Integrating Science into Water Supply Planning

McHenry County Division of Water Resources

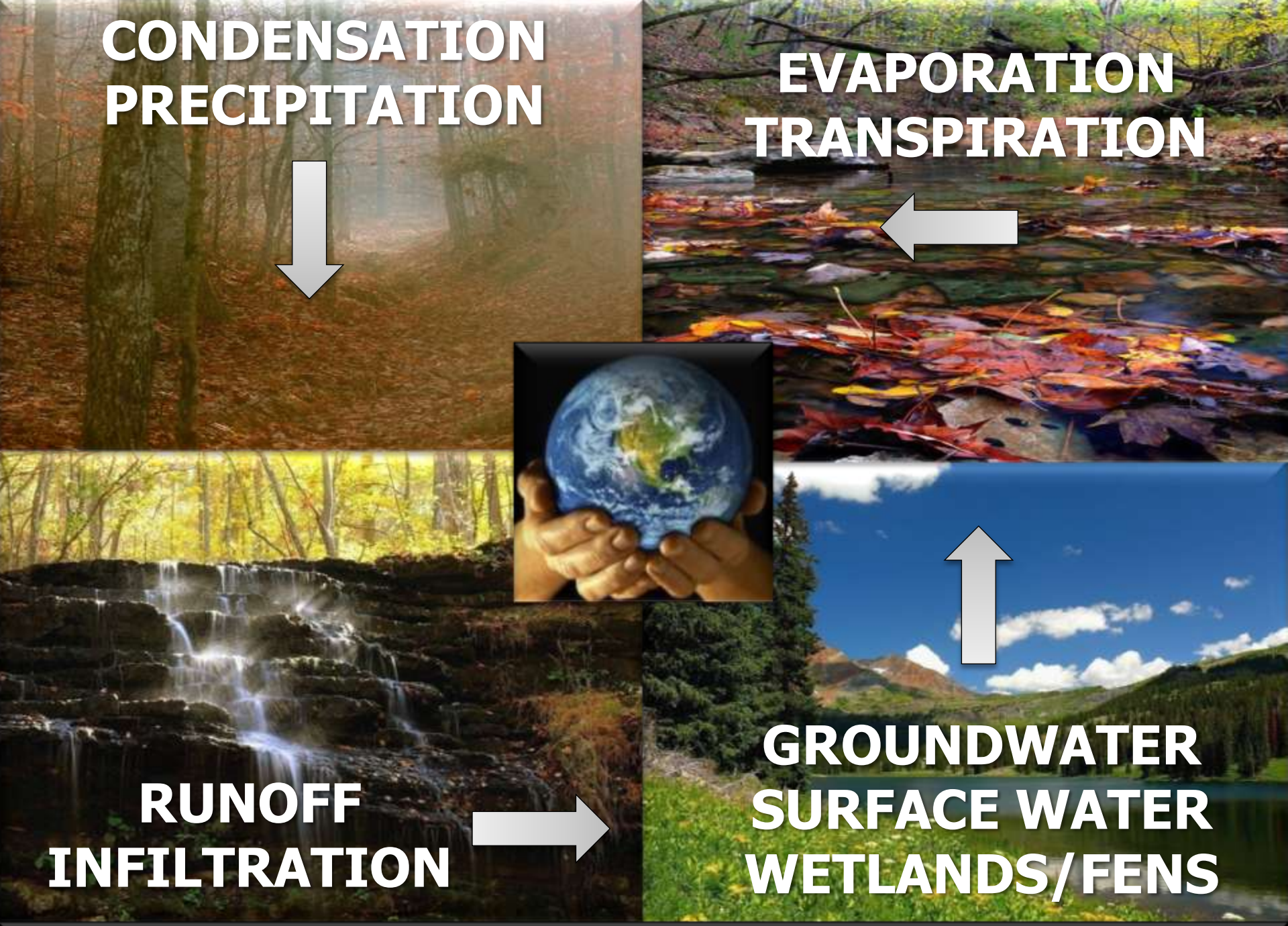
Cassandra McKinney
McHenry County Department of Planning and Development

Alarming Fact

- Less than ¼ of Americans know where their water comes from.

- Disconnect between ***understanding the science***, recognizing the ***value of science,*** and ***conducting and implementing*** the research and policies necessary to sustain resources.

Consider this...


CONDENSATION
PRECIPITATION
EVAPORATION
TRANSPIRATION
RUNOFF
INFILTRATION
GROUNDWATER
SURFACE WATER
WETLANDS/FENS

Providing habitat for all living things

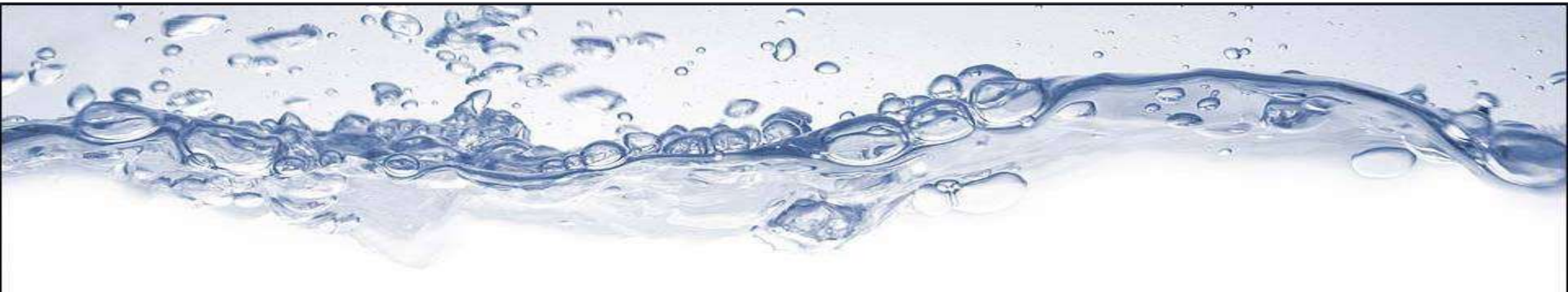
The average human requires 10.5 cups of water per day!

60% of your body
70% of your brain
80% of your blood

While you can survive almost a month without food…

You can't survive one week without water!

