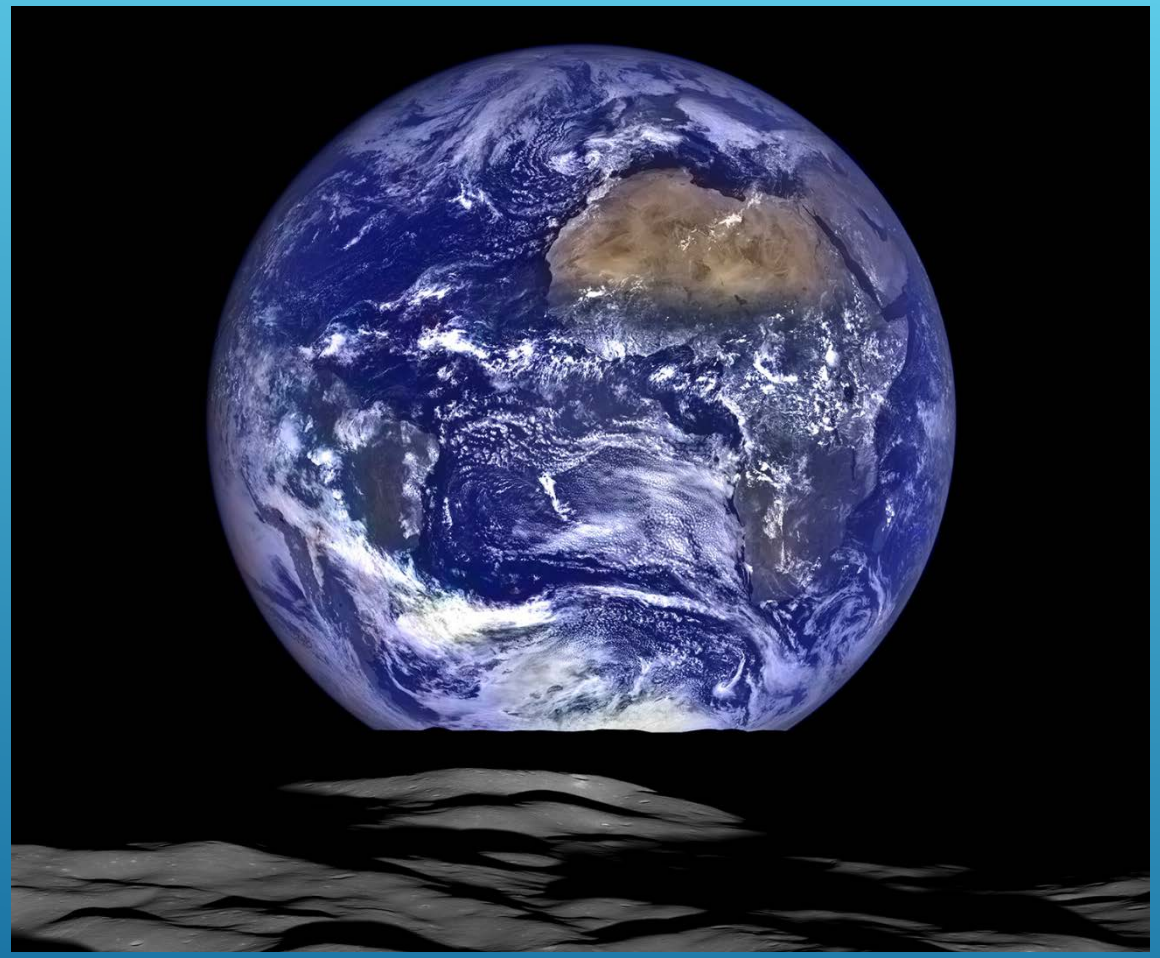
Water Resources in McHenry County

Scott Kuykendall

Water Resources Specialist

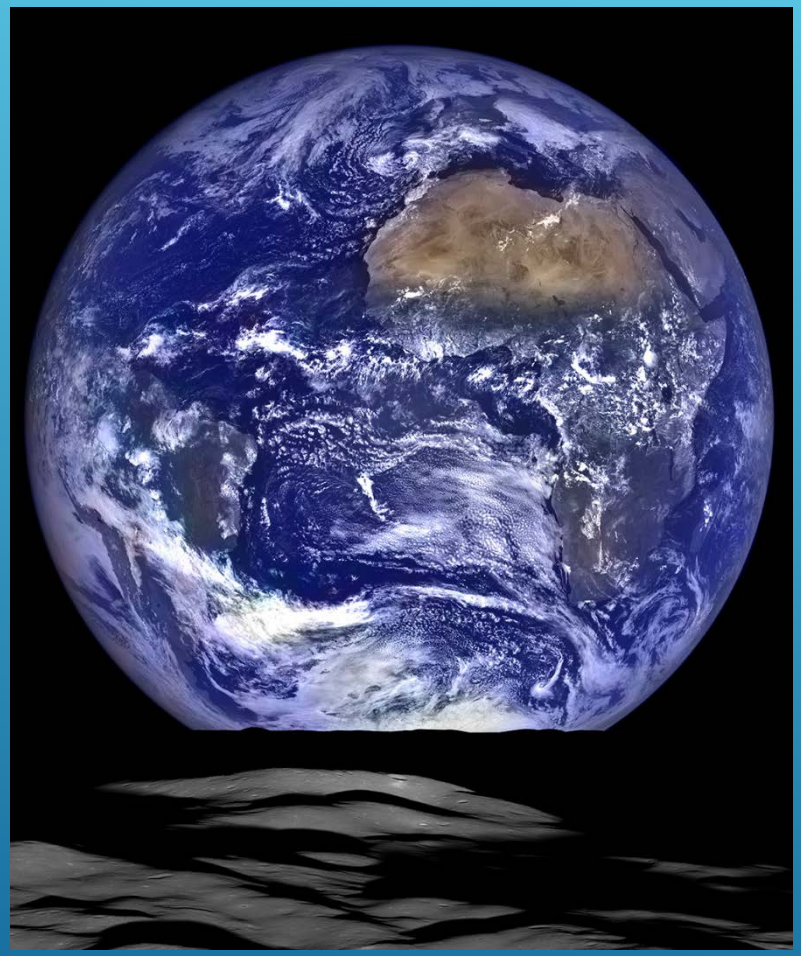
McHenry County Planning & Development

Consider this…

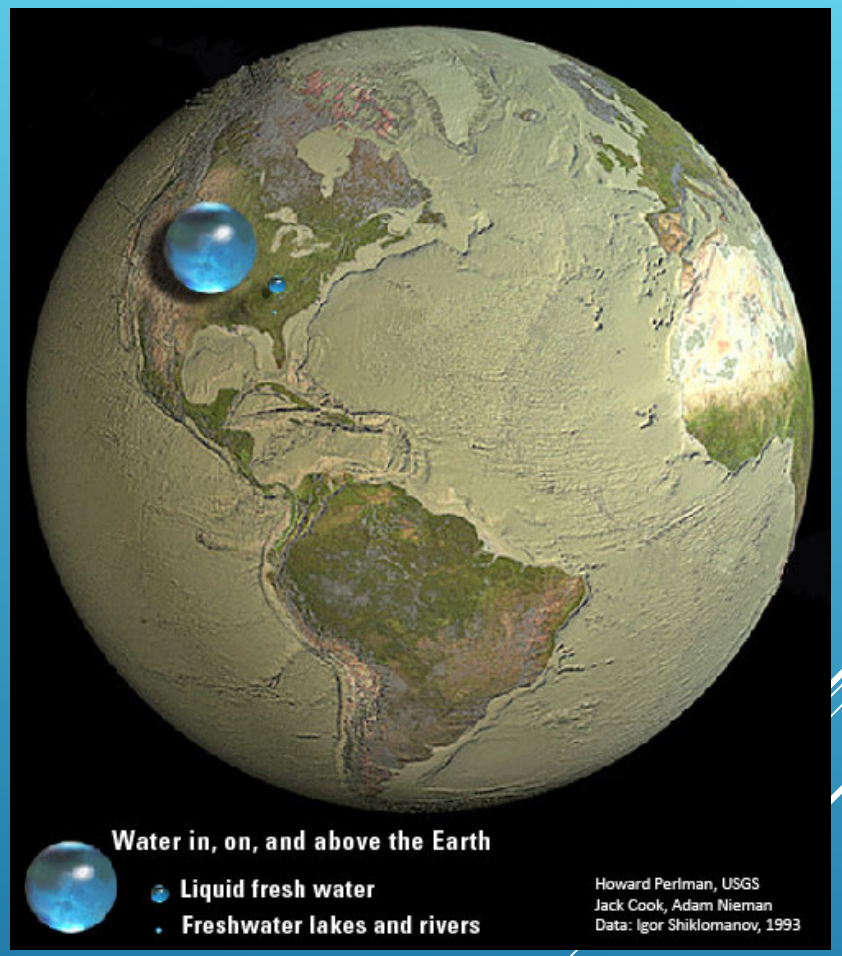


We live on a blue planet where about 75% of the Earth's surface is covered with water…

