Illinois Groundwater Monitoring Network

Greg Rogers

PRI - ISWS

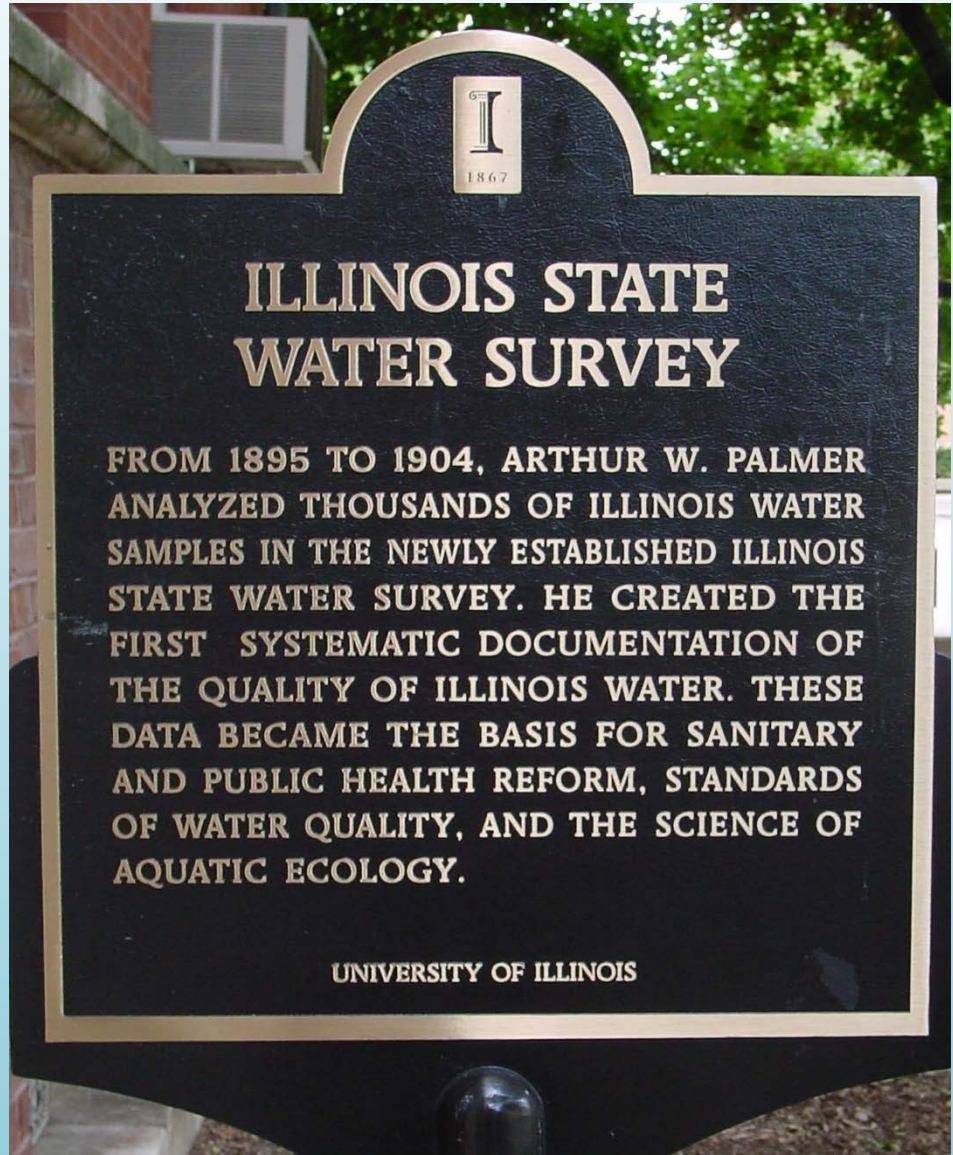
University of Illinois

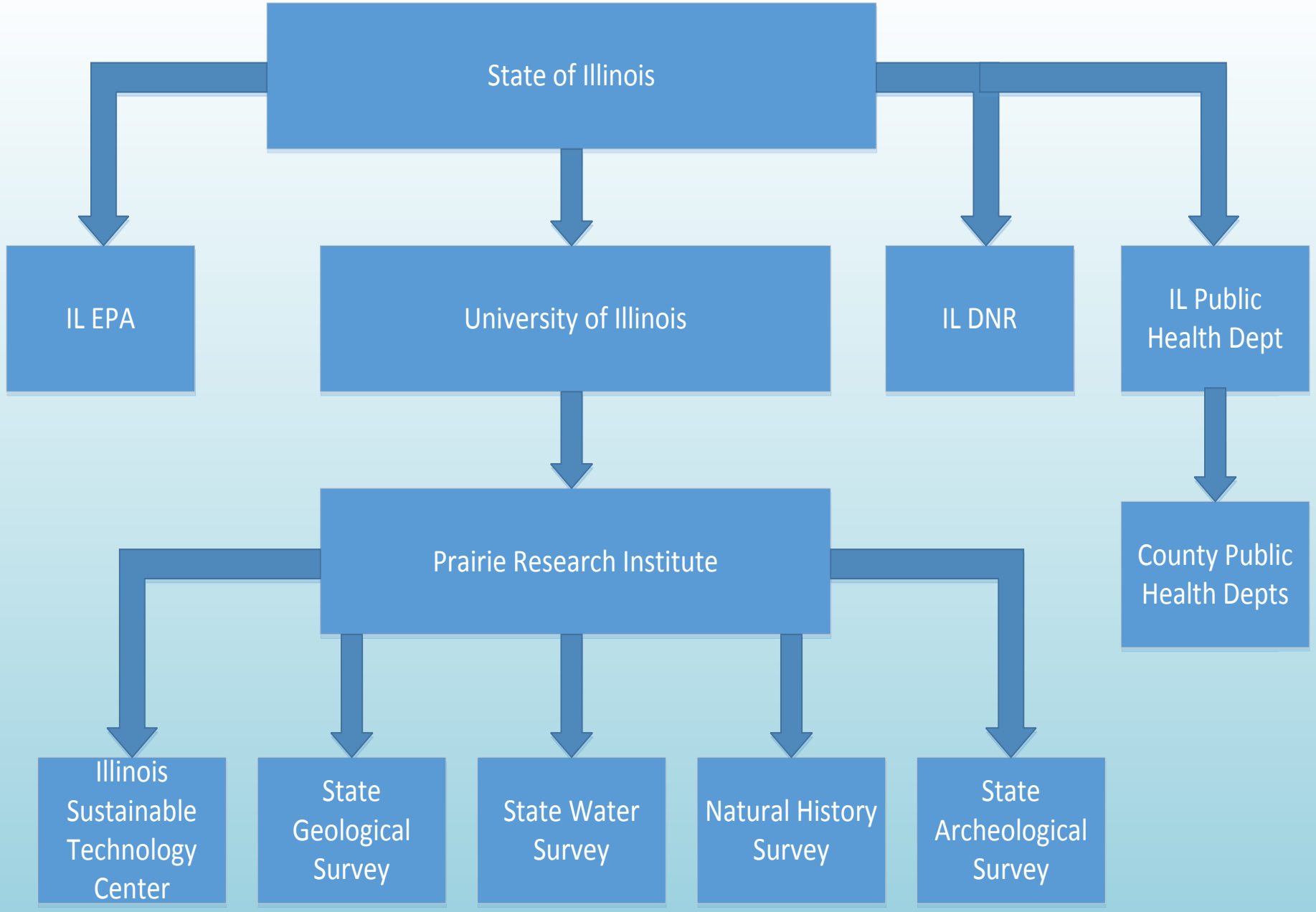
ILLINOIS

ILLINOIS STATE WATER SURVEY
PRAIRIE RESEARCH INSTITUTE

The IL State Water Survey

- Started in 1890's as part of Chemistry Unit at the Univ. of Illinois
- Data Collection, Public Service, Research
- Public Service Lab analyses about 1000 samples/yr




State of Illinois
IL EPA
University of Illinois
IL DNR
IL Public Health Dept
Prairie Research Institute
County Public Health Depts
Illinois Sustainable Technology Center
State Geological Survey
State Water Survey
Natural History Survey
State Archeological Survey

Data Collection

- 450,000+ well records
- Observation wells
- Water use
- Aquifer testing

Public Service

- Groundwater availability & quality