Water is Vulnerable…



Drought…

Pollution…

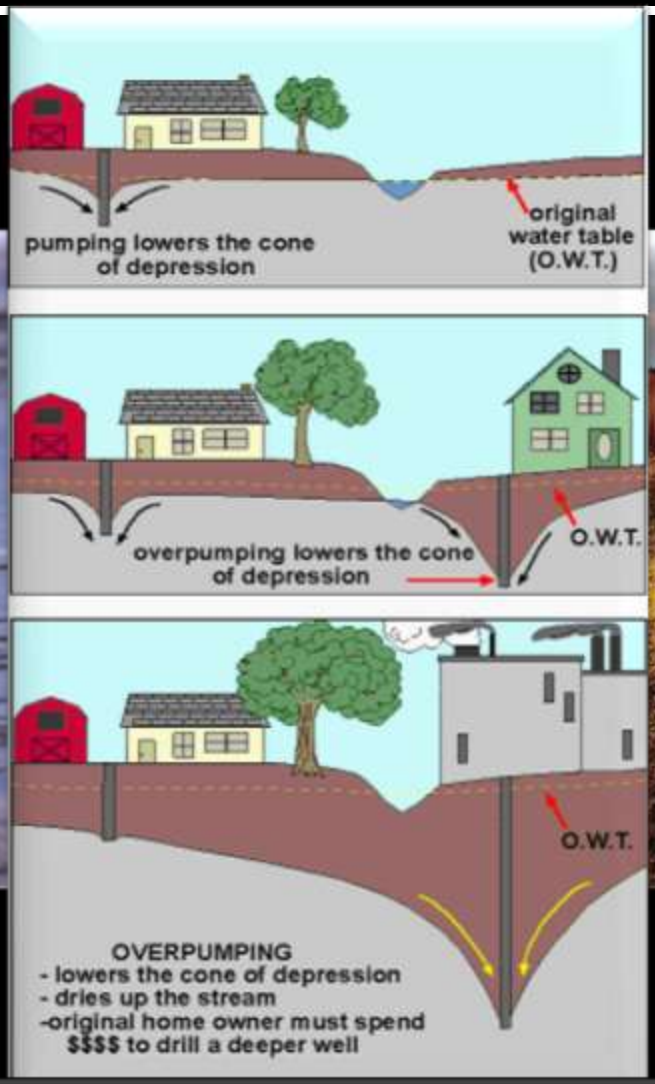

DANGER
DO NOT DRINK
THIS WATER
CEMETERY


THE DRAIN IS JUST FOR RAIN
Report Water Pollution

Mismanagement…

Impervious Surfaces

Irrigation

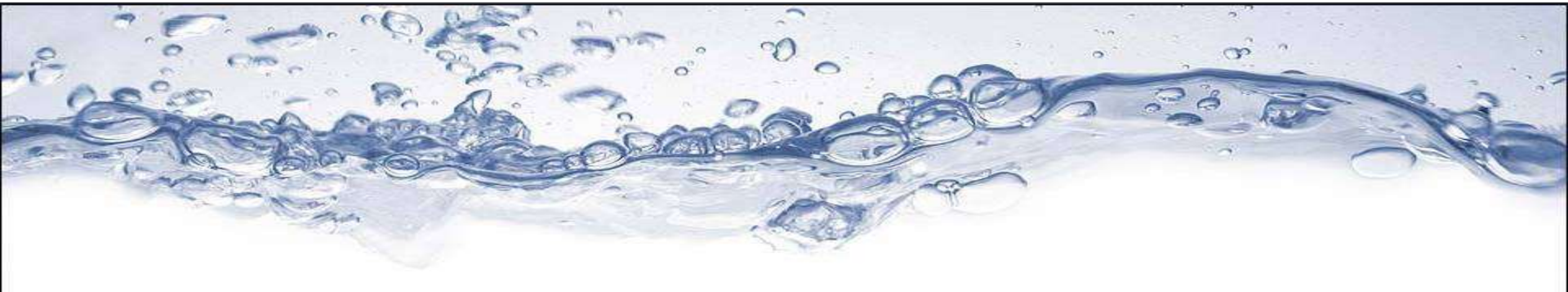


Urban Sprawl

Overuse

Vulnerabilities lead to…

Water Quality &
Quantity Concerns

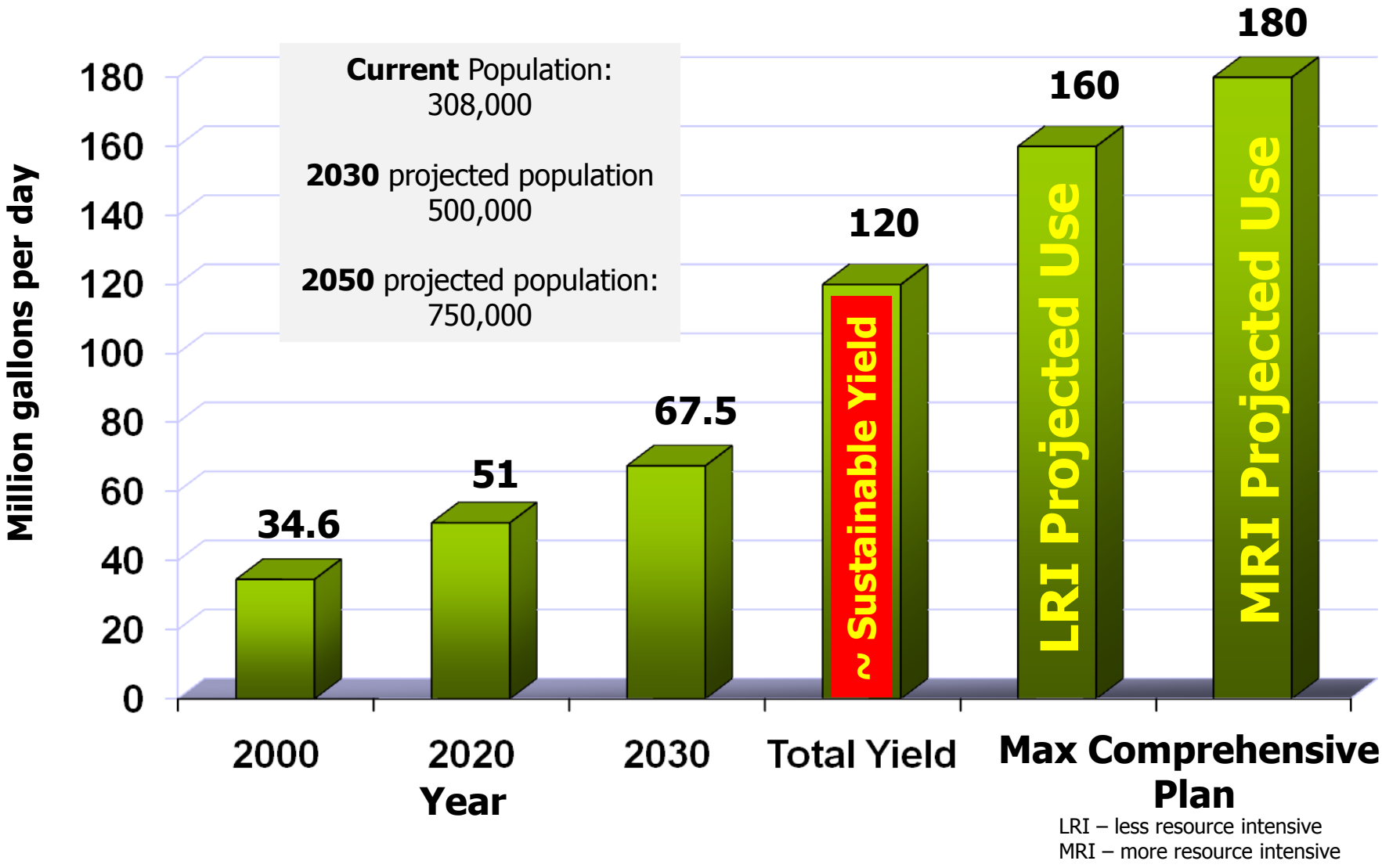


The State of Water in McHenry County, Illinois

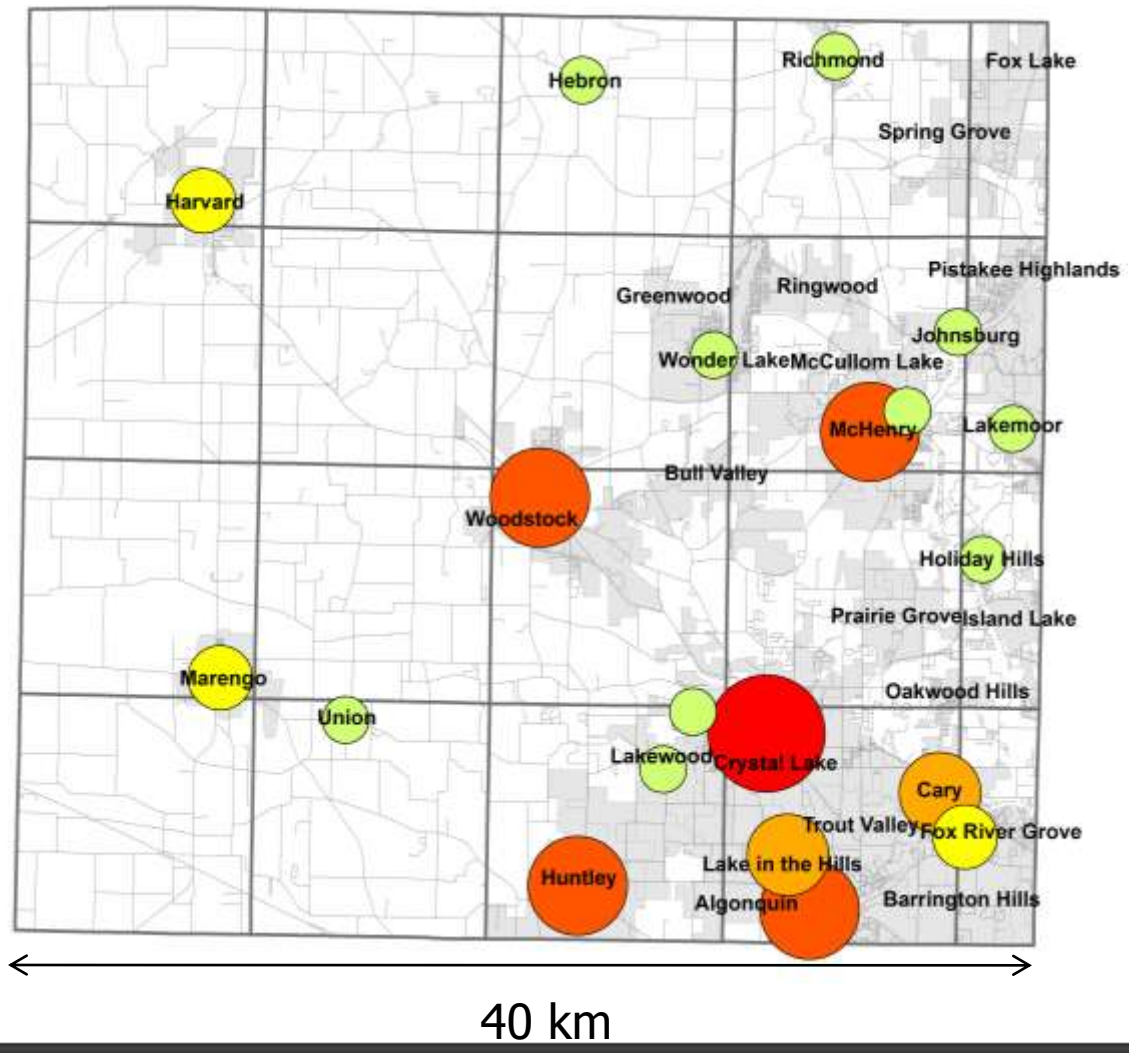
McHenry County Challenge

- McHenry County is solely dependant on groundwater for all of its potable water needs
- Adequate groundwater quantity *and* quality is essential to the present and future well being of McHenry County agriculturalists, residents and businesses.
- The groundwater supply is:
  - Limited
  - Vulnerable to pollution
  - Is being mismanaged

How Much Water Do We Use in McHenry County?

