mechanisms for addressing groundwater shortages.

## The act established:

- **Reasonable use:** Groundwater users may not use water wastefully or maliciously
- **Advance notice and review:** Process for reviewing substantial proposed withdrawals and their potential effects on other users
- **Water-conflict framework:** Foundation for identifying and addressing groundwater-use conflicts
- **Mandatory water-use reporting:** through the Illinois Water Inventory Program

# The high-capacity well review process as designed

- 1 Well proposed
- 2 Notify county SWCD
- 3 Notify local governments
- 4 Request ISWS and ISGS review
- 5 Review potential effects
- 6 Share findings

# The high-capacity well review process as designed

- 1 **Well proposed**
- 2 **Notify county SWCD**
- 3 **Notify local governments**
- 4 **Request ISWS and ISGS review**
- 5 **Review potential effects**
- 6 **Share findings**



Well driller helps property owner activate the process, or other state process may highlight the need for this review.

# The high-capacity well review process as designed

- 1 Well proposed
- 2 **Notify county SWCD**
- 3 Notify local governments
- 4 Request ISWS and ISGS review
- 5 Review potential effects
- 6 Share findings

Before construction, the property owner or other responsible party must provide information:

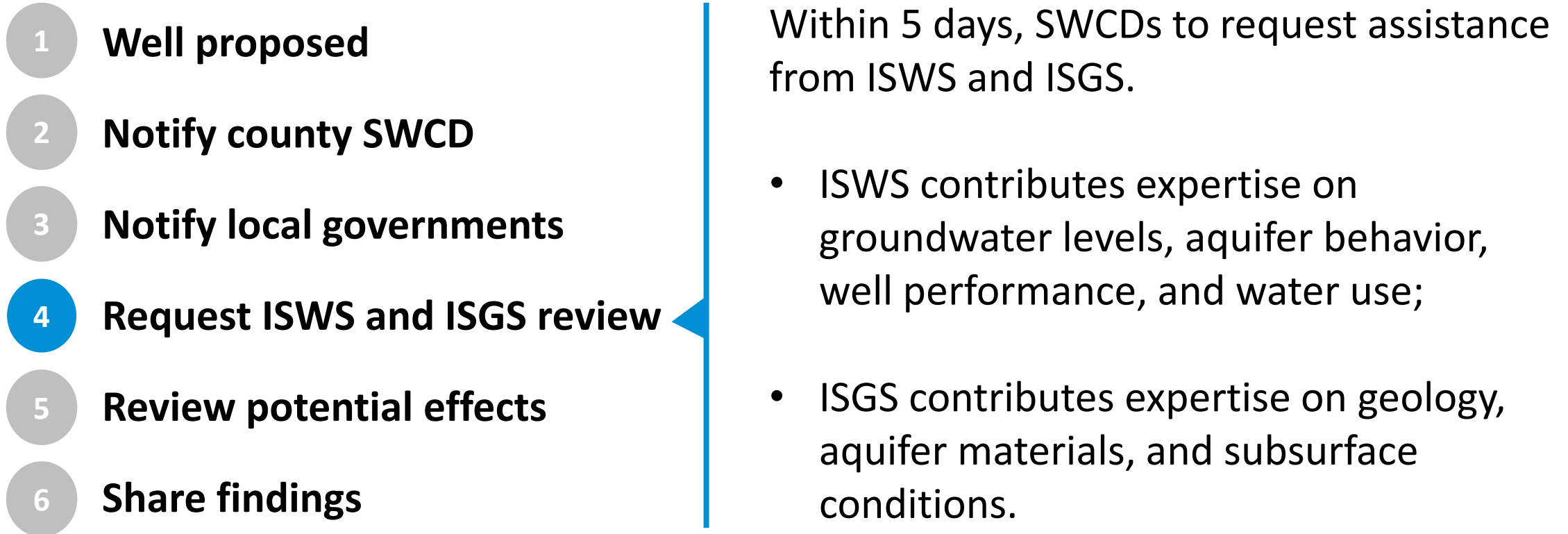
- Well construction, pump, and aquifer characteristics
- Anticipated daily and annual withdrawals
- Intended water use and other wells on the property
- Nearby landowners, residents, and public water systems within one mile

# The high-capacity well review process as designed

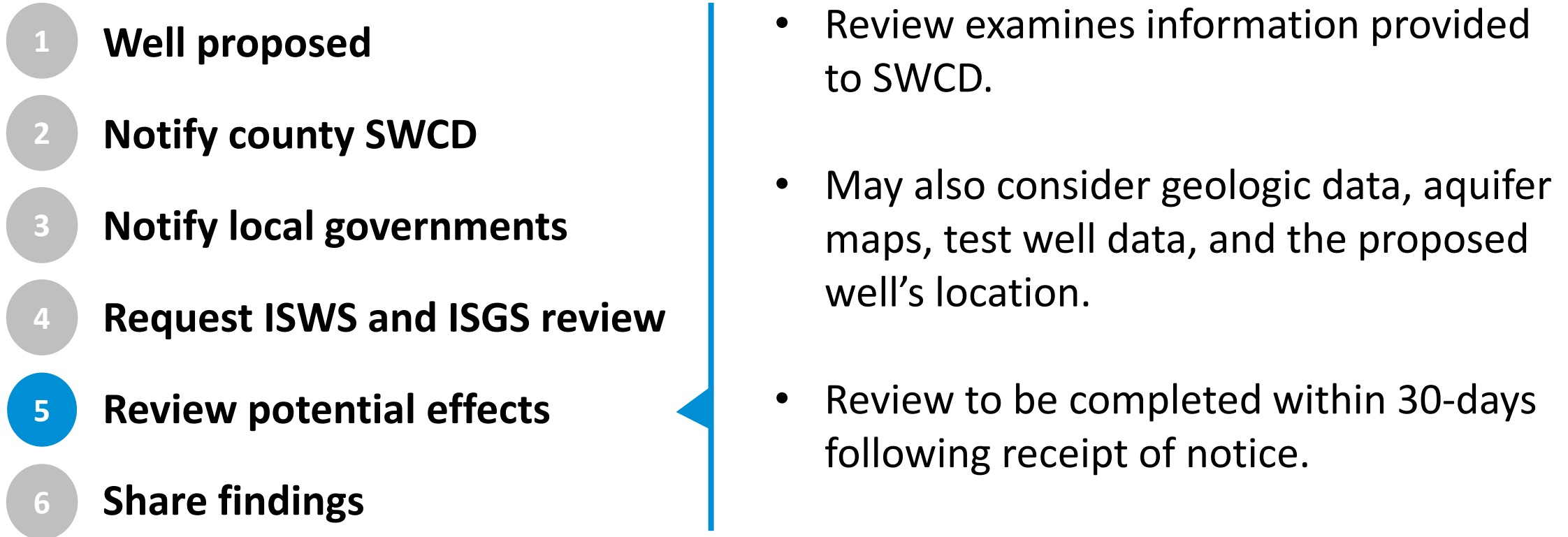
- 1 Well proposed
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SWCDs to notify local governments that operate a public water supply well within one mile of the proposed high-capacity well.

# The high-capacity well review process as designed



# The high-capacity well review process as designed



# The high-capacity well review process as designed

- 1 Well proposed
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Within 10 days of completing the review, SWCDs to:

- Provide potential well owner with report;
- Publish informational announcement in newspaper;
- If the proposed withdrawal would impact the groundwater supplies of a local government, notify that government.

**Why was the high-capacity  
well review process  
structured this way?**



# Water Use Act of 1983: in full

**Purpose:** Review potential water conflicts before damage occurs and establish mechanisms for addressing groundwater shortages.

## The Act established:

- **Reasonable use:** Groundwater users may meet natural needs and take a fair share for other purposes, but may not use water wastefully or maliciously.
- **Advance notice and review:** Proposed substantial withdrawals were subject to review of potential effects on other water users.
- **Response to water conflicts:** Specified counties along the Iroquois and Mackinaw rivers received mechanisms to investigate shortages and recommend emergency restrictions.
- **Mandatory water-use reporting** through the Illinois Water Inventory Program.

**How is the high-capacity  
well review process  
working today?**

# The high-capacity well review process in practice

- 1 Well proposed
- 2 Notify county SWCD
- 3 Notify local governments
- 4 Request ISWS and ISGS review
- 5 Review potential effects
- 6 Share findings

# The high-capacity well review process as designed

- 1 Well proposed
- 2 Notify county SWCD
- 3 Notify local governments
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- 5 Review potential effects
- 6 Share findings

Dedicated funding for the analysis ended in 1992.

# The high-capacity well review process as designed

- 1 Well proposed
- 2 Notify county SWCD
- 3 Notify local governments
- 4 Request ISWS and ISGS review
- 5 Review potential effects
- 6 Share findings

Inconsistent awareness and follow through

# The high-capacity well review process as designed

- 1 Well proposed
- 2 Notify county SWCD
- 3 Notify local governments
- 4 Request ISWS and ISGS review
- 5 Review potential effects
- 6 Share findings

Potentially affected water users do not receive information on potential impacts

# Other processes continue...

| Process                                          | Community water supply | Non-community public water supply | Private, industrial, agricultural, or other      |
|--------------------------------------------------|------------------------|-----------------------------------|--------------------------------------------------|
| Water Use Act review                             | If high capacity       | If high capacity                  | If high capacity                                 |
| Construction permit                              | Illinois EPA           | IDPH                              | IDPH/local health department                     |
| Approval to operate and drinking water oversight | Illinois EPA           | IDPH                              | Generally not regulated as a public water system |
| Water use reporting                              | Required               | Required                          | If high capacity                                 |

# Community water supply permits: IEPA

## Construction permit: before construction

- Engineering design, well location, and construction
- System capacity and reliability, using calculated safe yield and redundancy requirements
- Proposed treatment and drinking water compliance

## Operating permit: before use

- Construction was completed as approved
- The system is ready to operate
- Drinking water requirements are met

# Other wells and water systems: IDPH and local oversight

## Non-community public water systems

- IDPH permits construction and reviews system design, treatment, and readiness to operate.
- The water system undergoes ongoing drinking water monitoring, reporting, and inspections.

## Private and other wells

- IDPH and participating local health departments oversee siting, construction, modification, and sealing.
- Wells are generally sampled after construction but are not subject to the same ongoing compliance as public water systems.

# Well tracking continues even when formal review does not

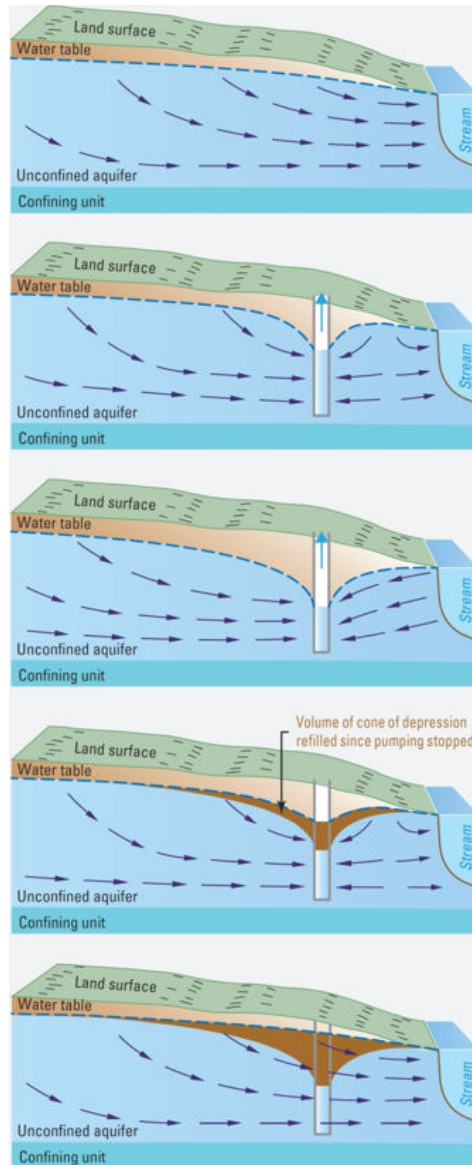
Despite lack of funding for well reviews, ISWS continues to:

- Track new well construction to support groundwater research and modeling.
- Receive Water Use Act notifications from IL Dept. of Ag, and county SWCDs.
- Review well construction report information
- Wells with  $\geq 70$  gpm pump installed are forwarded to our IWIP program to get them registered for reporting

# How can individual wells impact groundwater resources?



# Unconfined/shallow aquifer



a) Under natural conditions, recharge at the water table is equal to discharge at the stream.

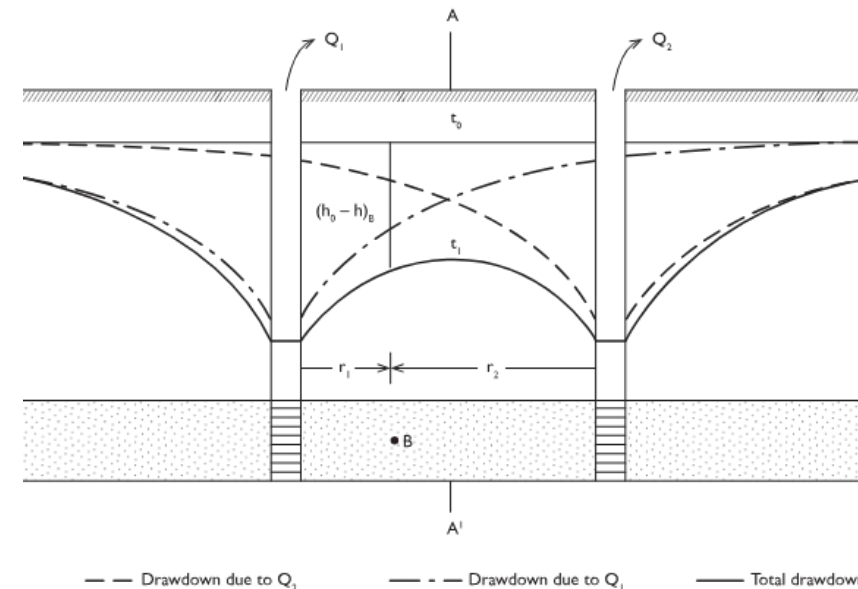
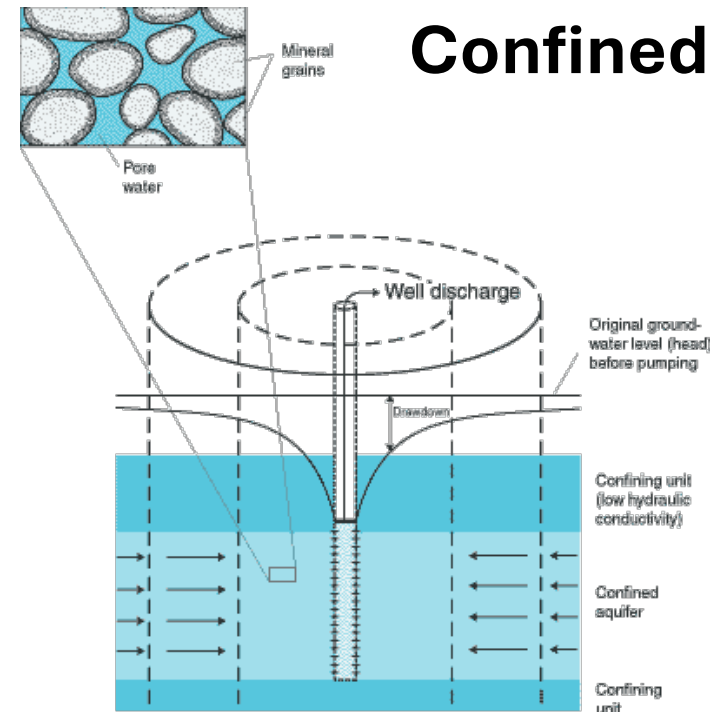
b) Pumping from a well removes water from storage in a cone of depression and reduces discharge to the stream.

c) In some circumstances, the pumping rate of the well may be large enough to cause water to flow from the stream to the aquifer, a process called induced infiltration of streamflow.