Consider this…

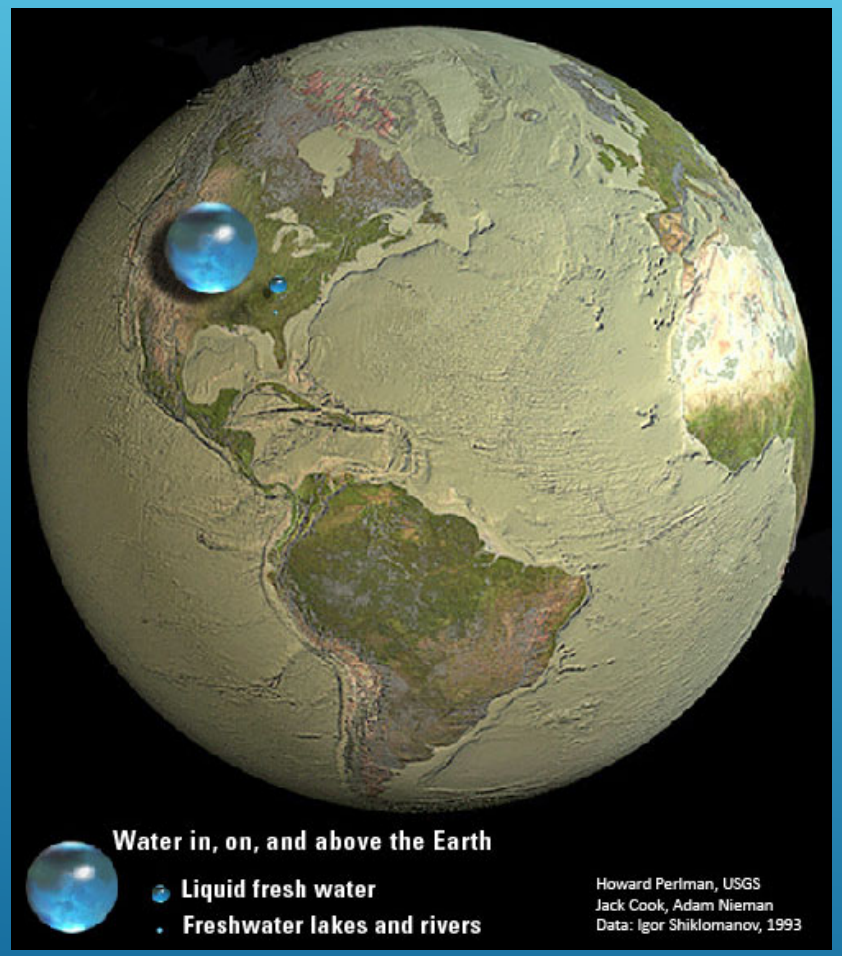


97.5% is ocean



only 2.5% is fresh water

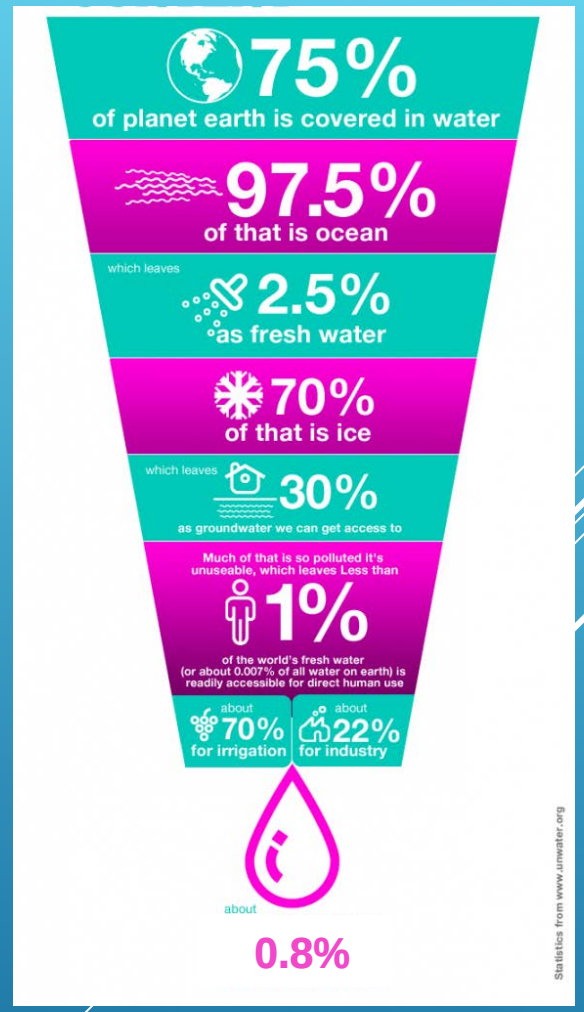
Consider this…



2.5% Fresh Water

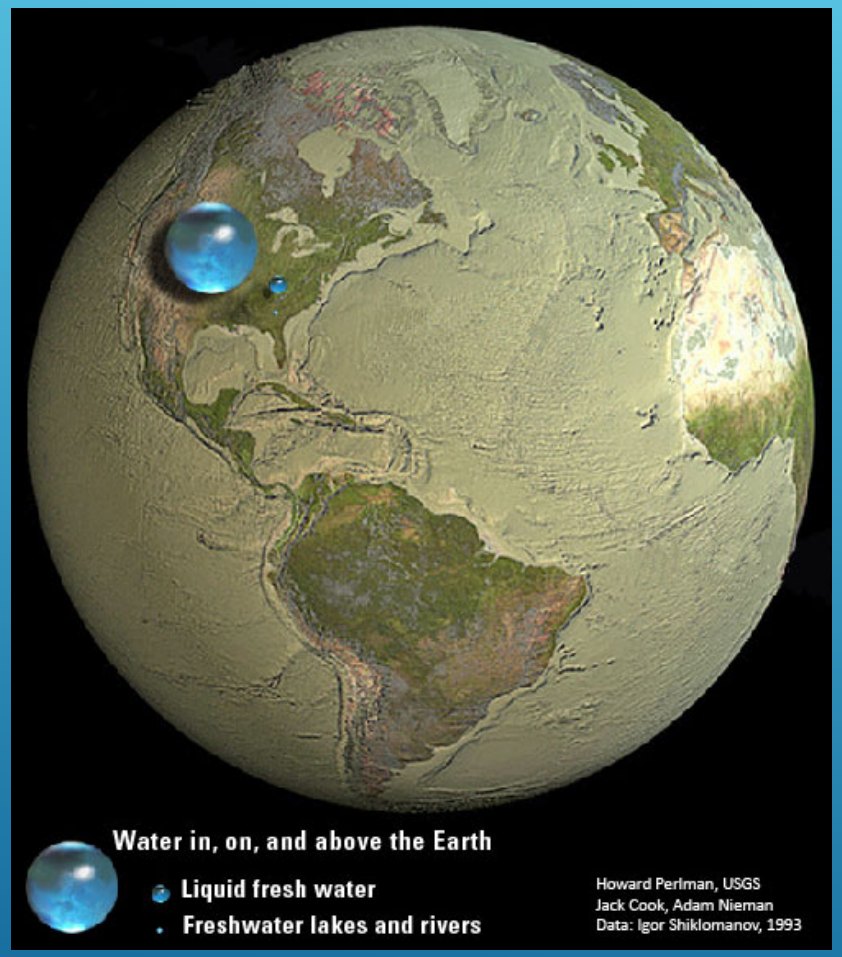
- 70% of that is ice

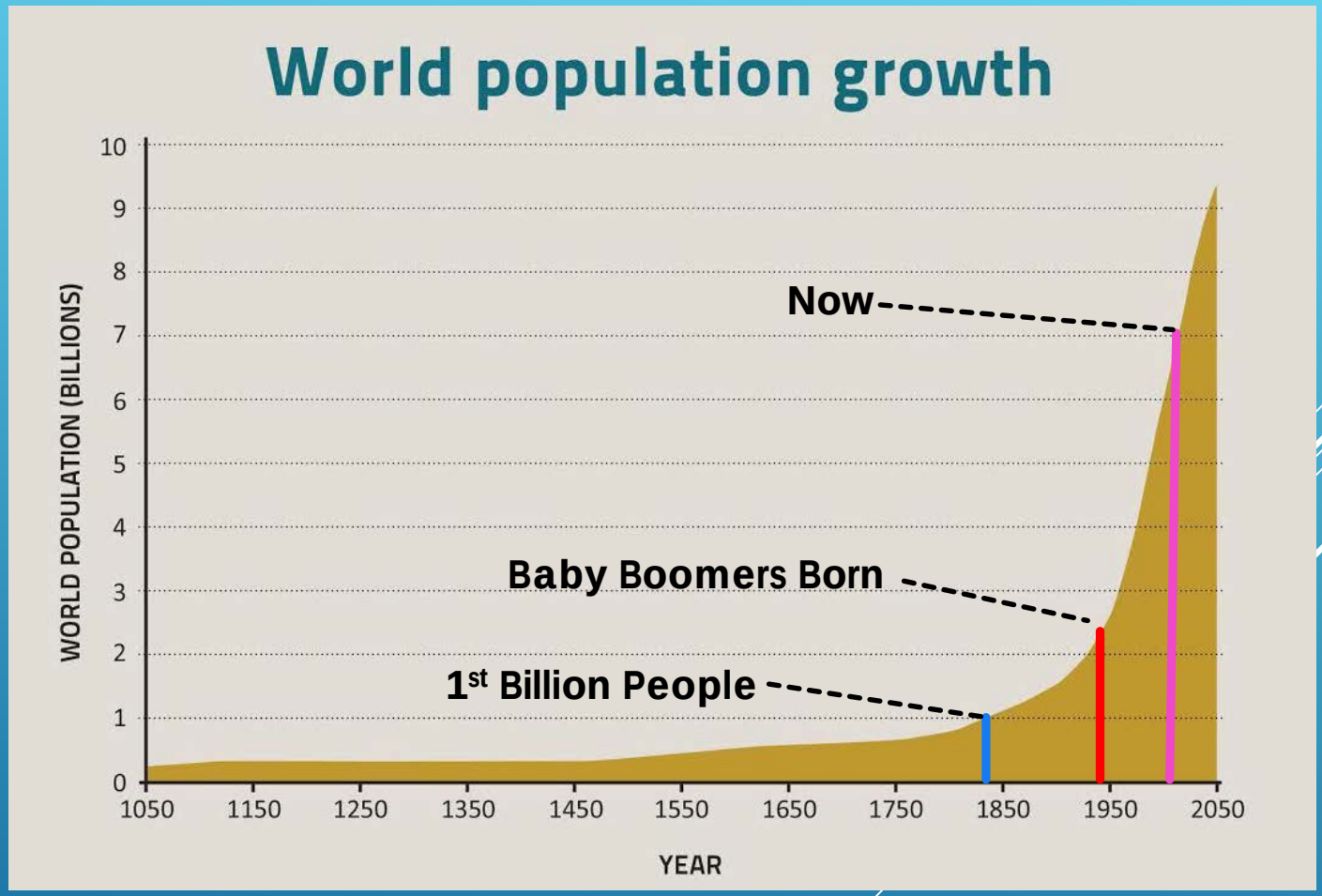
- Only 1% is clean & accessible
  - 70% used for Irrigation
  - 22% used for Industry
  - 0.8% for domestic use



Only about 0.8 % of all the fresh water on the planet is available for domestic use

Consider this…

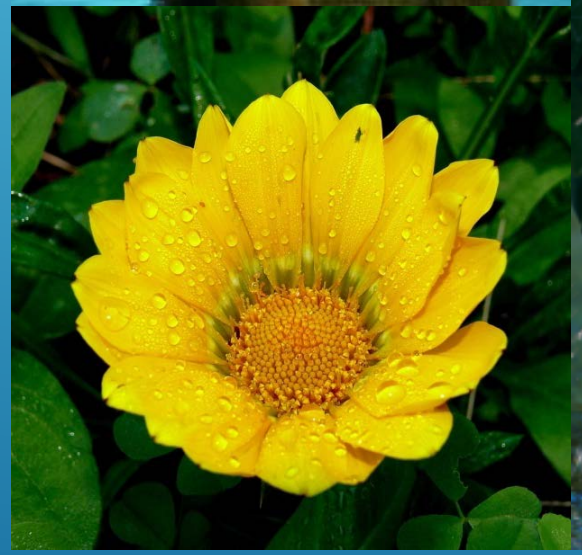




200 thousand years for 1st billion people, only 200 years for the next 8 billion people

More people competing for the 0.08% of available fresh water

Our actions are polluting the 0.08%



WATER IS NECESSARY FOR ALL LIVING THINGS

WATER IS NECESSARY FOR ALL ECONOMIC DEVELOPMENT

Water is scarce in much of the world

- **By 2025: 2/3 of worlds population under water stress**

  1.8 billion people in absolute water scarcity

- **McHenry County fortunate to have safe, sustainable water…**

Only if we protect it!

Where does McHenry County's drinking water come from?

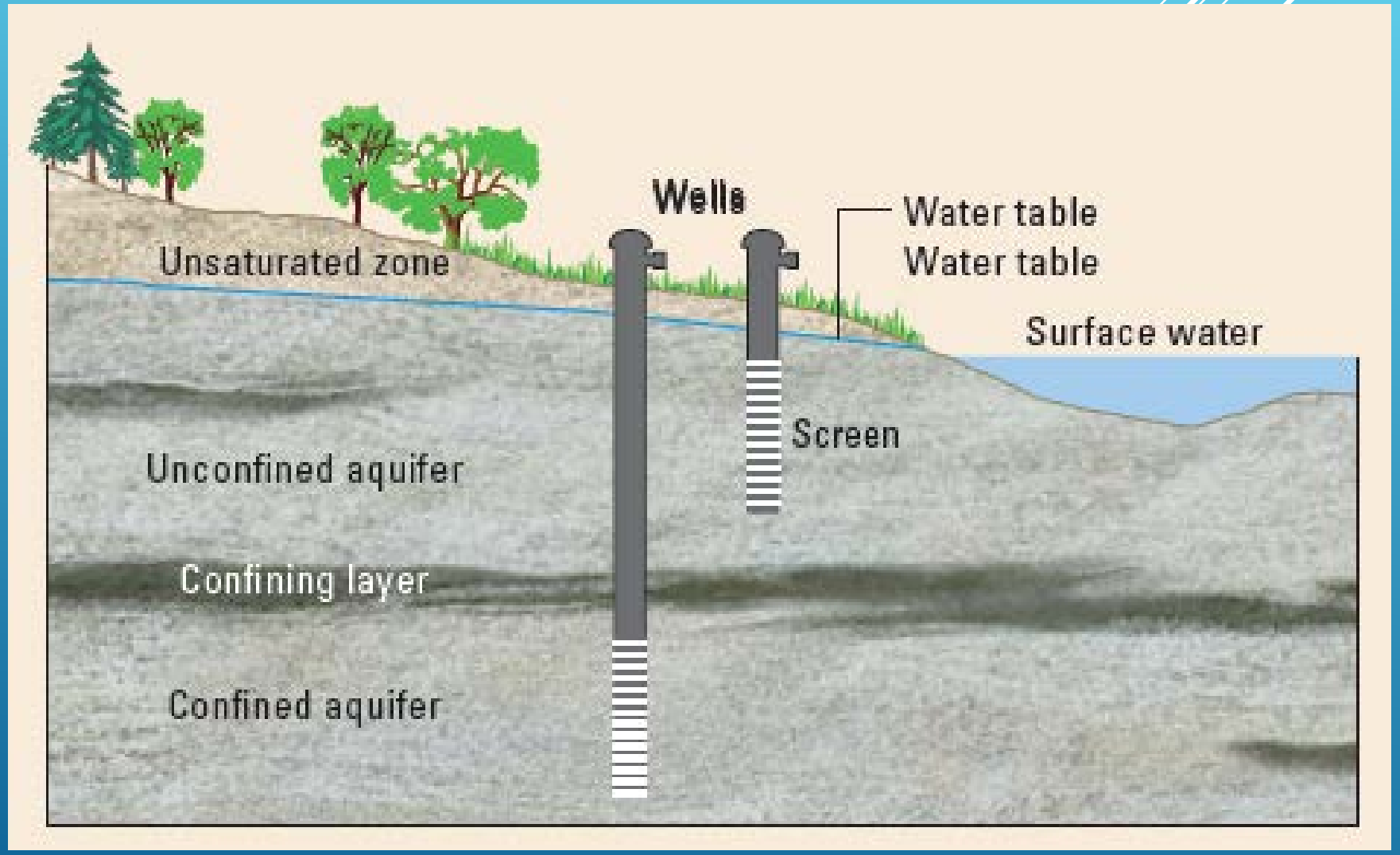
McHenry County: 100% Groundwater

Groundwater is stored in underground aquifers:

- **sand and gravel**
- **cracks of limestone**
- **granules of sandstone**

Wells installed to pump water from aquifers

- **Public wells**
- **Private wells**



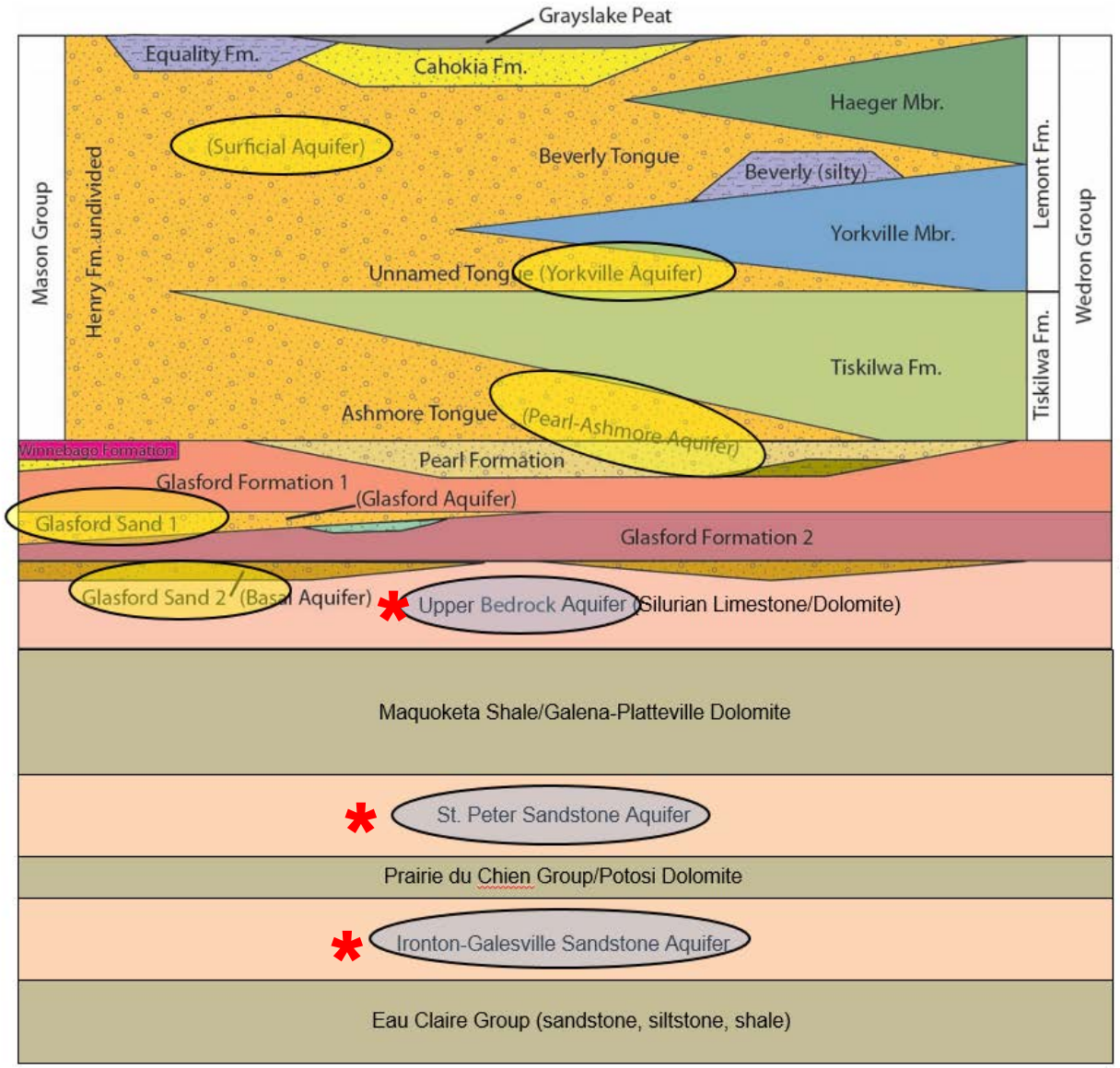
McHenry County Groundwater Aquifers

Sand & Gravel Aquifers

Limestone Aquifer

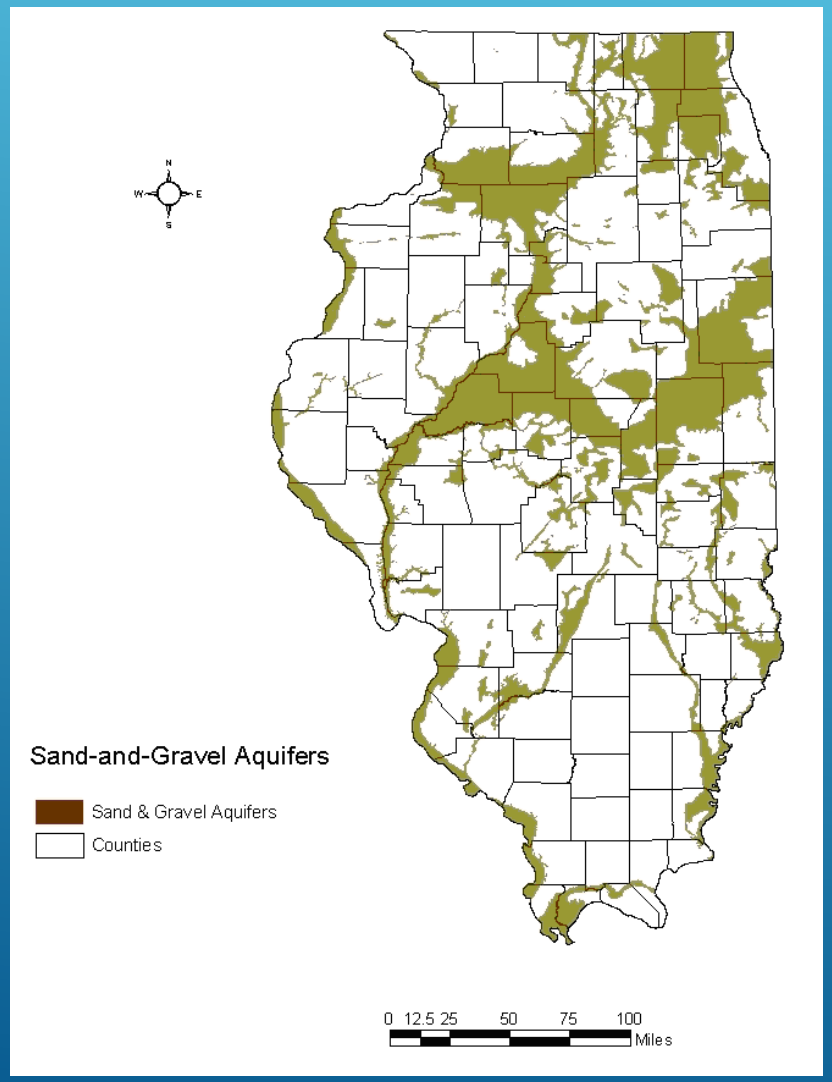
Sandstone Aquifer

Sandstone Aquifer

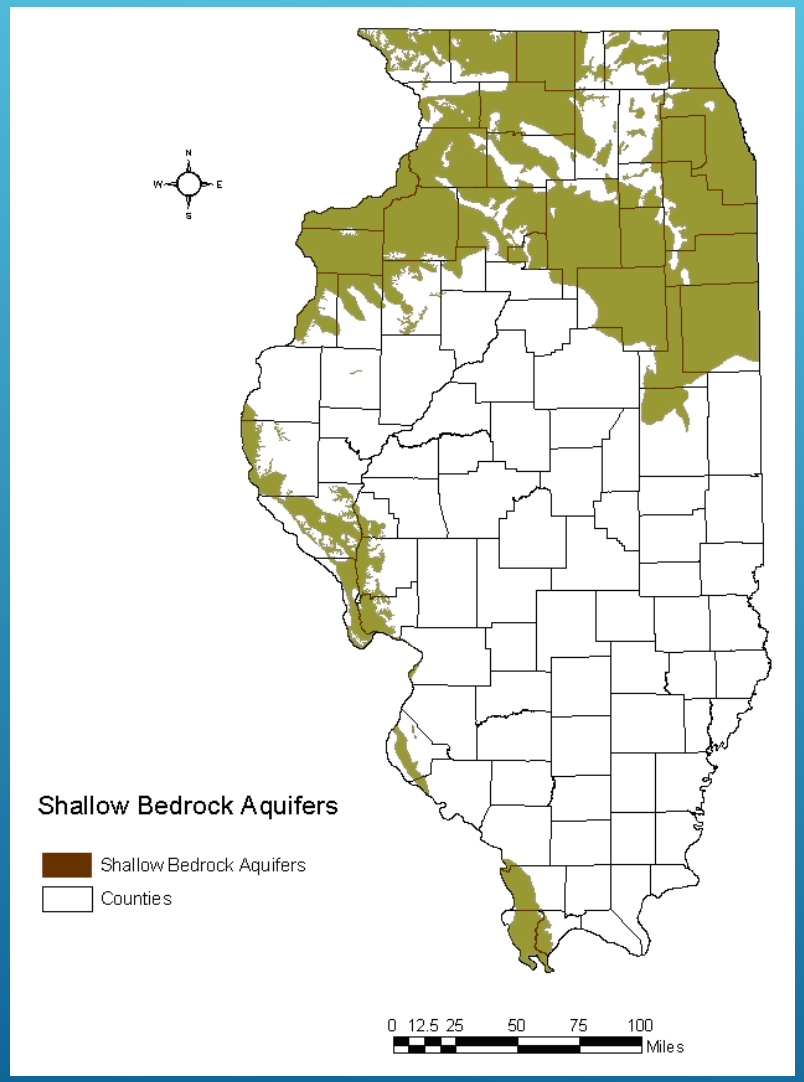


Groundwater Aquifer Distribution in Illinois

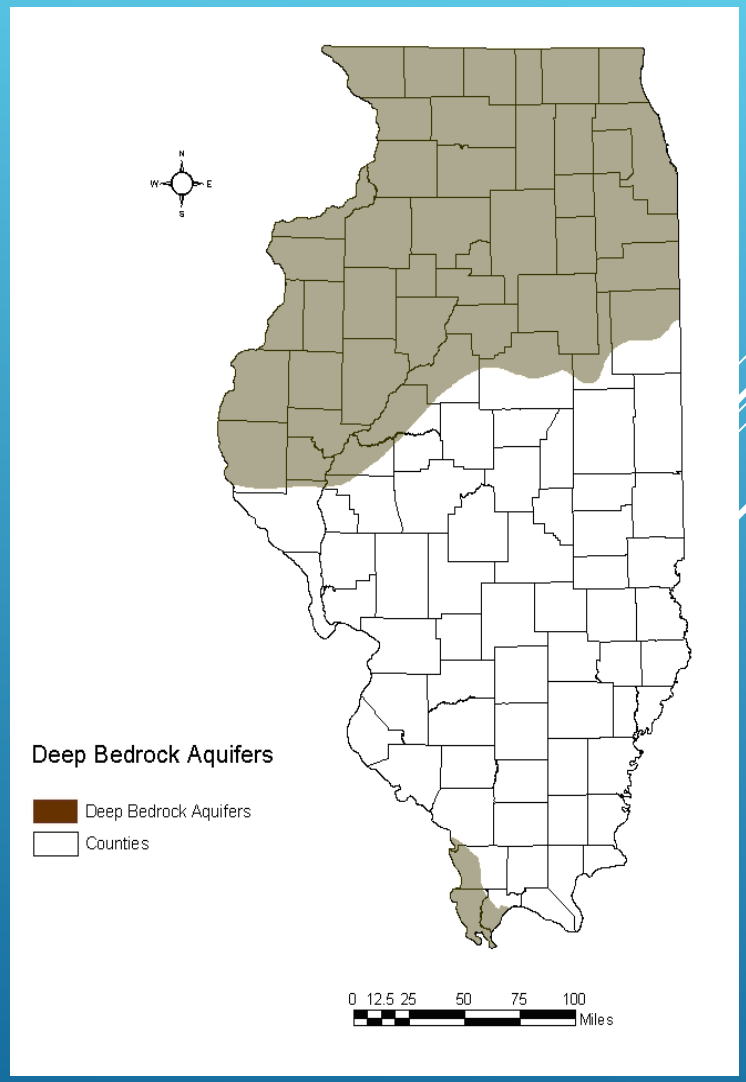
Sand & Gravel



Limestone

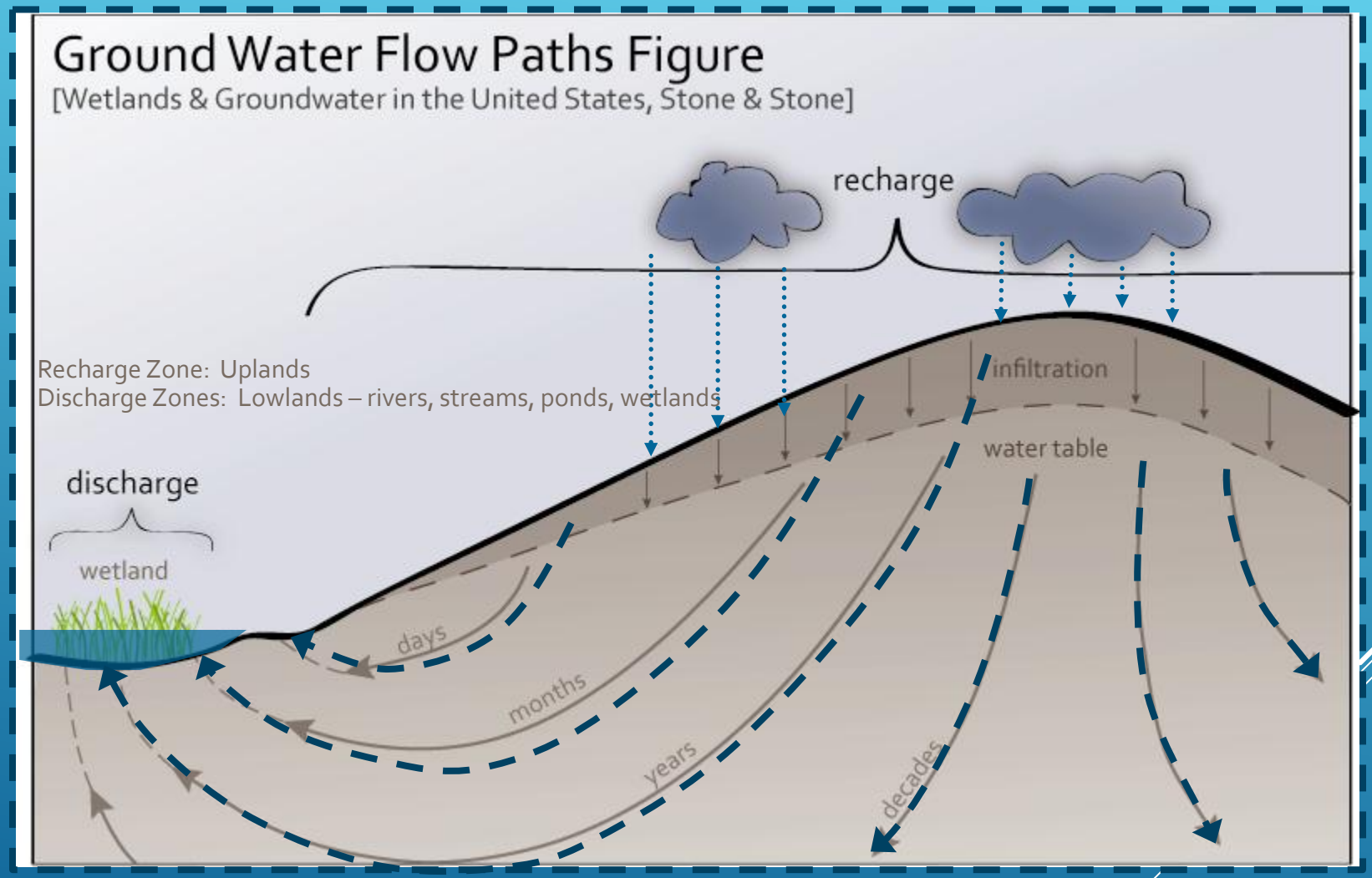


Sandstone



Natural Hydrology

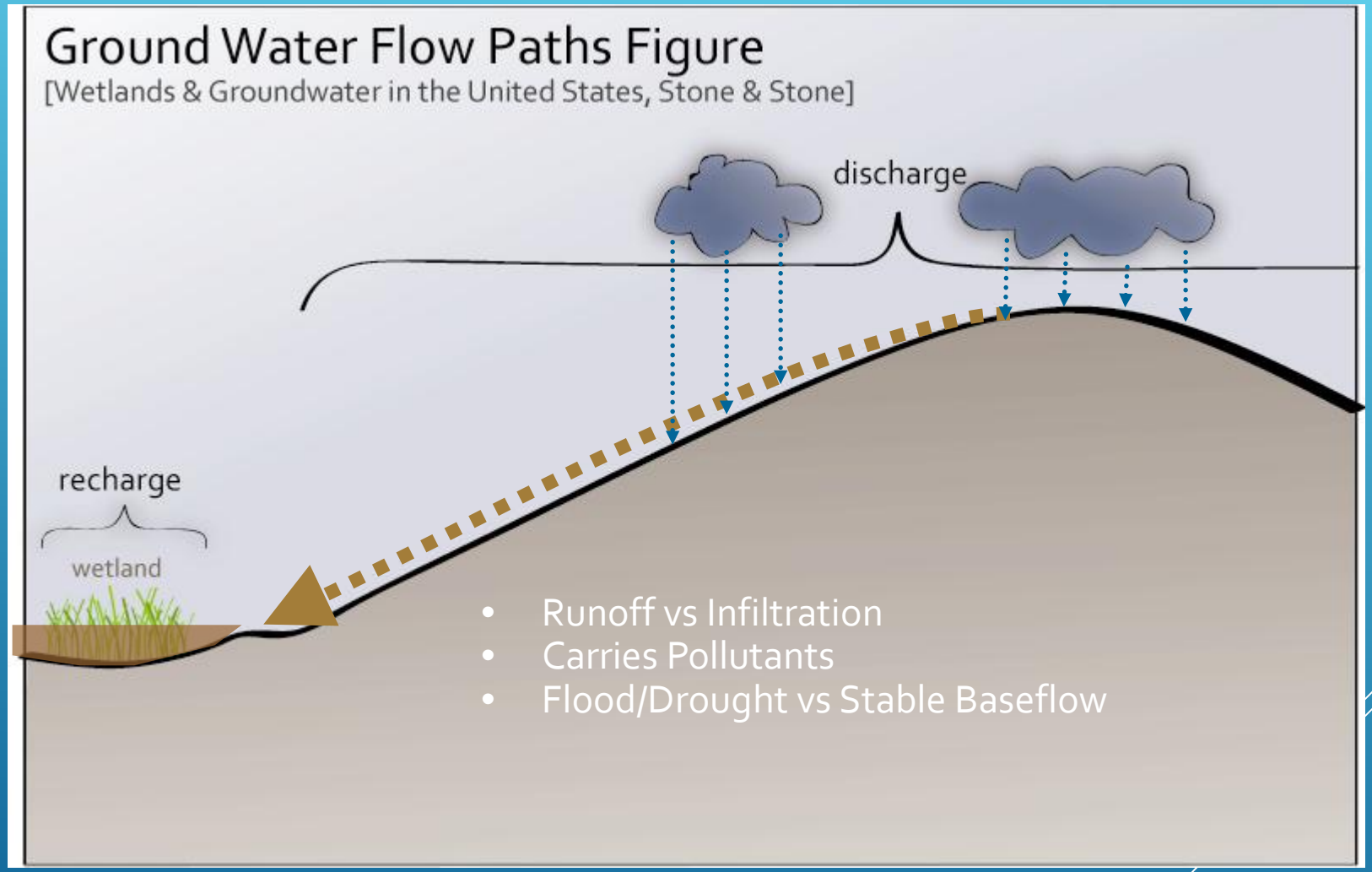
Slide courtesy of James Patchett and Conservation Design Forum



Constant, clean discharge flows, year round to sustain stable surface water hydrology with constant water temperature and chemistry

Urban Hydrology

Slide courtesy of James Patchett and Conservation Design Forum



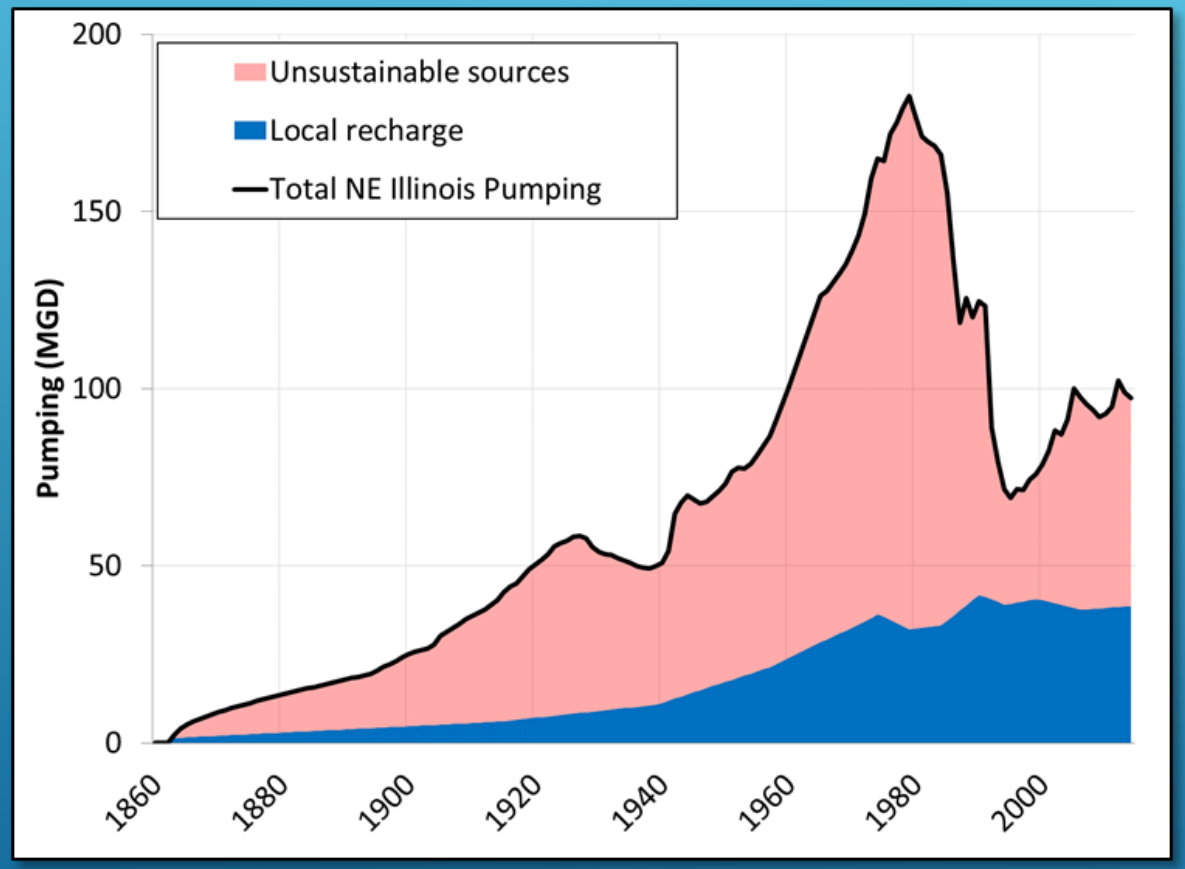
Reversed hydrological pattern results in runoff containing sediments, oils, greases, salts, fertilizers, pesticides, and higher water temperatures that inundate historical systems adapted to completely different hydrological and water quality conditions