- Well records
- Well design
- Public outreach
- Public service lab

Research

- Regional groundwater availability & quality
- Contamination
- Well interference
- Aquifer Mapping
- Groundwater modeling
- Contaminant studies

ISWS well records database

- Well records inventory
  - "Private" wells database
  - IWIP (high-capacity) wells database
- IWIP usage data

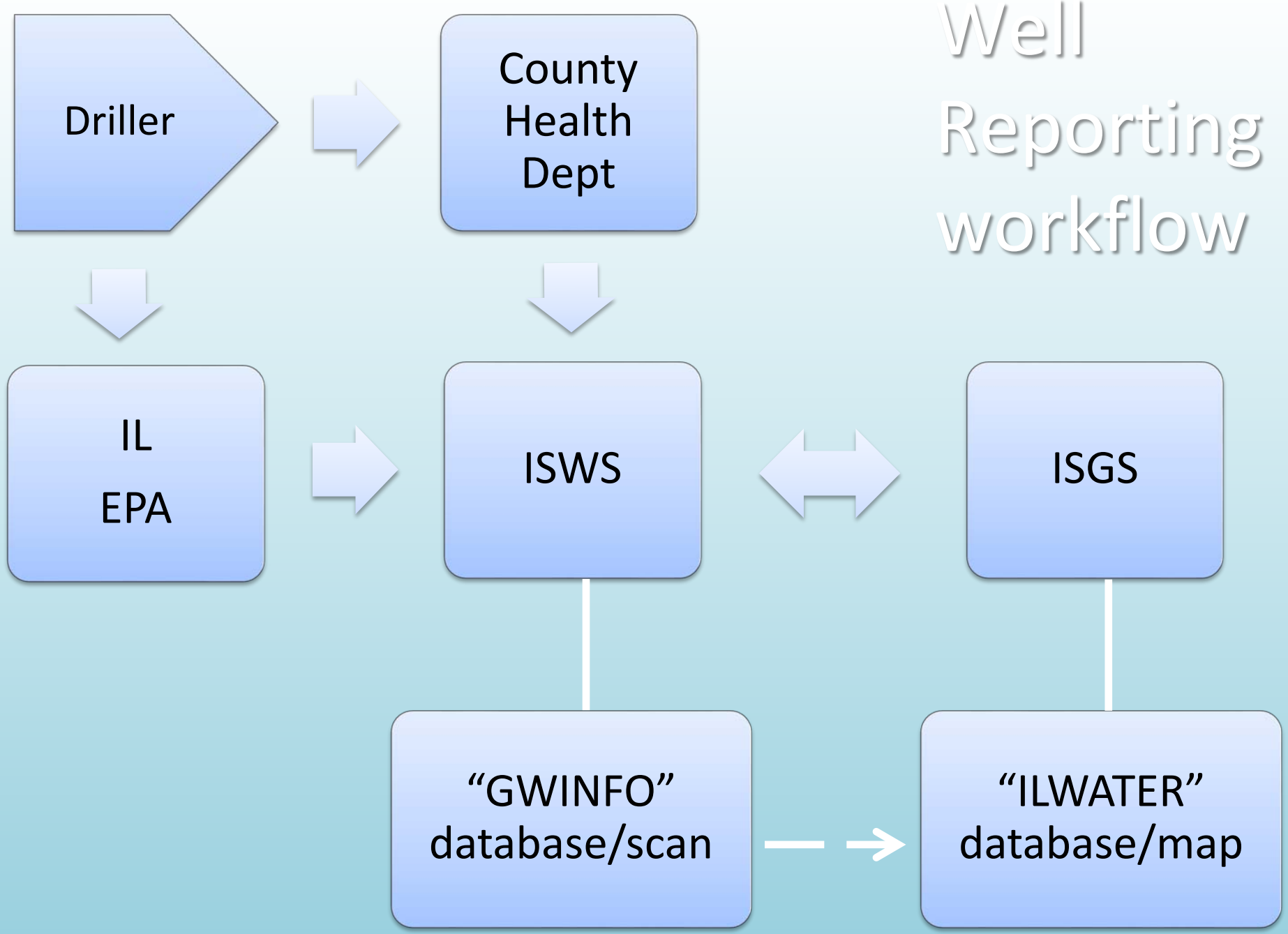
  (partly confidential)
- Water quality records

  IEPA

  PSL

  Public Health Dept
- Water levels
- Aquifer Properties

Well Reporting workflow



Illinois Monitoring Networks

Currently 111 water level sites in NGWMN

- Combination of ISWS wells, USGS wells, and ISWS wells measured by USGS staff
  - Additional 6 sites pending, will be added as data goes live

Illinois Monitoring Networks (cont'd)

