



Illinois State Geological Survey

*Geologic Mapping in Northeastern Illinois
&
What do we know about
Lake County's Geology?*

Donald A. Keefer, Director
Geologic Mapping and Hydrogeology Center

Societal Benefits of Mapping

- Water Supply Delineation, Protection and Management
- Aggregate Resource Delineation, Protection and Management
- Construction Engineering Guidance
- Mineral Resource Delineation, Planning and Management
- Development of Energy Infrastructure
- Habitat and Wildlife Protection

Mapping has an excellent cost to benefit ratio

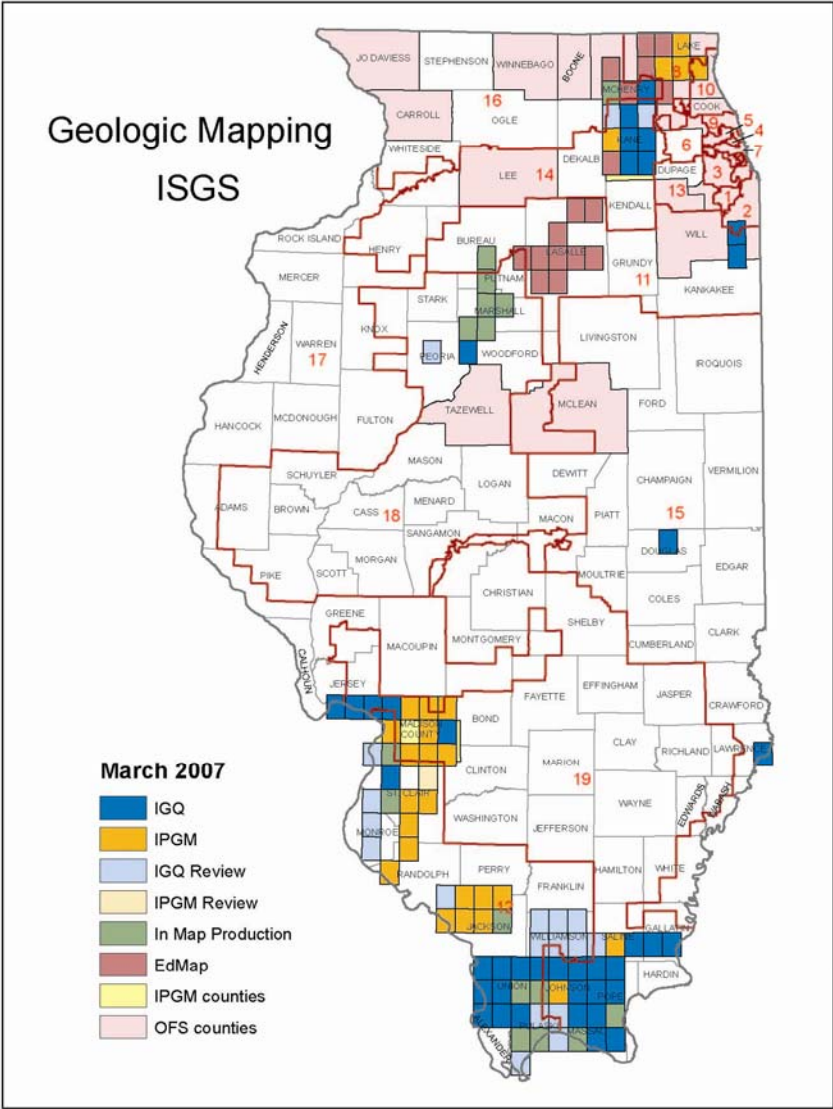
ISGS Geologic Mapping in Northeastern Illinois

- Central Great Lakes Geologic Mapping Coalition (a.k.a. “The Coalition”): high resolution 3-D mapping throughout Lake County; Federal and State funding
- STATEMAP Program: Lake, Cook, Kane, McHenry Counties; high resolution mapping of surficial materials; Federal and State funding
- Northeastern Illinois Water Supply Planning Region: regional geologic mapping for Fox River Basin sand and gravel aquifers and surficial bedrock aquifer, regional characterization of deep bedrock aquifer and confining unit; State funding
- Kane County: high to medium resolution 3-D mapping; County and State funding
- Kendall County: medium resolution 3-D mapping; County and State funding