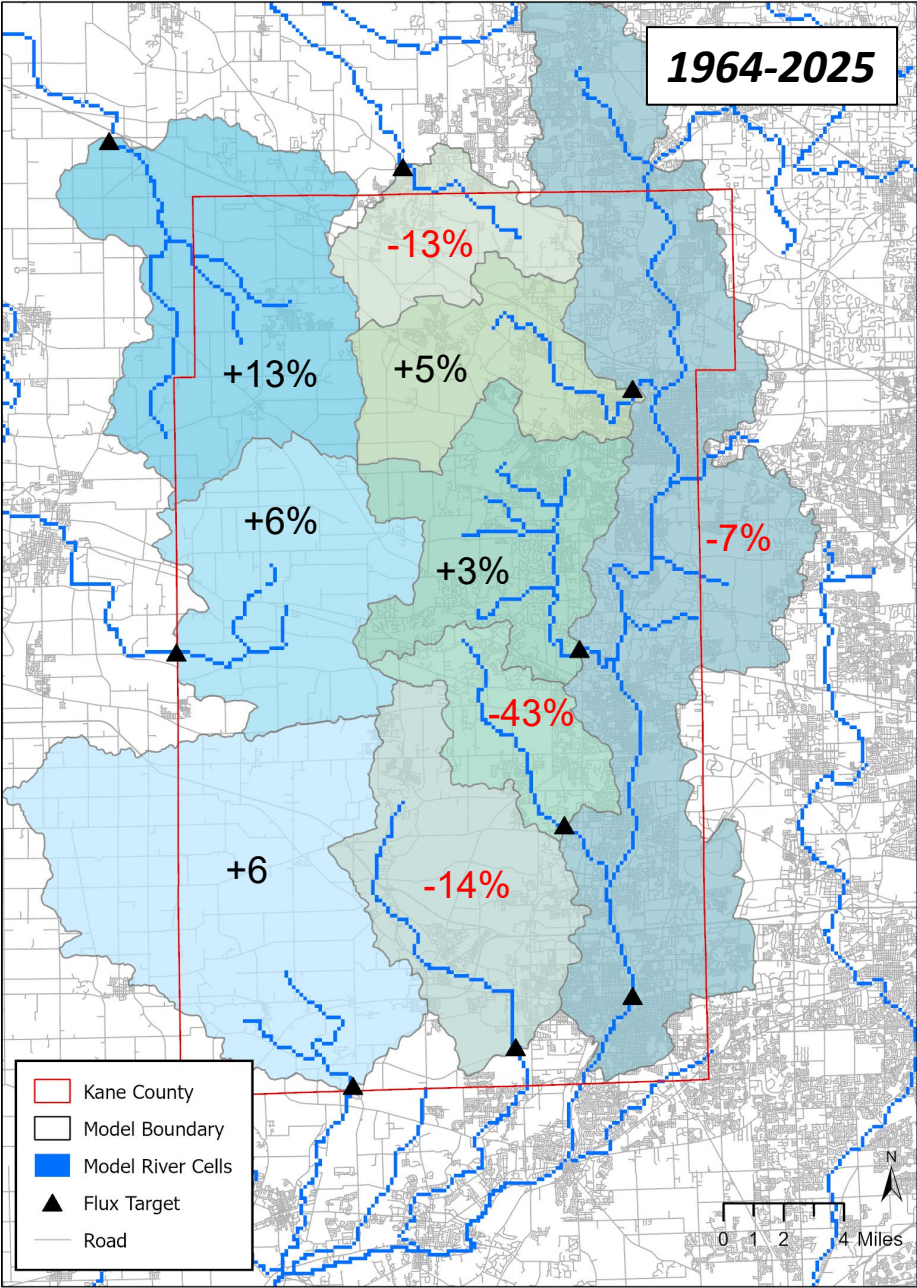
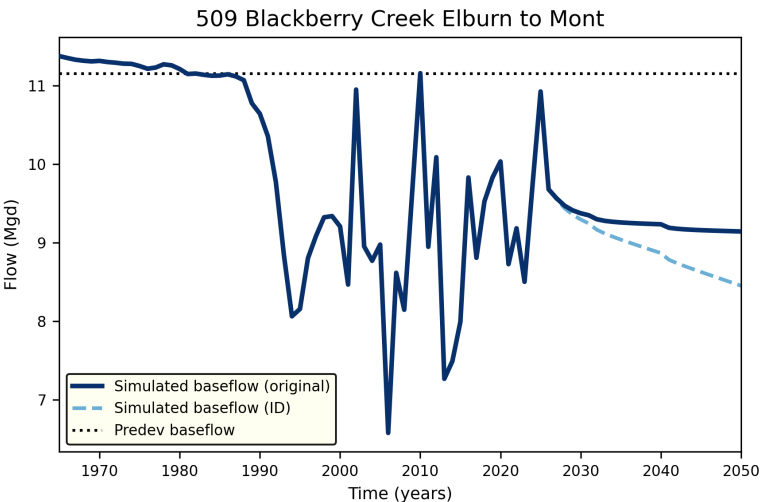
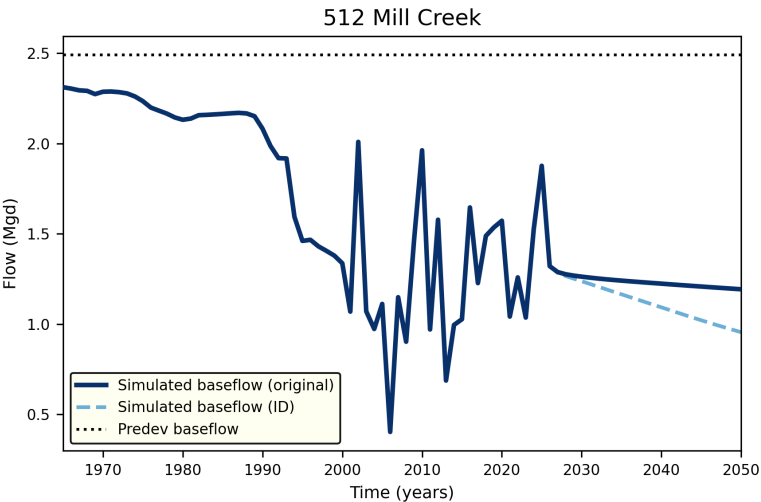
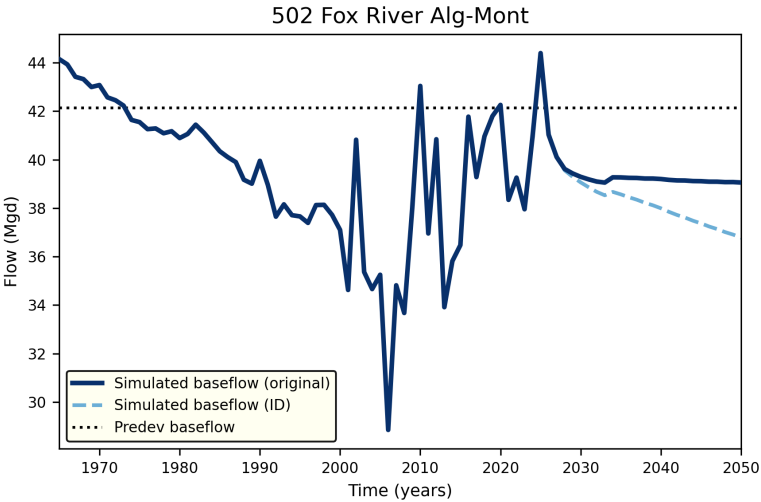
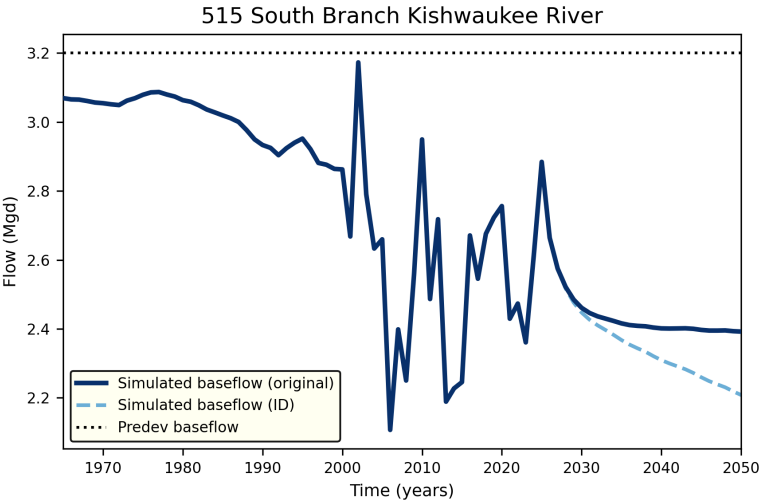
d) After pumping stops, groundwater levels begin to recover, and water flows into aquifer storage to refill the cone of depression created by the previous pumping stress.

e) Eventually, the system may return to its prepumping condition with no additional changes in aquifer storage or streamflow depletion.

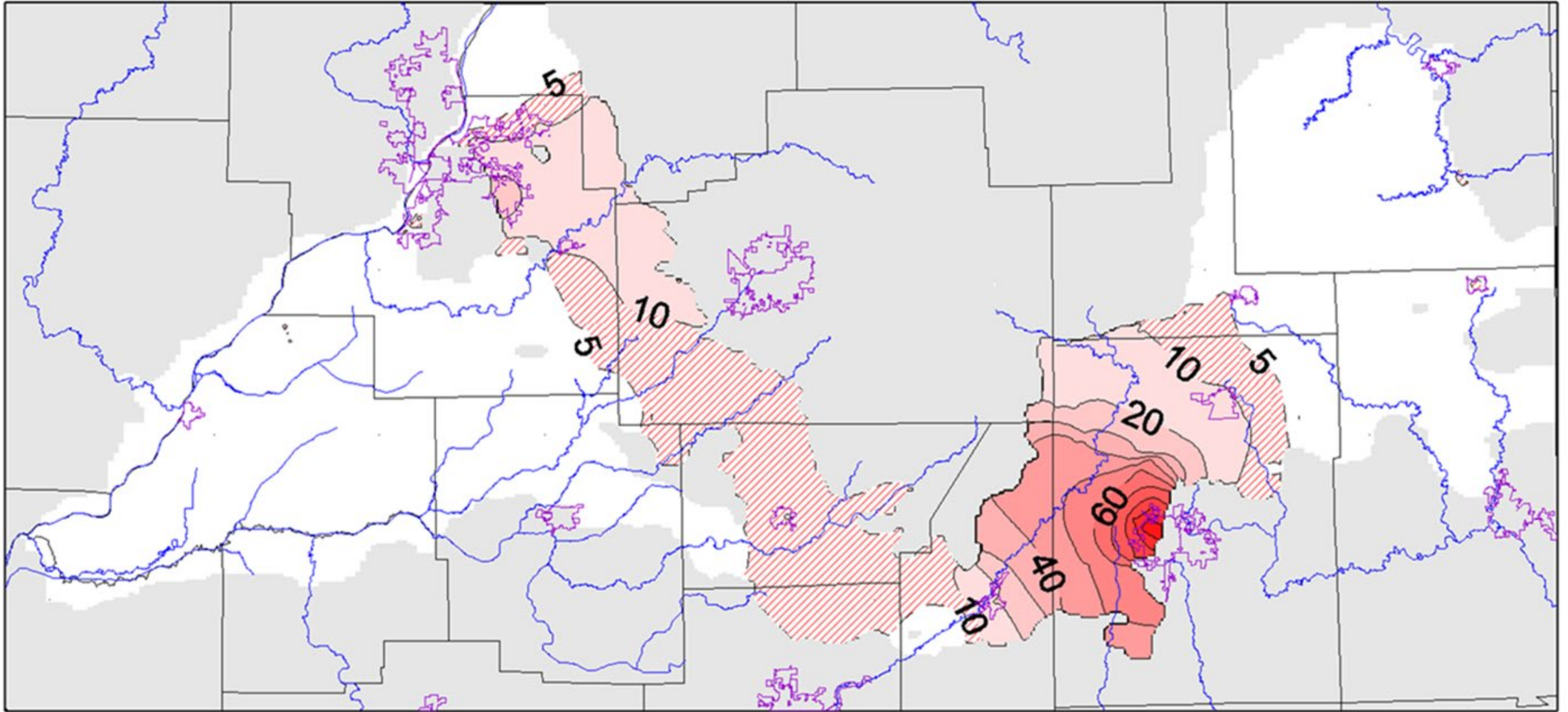
# Confined/deep aquifer



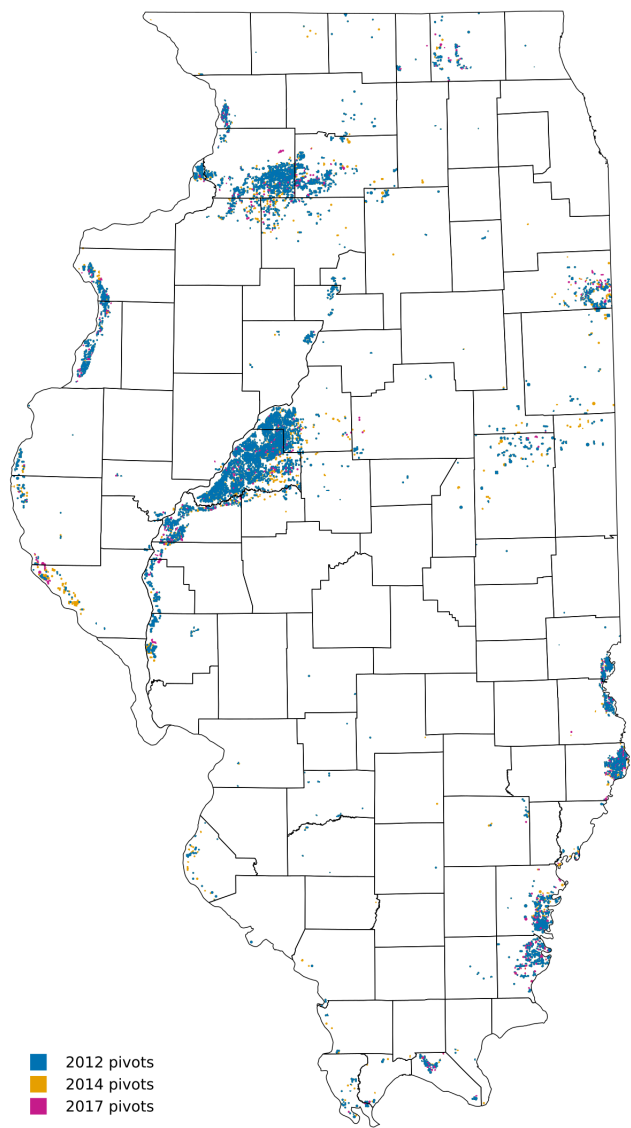
# Kane County baseflow reductions



## Impacts of municipal use: Mahomet Aquifer- Drawdown (1930-2005)



# Impacts of irrigation use



Illinois State Water Survey

## ISWS Aqueduct

[HOME](#) [ABOUT](#) [RESEARCH](#) [DATA](#) [STAFF](#)

[Home](#) / [Groundwater Science](#) / [Monitoring Well Report](#)