Water table aquifers

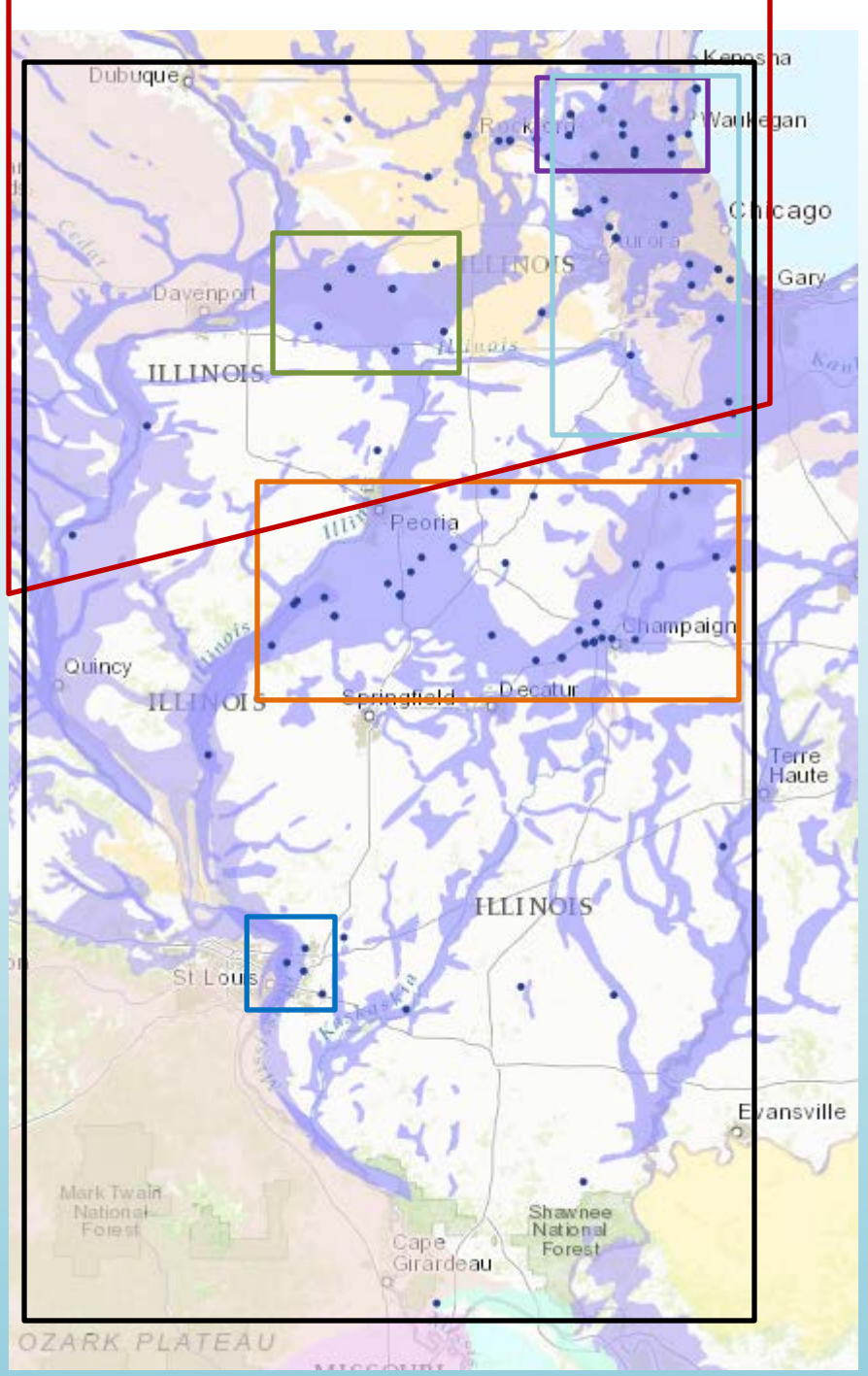
- WARM network

Glacial aquifers

- Sankoty Aquifer
- Mahomet Aquifer
- East St. Louis
- McHenry/Lake County

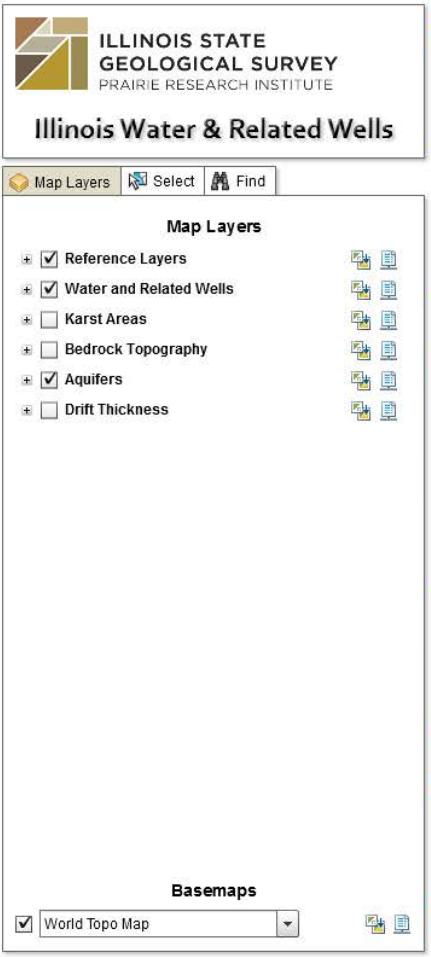
Bedrock

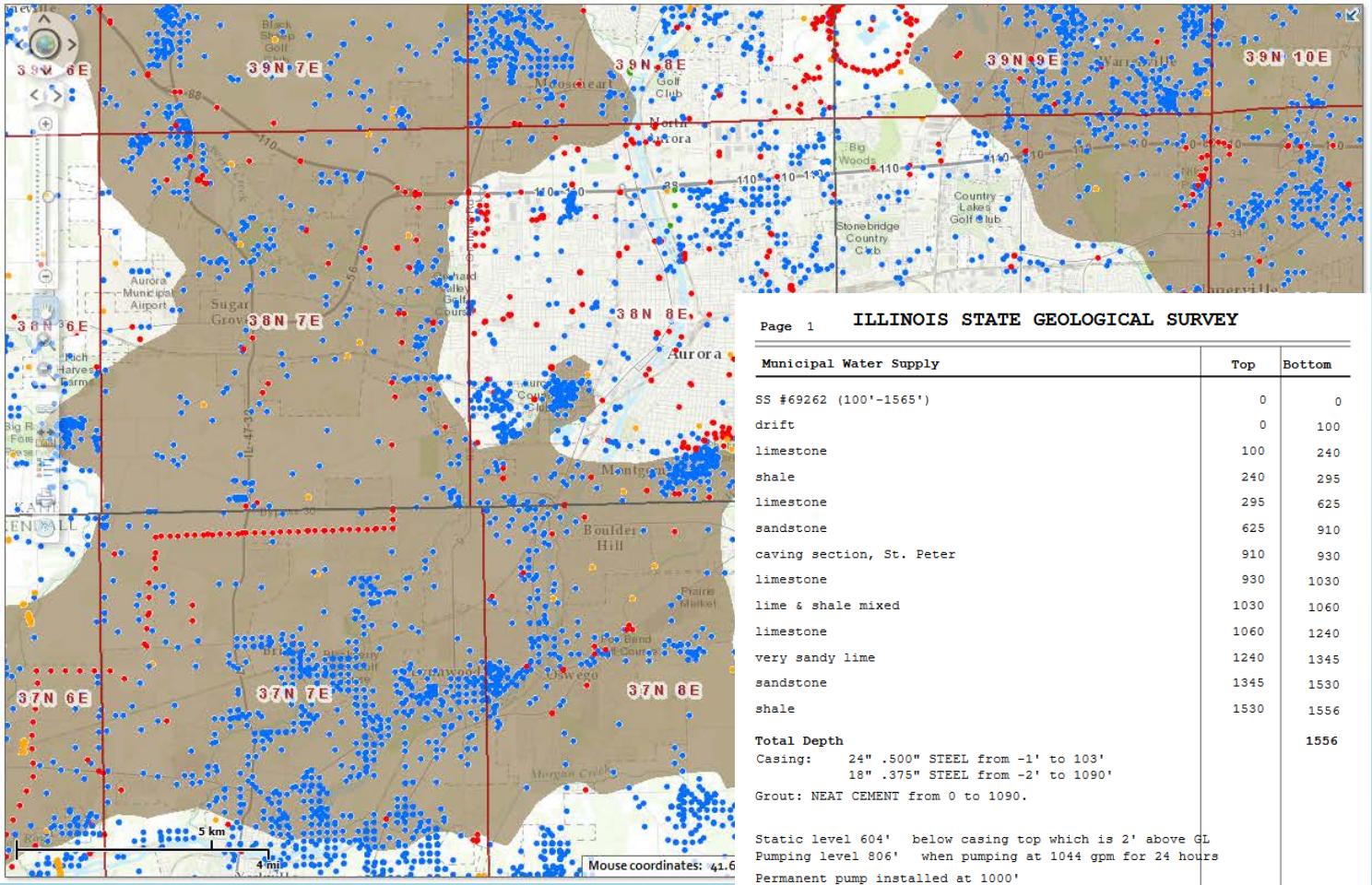
- Dolomites (Silurian, Galena-Platteville)
- Cambrian-Ordovician Sandstones



ILWATER – Illinois State Geological Survey

Geologic logs, well construction data





Page 1 **ILLINOIS STATE GEOLOGICAL SURVEY**

Municipal Water Supply	Top	Bottom
SS #69262 (100'-1565')	0	0
drift	0	100
limestone	100	240
shale	240	295
limestone	295	625
sandstone	625	910
caving section, St. Peter	910	930
limestone	930	1030
lime & shale mixed	1030	1060
limestone	1060	1240
very sandy lime	1240	1345
sandstone	1345	1530
shale	1530	1556
Total Depth		**1556**

Casing: 24" .500" STEEL from -1' to 103'
18" .375" STEEL from -2' to 1090'
Grout: NEAT CEMENT from 0 to 1090.

Static level 604' below casing top which is 2' above GL
Pumping level 806' when pumping at 1044 gpm for 24 hours
Permanent pump installed at 1000'
on May 3, 2004, with a capacity of 1200 gpm
Remarks: PICS 19790450 #20/well yield 1044 gpm
Sample set # 69262 (100' - 1565') Received: May 1, 2004

Owner Address: ,

http://maps.isgs.illinois.edu/ILWATER/

Prairie Research Institute – IL Water Wells Databases

	ISWS	ISGS
Well location records	425,000 records (151,000 matched to ISGS DB ->) Water well construction reports Some test boring records Standalone sealing records (incl MW) Standalone WQ samples (ISWS) Field inventories Special ISWS projects CWS wells from IEPA DB Surface water intakes	360,000 records (<- 148,000 matched to ISWS DB) Water well construction reports Any test boring record with stratigraphy Standalone gas samples (ISGS) Special ISGS projects Non-CWS PWS wells from IDPH DB
Well construction report data (ongoing; historical is more limited)	"Header" data (location, owner, date, etc.) Initial water levels, test gpm Basic construction detail Producing aquifer	"Header" data (location, owner, date, etc.) Initial water levels, test gpm All construction detail All geologic interval descriptions