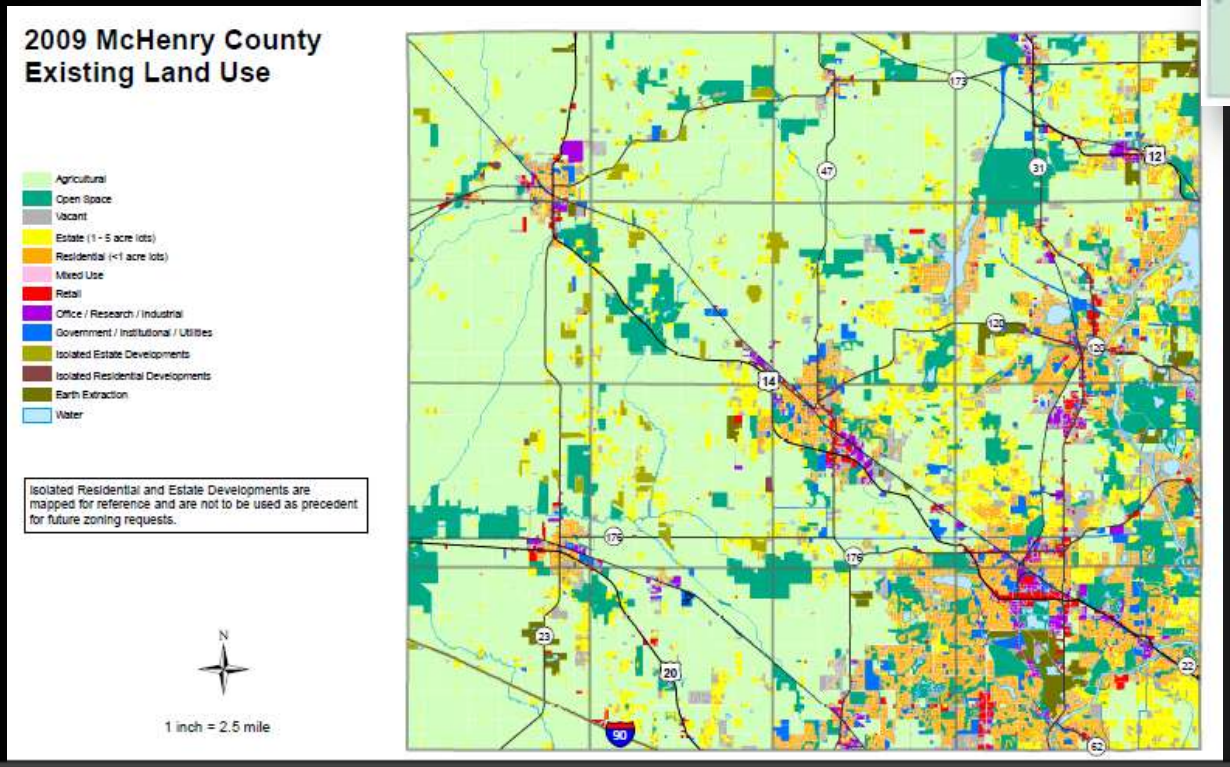


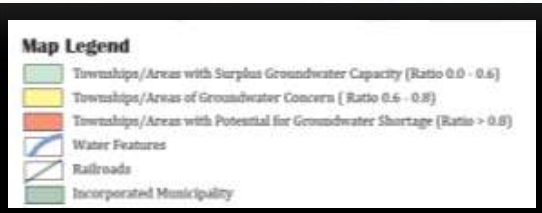
Municipal Water Supplies



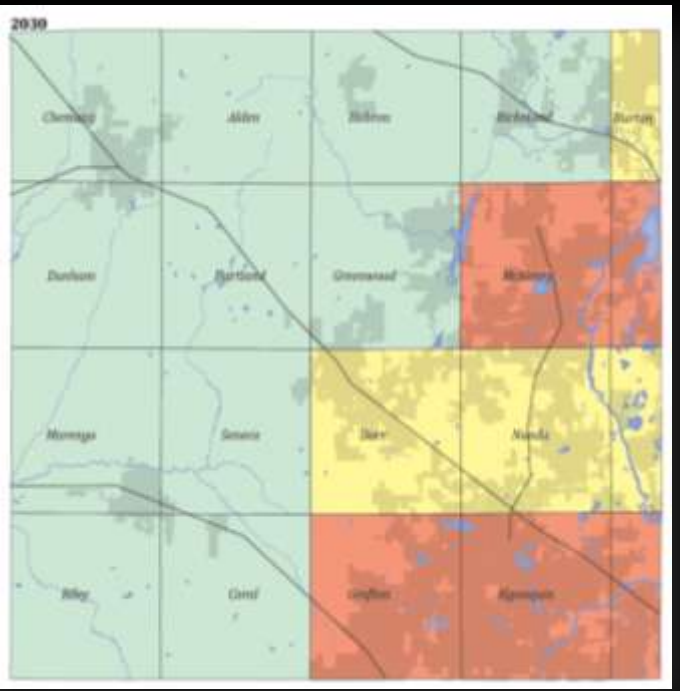
Water Supply:
100% Groundwater
~60% Sand and Gravel

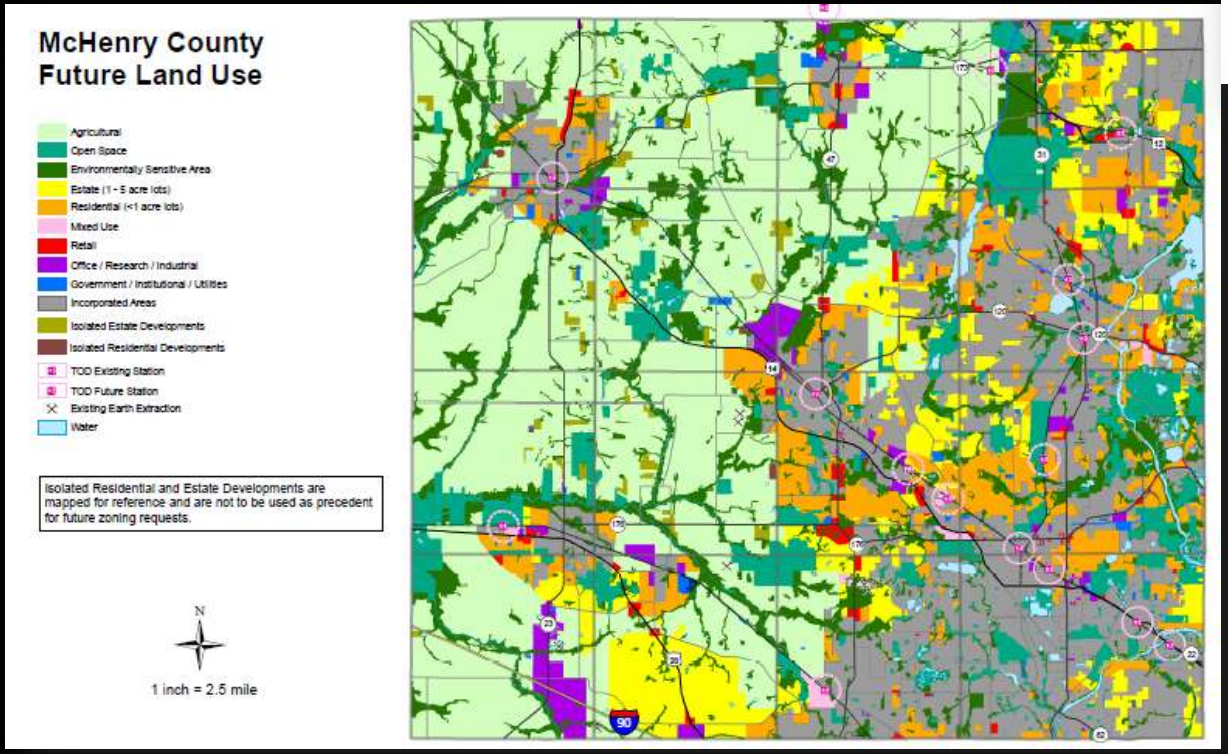
Current Conditions

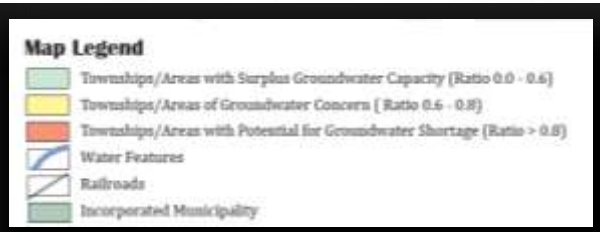




Future Conditions

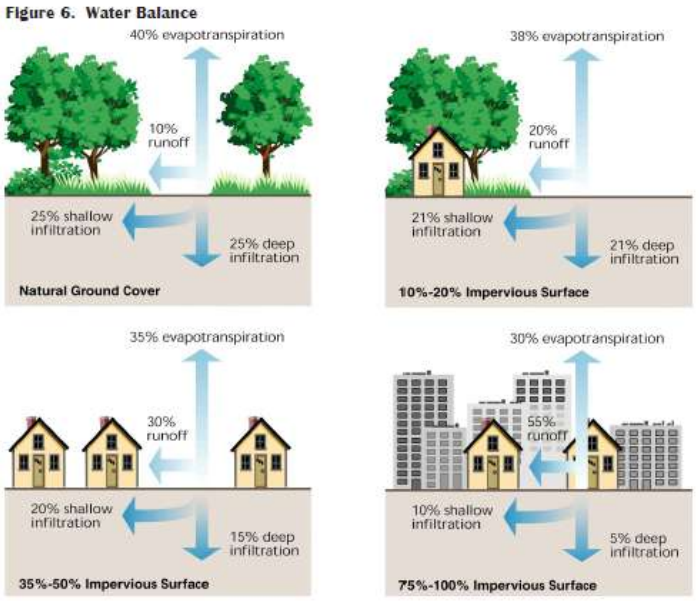






Development....

- Development Increases the Rate of Runoff
- Development Increases the Volume of Runoff
- Runoff from Developed Areas is Polluted
- Development increases the rate and volume of groundwater withdrawal



Source: "In Stream Restoration: Principles, Processes, and Practices" Fig. 3.21, Federal Interagency Stream Restoration Working Group, 1998.

Why is it that water takes up **70% of the earth's surface** and **60% of our bodies**, yet so little of our thinking?

Imagine turning water problems into **opportunities!**

Opportunity:

Create a Program to:

Protect and preserve the

quantity and quality

of groundwater for our generation and future generations, including the built and natural environment

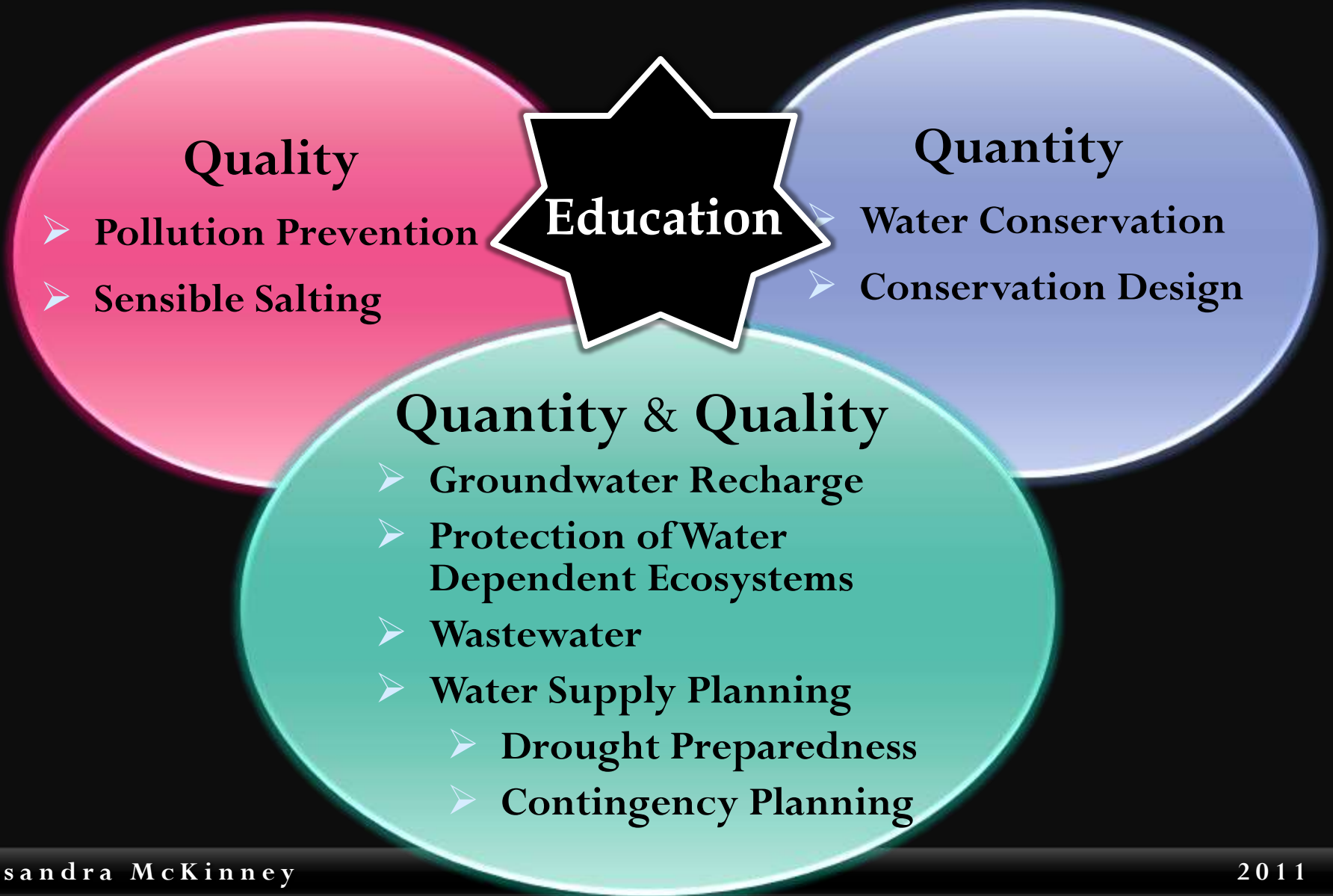
Integrated Water Resources 7 Step Planning Process