Our Ground Water is Vulnerable…

- Over-Consumption (Finite Supply)
- Loss/Modification of Recharge Area
- Drought (supply decreases/demand increases)
- Contamination (including salt)

Over Consumption…

Groundwater Demand vs. Recharge NE Illinois



Data provided by Illinois State Water Survey

Sustainable Yield vs. Current Demands
Deep Bedrock Aquifers NE Illinois

County	Sustainable Yield*	Current Demands	Percent Sustainable
Cook and DuPage	8	11	72%
Grundy	7	8	88%
Kane	**17**	**27**	**63%**
Kendall	**2**	**9**	**22%**
Lake	5	5	100%
McHenry	8	8	100%
Will	**12**	**30**	**40%**

MGD

Loss of Groundwater Recharge/Natural Hydrology…

Drought…

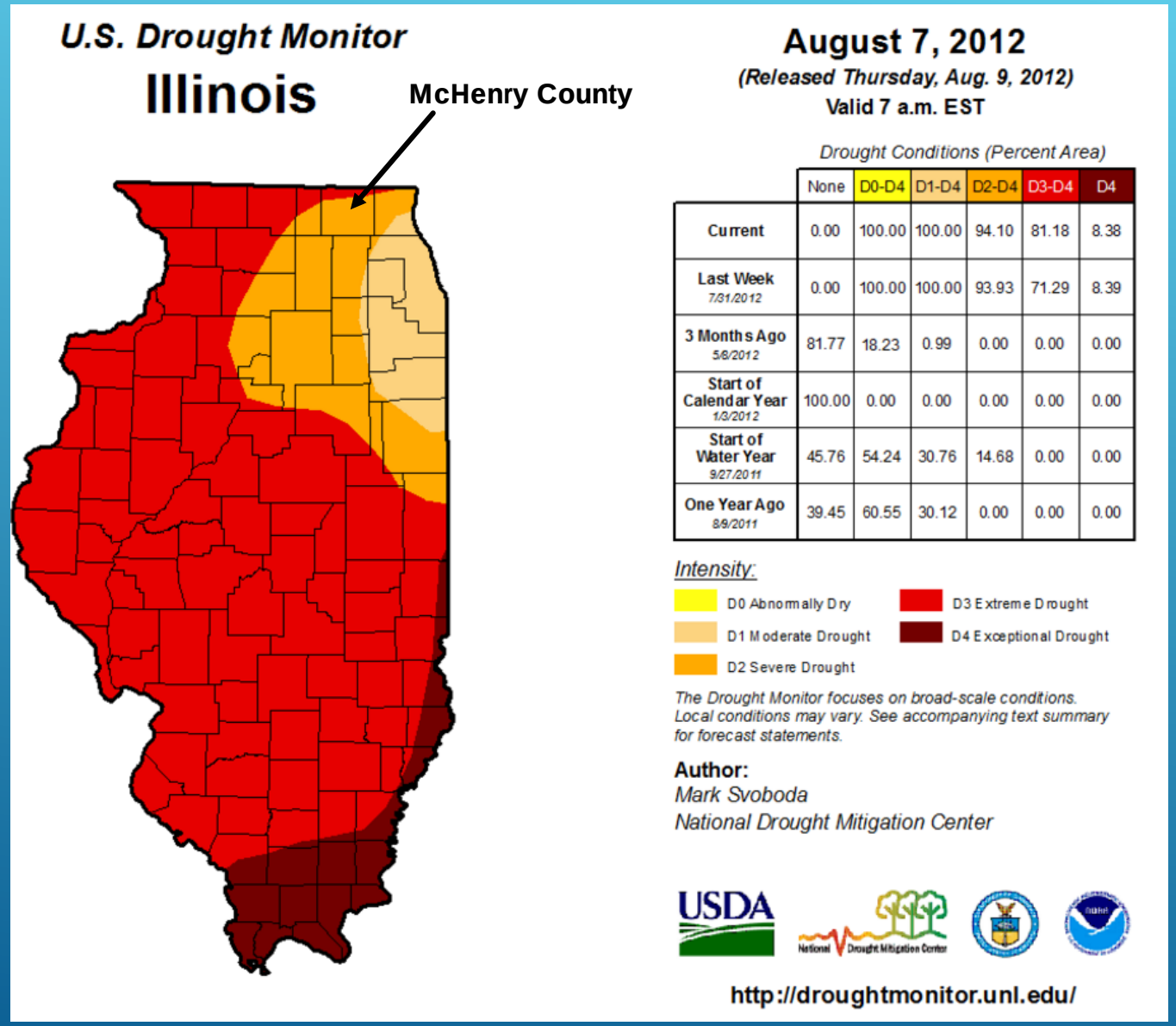
"Period of unusually persistent dry weather that continues long enough to cause serious problems such as crop damage and/or water supply shortages"

(McHenry County National Hazards Mitigation Plan)

During periods of drought:

- Groundwater recharge decreases
- Water use increases across all sectors (SIUC):
  - Public-supply withdrawals increase by 5%
  - Commercial and Industrial withdrawals increase by 5.5-5.6%
  - Irrigation and Agricultural withdrawals increase by 50%

Drought conditions in 2012



2012 Drought
Major Drop in Water Levels

CONTAMINATION…

We use lots of salt!

And it's contaminating our water

- **Road Salt**
- Water Softeners
- Fertilizers

Salt is a Chemical

- Toxic to Fish &Wildlife
- Kills Vegetation
- Highly Corrosive (metal/Infrastructure)
- Adverse Health Impacts

Salt: Once in Solution, Always in Solution

Chloride Standards

- Illinois Environmental Protection Agency standard for Class I Potable Groundwater Resource: **200 mg/L**

- Elevated levels of Chlorides make water non-potable, Secondary Drinking Water Standard: **250 mg/L**

1 teaspoon salt permanently contaminates 5 gal. of water (230 mg/L)

Source: 2008 IL EPA Bureau of Water Integrated Water Quality Report

Permanent Water Impacts from Salt

About 1.5pounds = 3cups = **150 teaspoons**:

Contaminates 4 years worth of drinking water for a person

Makes 30 gallons of water unlivable to fish

24,000 pounds = 48,000 cups = **2,400,000 teaspoons**:

Contaminates 65,753 years worth of drinking water for a person

Makes 500,000 gallons of water unlivable to fish

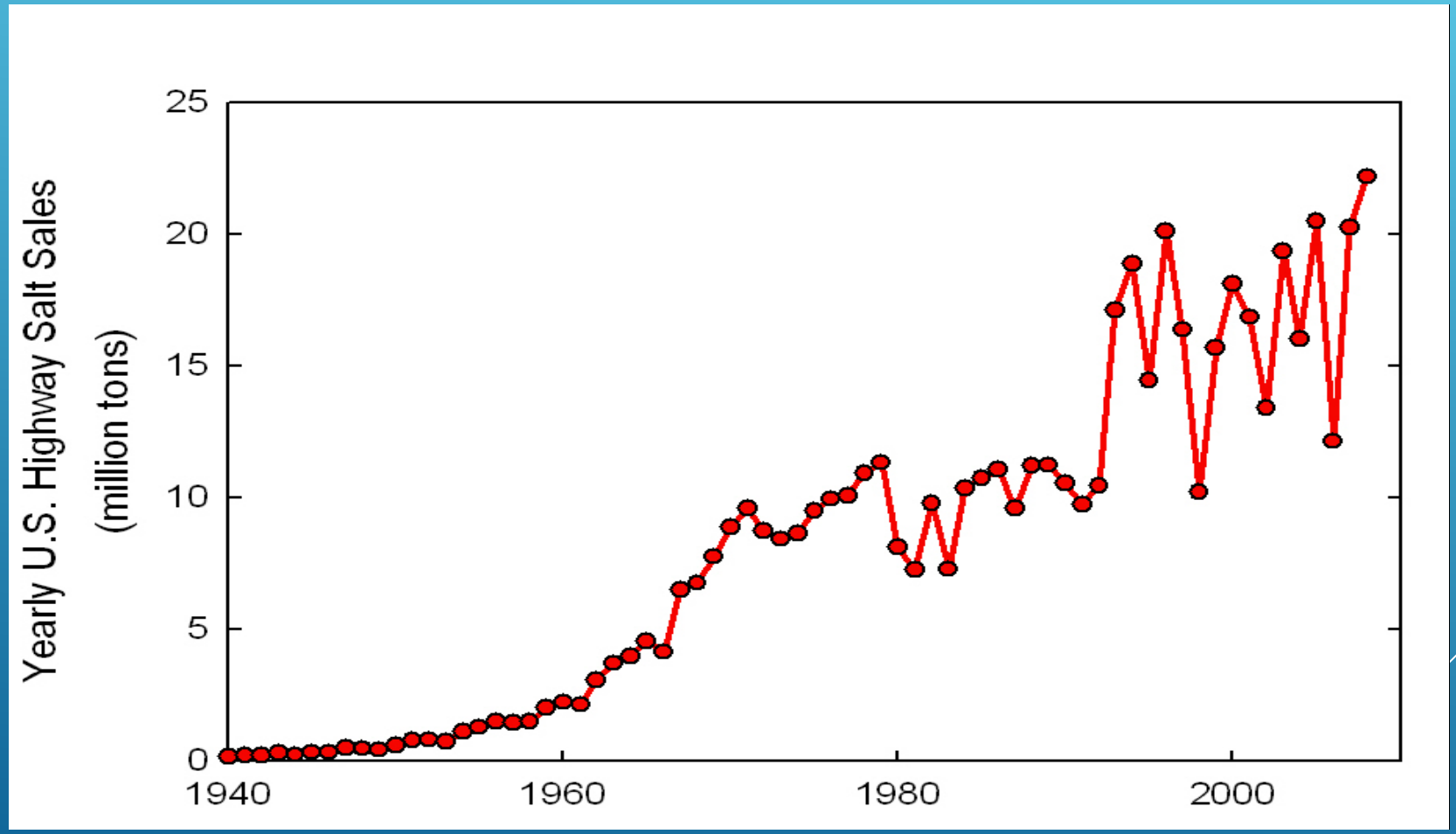
We use lots of salt!

McHenry County has approximately 2,500 miles of roadway

IT'S NOT JUST ROADS WE SALT!

- Parking lots
- Driveways
- Sidewalks

Road Salt in U.S.
Common Use Started in the 1960's

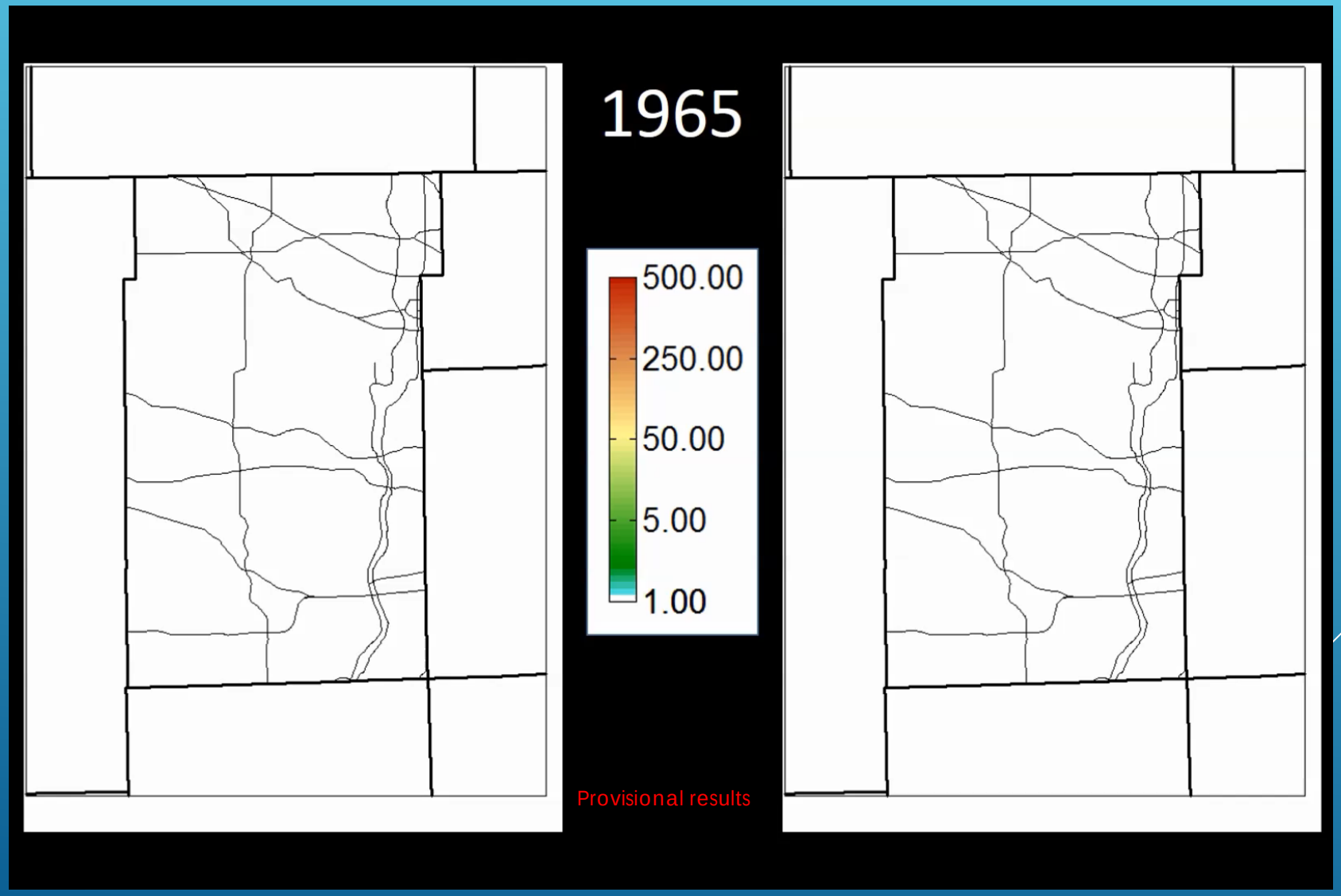


Graph courtesy of Walt Kelly

Increase of Chloride in Groundwater: 1965 - 2015

Sand & Gravel Aquifers

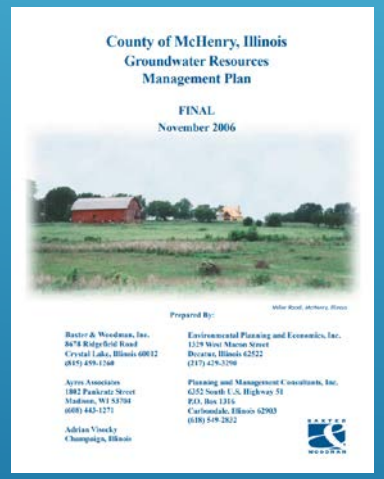
Limestone Aquifer

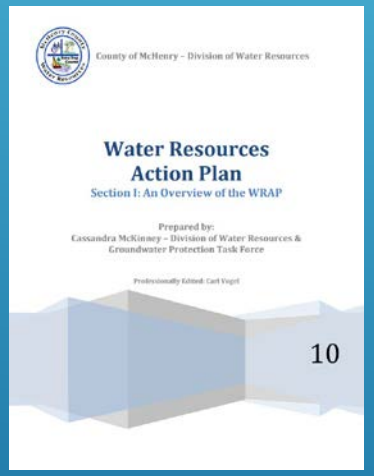


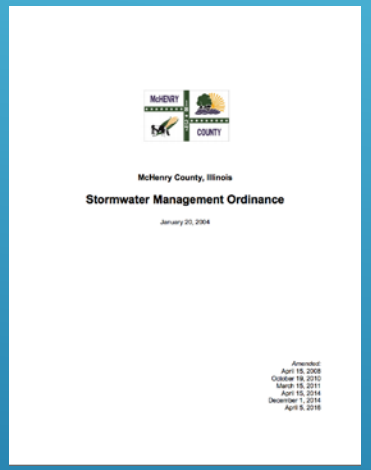
What Have We Done To Protect Water Resources?