Well permit info	1997-2013	(pre-) 1967-present
Back-end database server	MS SQL Server	Oracle
Development platforms	.NET, ASP, Crystal Reports	Java (browser-based), Oracle Reports, Flash, ArcGIS MapServer
Web Services	SOAP/XML	
Scan formats	tif, pdf	jpg, pdf

ISWS Water Levels fields

ID	Long Integer	
p_num	Text	The unique ISWS well_id
project_id	Long Integer	GW ProjectID
meas_date	Date/Time	Date of Measurement
meas_time	Date/Time	Time of Measurement
meas_depth	Decimal	Water Level Measurement (ft)
meas_point	Text	Point measurement taken from on well casing (default: top of casing)
mp_elevation	Decimal	Elevation of well casing above ground level (ft)
stick_up	Decimal	Height of top of well casing above ground (ft)
meas_method	Text	Type of Measurement (see defined options below)
1;"Airline - Standard Gauge";2;"Electric Dropline";3;"Airline - Direct Reading Gauge";4;"Steel Tape";5;"Transducer/Data Logger";6;"Visual Observation"; 7:"Plopper";8;"Other";0;"Unknown"		
meas_quality	Text	Quality of Water Level Measurement (see defined options below)
1;"Good";2;"Fair";3;"Poor";4;"Wrong";5;"Unknown; 6;"Provisional";"		
meas_precision	Decimal	Precision of measurement method
meas_type	Text	Type of water level measurement
1;"Static (default);2;"Dynamic";3;"Other"		
meas_remarks	Text	Comments regarding measurement conditions
meas_quality_remarks	Text	Comments related to measurement quality designation
air_line_length	Decimal	Length of Airline in Feet (if used)
gauge_reading	Decimal	Pressure Reading (Ft – if used) Ft = PSI *2.31
pumping_rate	Decimal	Pumping Rate (GPM – if used)
hours_on_off	Decimal	Hours pump off (static measurement) or on (dynamic measurement); otherwise field unused
meas_precision	Decimal	Precision of the water level measurement based on the meas_method field (ft)
ent_by	Text	Autofill
ent_date	Date/Time	Autofill
last_user	Text	Autofill
last_user_date	Date/Time	Autofill