Integrated Water Resource Planning (Palmer and Lundberg 2003)

Water Resources Action Plan

- Manage supply and demand
- Plan for growth and drought
- Utilize water conservation programs
- Value the land and treat water in all its forms as a resource!
  - Stormwater, Groundwater, Surface Water, Wetlands… they are all part of the water cycle and natural water balance.
- Consider all your "development" options
  - Open space, agriculture, pervious pavement, raingardens, parks, conservation design developments, buffer strips, and more…
- Increase access to recycling centers
- **Educate, Educate, Educate!!!**

Water Resources Action Plan:

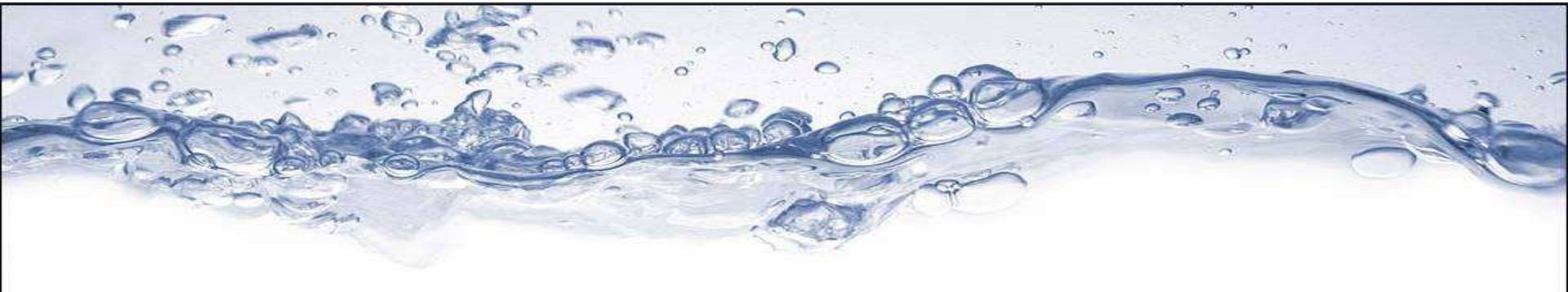


Steps to Implementation

1. Scientific Research
2. Symposiums, Workshops, and other Educational Offerings
    1. Municipal
    2. Public
        - Adult Education
        - Youth Education
    3. Private Business Owners
        - Agriculture, turf management, snow operators and more…
3. Municipal and County-Board Buy-in

Research and Development

Tools for Decision Making



Multiple "Coordinated" Projects and Multiple Sources of Funding

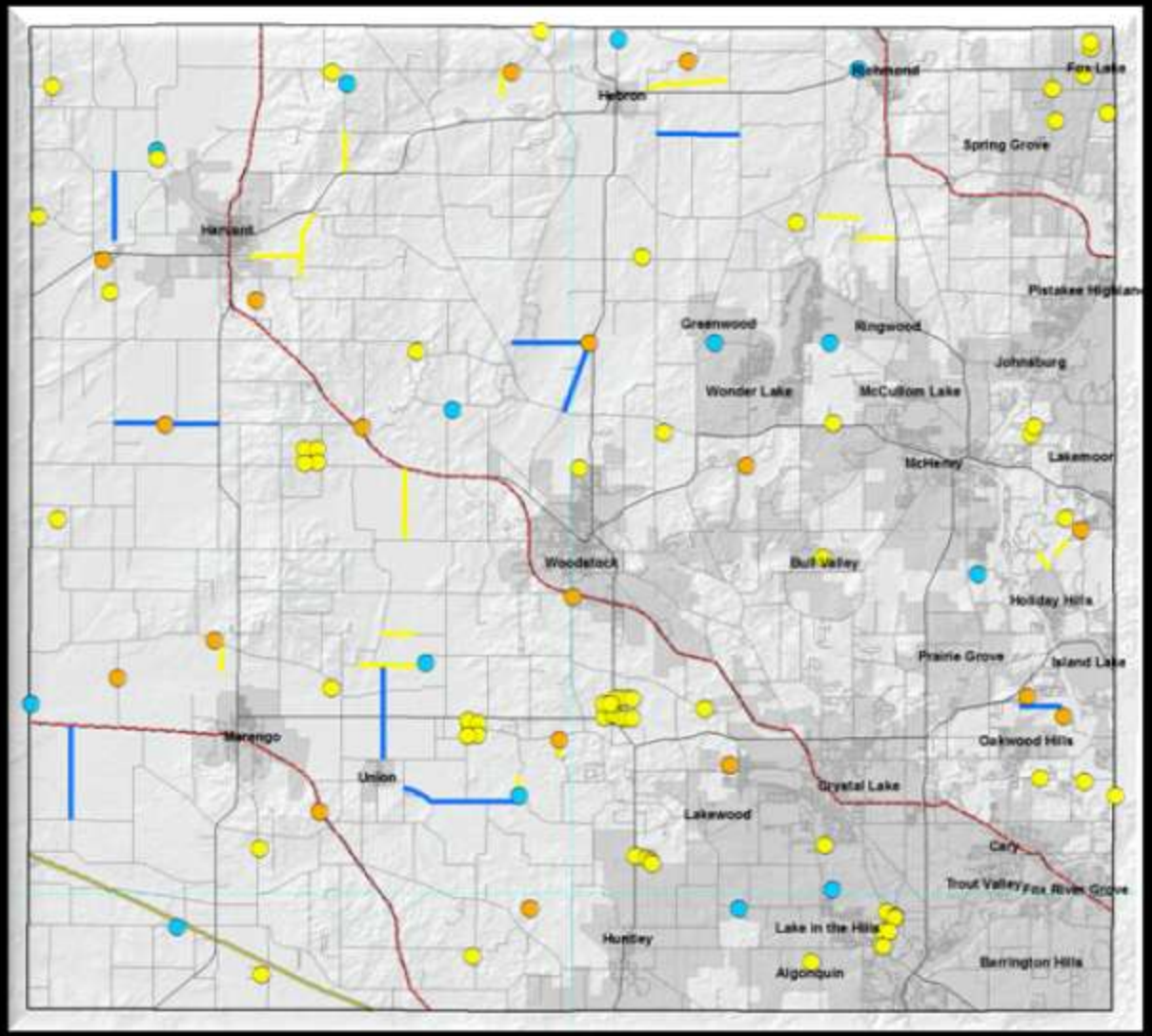
- **County Funded Projects**
  - 3 –D Geological Mapping - Illinois State Geological Survey
  - Groundwater Flow Modeling - Illinois State Water Survey

- **Joint Projects - Federal/County Cost Share**
  - Real-time Observation Wells and Stream Gauges - United States Geological Survey (USGS) and United States Army Corps of Engineers (USACE)

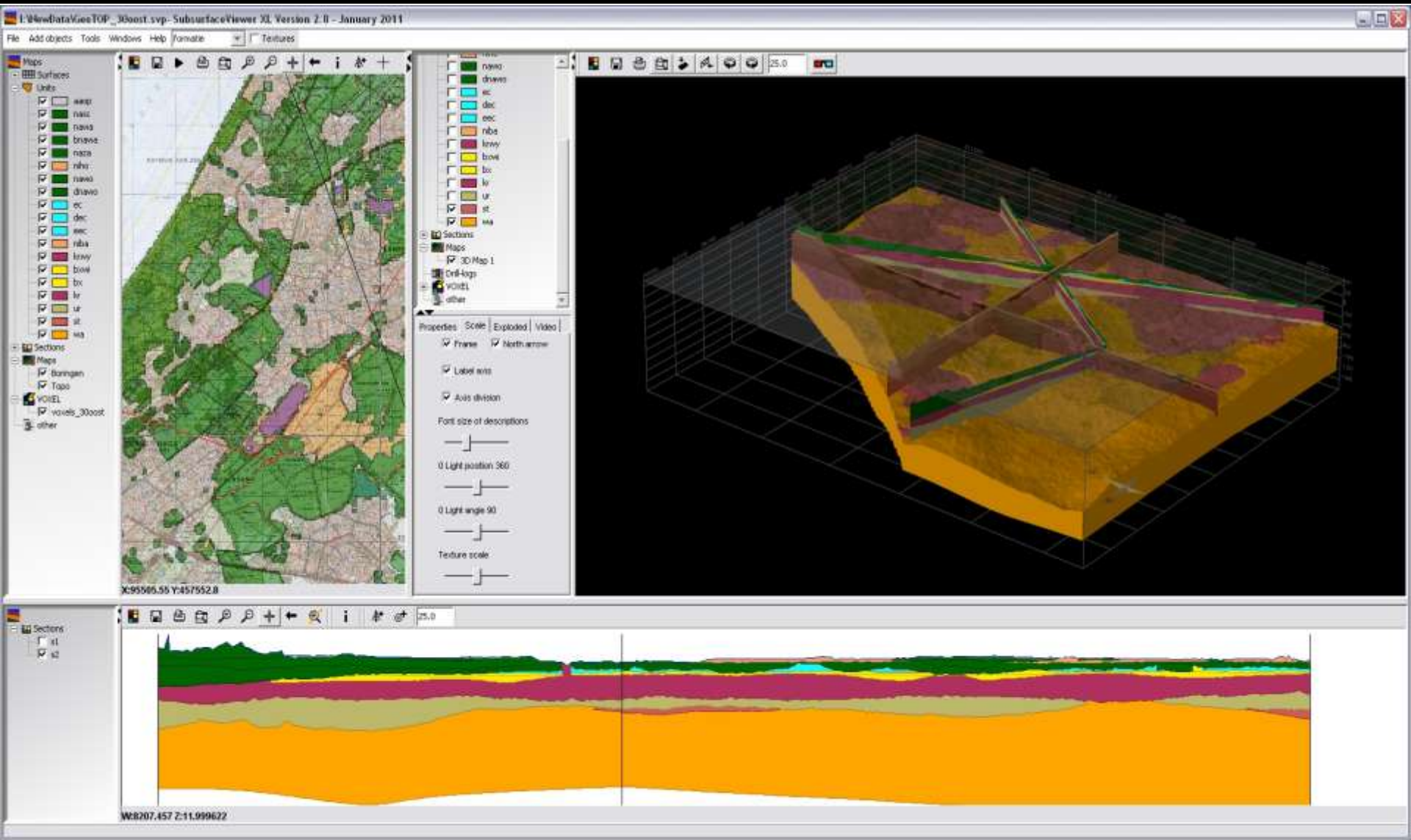
Illinois State Geological Survey
3D Hydrogeological Mapping