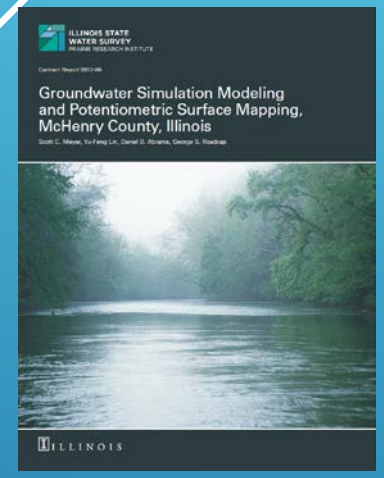
McHenry County a Leader in Protecting Water Resources

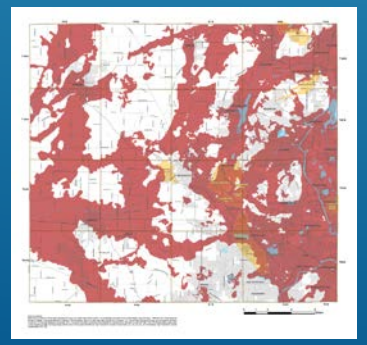
Research - Plans - Practices - Ordinances - Education - Action

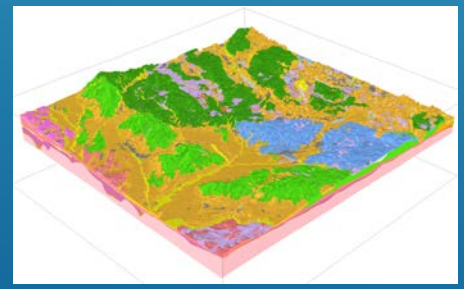




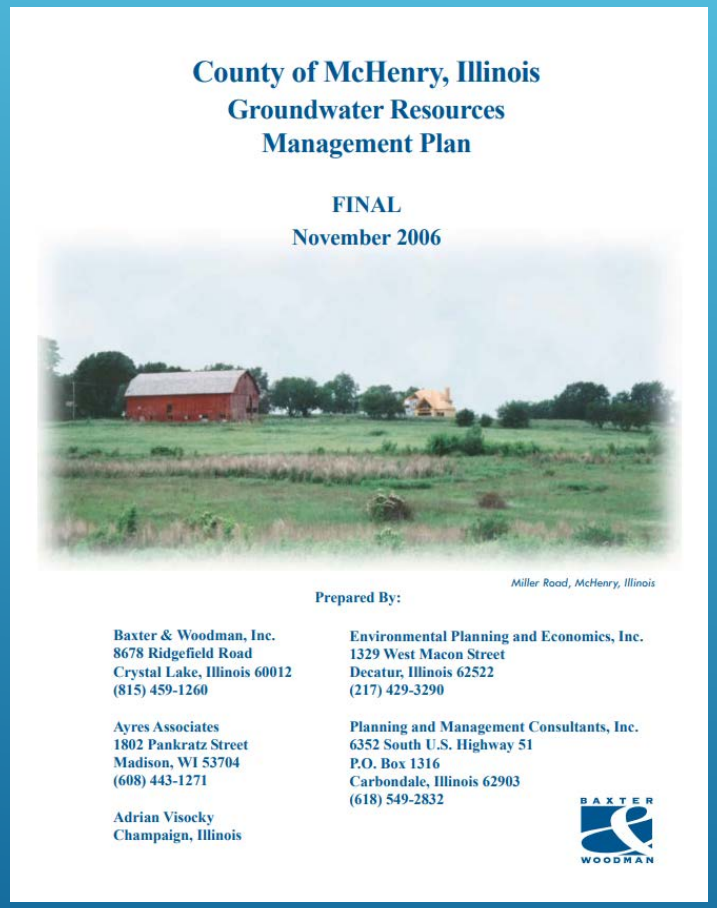








Groundwater Resources Management Plan - 2006



County of McHenry, Illinois
Groundwater Resources
Management Plan

FINAL
November 2006

Miller Road, McHenry, Illinois

Prepared By:

Baxter & Woodman, Inc.
8678 Ridgefield Road
Crystal Lake, Illinois 60012
(815) 459-1260

Environmental Planning and Economics, Inc.
1329 West Macon Street
Decatur, Illinois 62522
(217) 429-3290

Ayres Associates
1802 Pankratz Street
Madison, WI 53704
(608) 443-1271

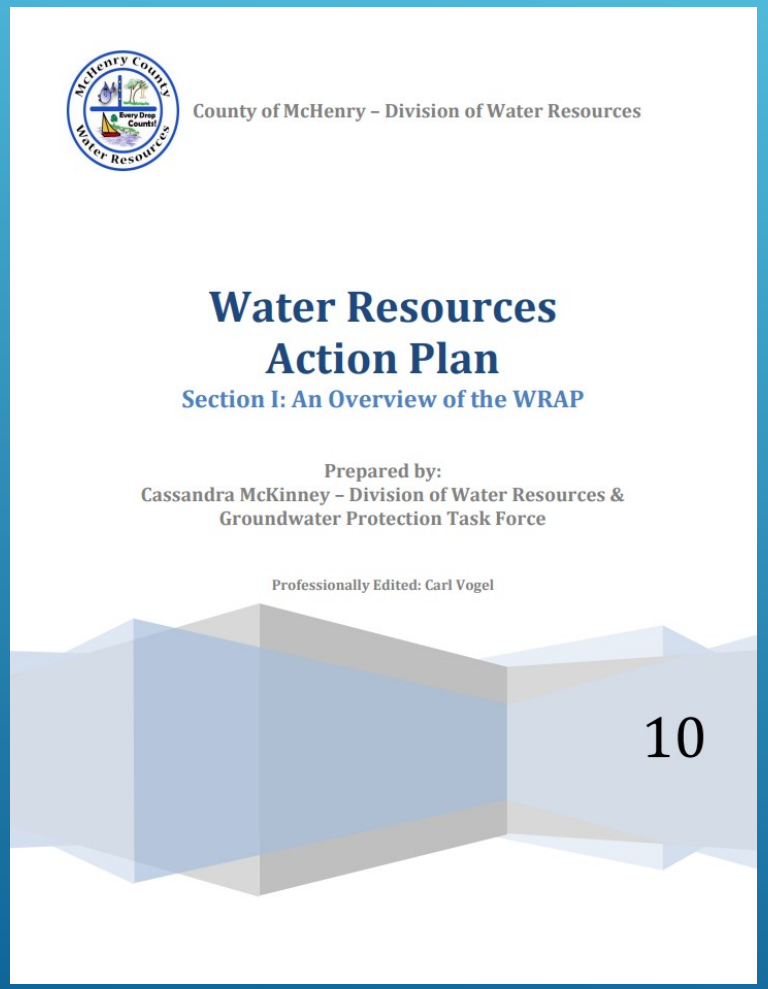
Planning and Management Consultants, Inc.
6352 South U.S. Highway 51
P.O. Box 1316
Carbondale, Illinois 62903
(618) 549-2832

Adrian Visocky
Champaign, Illinois

BAXTER & WOODMAN

- 1st Comprehensive study of County's water resources
- Evaluated water supplies and future demands
- Recognized potential for groundwater contamination
- Identified potential for aquifer depletion

Water Resources Action Plan (WRAP) - 2009



- Initiated under Direction of County Board
- Prepared by Groundwater Task Force **Volunteers (public, elected officials, municipal staff, professionals)**
- Focused on Solutions to Water Resource Issues

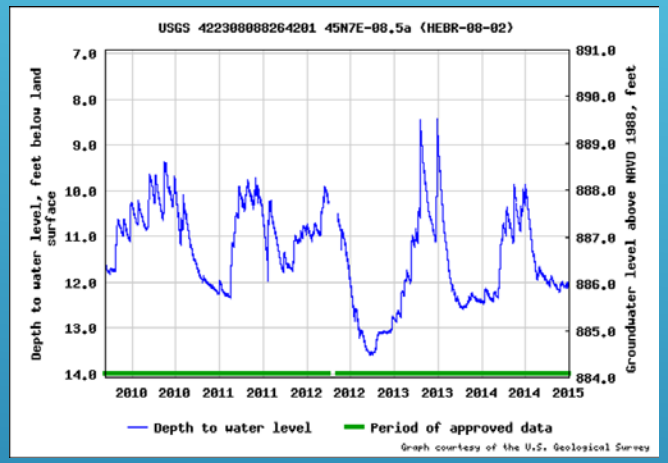
Is Due to be Updated !!!

USGS Monitoring Well Installations (2010)

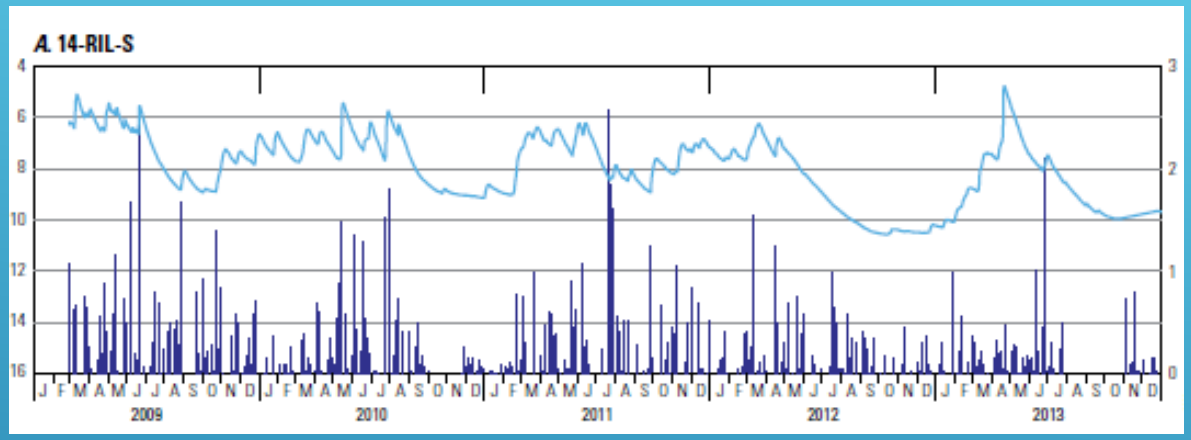
- Obtained grants from USGS/USACE
- Installed network of groundwater monitoring wells (37)
- Streamgages on Fox river, Kishwaukee River, Nippersink Creek, and Franklinville Creek
- Conducted water quality testing
- Water depth and streamgage data measured at 15 minute intervals and transmitted via satellite
- Data is Publicly Available