### Executive Summary - LEE-91A -

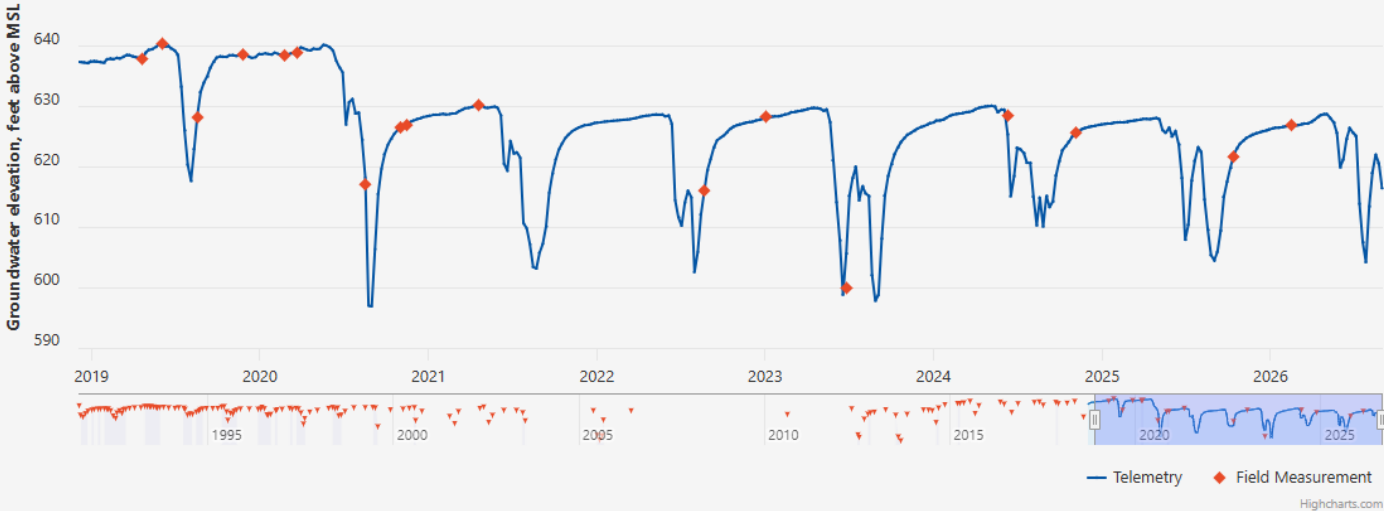


#### Groundwater Observations For: LEE-91A



Zoom 1w 1m 6m 1y All

Dec 4, 2018 → Sep 1, 2026

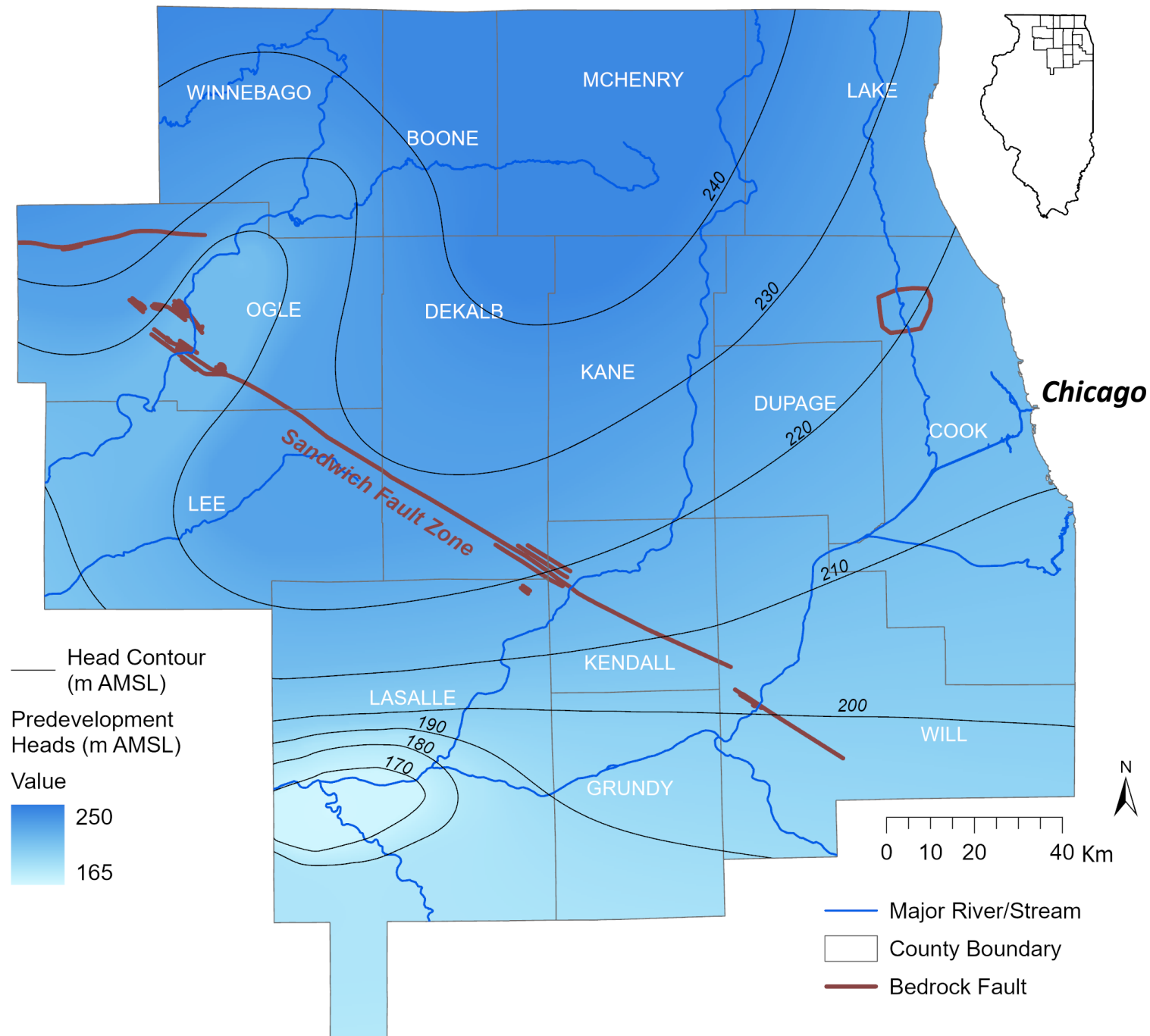


Convert to Depth to Water

User Guide

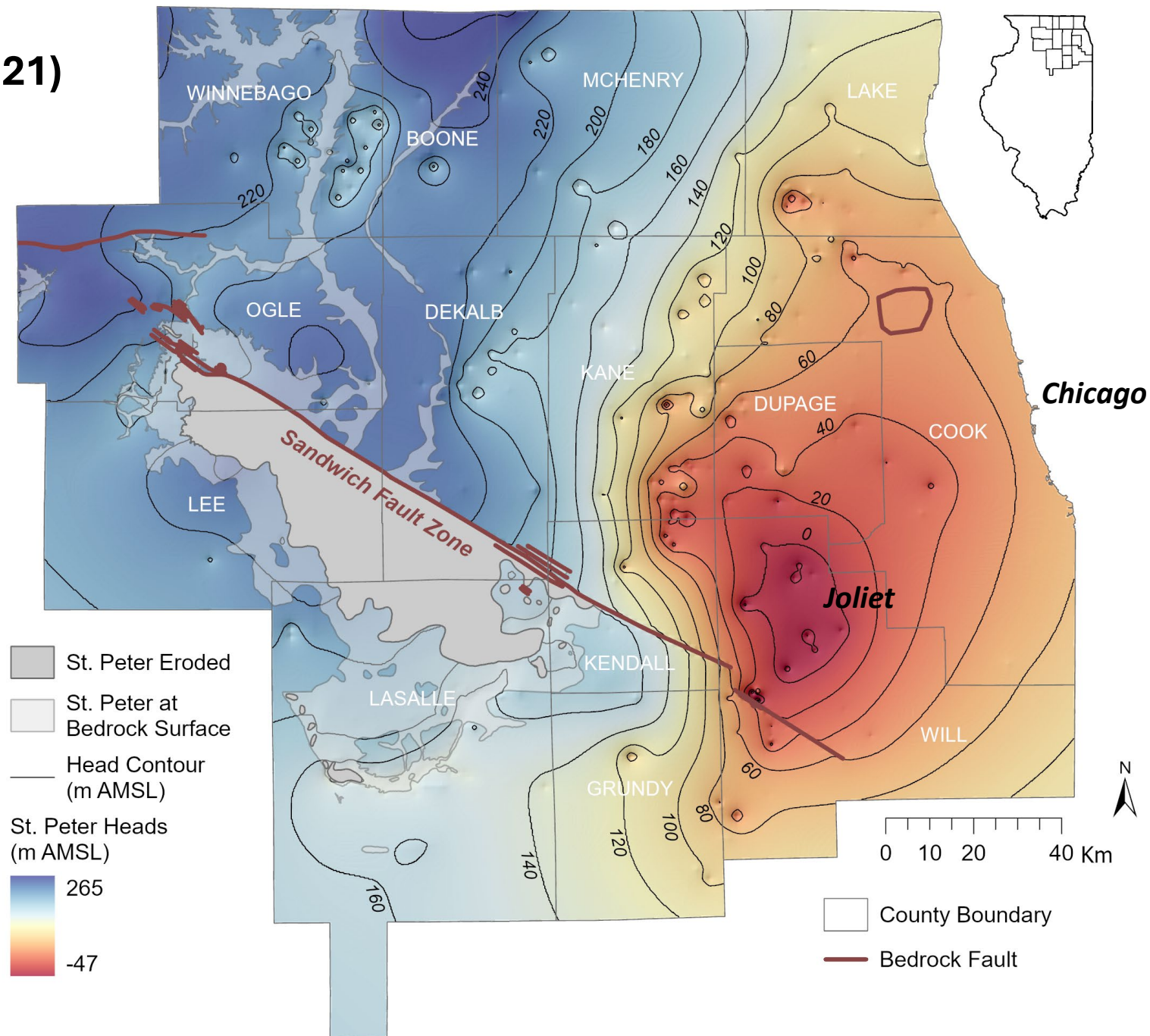
## Predevelopment surface

- Heads highest in North Central IL
  - Topographically higher
  - Recharge from bedrock valley connections
- Heads controlled by sections of Rock and Illinois Rivers
- No head offset (no stress yet)
- No head separation between sandstones



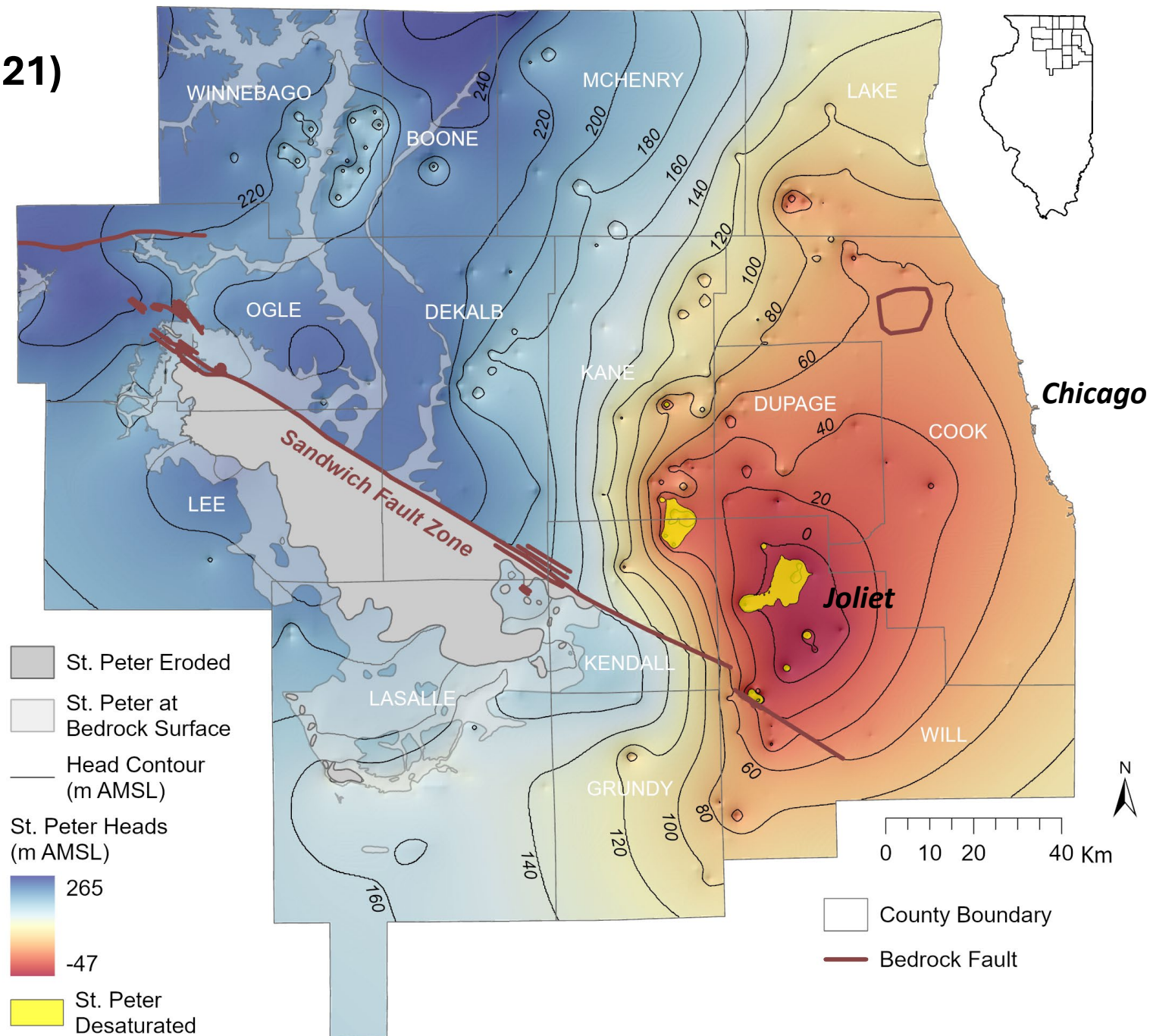
## St. Peter Potentiometric Surface (2021)

- Large cone of depression in northern Will county
- Very steep gradient to cone of depression
- 10-80 m of head offset along fault zone
- 265 m of static drawdown since predevelopment



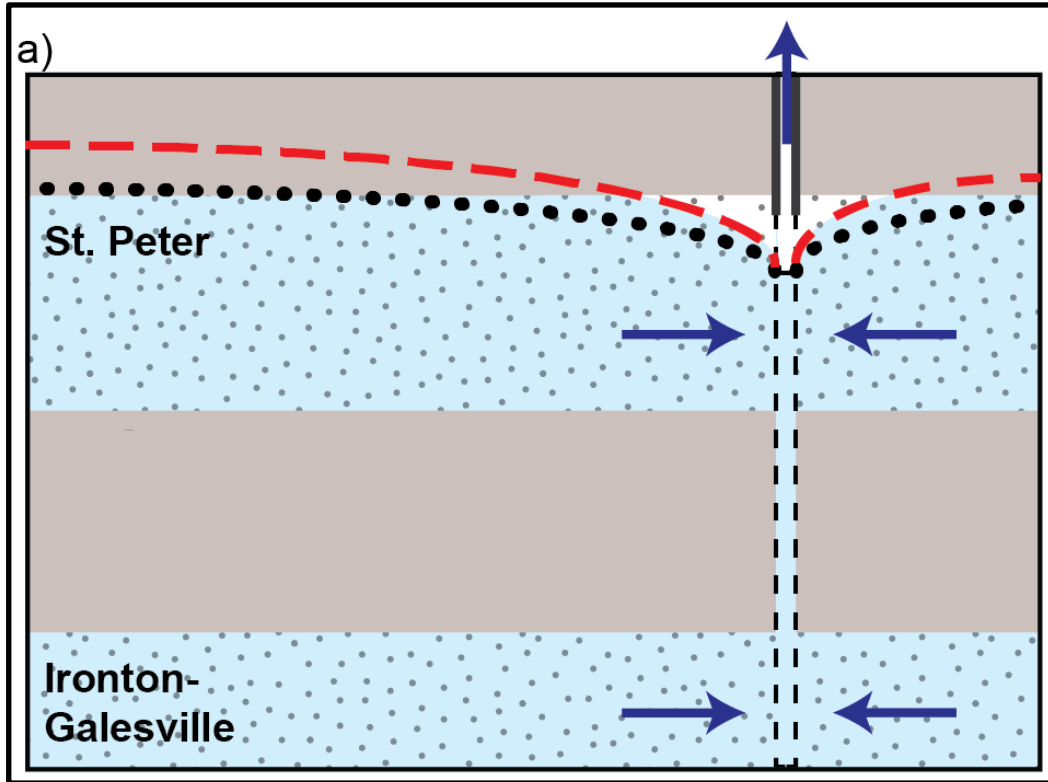
## St. Peter Potentiometric Surface (2021)

- Large cone of depression in northern Will county
  - Very steep gradient to cone of depression
  - 10-80 m of head offset along fault zone
  - 265 m of static drawdown since predevelopment
- 
- St. Peter is now desaturated locally
  - Domestic wells still reliant on aquifer
  - Pumps set within formation
  - Many high-capacity St. Peter wells abandoned



# Sandstone aquifer system: Multi-aquifer wells

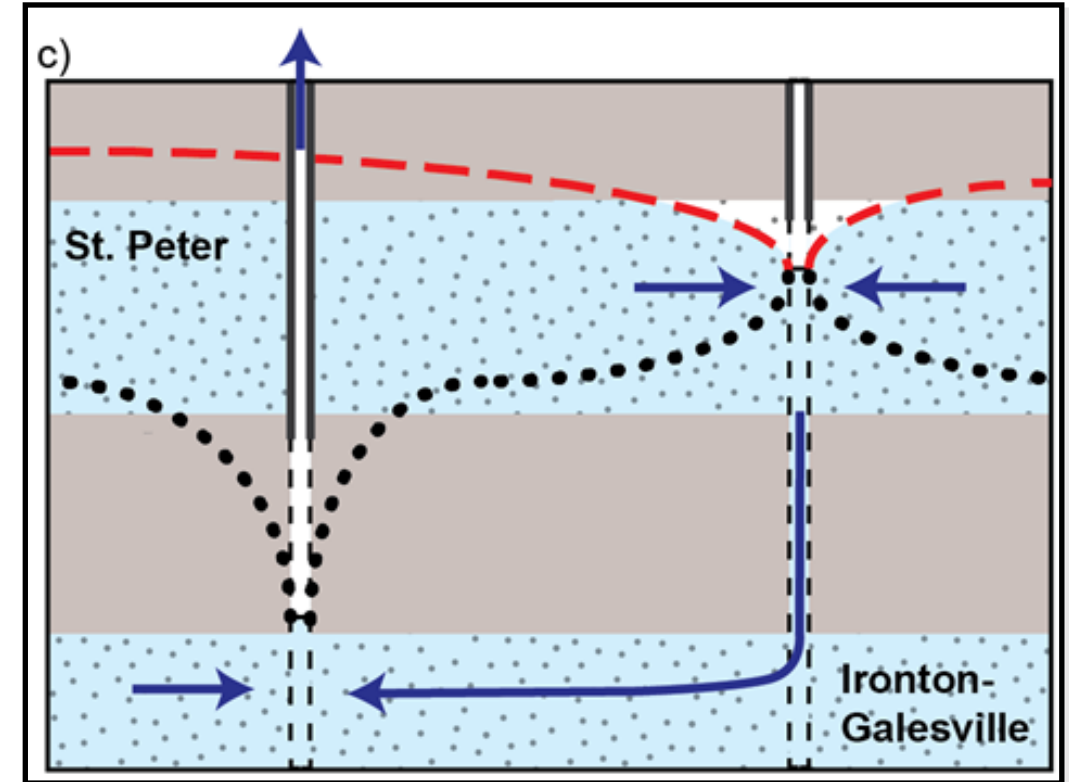
*Prior to 1980s*



High capacity wells generally open to both the St. Peter and Ironton-Galesville Sandstones.