ISWS Well Records main fileroom

- Records for 420,000+ water wells in Illinois (1860 – present)
  - Well construction, sealing forms
  - Water quality samples
  - Water levels, historical withdrawals, pump tests, service reports
  - Survey reports, studies, communications
- Some documents have been scanned, but majority are not available electronically, most data <1980 not in database

STATE WATER SURVEY

Department of Chemistry, University of Illinois

4, 5b 23N2E T

Use this **Certificate** for water whose original source is **Well, Spring** or **Cistern.**

El=810

Sample of water from, Town Bloomington County McLean

Report to be sent to J.K.Moore, 305 S. East St Bloomington Ills.
(Give Name and address)

Collected and sealed by J.K.Moore

Date, day and hour of collection

Shipped by _____ Express Company. Date and hour of shipment

Collected from Well
(State whether it is from a Well, Spring or Cistern, or from a Reservoir or Tap, original source being Well or Spring)

Location 305 S. East St.
(Give Street and Number; or Section, Township, Range, etc.)

State proximity of privy 34 Feet cesspool _____ stable 70 Feet

Feed lot 35 Feet dumping grounds for slops, dish water, wash water, etc. 50 Feet.

Is the drainage from all these places toward or from the Well, Spring or Cistern? From the well

If there is any other possible source of pollution, state it Might be from scrubbing porch

Has the water ever been considered unsafe? No. Why?

If there have been any cases of typhoid fever among users of this water, state number of persons affected No

date of illness Not this well but one about 75 Ft away number of deaths None

What other diseases have been attributed to use of this water? I have had bladder trouble.

State general condition of health of those using water Not as good as usual

Well.—State depth 32 Feet Is it dug, bored, driven or drilled? Dug well

State character and thickness of strata through which it is sunk Don't Know

State character of strata from which water is drawn Don't Know Is it a flowing well? No.

State approximate capacity and effect of dry or wet weather Dry weather about 50 gal. Wet 100 gal. day

With what is it walled or cased? Brick How is the well covered? 1" plank Is the cover water tight? No

If cemented or cased with iron pipe, state depth to which cement or casing extends No cementing

Spring.—What improvements has it?

Character of stratum from which water issues

Character of overlying strata

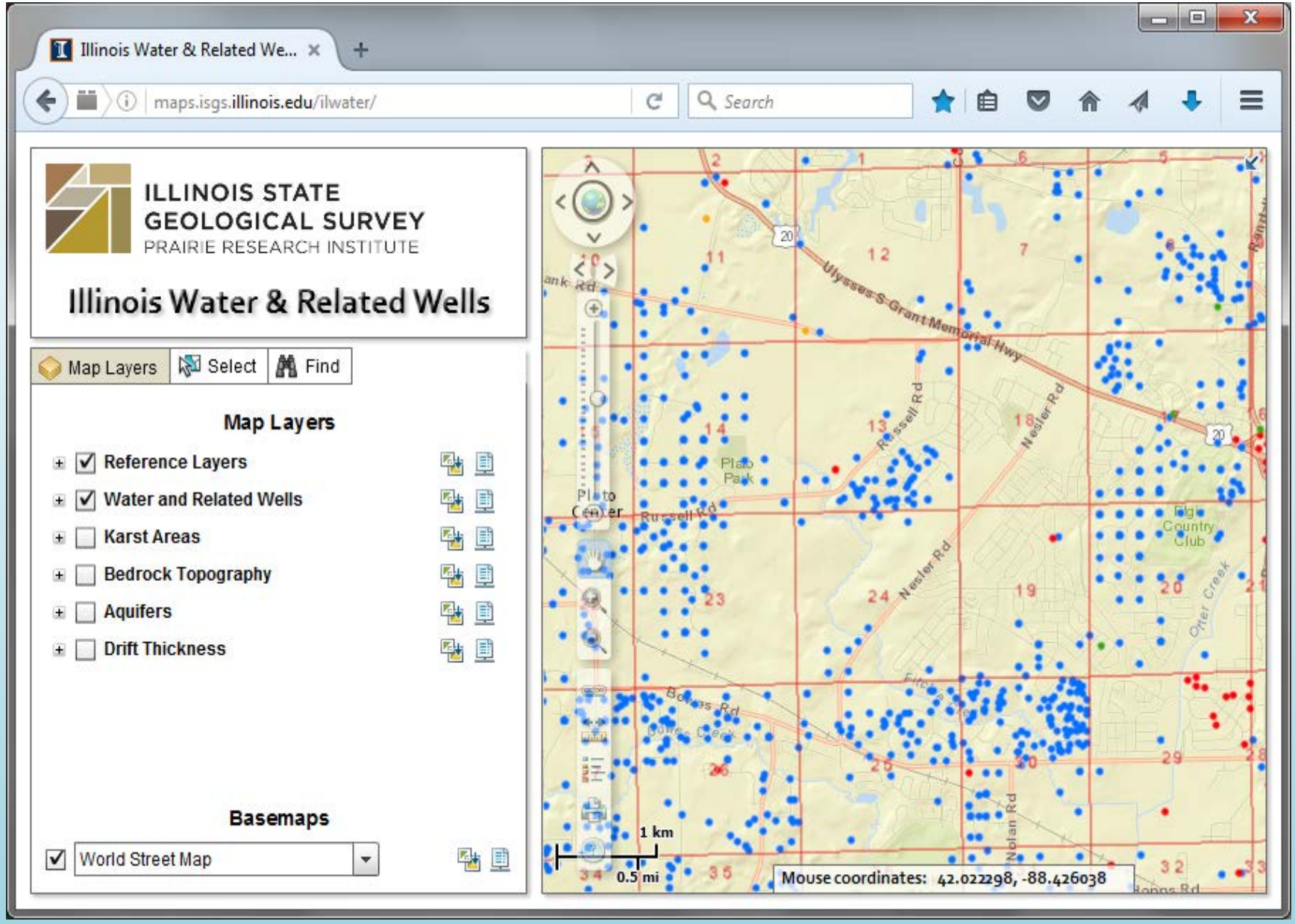
Approximate capacity and effect of dry or wet weather

Cistern.—What form of filter, if any, is used?

Does the cistern leak? _____ How long since last cleaned?

Can small animals get into it at top? _____ What care is taken in collecting and storing water?