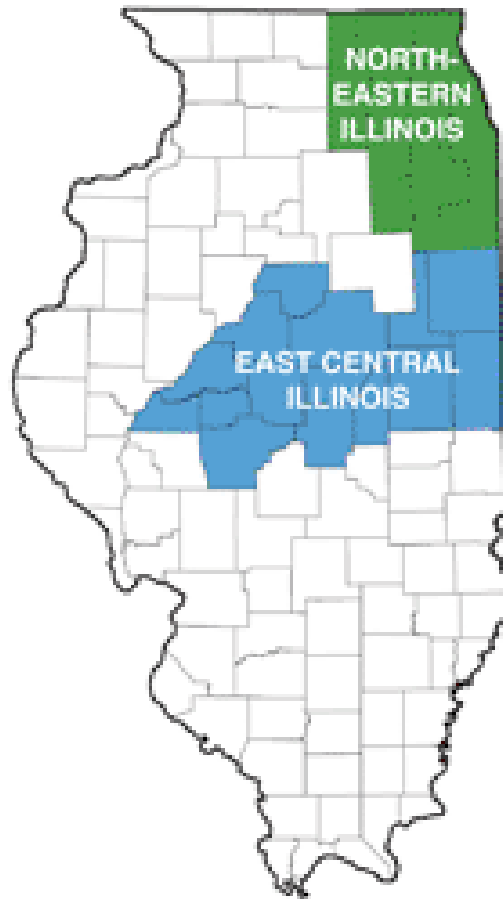
Costs Vary with Geology

- Costs are dependent on geologic complexity
- Northeastern Illinois collar counties demonstrate range of issues
- Subsurface complexity often difficult to estimate without new data