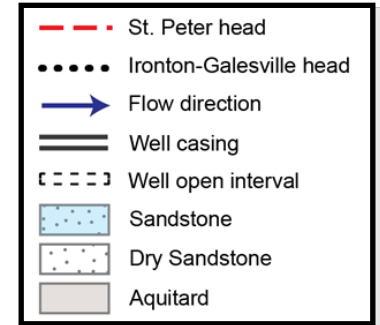
- The St. Peter Sandstone was at greatest risk of desaturation

*After 1980s*



Most new wells cased through the Ironton-Galesville Sandstone, but the cross-connected wells are still present

- The St. Peter Sandstone is still at greatest risk of desaturation



# What does this mean for Illinois?

# What does this mean for Illinois?

**Illinois has information, expertise, and multiple oversight processes — but no consistently functioning, integrated review of proposed high-capacity withdrawals.**

Illinois has:

- A statutory notice and review framework
- Groundwater data and scientific expertise
- Construction, public health, and reporting processes
- Continued well tracking and groundwater research

But implementation lacks:

- Routine funding for preconstruction impact review
- Consistent notice and referral
- Routine findings and public release
- Formal integration with other approvals

# Illinois faces two distinct challenges

## Implementation gap

The Water Use Act review does not routinely function as designed.

- Review is not routinely funded or completed
- Potential effects are not consistently evaluated
- Findings are not routinely shared

## Framework limitations

- Review findings do not approve, deny, or condition withdrawals
- The act does not comprehensively manage cumulative withdrawals or long-term groundwater sustainability

# Thank you!

Understanding Illinois' high-capacity well impact review process

# Learning from other states

# Speaker

**Jim Milne**

Water use unit supervisor

Michigan Department of  
Environment, Great Lakes and  
Energy (EGLE)



An aerial photograph of the Great Lakes region, specifically focusing on Lake Michigan and Lake Huron. The water is a deep blue, contrasting with the green land surrounding the lakes. The text is overlaid on the upper half of the image.

# MICHIGAN'S WATER USE PROGRAM

Strengthening Illinois' High-Capacity Well Impact Review Process

September 10, 2026

Jim Milne

MI Dept. of Environment, Great Lakes, and Energy

Geologic Resources Management Division

# Michigan's Water Withdrawal Regulations

## Chronology, Part 1

- Safe Drinking Water Act, 1976 PA 399, as amended
  - Public water supplies
  - Bottled drinking water
- 1985 Great Lakes Charter initiates water use reporting
- 1985 Great Lakes Preservation Act prohibits new diversions
- 1990 Great Lakes Preservation Act amended
  - Registration & water use reporting requirements for non-agricultural water use sectors
  - Implementation funding not provided until Fiscal Year 1994
- 1994 Great Lakes Preservation Act codified as Part 327, Great Lakes Preservation, of the Natural Resources and Environmental Protection Act, 1994 PA 451, as amended

# Michigan's Water Withdrawal Regulations

## Chronology, Part 2

- 2003 Agricultural sector required to register and report water use
- February 28, 2006, Part 327 amended
  - All large quantity withdrawals\* required to register and report water use
  - Baseline capacity for LQWs operating as of February 28, 2006
  - Adverse resource impact prohibition
- Bottled Water Litigation circa 2007
  - Michigan Citizens for Water Conservation v. Nestle Waters North America, Inc.
  - Sanctuary Springs site, Mecosta County, Michigan
  - Court order limited pumping rates
- Part 327 amended July 9, 2008
- October 1, 2008
  - Initial stream index flow (50% summer low flow) estimate
  - Interim LQW approval standards in effect until Water Withdrawal Assessment Tool launched

# Michigan's Water Use Regulations

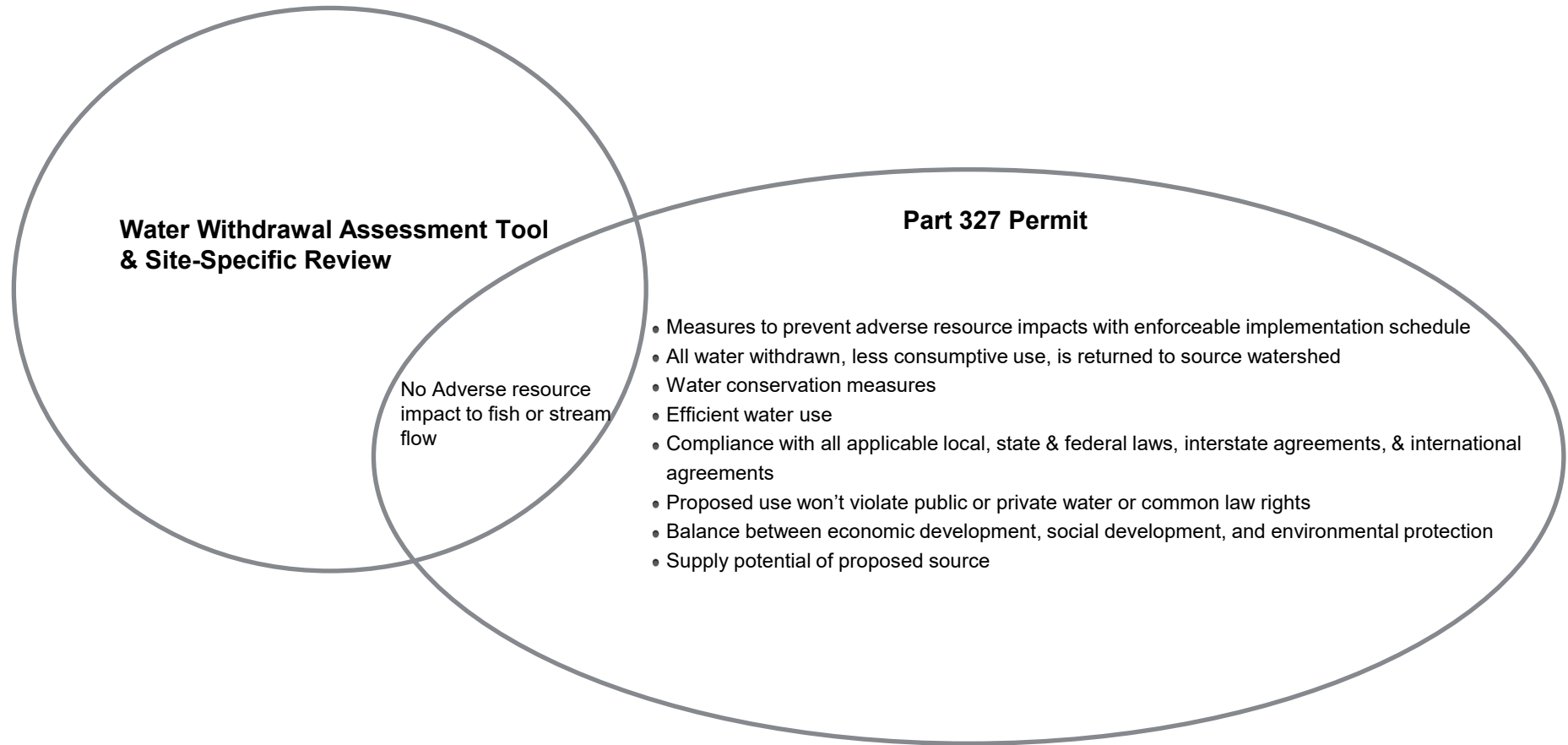
## Chronology, Part 3

- April 1, 2009, Deadline for LQWs in operation on 10/1/2008 to report their water use and be considered baseline capacity
- July 9, 2009
  - Water Withdrawal Assessment Tool (WWAT) launched
  - Site-specific Reviews (SSR) required for LQWs that cannot be registered by the WWAT
- 2018 Part 327 amended to create “alternative analysis” to SSRs
  - LQWs  $\leq$  1 MGD capacity eligible
  - Qualified hydrologist or hydrogeologist conducts alternative analysis
  - 20- or 25-business day deadline for EGLE review
  - LQW registered by operation of law if timeframe exceeded
  - Limited grounds for EGLE to deny alternative analysis
  - Conventional SSR process still available

# Part 327, Great Lakes Preservation

- Baseline capacity reported < 4/1/2009
- New or increased withdrawals > 100,000 gallons per day
- 70 gallons per minute rated pump capacity
- New or increased withdrawals register using Water Withdrawal Assessment Tool (WWAT)
- Site-specific reviews (SSR)
- New or increased withdrawals > 2 MGD require permit
- Prohibits diversions

# Decision Criteria



# Water Withdrawal Assessment Tool (WWAT)

- Model predicts 50% summer low flow
- Model links stream flow decreases & fish impacts
- Model predicts stream flow depletions caused by wells
- Withdrawals that pass tool are registered
- Proposed withdrawal must be authorized by site-specific review (SSR) if it can't pass the WWAT

# WWAT User Interface



## Registration Management

If you are assessing a new withdrawal or proposing to register a new withdrawal for the first time, choose "New Withdrawal" below. If you are modifying a registration you have made through the Water Withdrawal Assessment Tool, choose "Modify a Registration" below. If you no longer require a Water Withdrawal Assessment Tool registration for a previously registered withdrawal, select "Cancel a Registration".



### Note:

You are required to modify your registration if the actual water withdrawal is installed or used differently than what was approved in the Water Withdrawal Assessment Tool. This includes location, pump capacity, intake depth, pumping schedule or hydrogeological parameters.



 **New Withdrawal**



 **Modify a Registration**

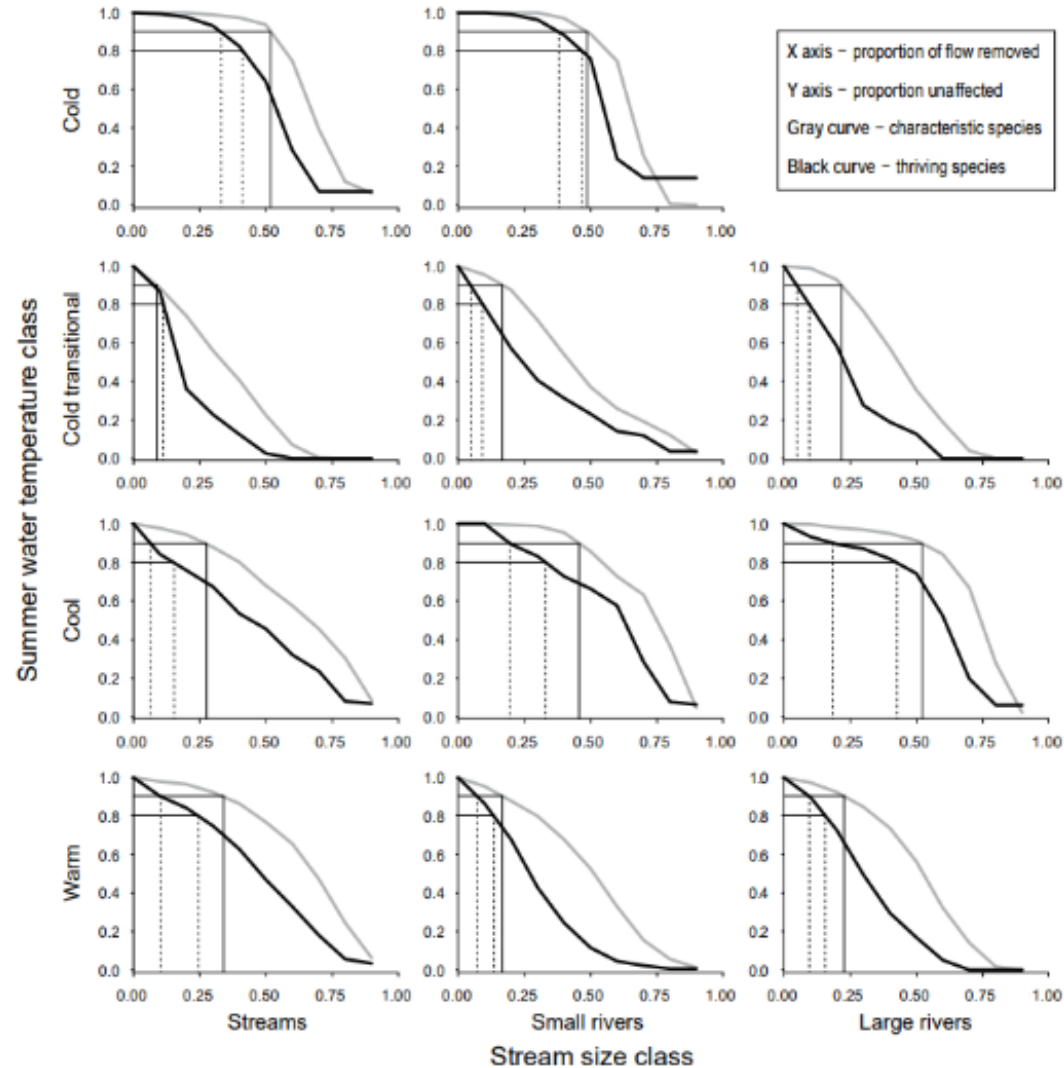


 **Cancel a Registration**

# WWAT User Supplied Information

- Groundwater, surface water, or pond withdrawal
- Latitude/longitude coordinates
- Aquifer type (bedrock or glacial)
- Pumping rate (gallons per minute)
- Well casing depth
- Pumping schedule
  - Continuous
  - Intermittent (months/year, days/week, hours/day)

# Fish Response Curves



# Allowable Index Flow Reductions By Stream Category

Table 4.—Allowable percentage reduction in Index Flow used in the Michigan Water Withdrawal Assessment Tool.