USGS Monitoring Wells – Uses of Data

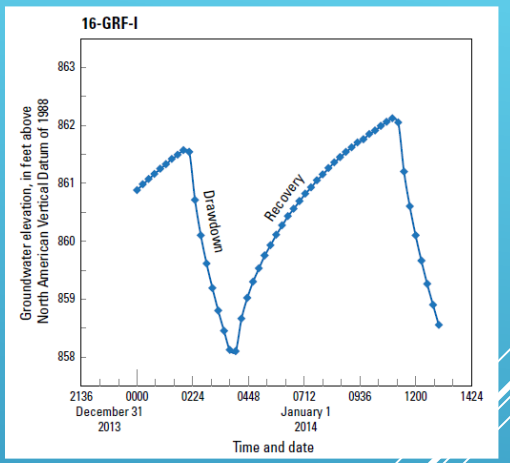
Groundwater Levels



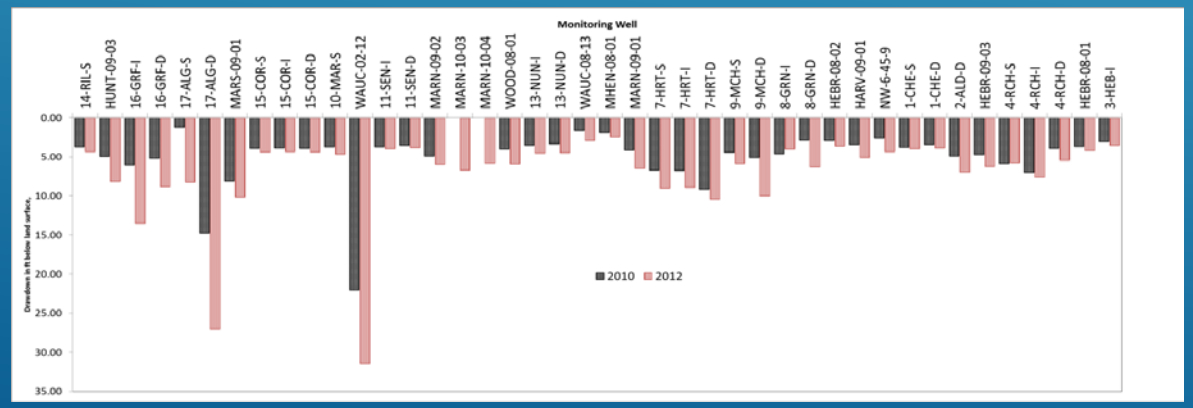
Water Recharge/Discharge Areas



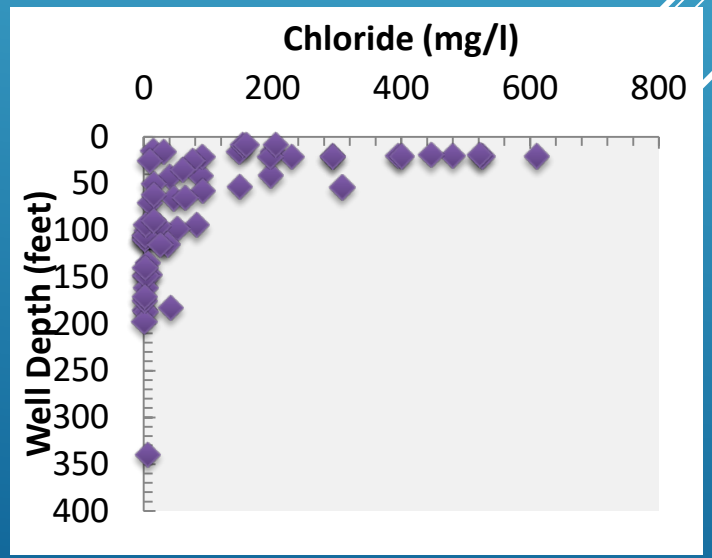
Pumping influences



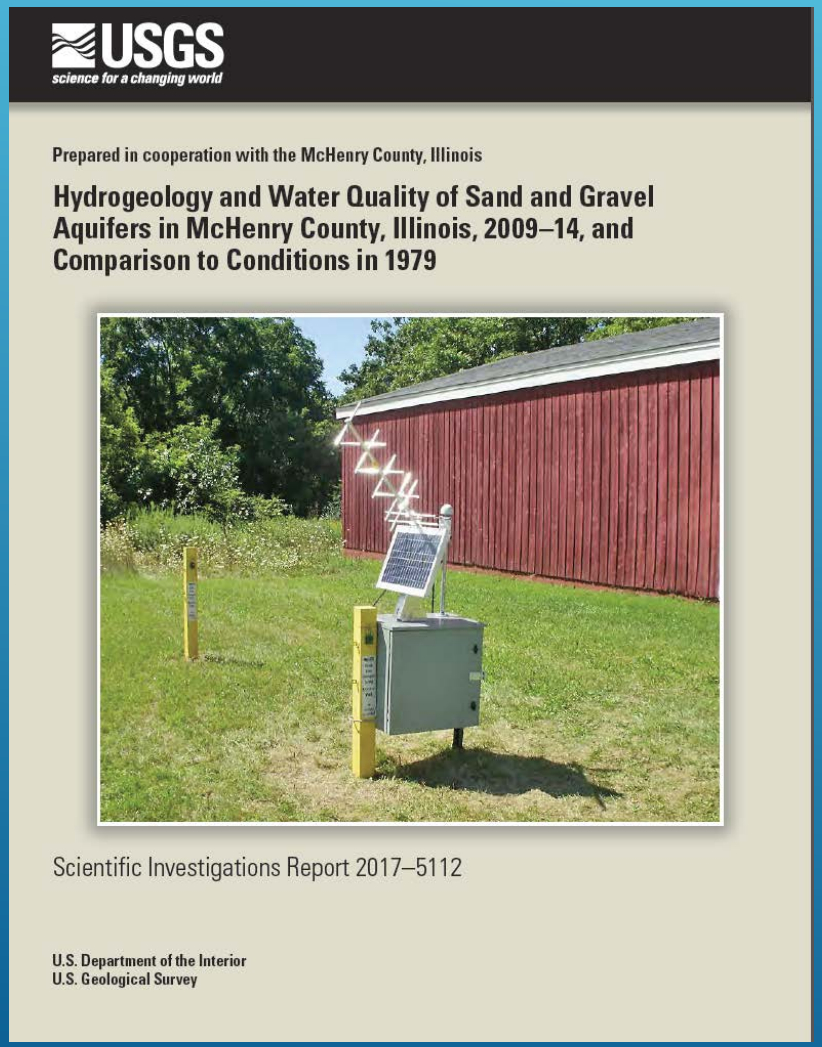
Drought Planning



Water Quality

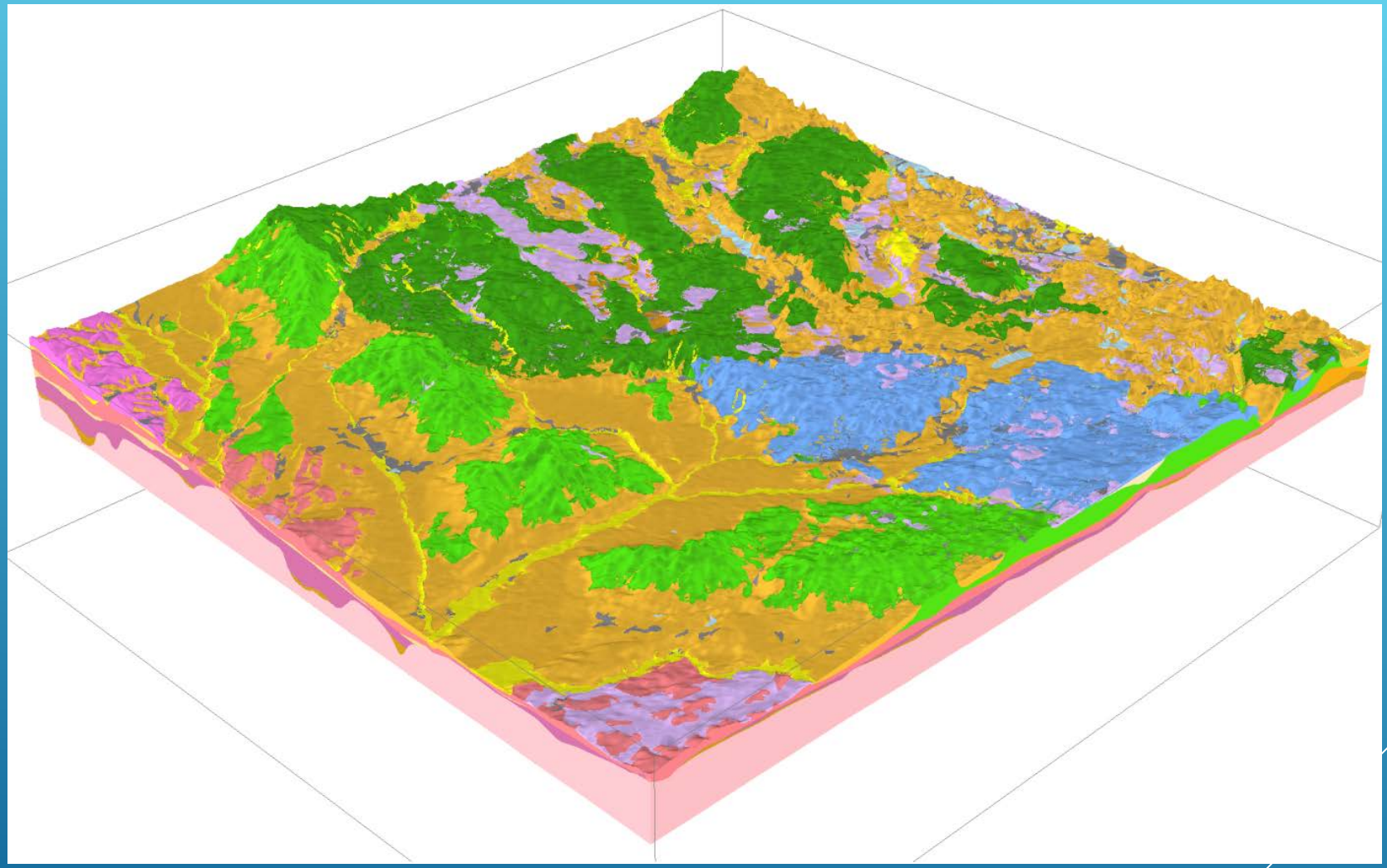


USGS Water Quality Report (2017)



- Summarized water quality findings of 2010 study
- Provided comparison with conditions observed in an earlier 1979 study
- **Established baseline conditions for comparison with future studies**

3D Geologic Mapping for McHenry County



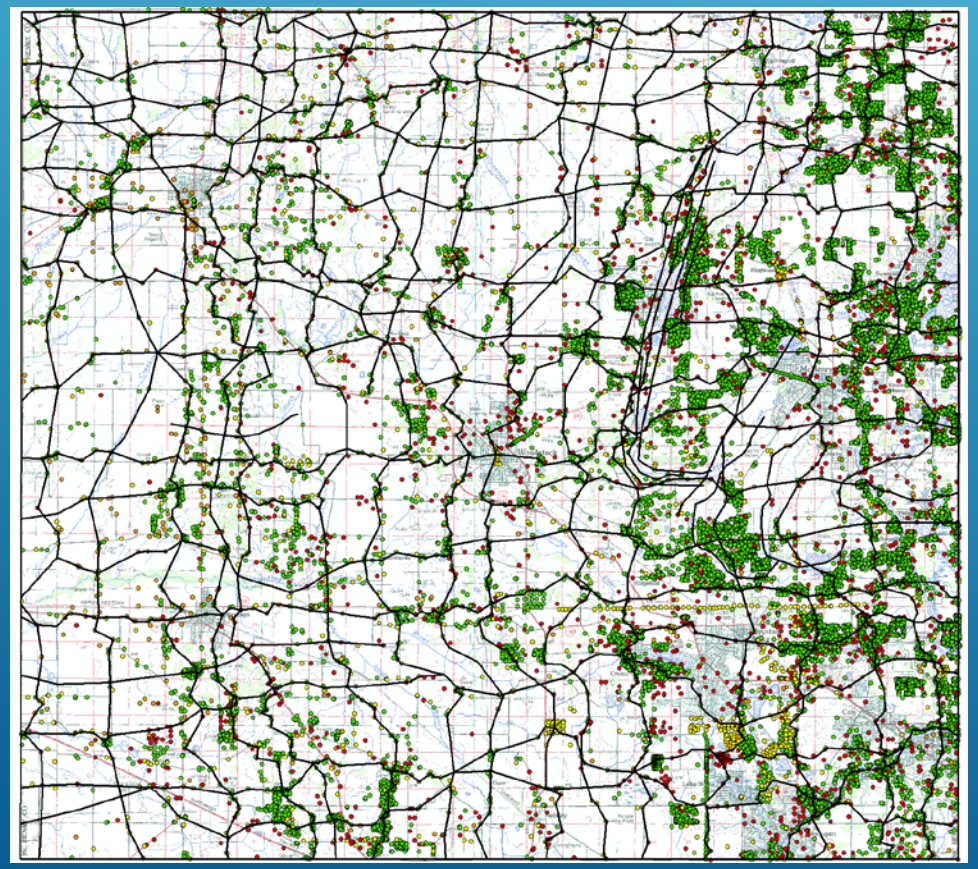
ILLINOIS STATE GEOLOGICAL SURVEY
PRAIRIE RESEARCH INSTITUTE

Jason F. Thomason and Don A. Keefer
Illinois State Geological Survey

ILLINOIS
UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

Data Acquisition

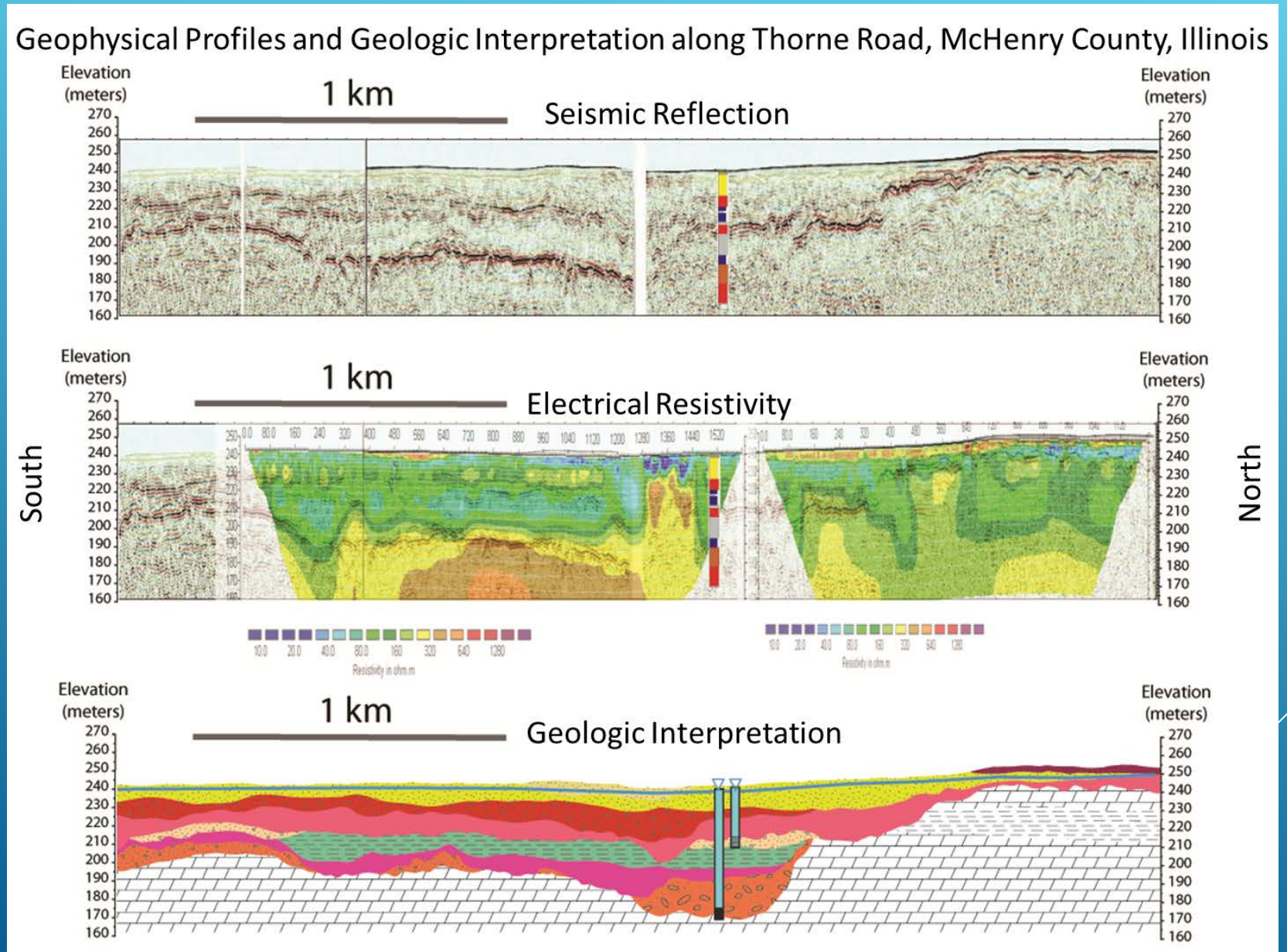
* Reviewed over 11,000 Well Logs,
* Installed new wells,
* Key cross section every ~1-2 miles