Geologic Mapping ISGS



Water Supply Planning Regions



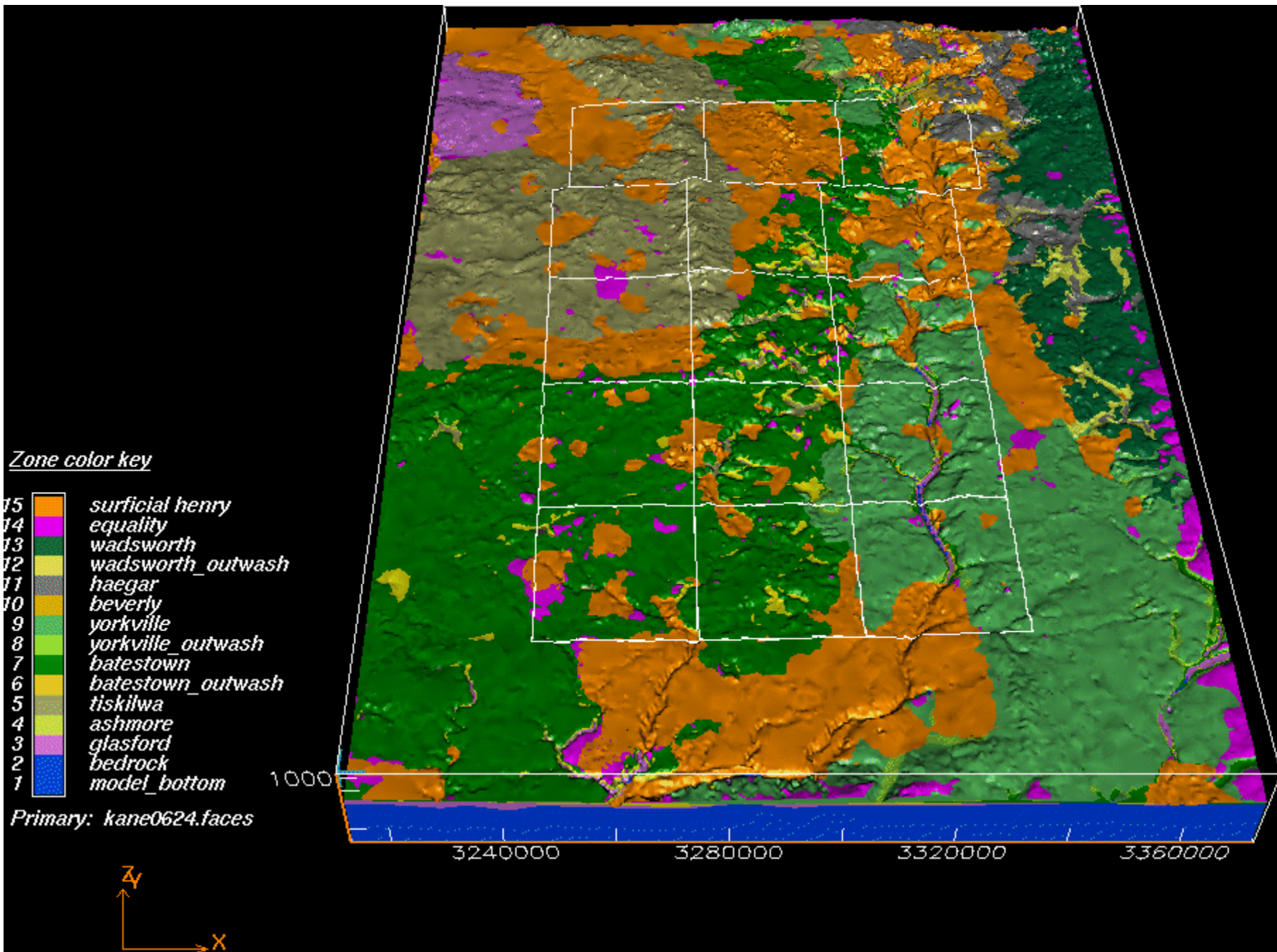