Geological Fieldwork

- ISGS Drilling (08-09)
- USACE (2008)
- Previous Drilling
- Geophysics



3-D Mapping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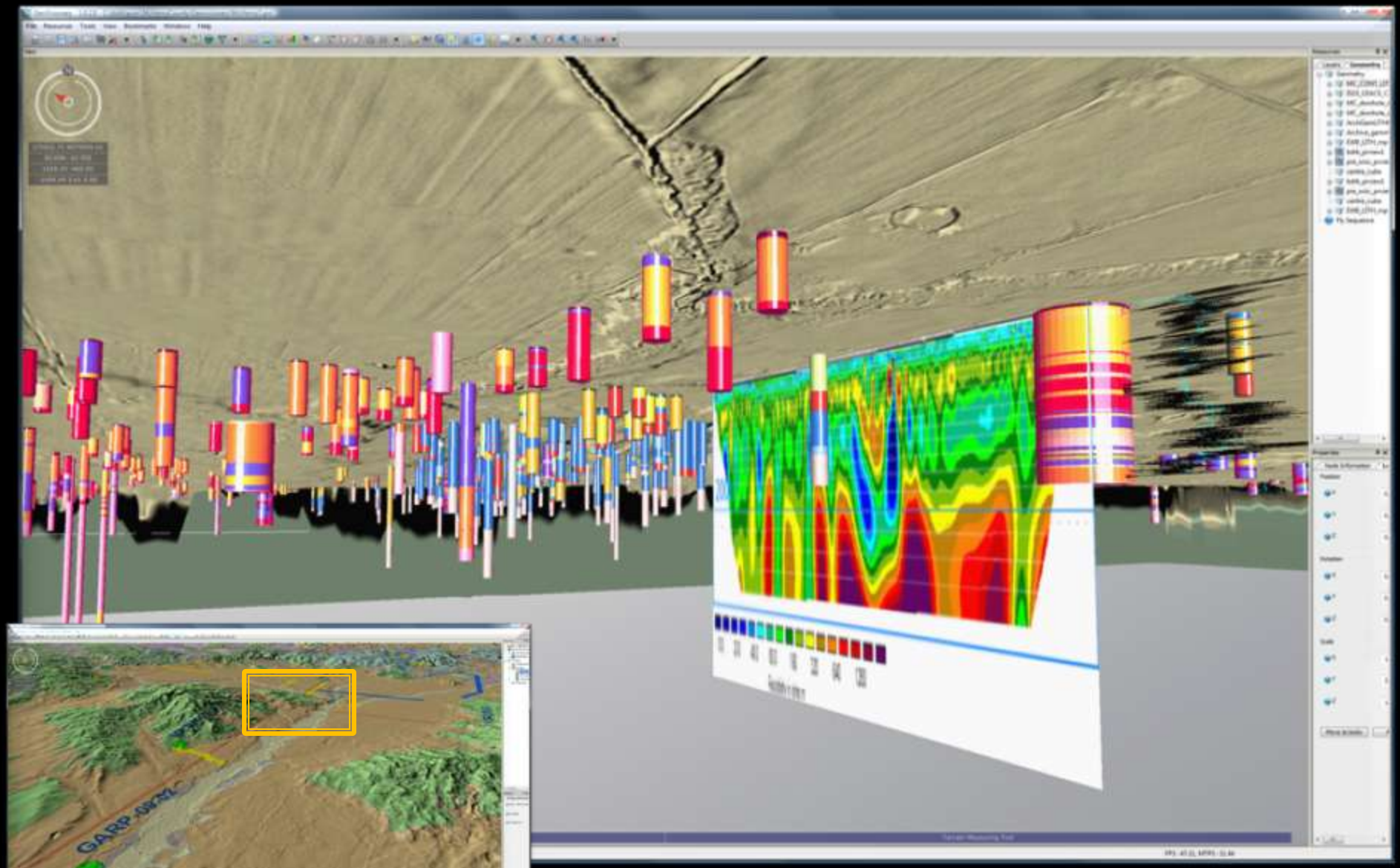
W:8207.457 Z:11.999622



Visualization

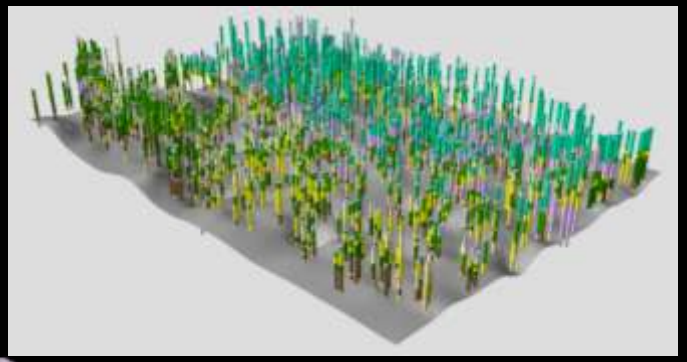
subsurface

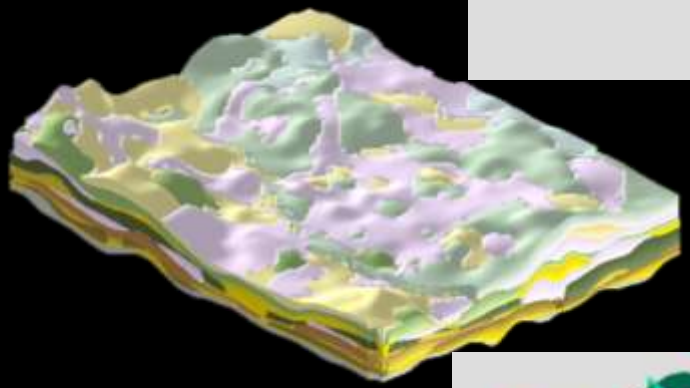
'Draft' Graphics Provided by the ISGS

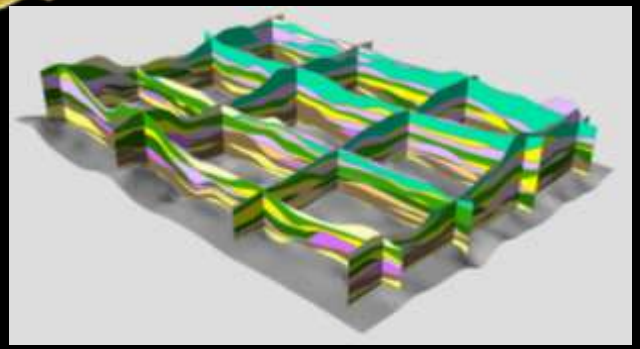
Example: Detailed 3D Hydrogeologic Mapping in Lake County, IL

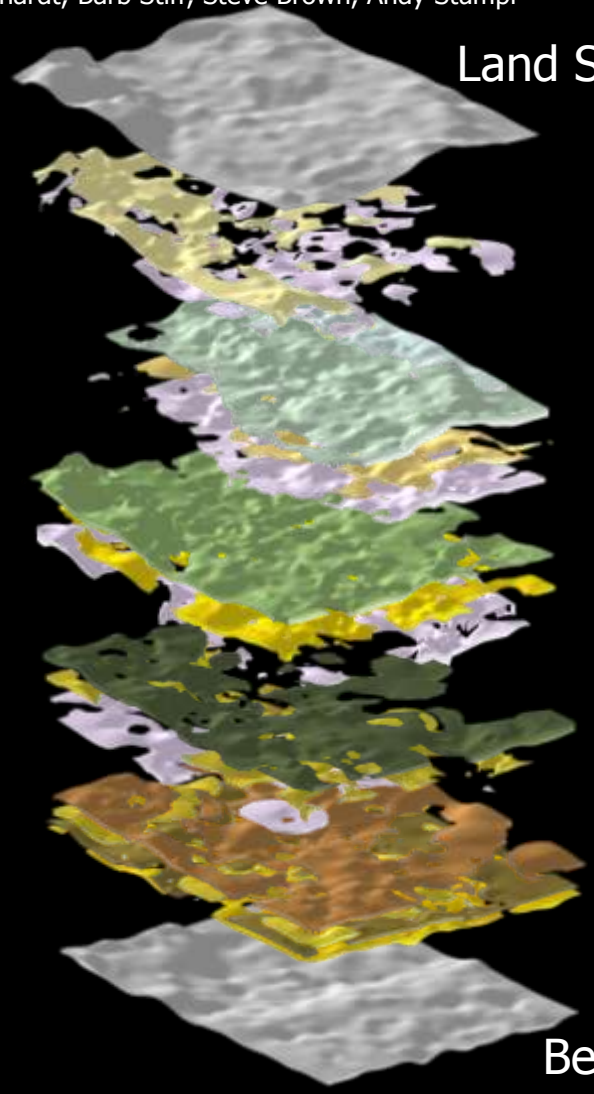
Central Great Lakes Geologic Mapping Coalition Project, ISGS

Jason Thomason, Ardith Hansel, Mike Barnhardt, Barb Stiff, Steve Brown, Andy Stumpf







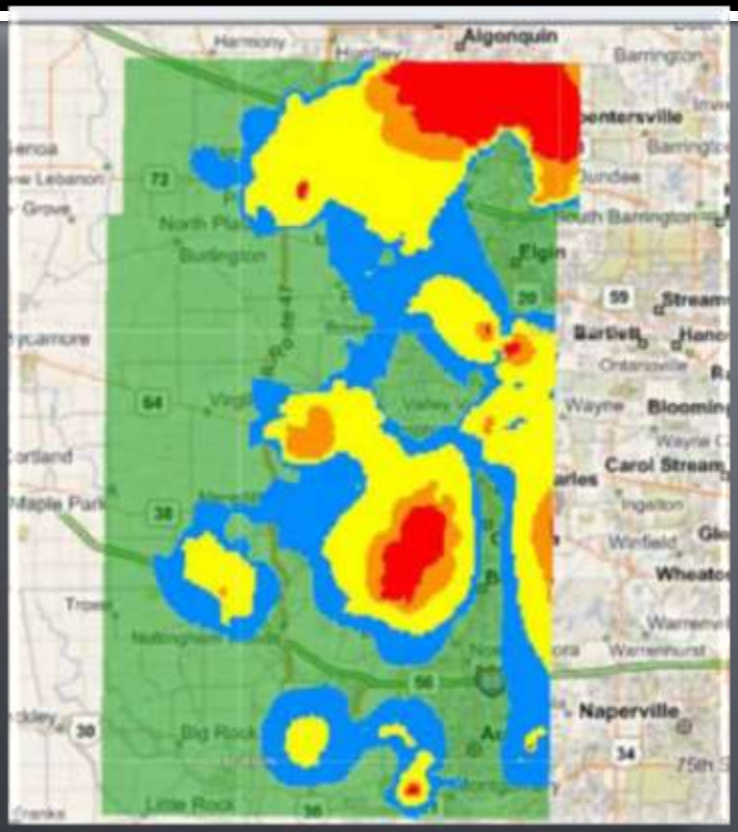


Note: yellows (sand and gravel; aquifers)
greens and purples (clay rich units; aquitards)