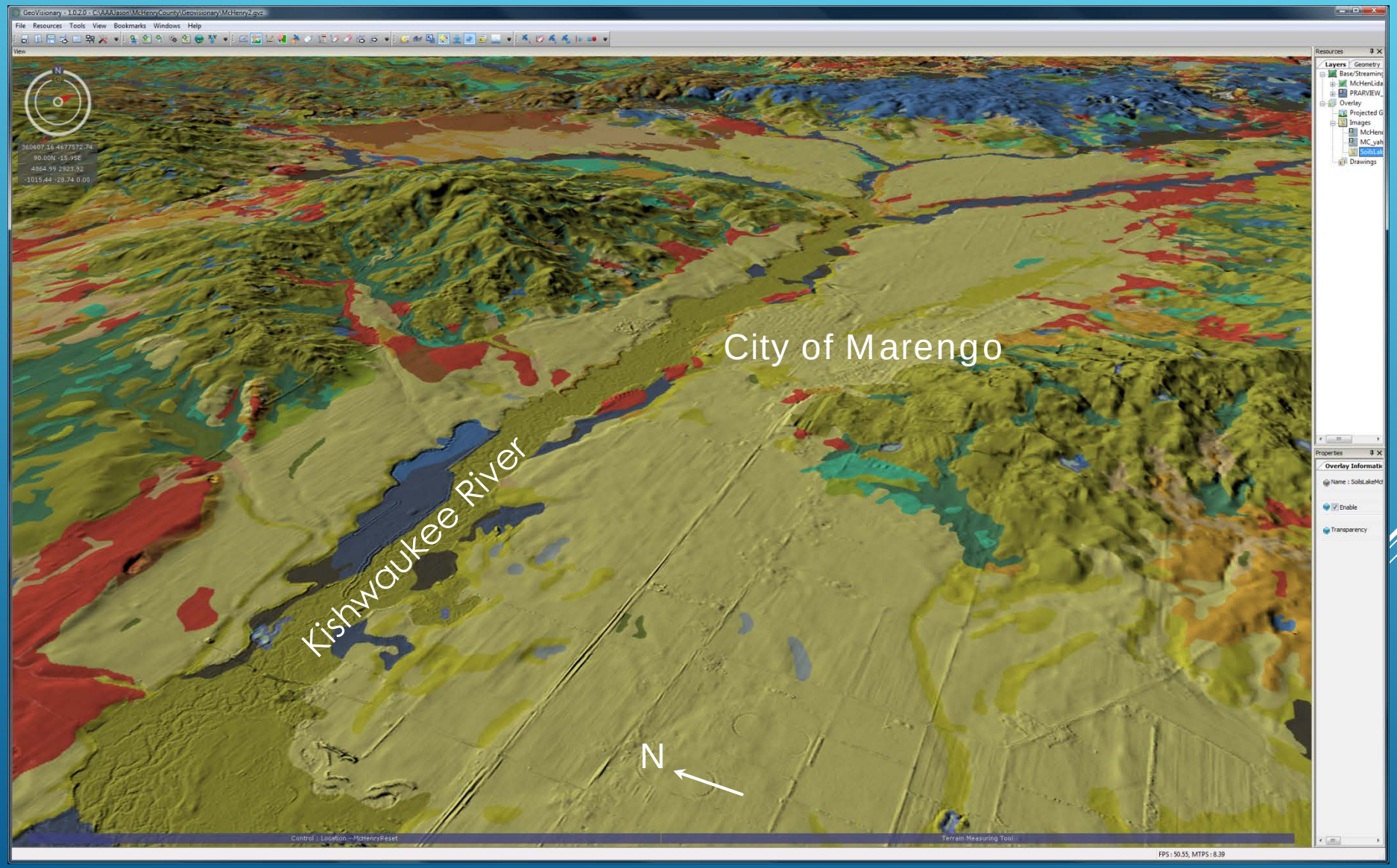
Seismic Surveys

Electrical Surveys

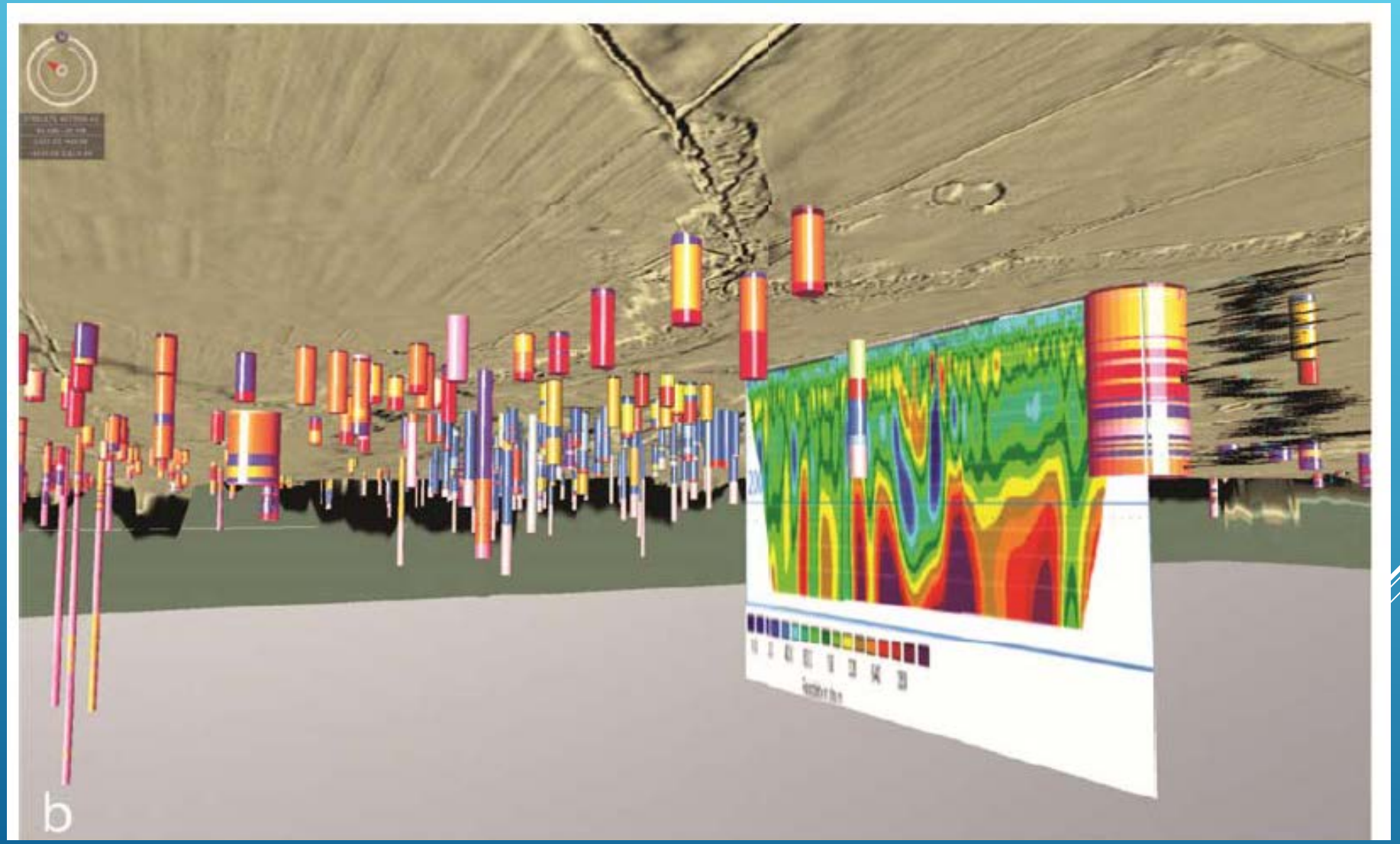
Data Provided Sub-Surface Imaging



3D Visualization of Land Surface Topography and Data

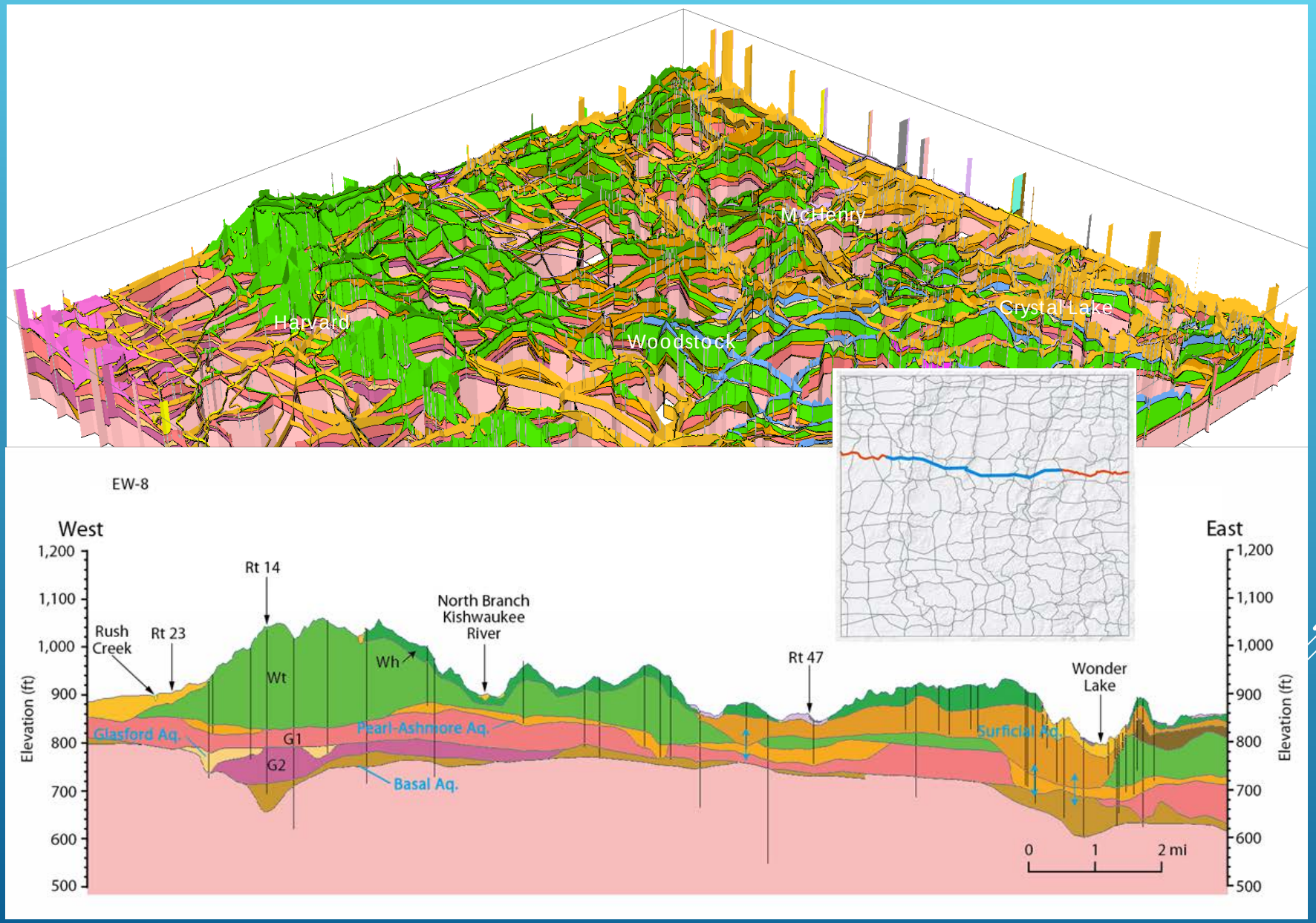


3D Visualization of Subsurface Data

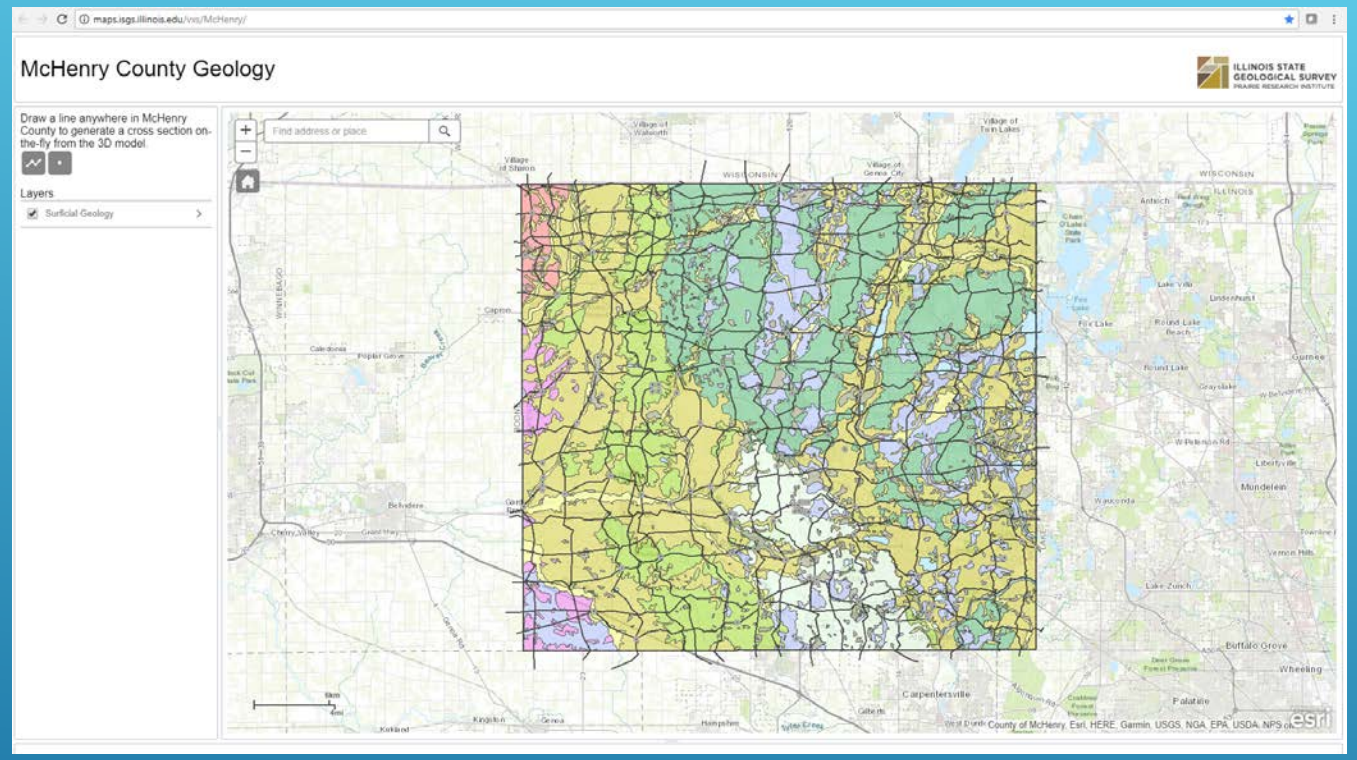


3D Geologic Map-Cross Section Network

Viewed from Southwest

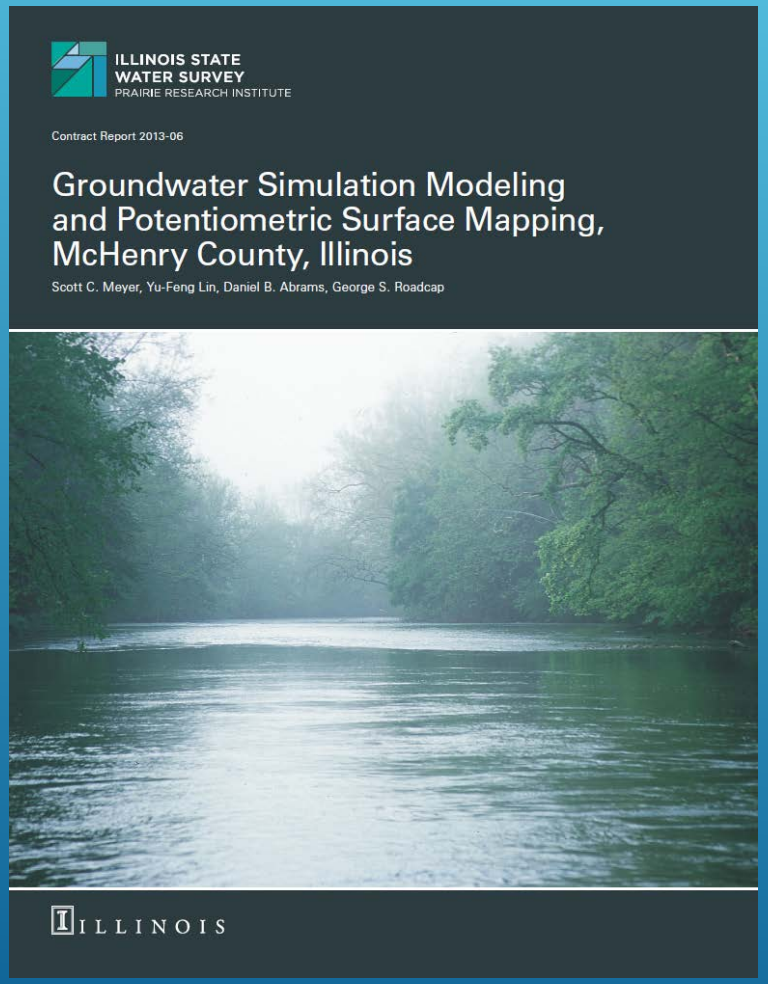


Interactive 3D Geologic Map



http://maps.isgs.illinois.edu/vxs/McHenry/

Illinois State Water Survey Modeling & Mapping



Potentiometric Surface Mapping

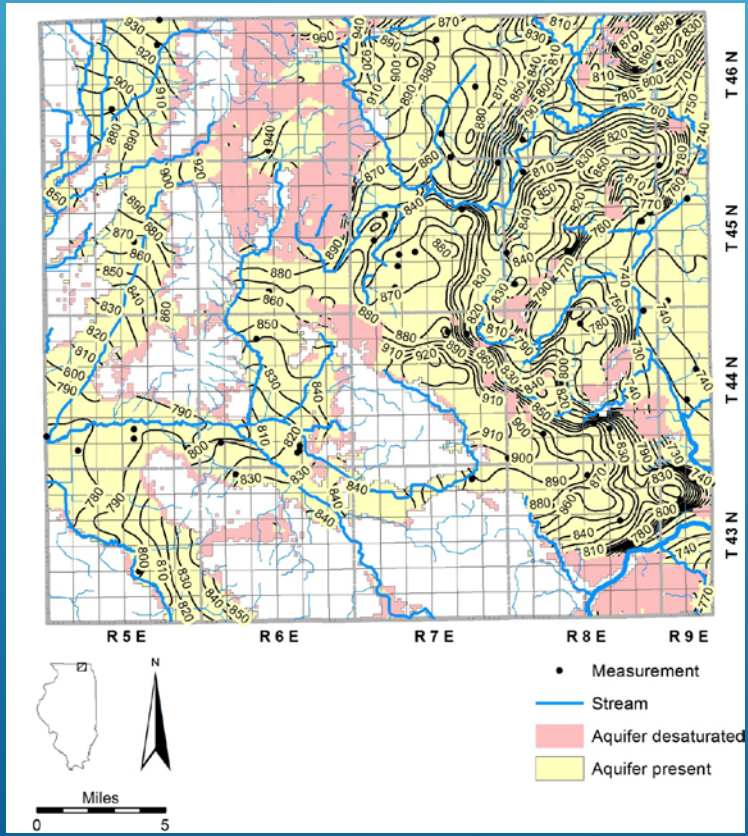
- Mapped elevation and head pressure in shallow and deep aquifers
- Changes in water levels
- Direction of groundwater flow