Laboratory No. 35570 *Received* OCT 17 1916 *19* 90 *M.*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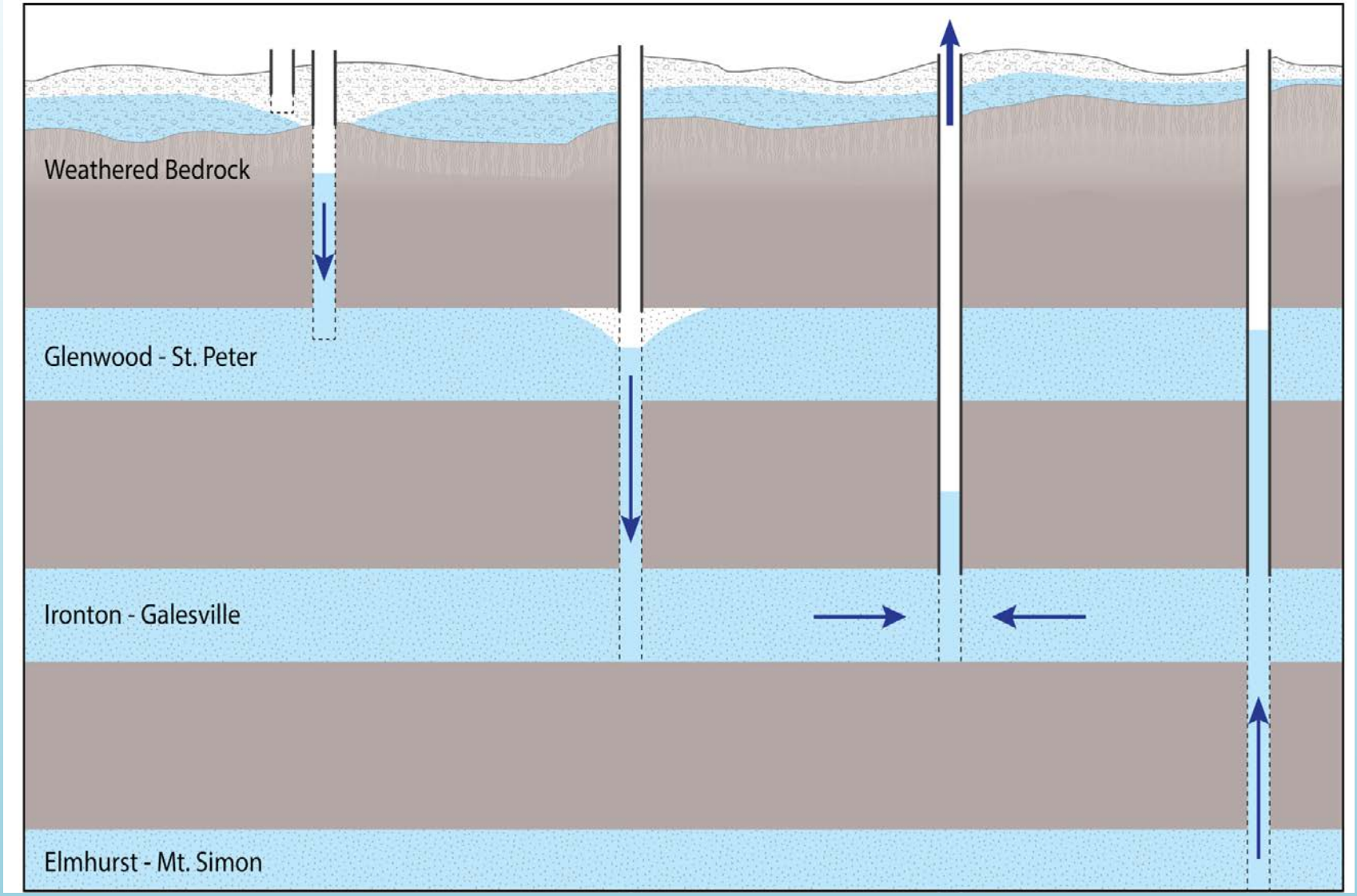
maps.isgs.illinois.edu/ilwater/
Search
ILLINOIS STATE GEOLOGICAL SURVEY
PRAIRIE RESEARCH INSTITUTE
Illinois Water & Related Wells
Map Layers
Select
Find
Map Layers
Reference Layers
Water and Related Wells
Karst Areas
Bedrock Topography
Aquifers
Drift Thickness
Basemaps
World Street Map
Ulysses S Grant Memorial Hwy
Russell Rd
Nesler Rd
Plato Park
Big Country Club
Otter Creek
Nolan Rd
1 km
0.5 mi
Mouse coordinates: 42.022298, -88.426038