Sensitive Aquifer Recharge Areas Map

In Development: Groundwater Flow Model

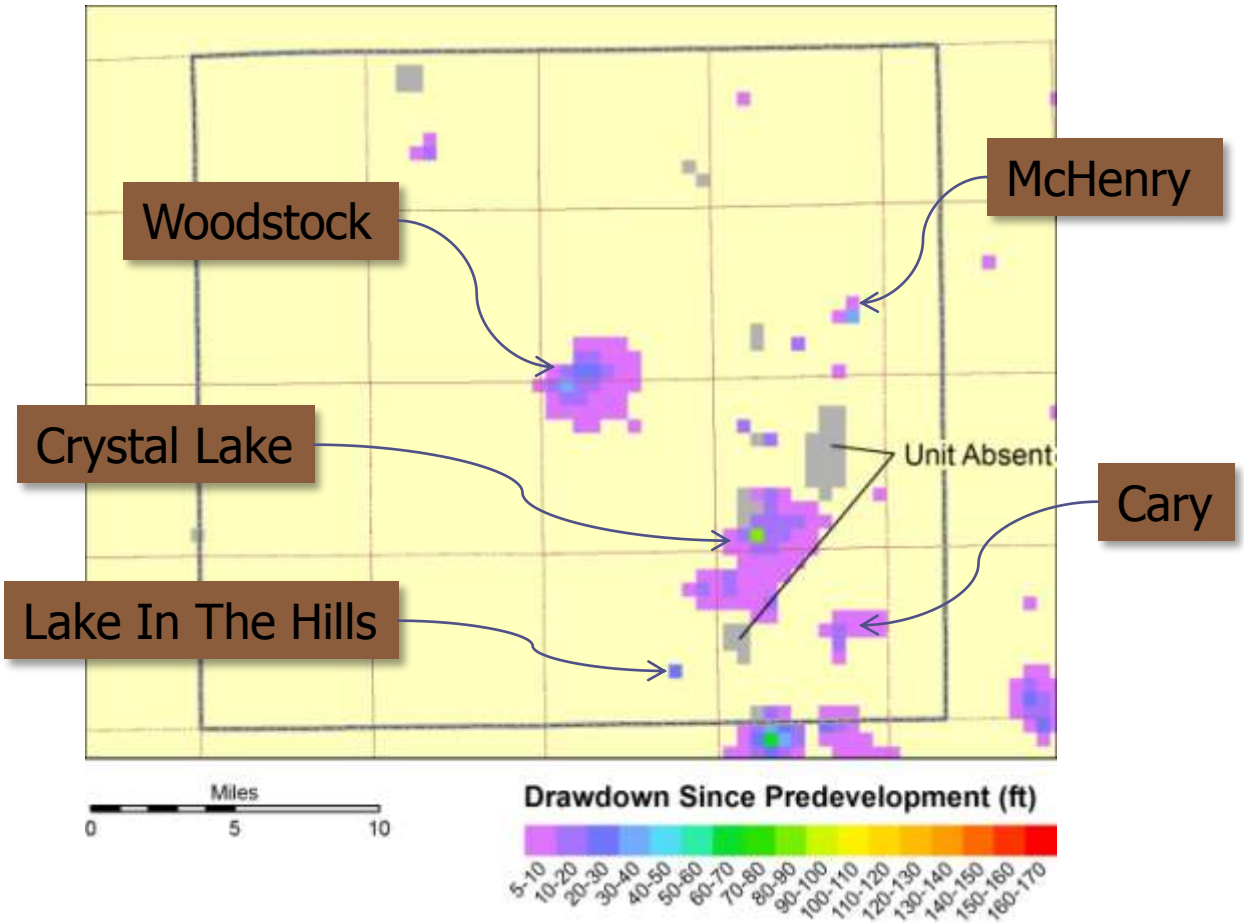
Illinois State Water Survey



Colored drawdown map for different degrees of drawdown

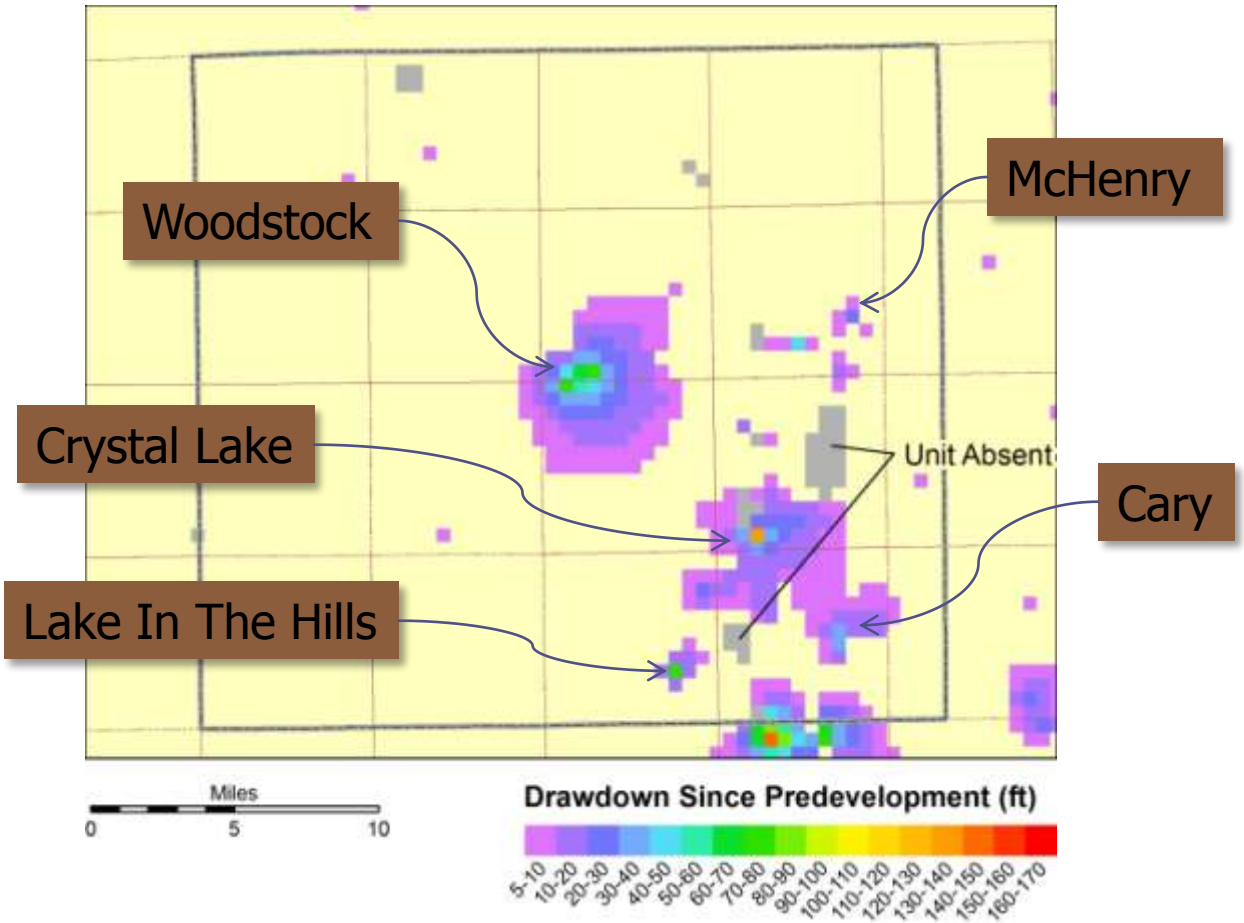
Drawdown (Predevelopment – 2005)

Basal Quaternary – CMAP model



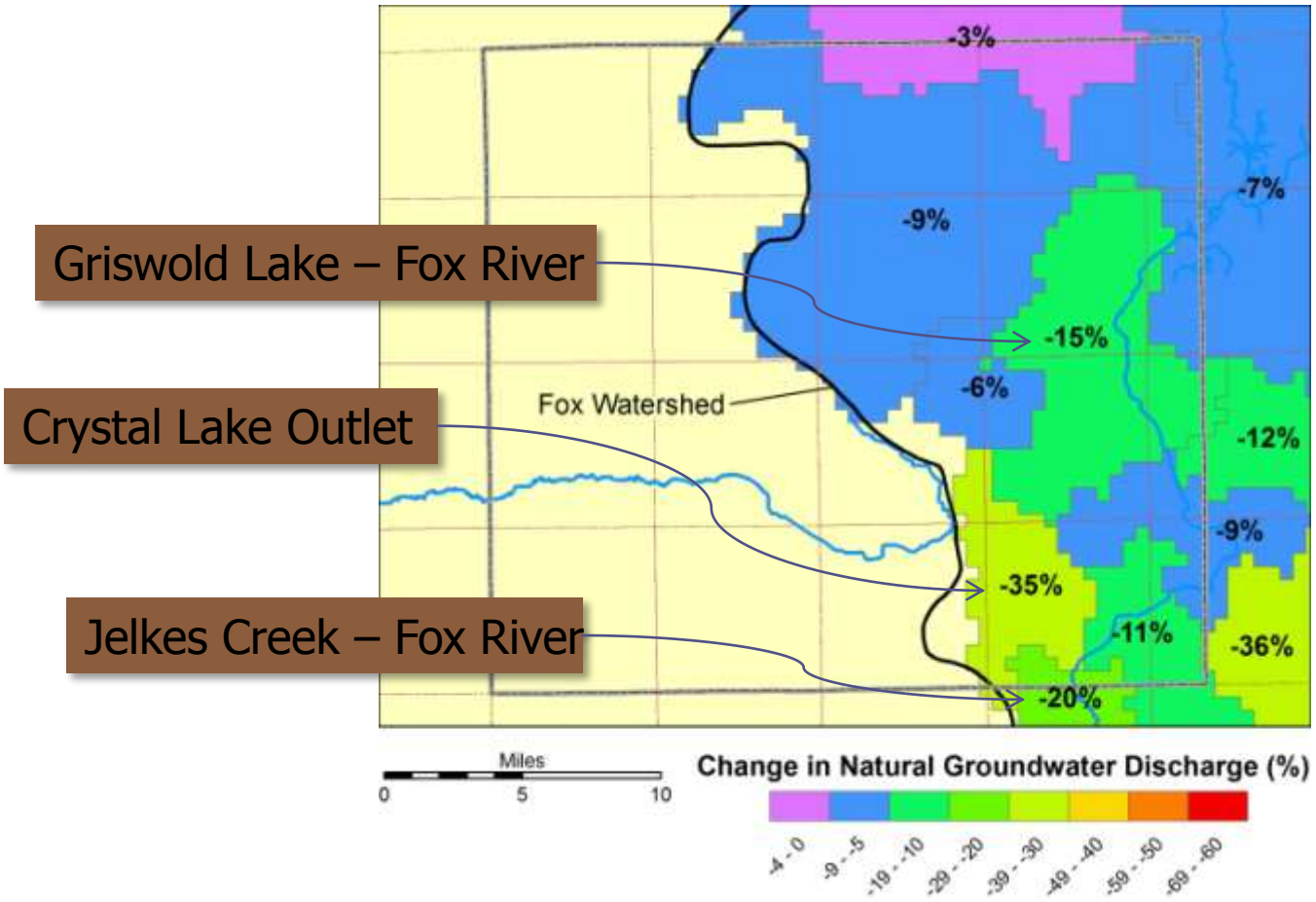
Drawdown (Predevelopment – 2050)