| Ecological Stream Types |              | Water Withdrawal Management Zones |           |             |              |
|-------------------------|--------------|-----------------------------------|-----------|-------------|--------------|
|                         |              | Zone A                            | Zone B    | Zone C      | Zone D (ARI) |
| Cold                    | Streams      | <14%                              | None      | 14 – <20%   | ≥20%         |
|                         | Small Rivers | <10.5%                            |           | 10.5 – <21% | ≥21%         |
| Cold Transitional       | Streams      | None                              | <4%       | None        | ≥4%          |
|                         | Small Rivers |                                   | <2%       |             | ≥2%          |
|                         | Large Rivers |                                   | <3%       |             | ≥3%          |
| Cool                    | Streams      | <6%                               | 6 – <15%  | 15 – <25%   | ≥25%         |
|                         | Small Rivers | <15%                              | 15 – <19% | 19 – <25%   | ≥25%         |
|                         | Large Rivers | <14%                              | 14 – <19% | 19 – <25%   | ≥25%         |
| Warm                    | Streams      | <10%                              | 10 – <18% | 18 – <24%   | ≥24%         |
|                         | Small Rivers | <8%                               | 8 – <13%  | 13 – <17%   | ≥17%         |
|                         | Large Rivers | <10%                              | 10 – <16% | 16 – <22%   | ≥22%         |

# Stream/River Flow Reduction Limit

- Explicit % flow reduction allowed
  - Based on stream size and temperature classification
  - 4% up to 25% of index flow
- Cumulative impact from all new large quantity withdrawals
- Tracked by segment/subwatershed (5,500)
- Predicted (modeled) prior to authorization
- Limit called “**adverse resource impact**” (ARI)
- New large quantity withdrawals prohibited from causing ARI

# LQW Registration Receipt

- Must be operational within 18 months
- Property owner
- Agent
- Location
- Type of withdrawal
- Pumping rate
- Pumping schedule
- Casing depth
- Total annual withdrawal volume (gallons)

# Site-Specific Reviews, Part 1

- Required if property owner or agent can't pass WWAT
- Same user supplied information as WWAT
- Applicant can provide additional information
- Same 18-month expiration date as WWAT registrations
- EGLE staff review all available information, including:
  - Aquifer pumping test data
  - Geologic cross-sections and maps
  - Stream flow data
  - Additional analytical models to estimate stream flow depletion by wells

## Site-Specific Reviews, Part 2

- Analytical Models:
  - Hunt 1999 (unconfined aquifer)
  - Hunt 2003 (leaky confined aquifer)
  - Dudley Ward & Lough 2011 (2-layered aquifer)
- Numerical models
- Negotiate modified use if unable to register as proposed?
- Denial options:
  - Apply for Part 327 permit
  - Form a water users committee
  - Collect additional data & reapply

# Part 327 Permit Application

- On-line permit application (MiEnviro)
- \$2,000 permit application fee
- 30-day administrative completeness review
- 45-day public notice & comment
- 120-day decision deadline
- No Adverse Resource Impact
- Reasonable use under common law
  - Includes assessing potential to impact other wells
- In compliance with all applicable international, interstate, federal, state, and local regulations
- Enforceable permit conditions
- Typically no expiration date

# Water User Committees

- Can be formed by water users at the sub-watershed level
- Help manage water resources at the local level
- Local units of government can form ad hoc citizen advisory panels
- Could reallocate unused streamflow depletion amounts in water management area
- Largely untested theory so far
- Competing interests
- Difficult to get large groups of people to agree
- If no water user committee, EGLE can convene meeting when ARI declared
  - Water users don't have to follow EGLE recommendations

# ARI Standards

- Numerical standards for stream flow & fish populations
  - USGS network of continuous stream gages
  - One-time stream flow measurements by EGLE & USGS
  - DNR Fisheries Division surveys
- Narrative standards for inland lakes
  - Applies only to direct surface water withdrawals
  - Adverse impacts to fish populations
  - Adverse impacts to other uses of inland lake
    - Docks
    - Navigation
- Few inland lakes have long term lake level data
  - Drought impact or pumping?

# Water Use Reporting

- Annual water use reports due by April 1 of following calendar year
- Agricultural water use reports go to MDARD
- No water use reporting fee for agricultural LQWs
- All other water use reports go to EGLE
- \$200 water use reporting fee for all other LQWs > 1.5 MGY
- EGLE & MDARD have separate water use reporting databases
- EGLE staff compile all of Michigan's water use data
- EGLE reports MI's water use data to regional & federal agencies

# Aquifer Dispute Resolution

- Part 317, Aquifer Protection and Dispute Resolution, of the NREPA
- High-capacity wells impacting private well's water quantity &/or water quality
- MDARD jurisdiction over agricultural LQWs
- EGLE jurisdiction over other LQWs
- Dewatering wells exempt
- EGLE or MDARD Directors can declare Aquifer Dispute
- Order provision of potable water, repair or replacement of well, order high-capacity well to reduce or stop pumping
- So far, high-capacity well owners have resolved disputes

# Ongoing Issues

- Incomplete understanding of complex glacial geology
- Glacial geology mapping continues
- Ongoing stream flow data collection
- Documenting ARI
- Implementing Water User Committees
- Dewatering wells exempt from aquifer dispute resolution
- Diverse stakeholder representation on Water Use Advisory Council—achieving consensus
- Program funding

# Thank you

Jim Milne

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Michigan Department of  
**Environment, Great Lakes, and Energy**

800-662-9278

Michigan.gov/EGLE



Follow us at: [Michigan.gov/EGLEConnect](https://Michigan.gov/EGLEConnect)

# Thank you!

# Speaker

**Michael Anderson, PE**

Environmental engineer senior

Water Supply Engineering Section,  
Iowa Department of Natural  
Resources





IOWA DEPARTMENT OF NATURAL RESOURCES

Leading Iowans in Caring For Our Natural Resources

# **Iowa's Water Use Program Emphasis on Practices**

**Strengthening Illinois' High-Capacity Well Impact Review Process**

**Iowa Case Study/Focus**

**September 10<sup>th</sup>, 2026**

**Michael K. Anderson, P.E.**

Senior Engineer

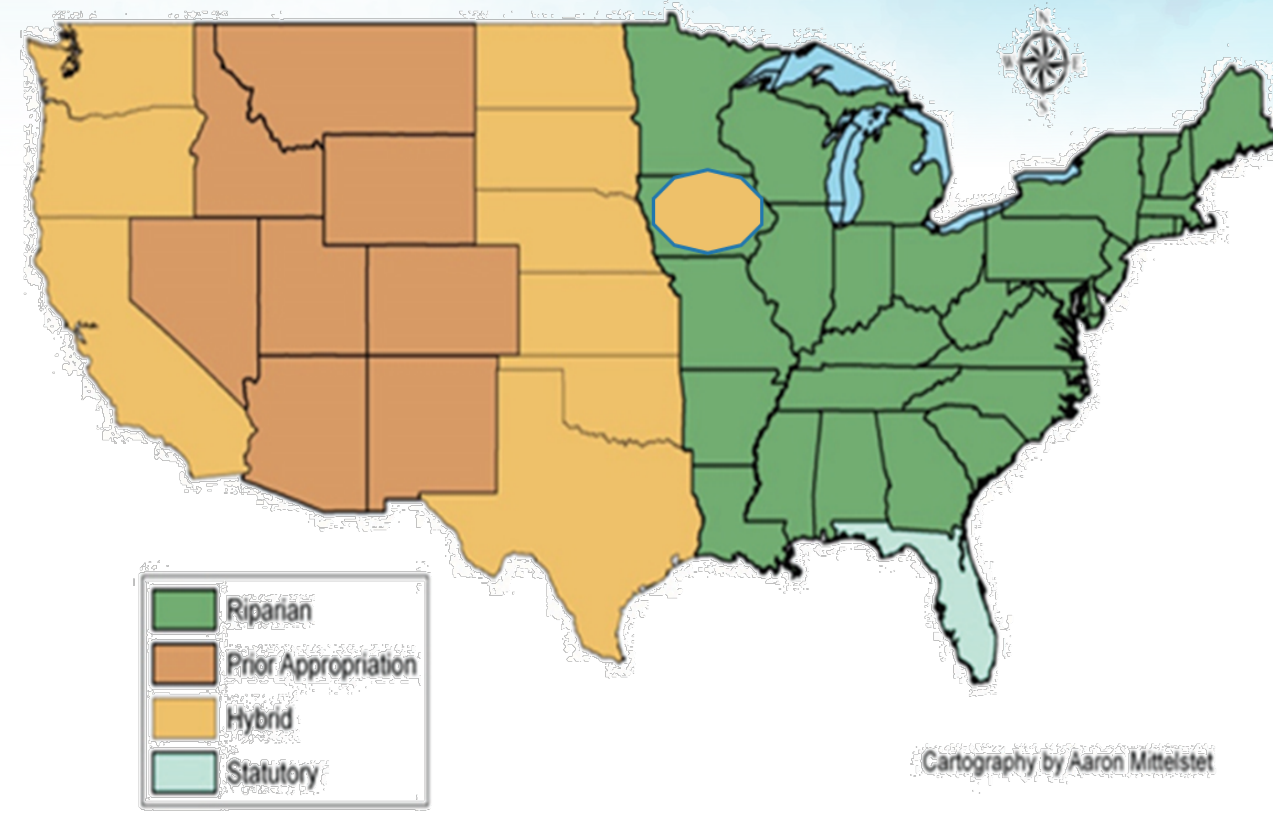
Iowa Department of Natural Resources – Water Use Program

# Outline - Iowa

- Overview of Iowa's Water Use Program
- Review Process for Wells
- Use of Pump Tests
- Jordan Rules as a sub-example
- DSM Examples

# IA Water Use Program Rules

- State (not a federal) program.
- Enacted in 1957 by Iowa Legislature.
- IA is a hybrid between “Riparian” (Eastern U.S.) and Prior Appropriation (Western U.S.) law.
- All IA waters “public waters and public wealth” of citizens.
- A permit system for anyone using >25,000 gallons per day, any single day of the year.



# Water Use Law

## Riparian

- **Reasonable Use:** Landowners have right to make "reasonable use" of water as long as it doesn't unreasonably harm downstream neighbors.
- **Proportionality:** If a river's level drops during a drought, everyone is expected to "share the shortage." There is no hierarchy; everyone's right to water is essentially equal.

## Prior Appropriation

- **Priority:** Every water right has a date attached to it. The "Prior" right holder (the person who first diverted the water for use) has priority over subsequent users.
- **Beneficial Use:** To keep your right, you prove the water is being used for a "beneficial" purpose (e.g., irrigation, mining, municipal use).
- **Hierarchy in Use:** In a dry year, a 'higher' use can shut off 'lower' use.

# Iowa's Program

**Anyone** diverting/withdrawing over **25,000 gallons per day** any single day of they year submits an application for review. The program checks:

- How much water will be withdrawn (annual and 'instantaneous' rates).
- Where the water will be withdrawn.
- Where and how the water will be used ("Beneficial use" to fullest extent possible.)

The Water Use Program reviews

- The beneficial use of the water.
- The effect of withdrawals on *prior* water users.

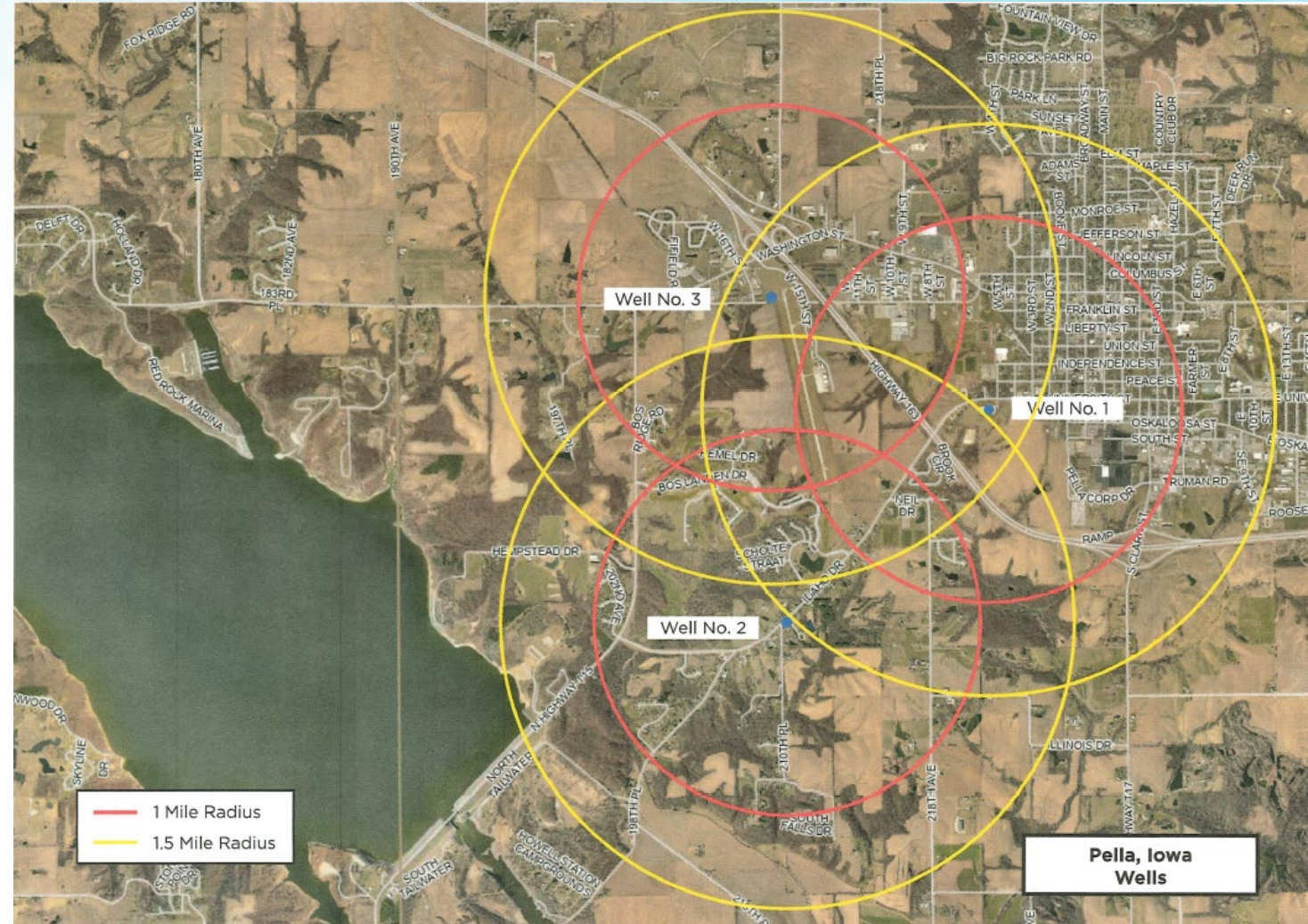
Allocation Permit is issued if the conditions listed above are met.

# More on Iowa's Water Use Program

- Water use permits can be completed before, after, or during a well construction (though we prefer they are completed before construction)
- Water use permit applications are reviewed within 90 days after a complete permit is received (pump test, groundwater model, test logs, etc.)
- 20 days is for public notice/public reaction
  - ***\*\*public notice is now online only, not in the local newspaper!!!***
- End result is the draft permit with an associated summary analysis, then the final permit
- Permits are typically for 10 years (5-Years for Jordan aquifer)
- Annual “Stakeholder Meeting”, in July, for anyone interested in water use, where the program outlines what occurred in the previous fiscal year.

# Water Use Application (Pella example)

- Has the who, what, where and water source for the permit.
- Includes a map of the intake(s)/well(s).
- Staff review and approve/modify (or deny) the water use application based on water availability, impacts of withdrawals and prior allocations and use in the area.



# Well Log

State Well IDs

Local ID, depths,  
and and Drill Dates

Well Construction Information (hole size, casing type,  
pump setting, grout, etc.)

Well Site Location information  
(w/GPS)

Well Formation Log  
(clay, till, sand, limestone,  
red, green blue, etc.)