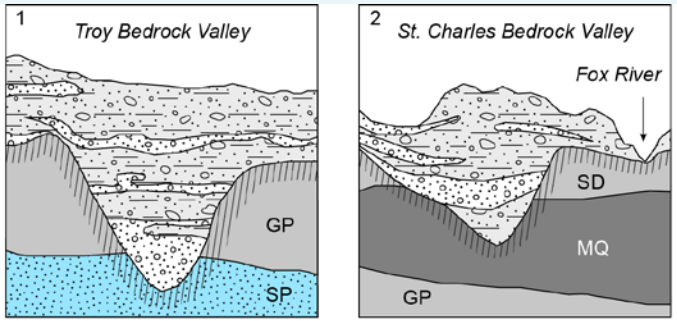


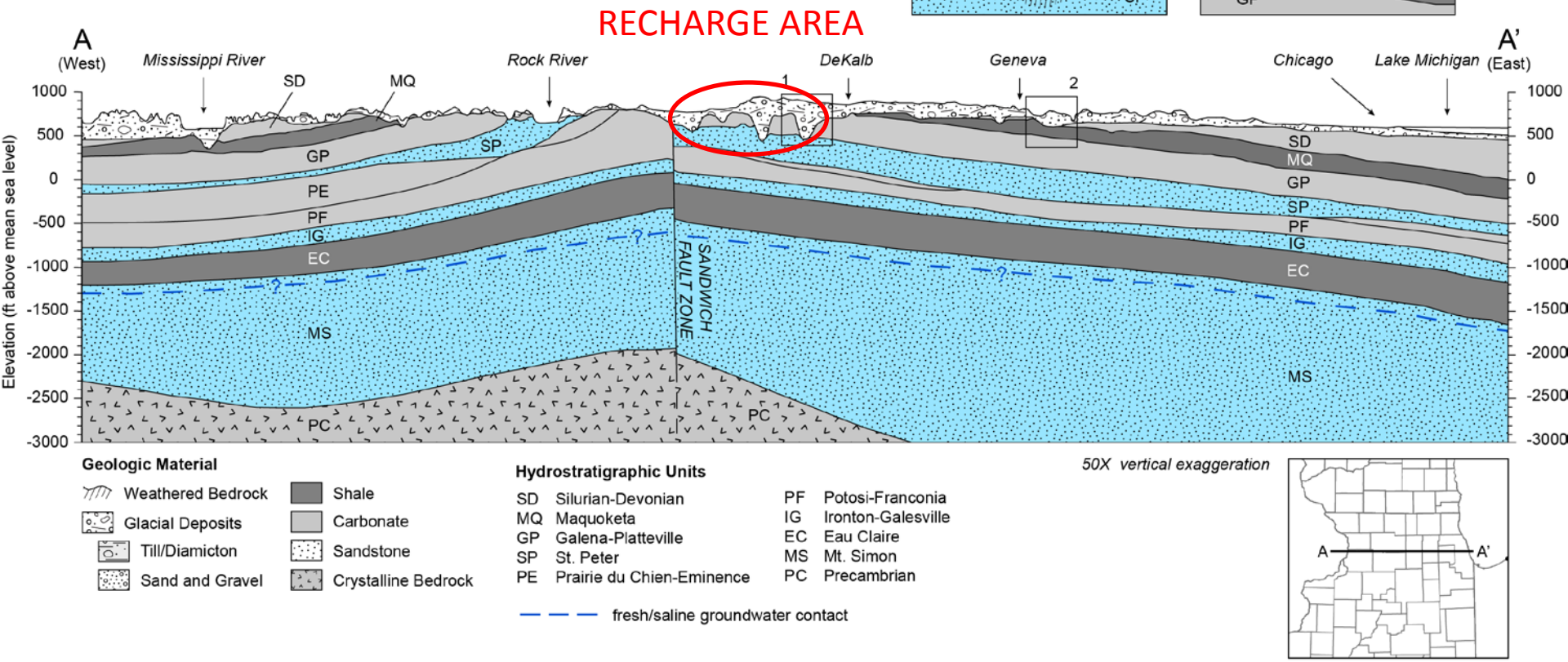
Devin Mannix, Daniel Abrams, George Roadcap

Cambrian-Ordovician Sandstones

Hydrostratigraphic Cross Section (West to East)

- St. Peter Sandstone
- Ironton-Galesville Sandstone
- Both Confined in NE Illinois