Basal Quaternary, Baseline Scenario – CMAP model



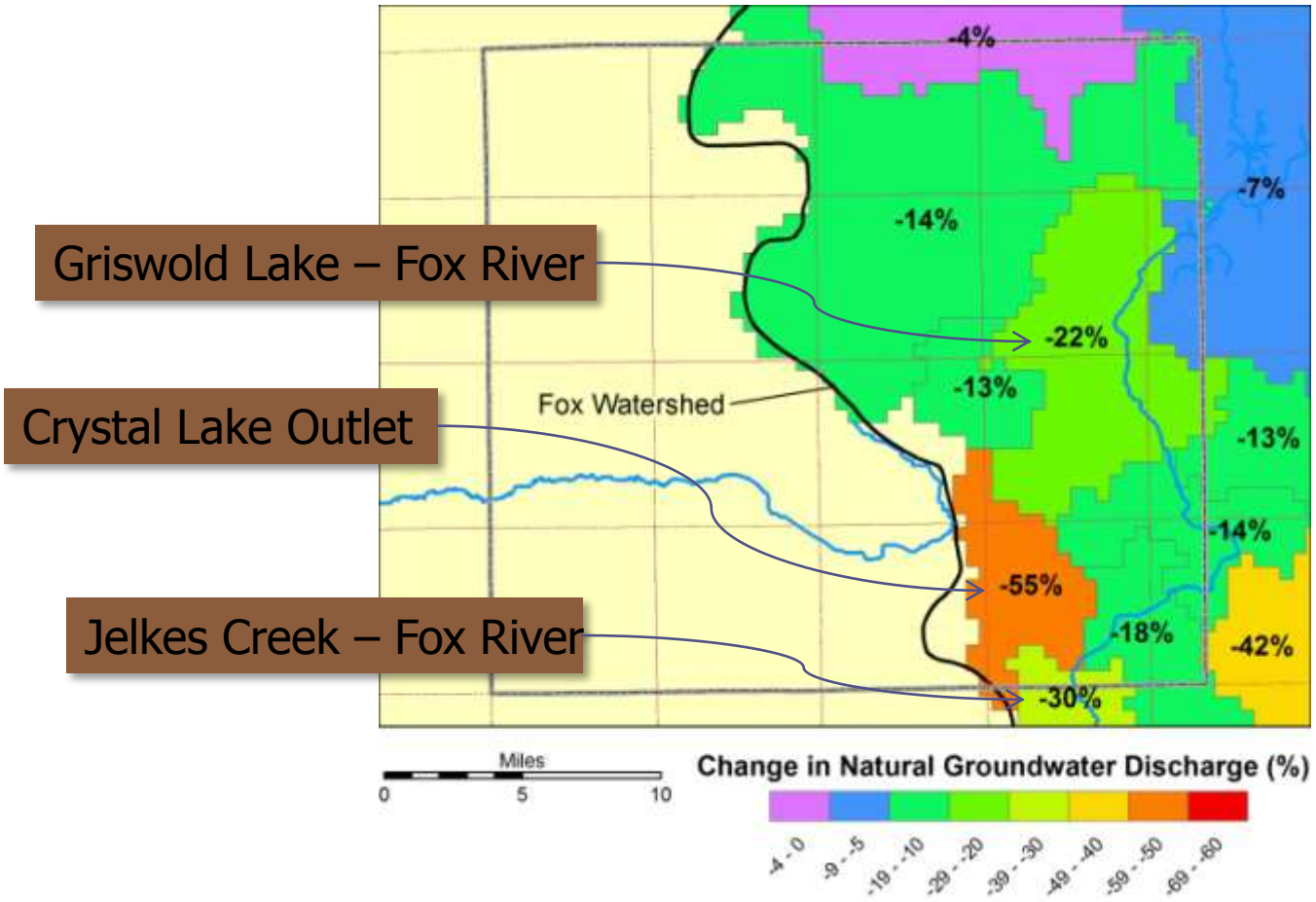
Change in Natural Groundwater Discharge (Predevelopment – 2005)

Baseline Scenario – CMAP model

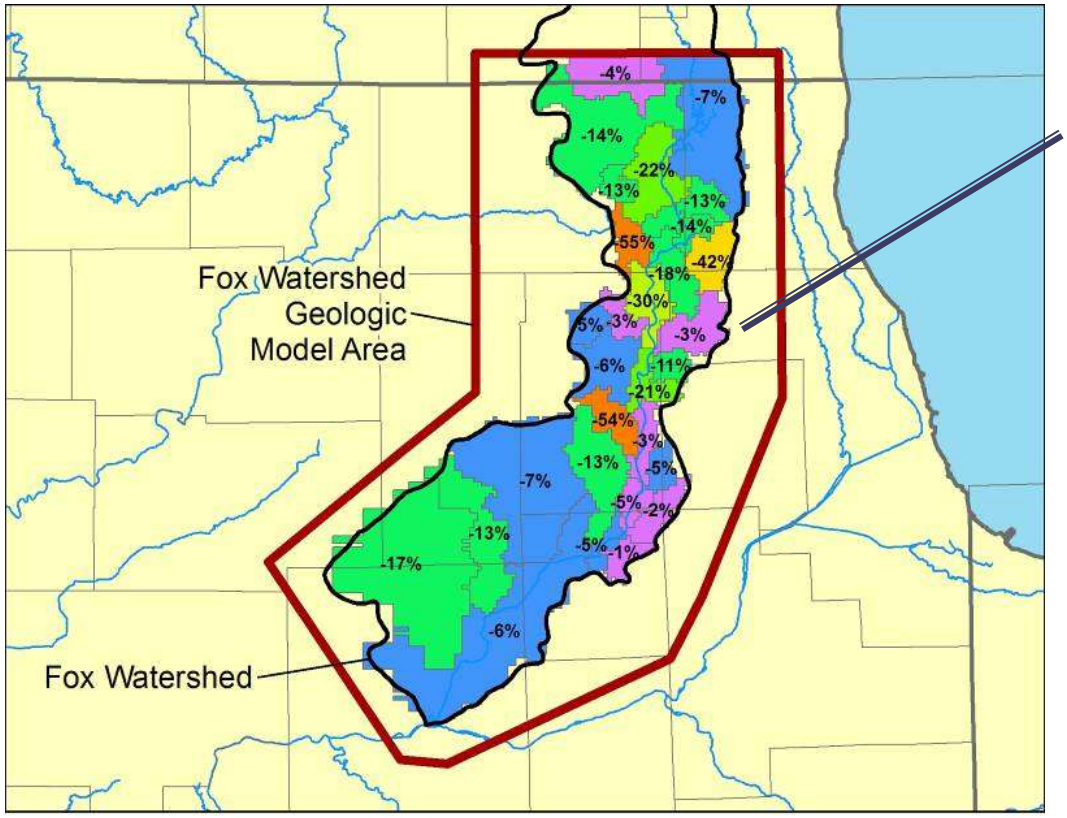


Change in Natural Groundwater Discharge (Predevelopment – 2050)

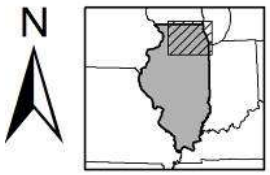
Baseline Scenario – CMAP model

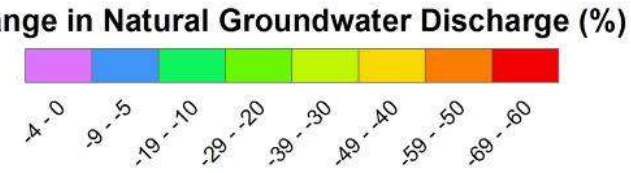


2050: Streamflow Capture



Due to Groundwater Drawdown





(ISWS, 2010)

Observation Wells & Stream Gauges

USGS - McHenry County - Windows Internet Explorer

http://il.water.usgs.gov/data/McHenry/index.php

USGS - McHenry County

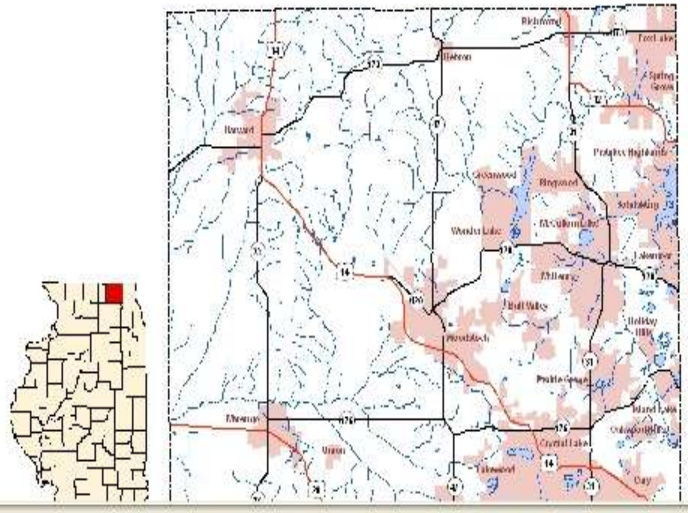
USGS science for a changing world

USGS Home
Contact USGS
Search USGS

McHenry County Data Home Page

Introduction | Ground Water | Surface Water | Rainfall | All | Water Quality | Geophysical | Publications

Welcome to the McHenry County website



McHenry County Hydrologic Information McHenry County, Illinois has current and long-term issues with water resources in providing drinking water, responsible handling of stormwater, and balancing these needs while preserving the rich and diverse ecological systems. In the effort to supply and present timely data to assist in determining the hydrologic conditions of the area, the U.S. Geological Survey (USGS) Illinois Water Science Center presents a near real-time data network of groundwater wells, streamgages and rain gages, in addition to other relevant information such as water-quality data for many of these sites.