Well Water Information  
(static, pumping, Yield,  
Duration)

Well Development and  
Contractor Contact  
Information

**WELL RECORD FORM**

|                                                                                                                                                                                          |  |                       |  |                                                                                                                                                        |  |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|-----------------------|--|--------------------------------------------------------------------------------------------------------------------------------------------------------|--|
| PWSID# or PWTS No. _____                                                                                                                                                                 |  | PWTS Permit No. _____ |  | GeoSam WNumber (IGS use only) _____                                                                                                                    |  |
| <b>Site Identification</b>                                                                                                                                                               |  |                       |  | <b>Drill Method</b> <input type="checkbox"/> Rotary <input type="checkbox"/> Auger <input type="checkbox"/> Cable <input type="checkbox"/> Other _____ |  |
| Property owner _____ Other ID _____                                                                                                                                                      |  |                       |  | <b>Hole size</b>                                                                                                                                       |  |
| Address _____ City _____                                                                                                                                                                 |  |                       |  | hole size continued                                                                                                                                    |  |
| Tenant _____                                                                                                                                                                             |  |                       |  | _____ inch from 0 ft to _____ ft                                                                                                                       |  |
| Well depth _____ ft Date completed ____/____/____                                                                                                                                        |  |                       |  | _____ inch from _____ ft to _____ ft                                                                                                                   |  |
| <b>Location</b> County _____                                                                                                                                                             |  |                       |  | <b>Casing or Loop Pipe</b>                                                                                                                             |  |
| GPS coordinates (NAD83 datum)                                                                                                                                                            |  |                       |  | Record all depth measurements from ground level (GL). Use + for above GL measurements.                                                                 |  |
| Latitude _____ Longitude _____                                                                                                                                                           |  |                       |  | Size (in) Material Depth Top Depth Bottom Perforated Screen                                                                                            |  |
| <input type="checkbox"/> Decimal Degrees <input type="checkbox"/> Degrees, Decimal Minutes <input type="checkbox"/> Degrees, Minutes, Seconds                                            |  |                       |  | <input type="checkbox"/> slot size _____                                                                                                               |  |
| _____ 1/4 of the _____ 1/4 of the _____ 1/4 of Sec _____ TWP _____ RNG _____ E                                                                                                           |  |                       |  | <input type="checkbox"/> slot size _____                                                                                                               |  |
| Show exact location of well in section grid with a dot (.). Sketch map of well location on property.                                                                                     |  |                       |  | <input type="checkbox"/> slot size _____                                                                                                               |  |
| <div style="text-align: center;">N<br/>+ + +<br/>     <br/>+ + +<br/>W m<br/>+ + +<br/>S<br/>1 mile<br/>200 ft</div>                                                                     |  |                       |  | <input type="checkbox"/> slot size _____                                                                                                               |  |
|                                                                                                                                                                                          |  |                       |  | <input type="checkbox"/> slot size _____                                                                                                               |  |
|                                                                                                                                                                                          |  |                       |  | <input type="checkbox"/> slot size _____                                                                                                               |  |
|                                                                                                                                                                                          |  |                       |  | <input type="checkbox"/> slot size _____                                                                                                               |  |
| <input type="checkbox"/> Gravel packed amount _____ variety _____                                                                                                                        |  |                       |  | <input type="checkbox"/> Seals/packers type _____                                                                                                      |  |
| <input type="checkbox"/> Bottom capped with _____                                                                                                                                        |  |                       |  | <b>Casing Grout</b> Placement method _____                                                                                                             |  |
| <b>Formation Log</b>                                                                                                                                                                     |  |                       |  | Type _____                                                                                                                                             |  |
|                                                                                                                                                                                          |  |                       |  | Depth Top _____                                                                                                                                        |  |
|                                                                                                                                                                                          |  |                       |  | Depth Bottom _____                                                                                                                                     |  |
|                                                                                                                                                                                          |  |                       |  | Amount (yd/w) _____                                                                                                                                    |  |
|                                                                                                                                                                                          |  |                       |  |                                                                                                                                                        |  |
|                                                                                                                                                                                          |  |                       |  |                                                                                                                                                        |  |
|                                                                                                                                                                                          |  |                       |  |                                                                                                                                                        |  |
|                                                                                                                                                                                          |  |                       |  |                                                                                                                                                        |  |
|                                                                                                                                                                                          |  |                       |  |                                                                                                                                                        |  |
|                                                                                                                                                                                          |  |                       |  |                                                                                                                                                        |  |
| <b>Pump Installation</b> Date ____/____/____                                                                                                                                             |  |                       |  | Type of pump _____ Depth to intake _____ ft                                                                                                            |  |
| Pump diameter _____ in                                                                                                                                                                   |  |                       |  | Rated capacity _____ GPM                                                                                                                               |  |
| <b>Water Information</b> Date ____/____/____                                                                                                                                             |  |                       |  | Static Water Level _____ ft                                                                                                                            |  |
| Pumping Water Level _____ ft                                                                                                                                                             |  |                       |  | Yield _____ GPM                                                                                                                                        |  |
|                                                                                                                                                                                          |  |                       |  | Duration _____ hrs                                                                                                                                     |  |
| Water level measurement: <input type="checkbox"/> Sonic <input type="checkbox"/> Tape <input type="checkbox"/> Airline <input type="checkbox"/> E-line <input type="checkbox"/> Estimate |  |                       |  |                                                                                                                                                        |  |
| Water yield measurement: <input type="checkbox"/> Orifice <input type="checkbox"/> Volumetric <input type="checkbox"/> Estimate                                                          |  |                       |  |                                                                                                                                                        |  |
| Main water-supply zone from _____ ft to _____ ft below GL                                                                                                                                |  |                       |  |                                                                                                                                                        |  |
| <b>Well Development</b>                                                                                                                                                                  |  |                       |  |                                                                                                                                                        |  |
| <input type="checkbox"/> Physical explain: _____                                                                                                                                         |  |                       |  |                                                                                                                                                        |  |
| <input type="checkbox"/> Chemical explain: _____                                                                                                                                         |  |                       |  |                                                                                                                                                        |  |
| <b>Contractor</b>                                                                                                                                                                        |  |                       |  |                                                                                                                                                        |  |
| Company _____                                                                                                                                                                            |  |                       |  |                                                                                                                                                        |  |
| Address _____                                                                                                                                                                            |  |                       |  |                                                                                                                                                        |  |
| Driller _____                                                                                                                                                                            |  |                       |  | Certification no. _____                                                                                                                                |  |
| <b>Remarks</b> (including depth of lost drilling fluids, materials, or tools)                                                                                                            |  |                       |  |                                                                                                                                                        |  |
|                                                                                                                                                                                          |  |                       |  |                                                                                                                                                        |  |
| <b>Well Use</b>                                                                                                                                                                          |  |                       |  |                                                                                                                                                        |  |
| <input type="checkbox"/> Domestic <input type="checkbox"/> Public supply <input type="checkbox"/> Livestock                                                                              |  |                       |  |                                                                                                                                                        |  |
| <input type="checkbox"/> Heat pump <input type="checkbox"/> Commercial <input type="checkbox"/> Irrigation                                                                               |  |                       |  |                                                                                                                                                        |  |
| # of borehole(s) _____ <input type="checkbox"/> Monitoring <input type="checkbox"/> Other _____                                                                                          |  |                       |  |                                                                                                                                                        |  |
|                                                                                                                                                                                          |  |                       |  |                                                                                                                                                        |  |



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Mail form to Iowa Department of Natural Resources: 502 E. 9th St., Des Moines, IA 50319-0034

[Or click here to e-mail form to: well.records@dnr.iowa.gov](mailto:well.records@dnr.iowa.gov)

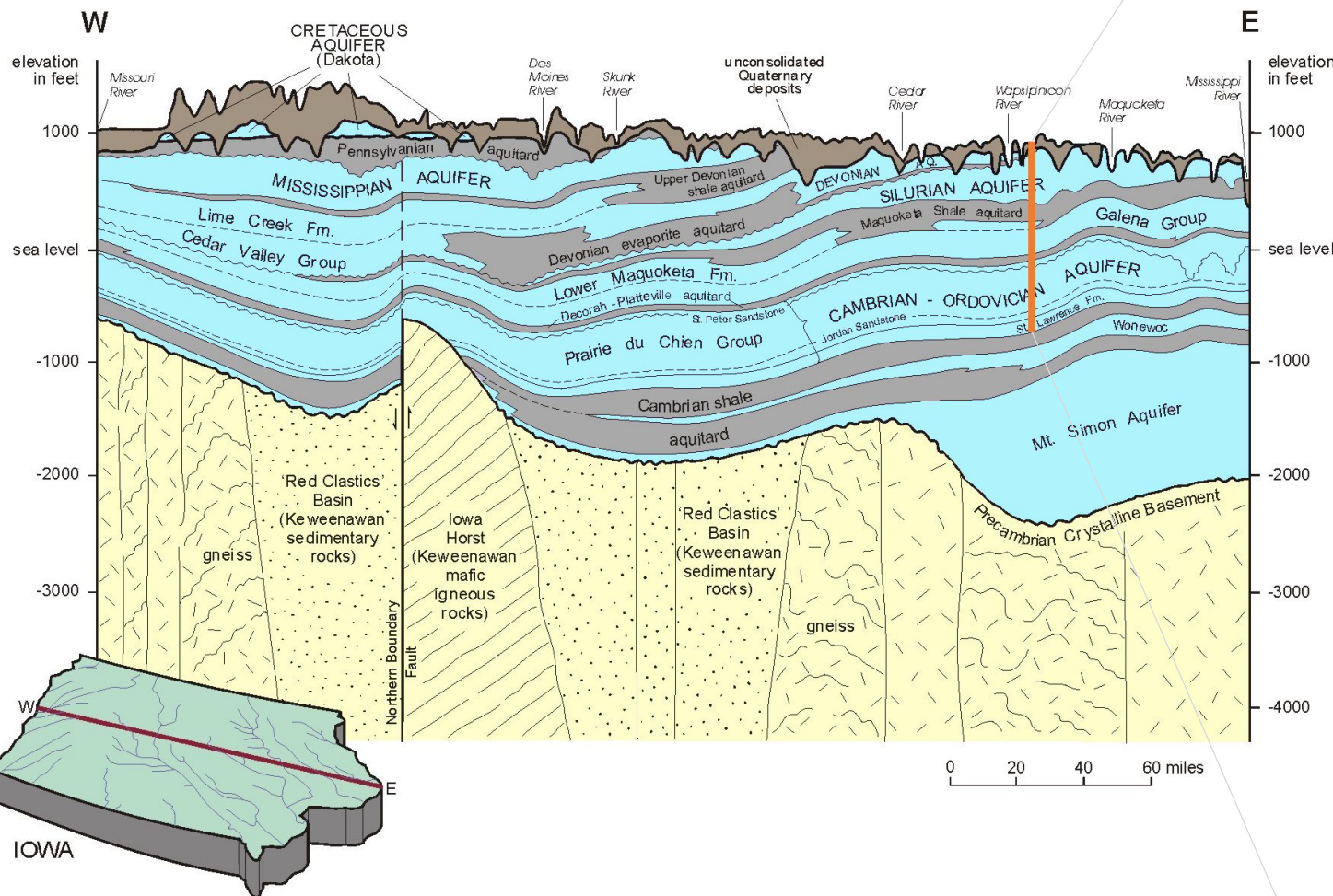
Make copies for well contractor, customer, and county health department



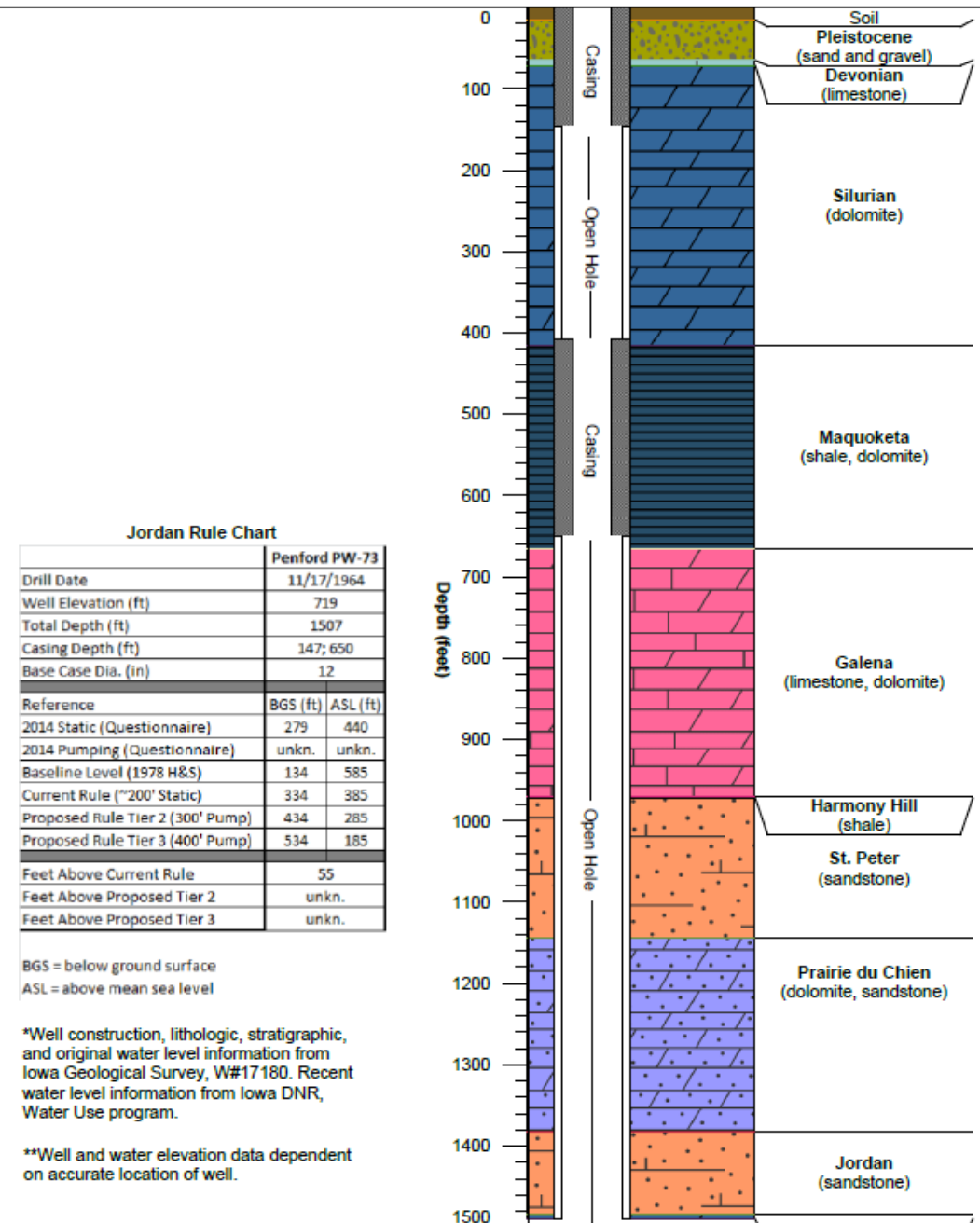
DNR Form 542-8170

# Iowa Groundwater

Bedrock Aquifer Systems across Iowa  
West to East

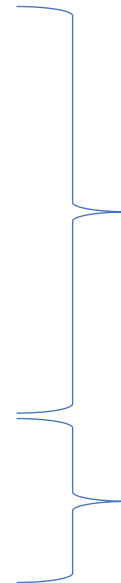


PW-73 Well Diagram



# Iowa's Major Water Sources

- Surface Water
- Iowa aquifers, from bottom to top:
  - “Jordan” or Cambrian-Ordovician Aquifer
  - Upper Ordovician Aquifer
  - Silurian-Devonian Aquifer
  - Mississippian Aquifer
  - Dakota Aquifer
  - Buried Sand and Gravel Aquifer
  - Alluvial Aquifer



Bedrock aquifers (*shallow seas*)

“Unconsolidated” aquifers  
(glaciers and rivers)