Water Supply Planning and Management

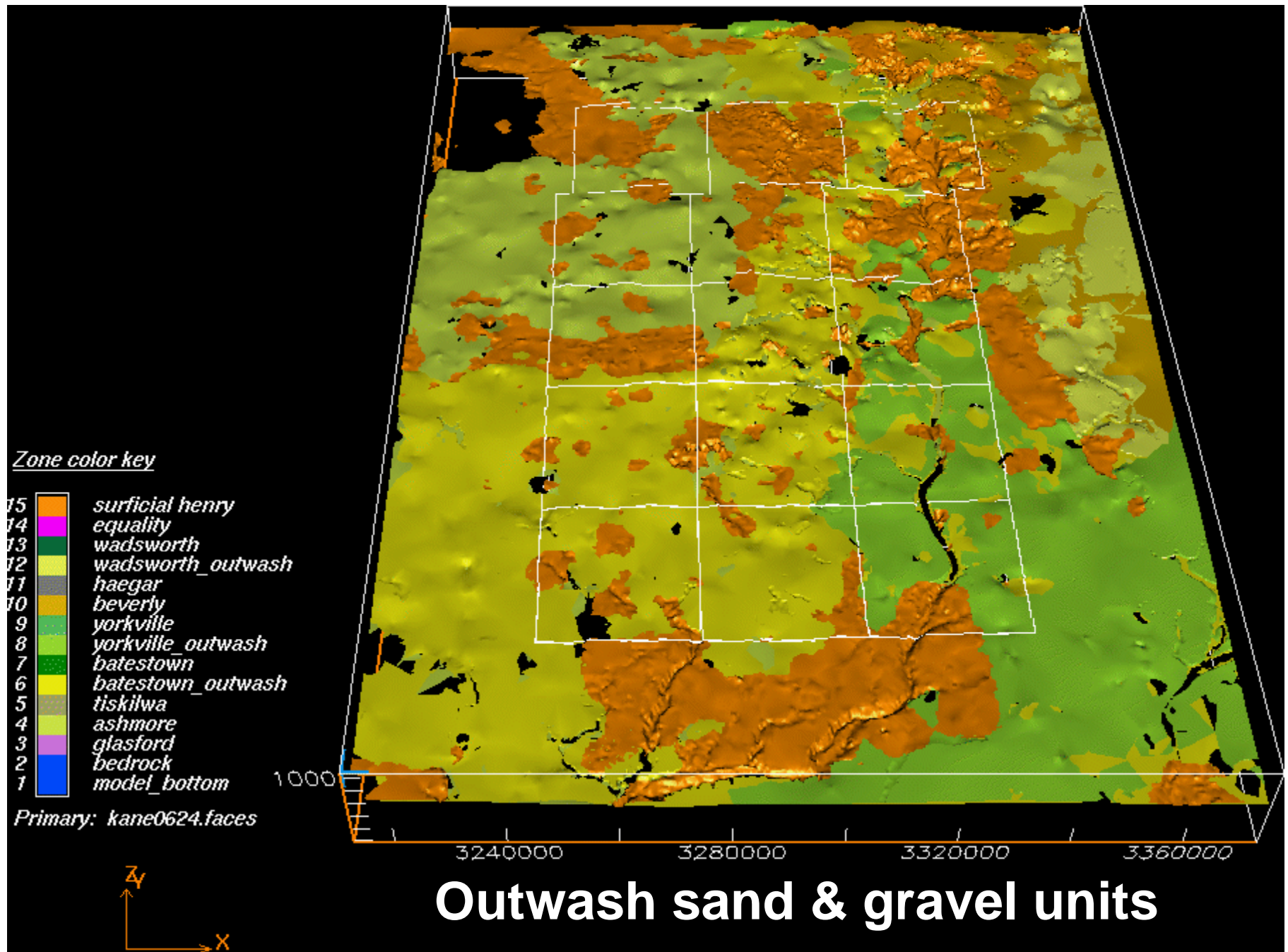
State Geological Survey role:

- Mapping and characterizing
 - Deep Bedrock Aquifer
 - Confining units of Deep Bedrock Aquifer
 - Glacial aquifers and surficial bedrock aquifer, particularly within Fox River Basin
 - Glacial aquifers within and above Mahomet bedrock valley (Mahomet aquifer system)
- Create and improve 3-D geologic maps and work with SWS colleagues to help integrate these into groundwater flow models

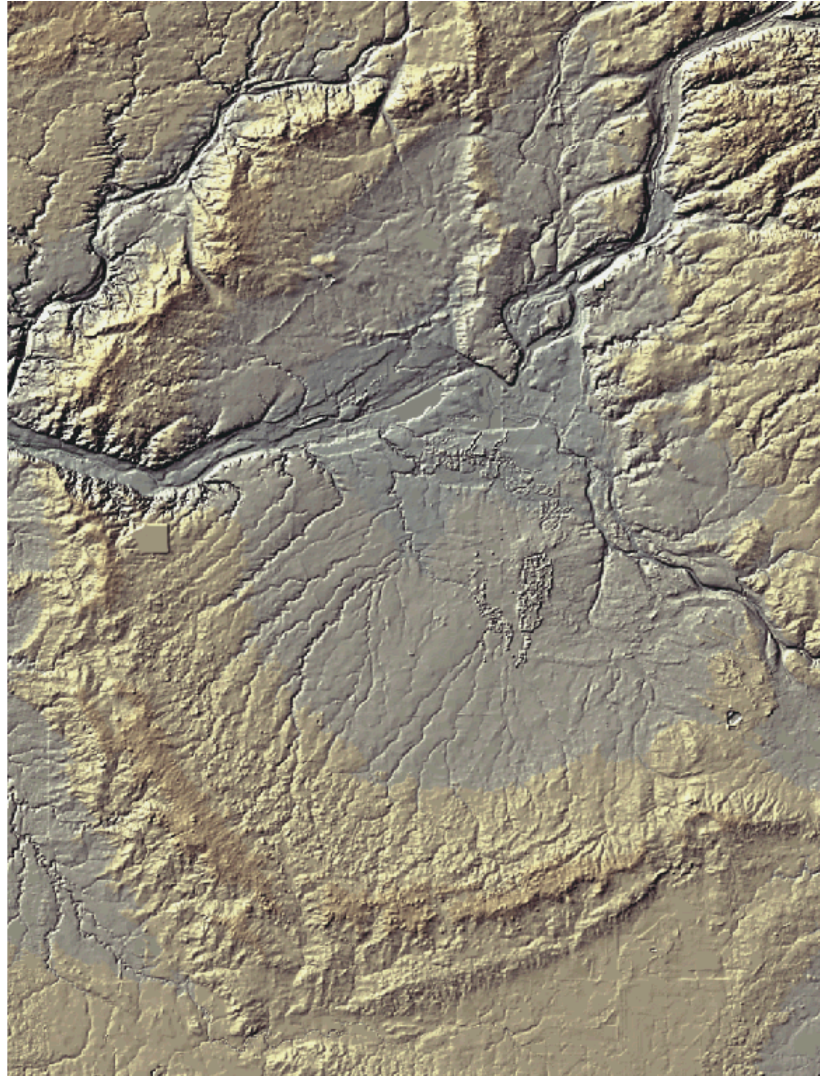
Water Supply Planning and Management

- Exploring new methods for bedrock aquifer characterization
- Characterizing confining units
- Evolving 3-D geologic mapping approach to integrate existing maps of glacial deposits for large Fox River Watershed