The groundwater wells are all in glacial deposits and have well depths ranging from 20 to 345 feet. These wells have multiple owners, including those owned by the McHenry County, the Illinois State Geological Survey (ISGS) and the

Internet 100%

USGS - McHenry County - Windows Internet Explorer

http://il.water.usgs.gov/data/McHenry/gmaps.php

USGS - McHenry County

McHenry County Data Home Page

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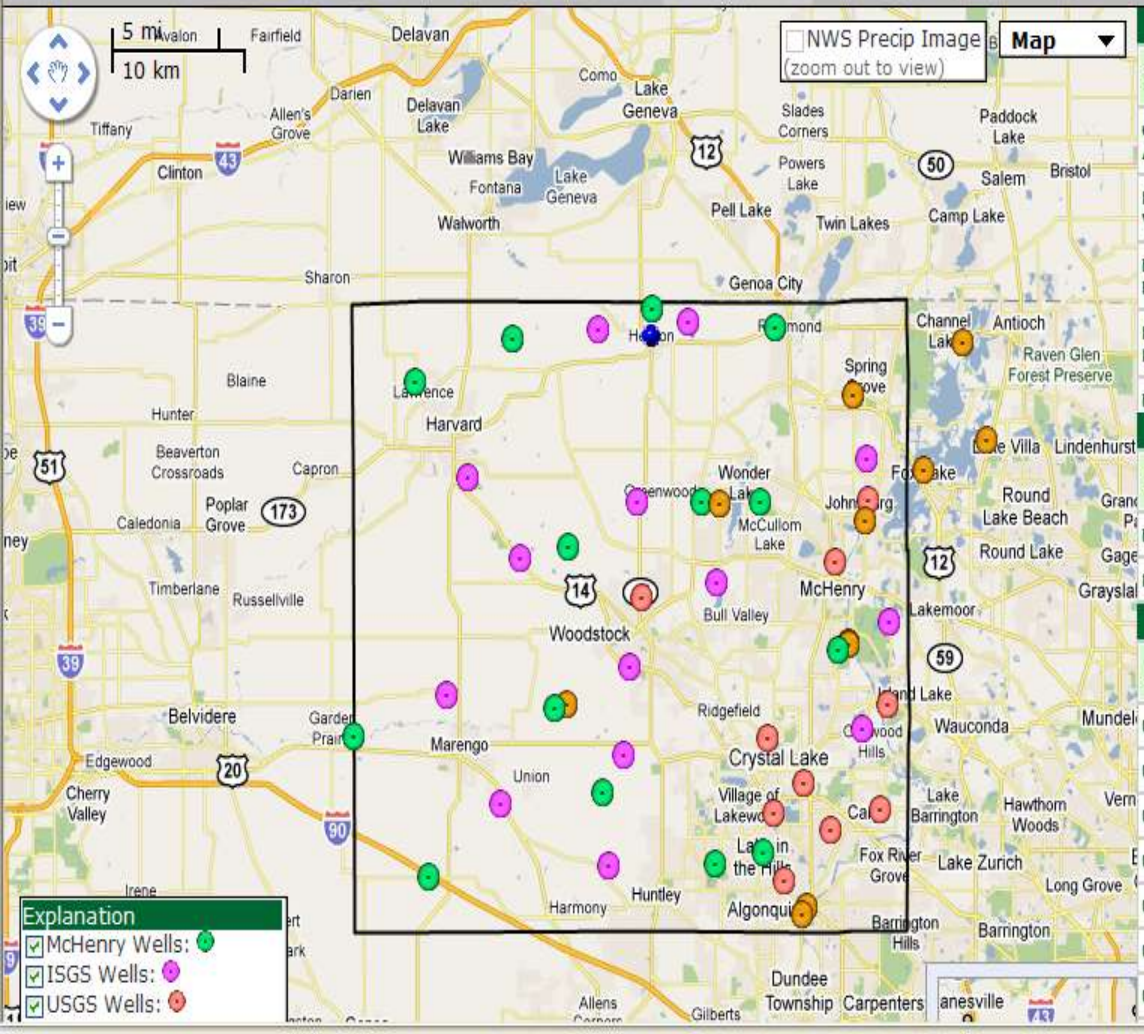


Streamflow Station Data

Station	Datum	Height	Discharge	Date
Channel Lake near Antioch, IL	733.00 feet above NGVD29.	2.96 ft	No data available	2011-01-11 12:00
Fox Lake near Lake Villa, IL	733.00 feet above NGVD29.	2.74 ft	No data available	2011-01-11 12:00
Nippersink Lake at Fox Lake, IL	733.00 feet above NGVD29.	2.54 ft	No data available	2011-01-11 12:15
Franklinville Creek at Franklinville, IL	829.83 feet above NGVD29.	6.40 ft	No data available	2011-01-11 12:15
Nippersink Creek	798.00 feet	5.01 ft	No data	2011-01-11

Rain Gage Data

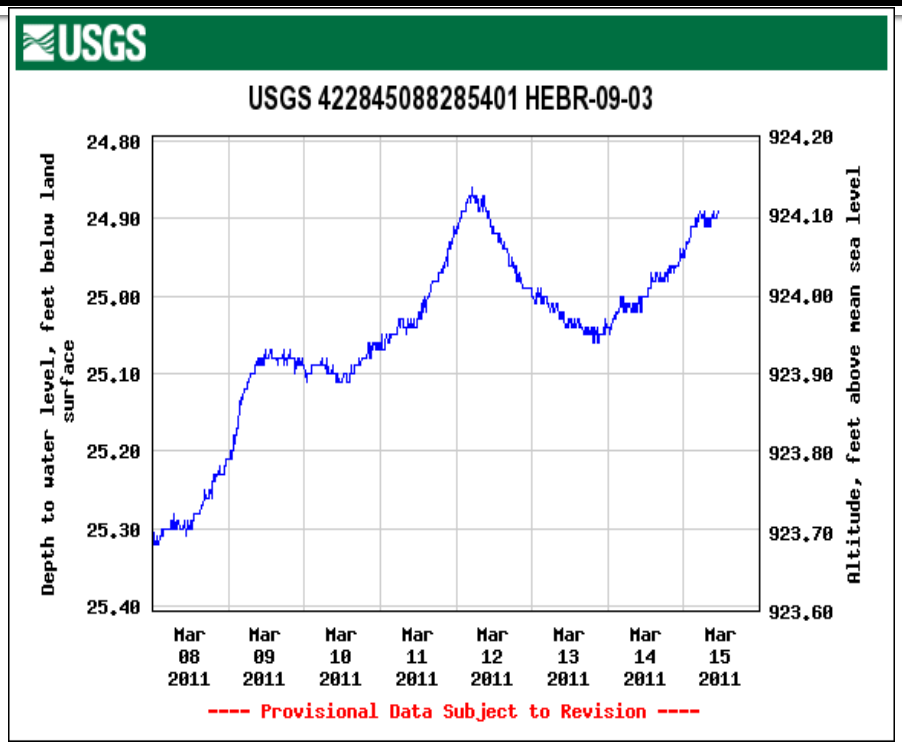
Gages	6 Hr	24 Hr
NIPPERSINK CREEK NEAR SPRING GROVE, IL	0	0
RAIN GAGE AT HEBRON, IL	0.02	0.02

Well Data

Agency ID	Owner	UGSG ID	Depth
URBLUS 02	USGS	422002088263001	Unavailable
URBLUS 10	USGS	421527088193401	Unavailable
URBLUS 11	USGS	421301088191501	Unavailable
URBLUS 14	USGS	421402088173501	Unavailable
URBLUS 13	USGS	421052088184101	Unavailable
URBLUS 20	USGS	422314088140001	Unavailable
URBLUS 21	USGS	422111088154901	Unavailable

Done | Internet | 100%

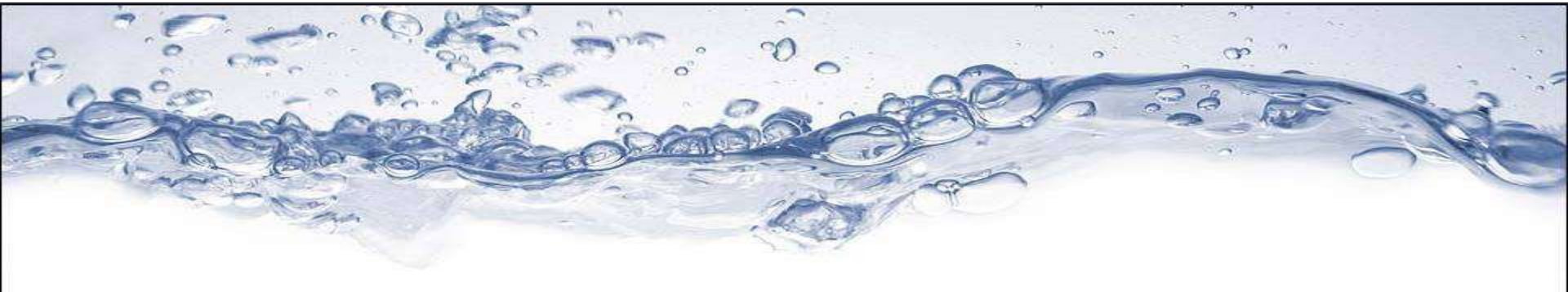
Example of a Hydrograph from Hebron Township



DESCRIPTION:

Latitude 42°28'44.84", Longitude 88°28'53.85" NAD83
McHenry County, Illinois, Hydrologic Unit 07120006
Well depth: 120.6 feet
Hole depth: 234 feet
Land surface altitude: 949 feet above sea level NAVD88.
Well completed in "Sand and gravel aquifers (glaciated regions)" (N100GLCIAL) national aquifer.
Well completed in "Quaternary System" (110QRNR) local aquifer

Symposiums, Workshops
&
Other Educational Offerings



Winter Snow and Ice Operations – Training and Certification

- Public and Private Sector
  - Environmental Impacts
  - Storage
  - Handling
  - Application Rates
  - Material Options
  - Anti-icing
  - De-icing

Medication Disposal Program

- **In partnership with:**
  - Local Law Enforcement
  - Illinois Environmental Protection Agency
- **Open to all county "residents" –**
  - Not open to physicians, nursing homes, or pharmacies
- **Free anonymous disposal of:**
  - Most controlled and uncontrolled pharmaceuticals
  - Most over the counter remedies

Additional Programs

- Partners in Paint Recycling
- Household Hazardous Waste Disposal
- McHenry County Schools Environmental Education Program
  - ✓ 2nd & 8th Grade – Water Lessons instructed by professional staff
  - ✓ K-12 lessons available on www.mchenryh2o.com
- In Development:
  - Turf Management Workshop

Building and Strengthening Relationships

Shared Vision = Common Goals

Communicating your Science

- Is not just about communicating what services you offer, it is first about **understanding** what the local ***needs or concerns*** are and second about **communicating** your science in ***terms the "average" person*** understands.

Communication Your Science!

- Know your audience.
  - What's their background?
  - Are they an elected official?
  - A planner?
  - What are their local concerns/needs?

Communicating your Science

- Give a basic understanding of:
  - What the tools can do,
  - The level of knowledge needed to use them,
  - How long they take to develop
  - What others have done and benefits they've realized
- Ask questions that will prompt a response … planners aren't scientists, they don't know what to ask…

Closing Thoughts:

- ✓ Sound science is vital for resource protection
- ✓ Communication is Key!
- ✓ ***Be a part of the solution, every drop counts!***

QUESTIONS?

"We abuse land because we regard it as a commodity belonging to us. When we see land as a community to which we belong, we may begin to use it with love and respect."

Aldo Leopold, A Sand County Almanac

Cassandra McKinney

Water Resources Manager - Division of Water Resources

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