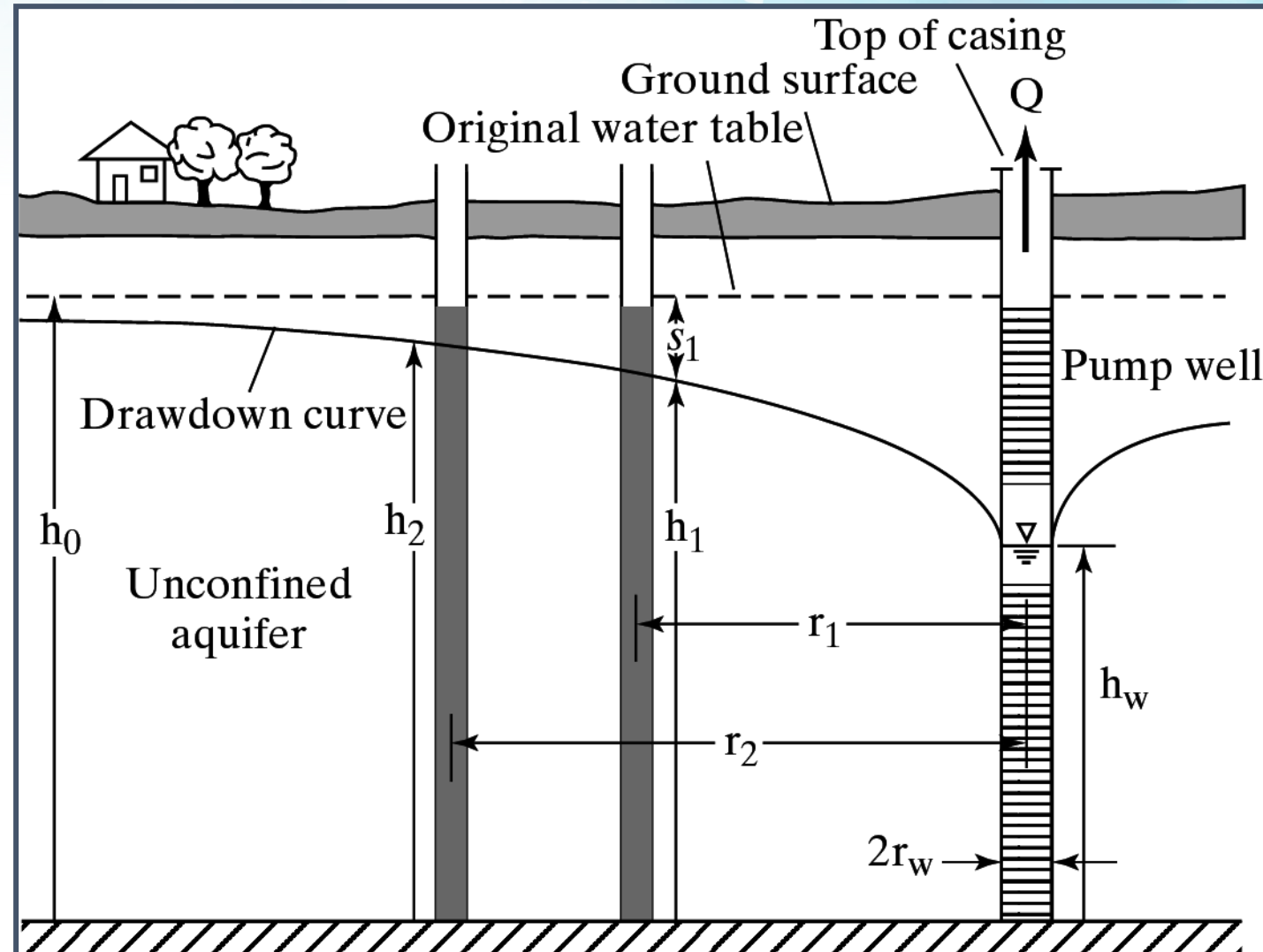
# Pump Tests

- Pump tests generally, but not always, completed after the initial well construction.
- Pump tests provide information on;
  - Aquifer viability
  - Well interference
  - Aquifer extent
  - (sometimes) aquifer boundaries and induced recharge.

$Q$  = Volume of water discharged  
 $h$  = water level above base of aquifer  
 $r$  = distance from pumping well

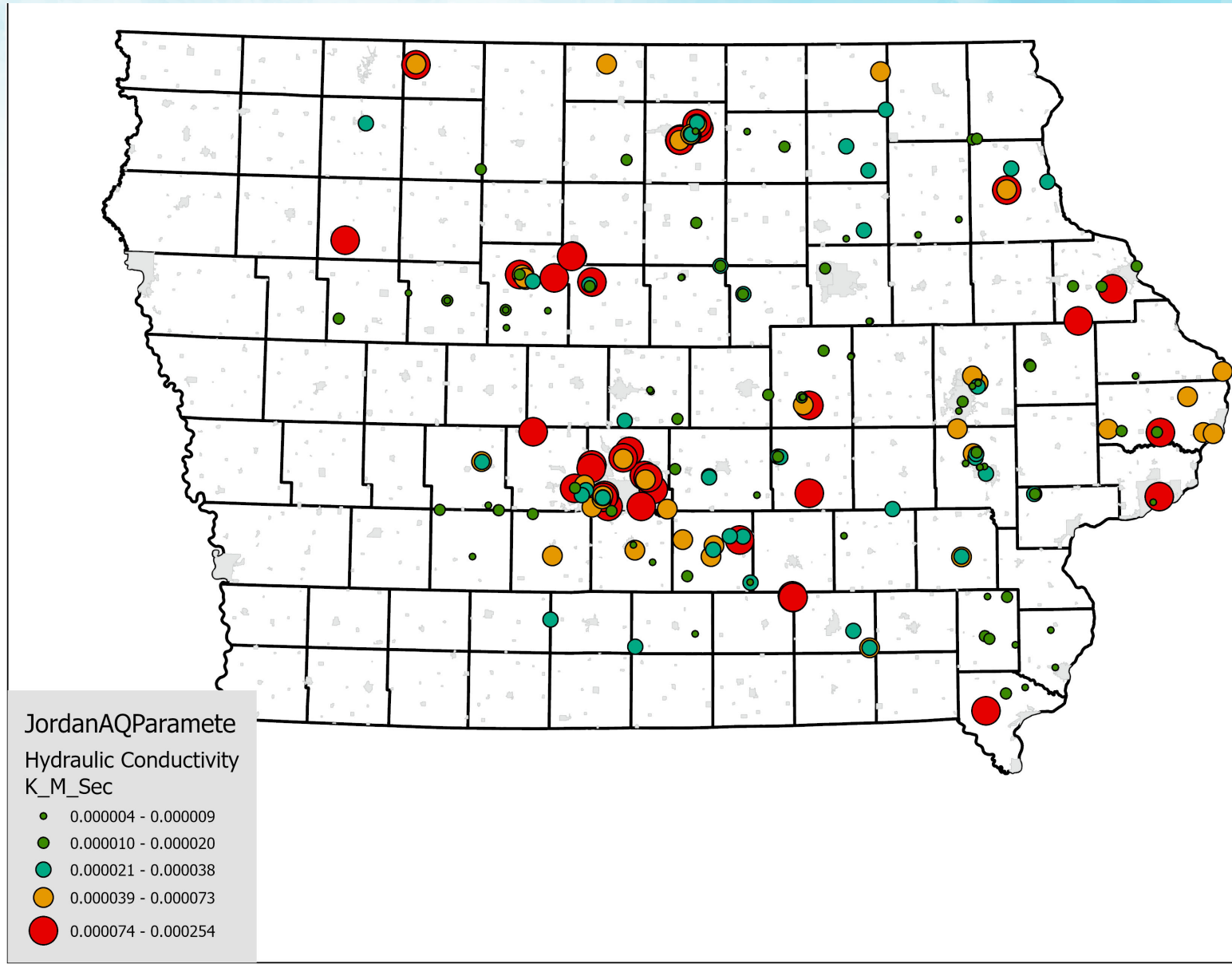
## Hydraulic Conductivity

$$K = [Q/\pi(h_2^2 - h_1^2)] \ln(r_2/r_1)$$



# Aquifer Pump Tests

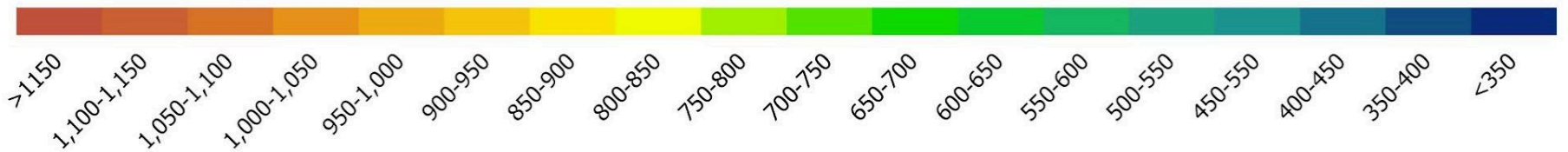
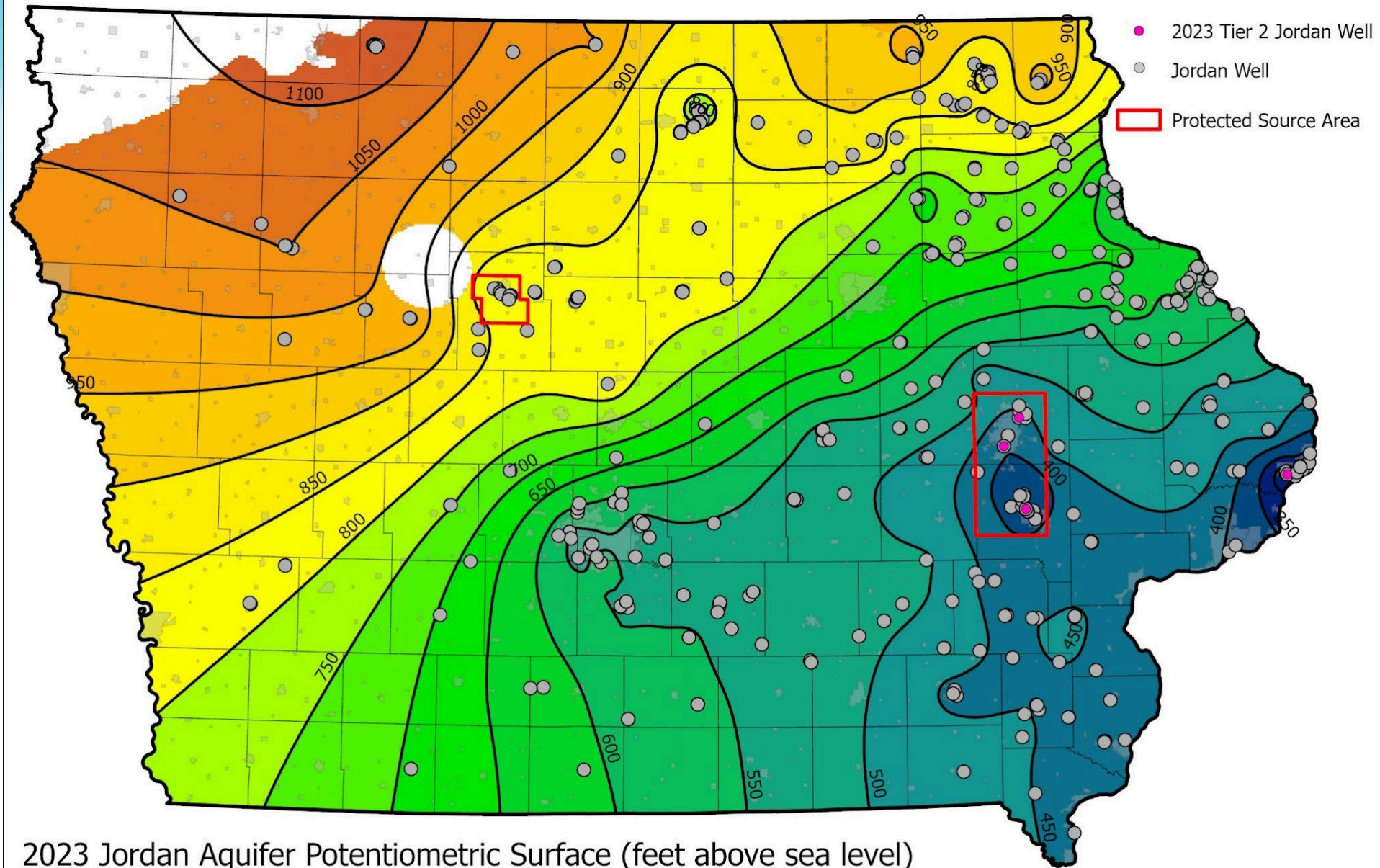
- Multiple well construction, geology, pump test data can be used to characterize aquifers.
- That info can be used to help municipalities, industries, and IDNR use & manage water.
- We need more!



# Let's drill down to a specific example

- Cambrian\_Ordovician (e.g., “Jordan Sandstone”)
- Expressed need
- Stakeholder input
- Somewhat modeled on Minnesota efforts

# Jordan Aquifer Potentio- metric Surface 2023

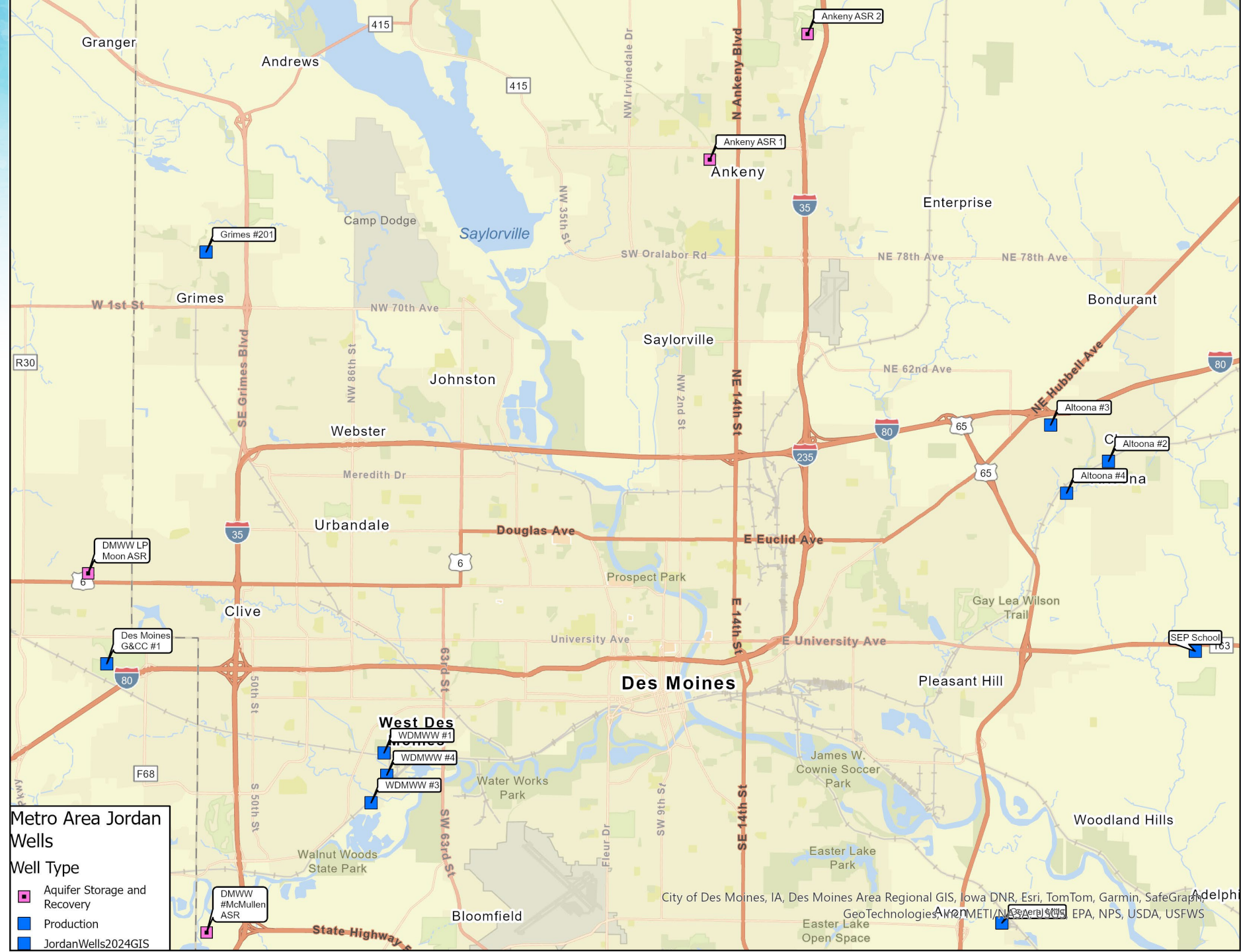


# Jordan Aquifer Rule (2015 Update)

- a. 2,000 gpm restriction on industrial or power generation uses.
- b. Limited cooling and geothermal use. No once-through (single pass with disposal to storm sewer or equivalent) cooling water or geothermal usage is allowed.
- c. 5-year cycle for Jordan aquifer high capacity permits and wells.
- d. Jordan Tier Levels.
  - Tier 1: *PWL <300 ft from MMS-6 level or 50% decline to top of aquifer (green light)*
  - Tier 2: *PWL 300-400 ft from MMS-6 or 50-75% decline to top of aquifer (yellow light)*
  - Tier 3: *PWL >400 ft decline from MMS-6 or > 75% decline PWL (red light)*
- f. Water use reduction plan required for wells classified in Tier 2 and Tier 3 to minimize the Jordan aquifer withdrawals