Groundwater Simulation Modeling

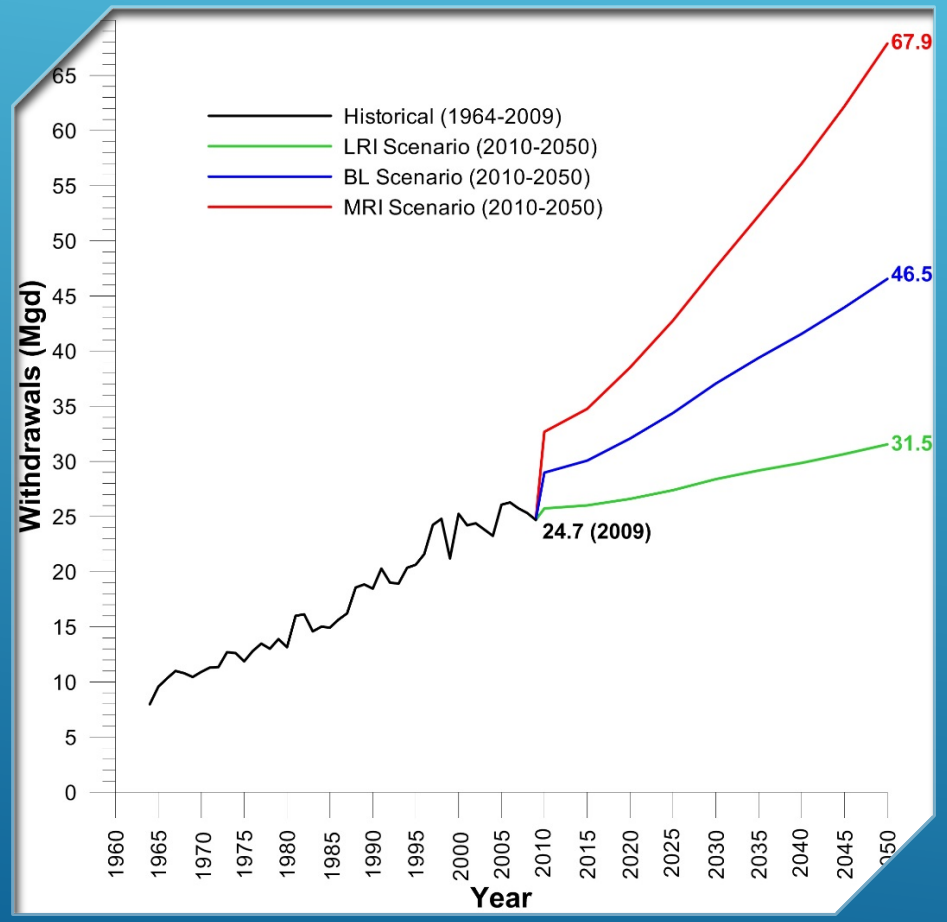
- Able to simulate aquifer drawdown
- Run scenarios based on varying conditions

Illinois State Water Survey Modeling & Mapping

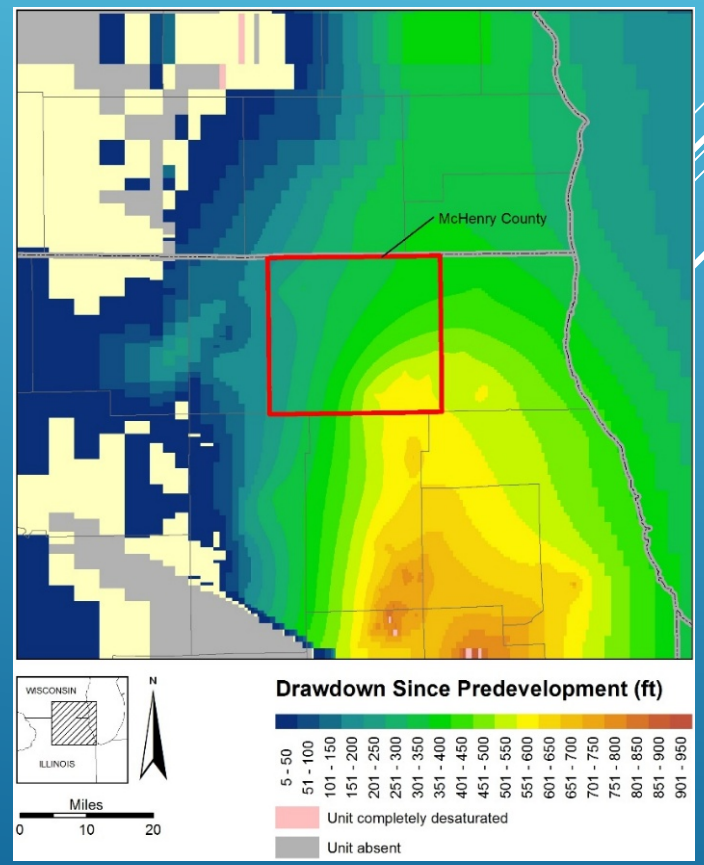
POTENTIOMETRIC MAPS



SIMULATED PUMPING SCENARIOS

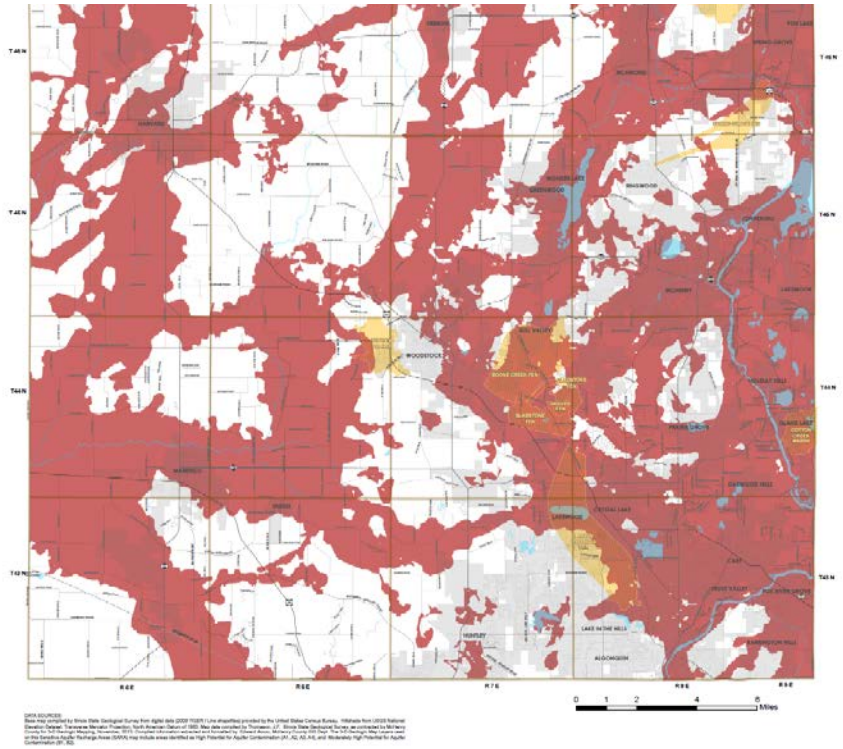


SIMULATION MODELING MAPS



Sensitive Aquifer Recharge Areas (SARA) Map - 2018

REVISED McHenry County
SARA Map



- Mapped soils with the greatest potential for aquifer recharge…and contamination
- Based on 3-Dimensional Geologic Mapping
- Connects Land Surface/Groundwater Aquifers
- Adopted into updated Unified Development Ordinance with added protection for recharge areas

Sensible Salting

McHenry County DOT has been a National Leader in developing and implementing **Sensible Salting** Practices

The use of Best Management Practices for snow and ice management to maintain safety for pedestrians, drivers, vehicles and property while minimizing the unnecessary use of salt to reduce impacts to water and the environment.

Sensible Salting

- Proper Storage
- Calibrating equipment
- Only applying enough product to be effective
- Tracking Weather
- Applying correct product for road temperature
- Anti-Icing vs. De-Icing
- Using liquid applications before events
- Use of carbohydrates (beet juice)
- Pre-wetting
- Training and Certification

Proper Salt Storage

Wrong

Better

Best

Calibrate Equipment

- **Calibrate Annually**
- **Correct application rate**

Use Correct Application Rates

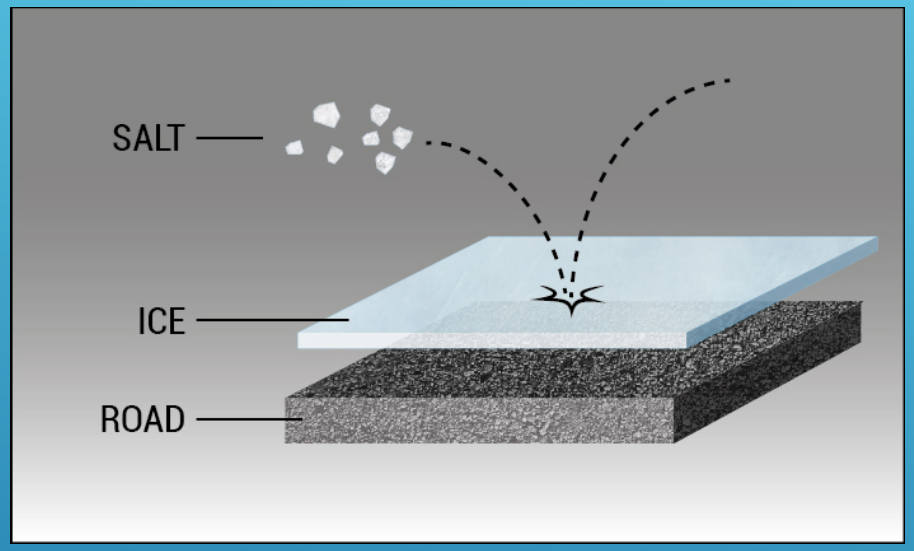
More Like This

Right

NOT Like This

Wrong

REDUCE SALT USE



Pre-Wet Salt

- Activates the Salt
- Improves Effectiveness
- Reduces Bounce

Use Correct Product for Pavement Temperature

REDUCE SALT USE

Anti-Icing – Liquid Application Prior to Storms

- **Prevents ice from bonding**
- **Simplifies snow removal**
- **Reduces need for additional salt applications**

Sensible Salting Workshops

- McHenry County has held Snow & Ice Workshops for 10 Consecutive Years

- ~ *Trained and Certified over 850 People from:*
  - Municipalities
  - Townships
  - Private Operators
  - County Operators
  - Schools
  - Distributors
  - Facility Managers
  - Business Owners

What's Next for Water Resources?

What's Next for Water Resources?

- Build off of the scientific studies that have been conducted
- Conduct new water quality studies
- Update and expand Sensible Salting training in the county
- Education and outreach
- Raise awareness of water resources to support protection
- Living snow fences

What Can We Do for Water Resources?

CONSERVE

Change Fixtures

- Use Watersense Products

Change Behavior

- Don’t Leave Water Running
- Take Shorter Showers
- Only water Lawns/Plants in Morning or Evening

Change Demand

- Landscape with Native Plants
- Convert Turf to Native
- Raingarden

PROTECT

Don’t Pollute

- Anything we put in the air, on the land, or in the ground can pollute water

Properly dispose of Medicine

- Don’t Flush Down Toilet/Sink
- Don’t Dispose in Trash

- Do Dispose at Take-Back Collection Sites or Events

Properly Dispose of Household Materials

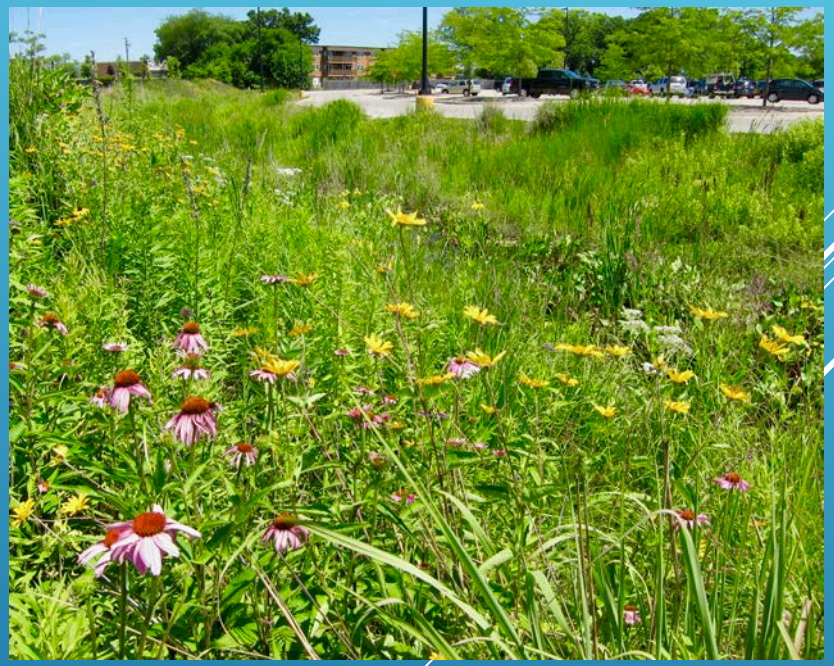
- Do Dispose at Take-Back Collection Sites or Events
- Dry Paint on Cardboard then Dispose with Regular Waste

PRESERVE

Support the Protection, Restoration and Enhancement of Natural Areas to maintain Resilience and Ecosystem Services

- Groundwater Recharge

- Natural Hydrology



- Green Infrastructure

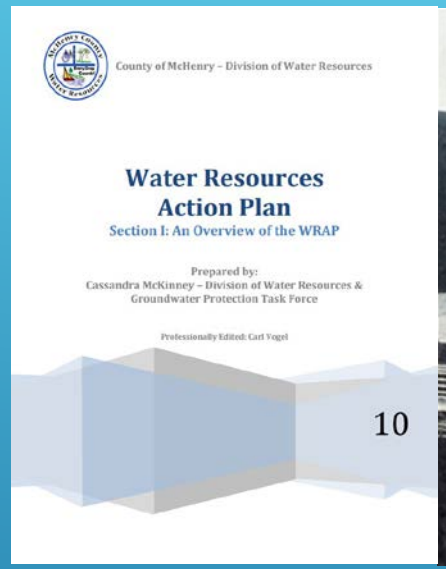
Join us in the Fall of 2019

Annual McHenry County Water Forum

"Where Does Our Water Come From?"

This **FREE** program held at McHenry County College features wonderful speakers, delicious food, and great sponsors to answer your questions about water

WE'RE PUTTING THE BAND BACK TOGETHER !!!



Water Resources Task Force

- On a Mission to Update the **Water Resources Action Plan (WRAP)**
- Working on **solutions** for Both Kinds of Water: Surface … and Groundwater
- **We Will Be Looking for Volunteers to Participate !!!**

CLOSING THOUGHTS

Remember:

- ✓ Water is a finite resource
- ✓ Residents of McHenry County are extremely fortunate to have safe, reliable water resources
- ✓ Those water resources will only be available if we take care for them

CONSIDER HOW YOUR ACTIONS CAN IMPACT OUR WATER & ENVIRONMENT!

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