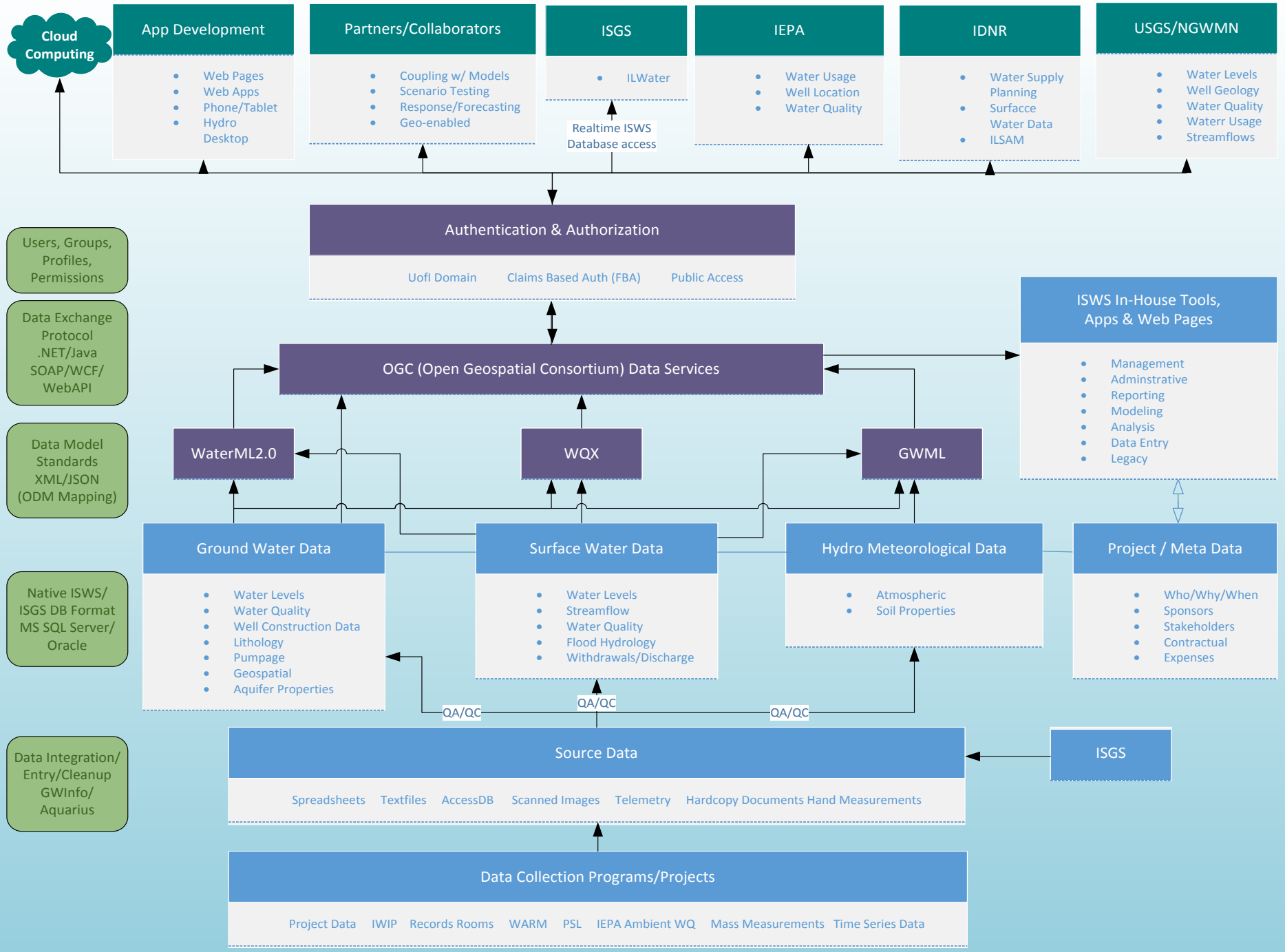


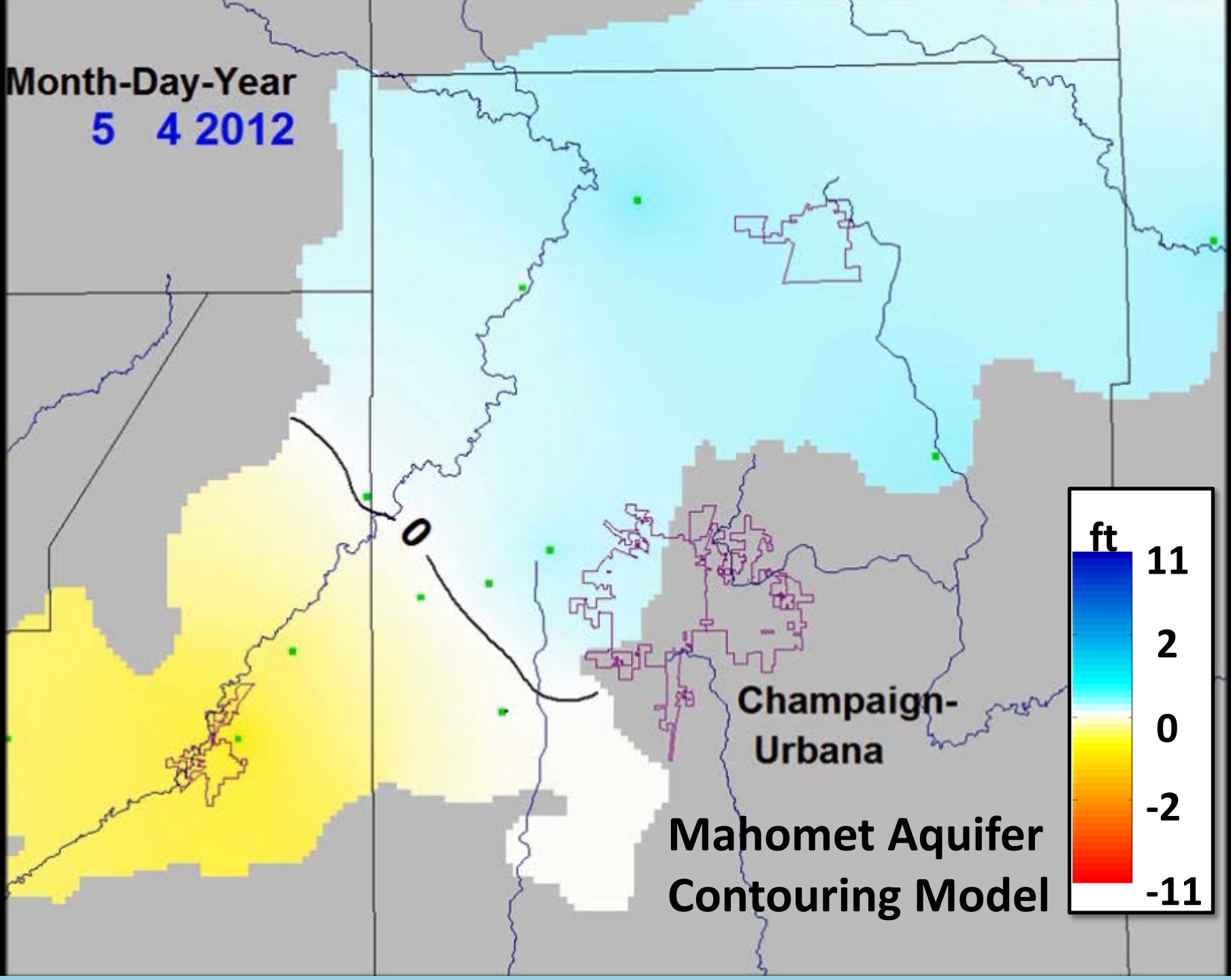
Managing Continuous Data

- Telemetry data has been previously captured through regular updates (cellular network) and dumped into CSVs
  - Requires staff to manually adjust for drift, currently stored in Excel spreadsheets
- Rolling out infrastructure to accommodate existing and new continuous sites
  - Trend sites may need to be classified as Surveillance for the interim
- Exploring options for data management (scaling issues for time series data)
  - Aquarius?
  - Custom (MATLAB)?
- http://aqueduct.isws.illinois.edu/NGWMNService.asmx
- http://iwip.isws.illinois.edu/ngwmn_consumer.aspx
- http://maps.isgs.illinois.edu/ILWATER/
- http://cida.usgs.gov/ngwmn/index.jsp

Current Work

- ISWS observation well network is slowly moving into the 21st century, but there are certainly growing pains
- Telemetry stations and sensory data becoming more predominant and affordable
- Linking/merging ISWS and ISGS wells database (detailed geologic logs)
- Sorting out data sharing with the IEPA, eventually adding water quality sites to NGWMN and supplementing with ISWS samples in historical records
- Electronic Reporting
- Establish SOA Architecture – web enable data
  - Decouple data layer from presentation layer
  - Allow others to implement their own front-end that consumes data over standard internet protocols
  - Independent of platform or programming language
  - Examples: NGWMN Portal, Hydro-Desktop


Cloud Computing
App Development
Web Pages
Web Apps
Phone/Tablet
Hydro Desktop
Partners/Collaborators
Coupling w/ Models
Scenario Testing
Response/Forecasting
Geo-enabled
ISGS
ILWater
Realtime ISWS Database access
IEPA
Water Usage
Well Location
Water Quality
IDNR
Water Supply Planning
Surfacce Water Data
ILSAM
USGS/NGWMN
Water Levels
Well Geology
Water Quality
Waterr Usage
Streamflows
Authentication & Authorization
Uofl Domain
Claims Based Auth (FBA)
Public Access
Users, Groups, Profiles, Permissions
Data Exchange Protocol .NET/Java SOAP/WCF/ WebAPI
Data Model Standards XML/JSON (ODM Mapping)
Native ISWS/ ISGS DB Format MS SQL Server/ Oracle
Data Integration/ Entry/Cleanup GWInfo/ Aquarius
OGC (Open Geospatial Consortium) Data Services
ISWS In-House Tools, Apps & Web Pages
Management
Adminstrative
Reporting
Modeling
Analysis
Data Entry
Legacy
WaterML2.0
WQX
GWML
Ground Water Data
Water Levels
Water Quality
Well Construction Data
Lithology
Pumpage
Geospatial
Aquifer Properties
Surface Water Data
Water Levels
Streamflow
Water Quality
Flood Hydrology
Withdrawals/Discharge
Hydro Meteorological Data
Atmospheric
Soil Properties
Project / Meta Data
Who/Why/When
Sponsors
Stakeholders
Contractual
Expenses
QA/QC
QA/QC
QA/QC
Source Data
ISGS
Spreadsheets
Textfiles
AccessDB
Scanned Images
Telemetry
Hardcopy Documents Hand Measurements
Data Collection Programs/Projects
Project Data
IWIP
Records Rooms
WARM
PSL
IEPA Ambient WQ
Mass Measurements
Time Series Data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Urbana
Mahomet Aquifer
Contouring Model
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