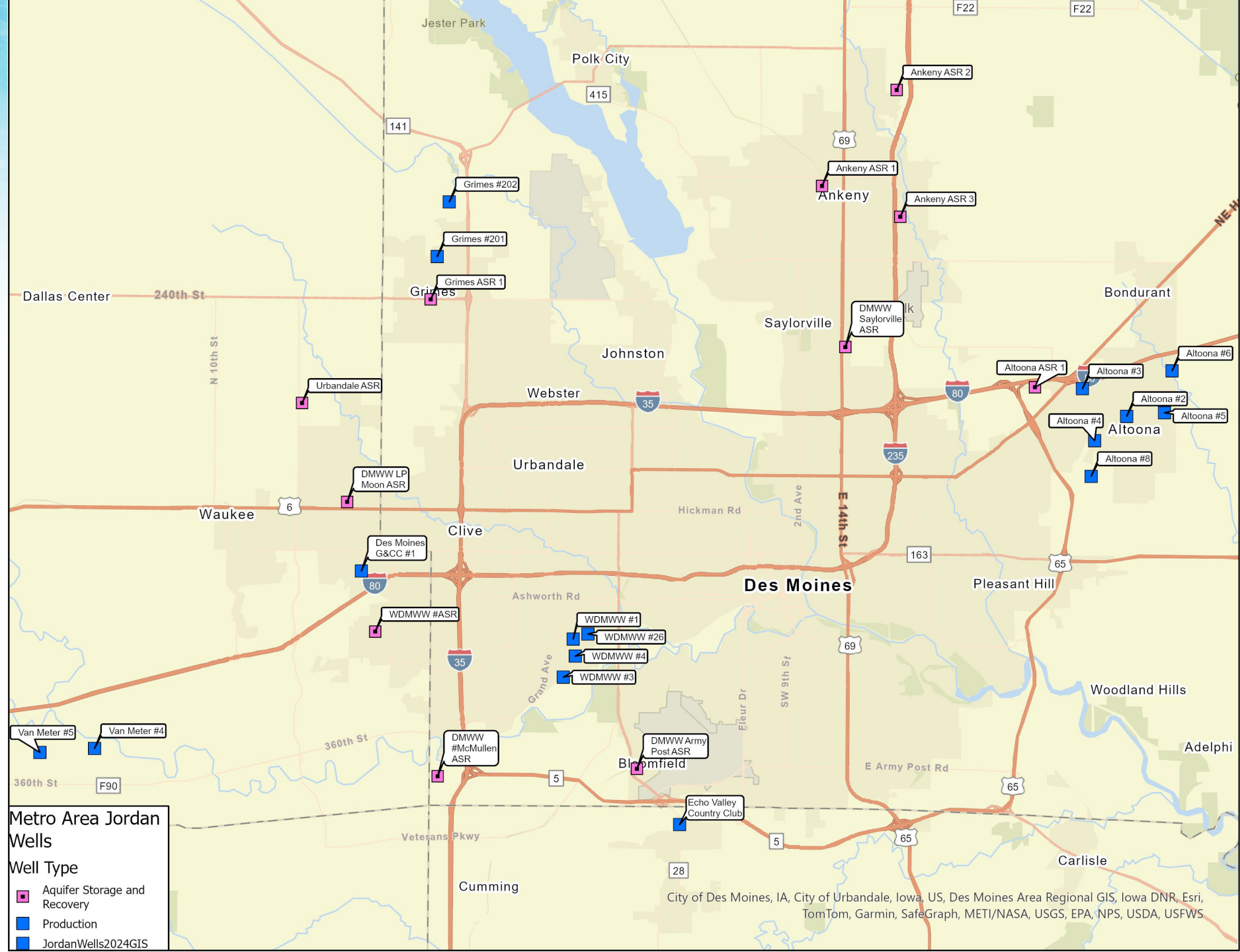
# 2015 Jordan Aquifer Water Use Wells and Withdrawals

- Eight Production Wells
  - Altoona (3)
  - West Des Moines (3)
  - Des Moines G&CC (1)
  - General Mills (1)
  - SEP Schools (1)
  - Grimes (1)
- Four ASR Wells
  - Ankeny (2)
  - DMWW (2)
- ~1.89 Billion Gallons



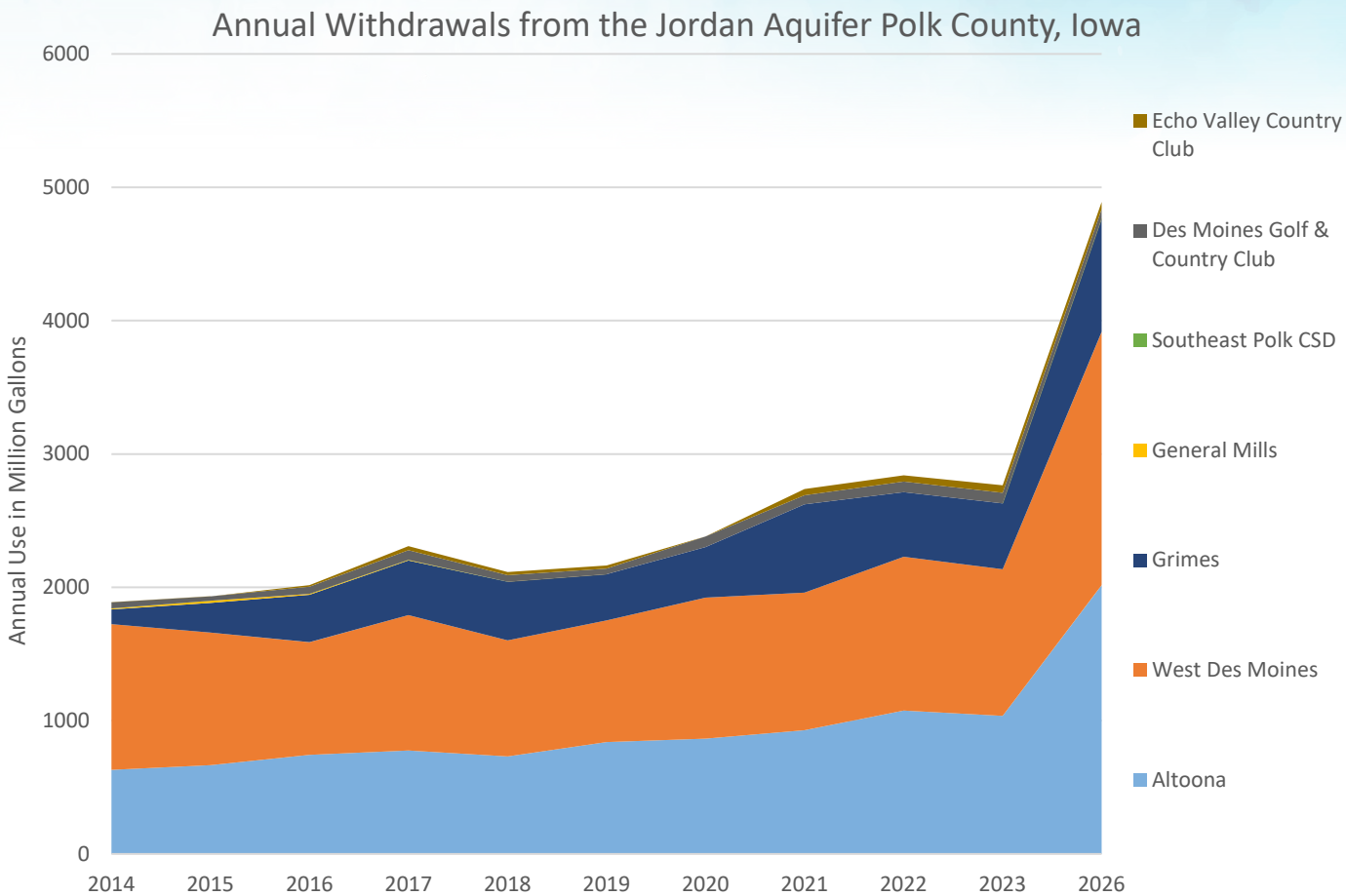
# 2025+ Jordan Water Use

- ~16 Production Wells
- ~Ten ASR Wells
- ~4.89 Billion Gallons



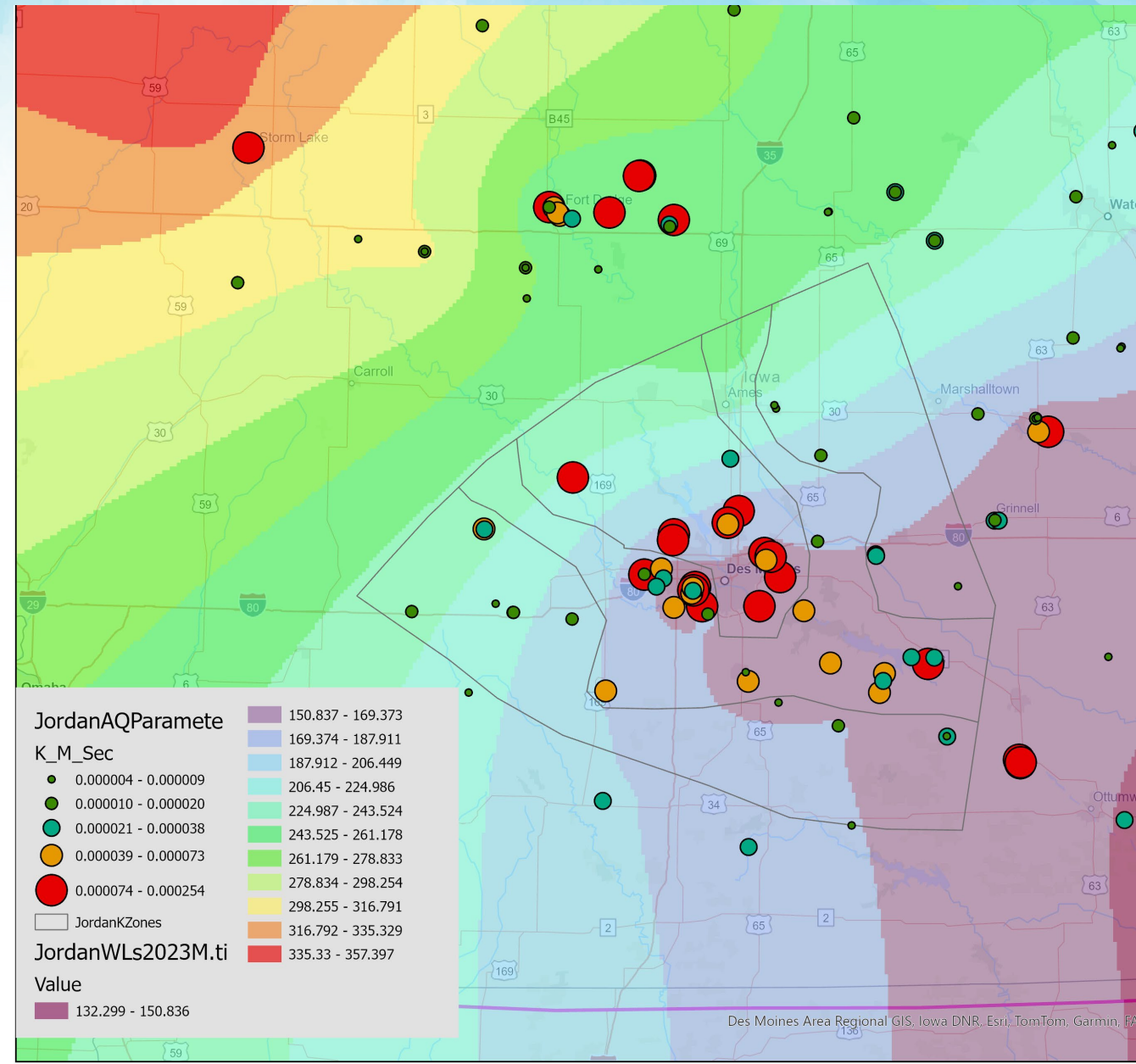
# Water Use Data - Examples

| Water User                     | 2024<br>Mgy per permit | 2025+<br>Mgy per permit |
|--------------------------------|------------------------|-------------------------|
| West Des Moines                | 1099.0                 | 1900.0                  |
| General Mills                  | 0.0                    | 0.0                     |
| Southeast Polk CSD             | 0.0                    | 0.0                     |
| Grimes                         | 492.8                  | 850.0                   |
| Des Moines Golf & Country Club | 79.9                   | 70.0                    |
| Echo Valley Country Club       | 55.9                   | 55.0                    |
| Altoona                        | 1036.8                 | 2015.0                  |
| Des Moines                     | 0.0                    | 0.0                     |



# Water Use Data – Groundwater Models

- Three layers
  - (Miss/Penn/Overburden)
  - Decorah/Platteville Confining Layer
  - Jordan Aquifer (model base)
- 2000-2023 calibration
  - Monthly data to WACOP
  - Water Levels to WACOP
- 2023 -2050 forecast
  - Permitted or forecasted use limit
- Jordan aquifer K ranges from  $7e-6$  to  $0.00023$  m/s from 50 + pump tests in area
- Jordan aquifer Ss 1/m ranges from  $2e-7$  to  $2e-6$  from 4 pump tests w/obs. wells in model area
- Thicknesses from digital models
- Jordan Head boundary conditions
  - NW2000: 250m SE2000: 180m
  - NW 2050: 232m SE2050: 140m



**Process has worked, but.....**

**Opaque?**

**More data**

**Some degree of pushback**

# Water Use Program Summary

- Iowa's Water Use Program has existed since the 1950s, and has changed & adapted. Events like drought, new water uses and users, and understanding of Iowa's aquifers have all advanced the program.
- Irrigation wells are often hardest to track.
- New (2015) water use regulations are in place for the "Jordan" (a.k.a. Cambrian-Ordovician) aquifer that regulate water levels.
- The Water Use Program has an annual stakeholder meeting to discuss the past year and receive feedback and direction from the public.
- Some degree of "ecological pushback" recently. Is review sufficient to preserve "ecological integrity"?



# Thank You!

Chad Fields  
Geologist – Iowa DNR  
515-725-3407  
[chad.fields@dnr.iowa.gov](mailto:chad.fields@dnr.iowa.gov)

# Comparing Michigan and Iowa



**Jim Milne**



**Michael Anderson, PE**

# Comparing approaches and applying lessons

Moderated discussion

# Panel discussion

- **Nora Beck** — Chicago Metropolitan Agency for Planning
- **Jim Milne** — Michigan Department of Environment, Great Lakes, and Energy
- **Michael Anderson, PE** — Iowa Department of Natural Resources

# Strengthening Illinois' high-capacity well impact review process

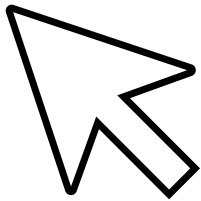


**Shared Waters,  
Shared Future**  
Northeastern Illinois Regional Water  
Supply Sustainability Workshops

# After today's workshop, how well do you understand Illinois' high-capacity well impact review process, including how it is implemented in practice?

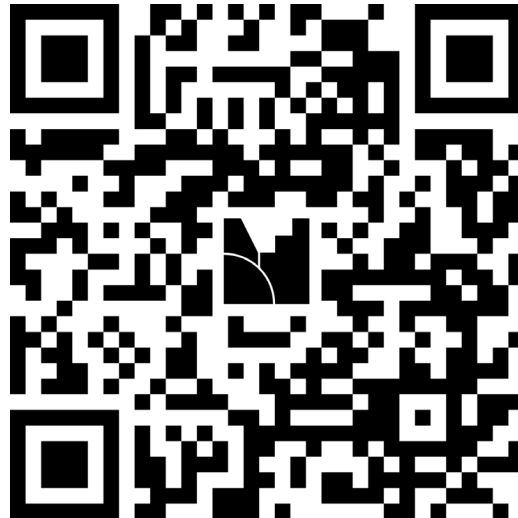
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It's on the screen in front of you

# What's next

## **November 12:** Understanding water governance & management in Illinois

- Final Shared Waters, Shared Future workshop
- 9:00 a.m. to noon CT

Please complete exit survey as you leave

# Thank you!



**Shared Waters,  
Shared Future**  
Northeastern Illinois Regional Water  
Supply Sustainability Workshops