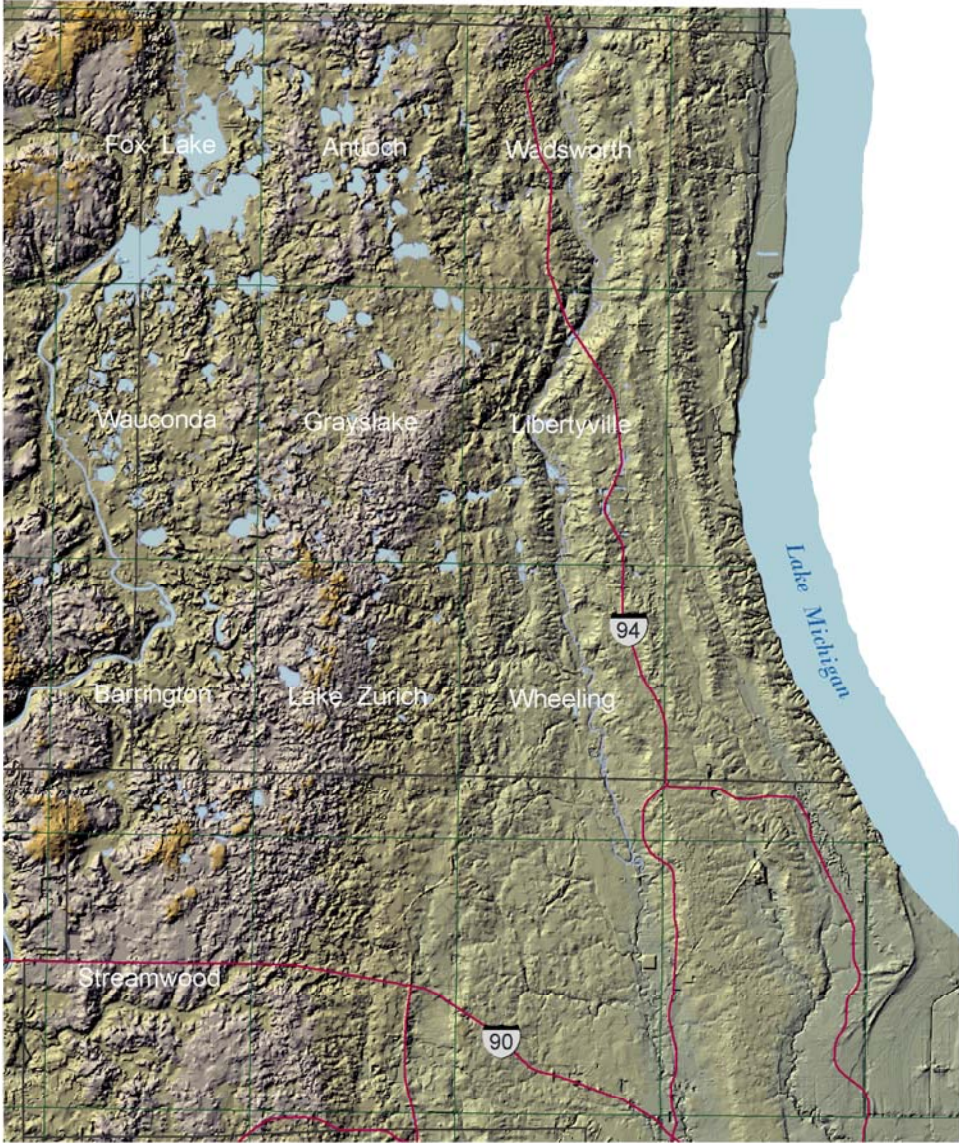


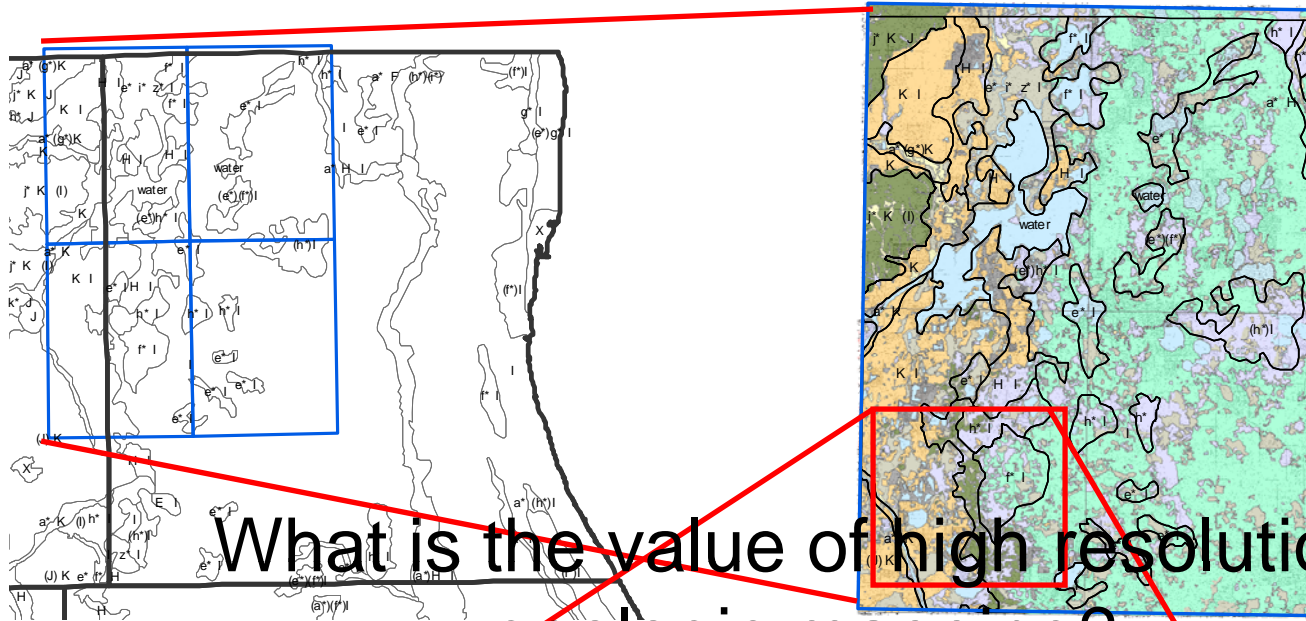


Geologic Mapping In Kendall County

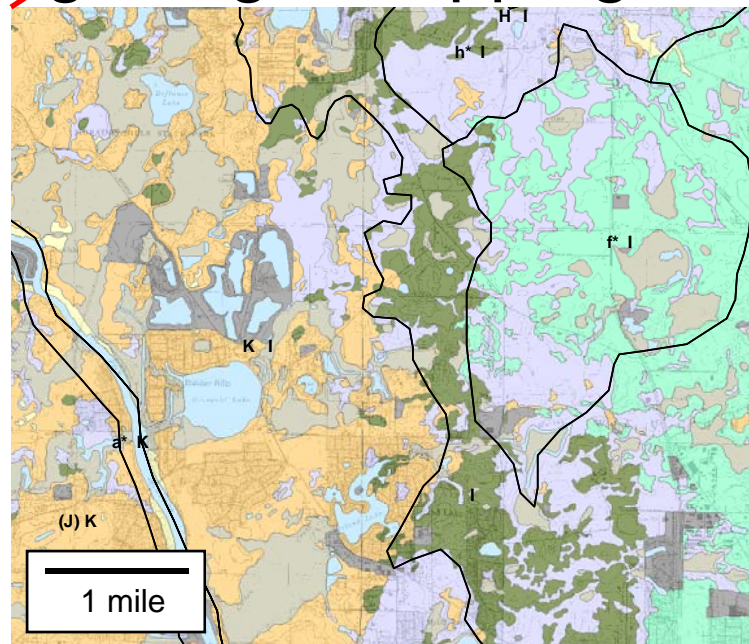


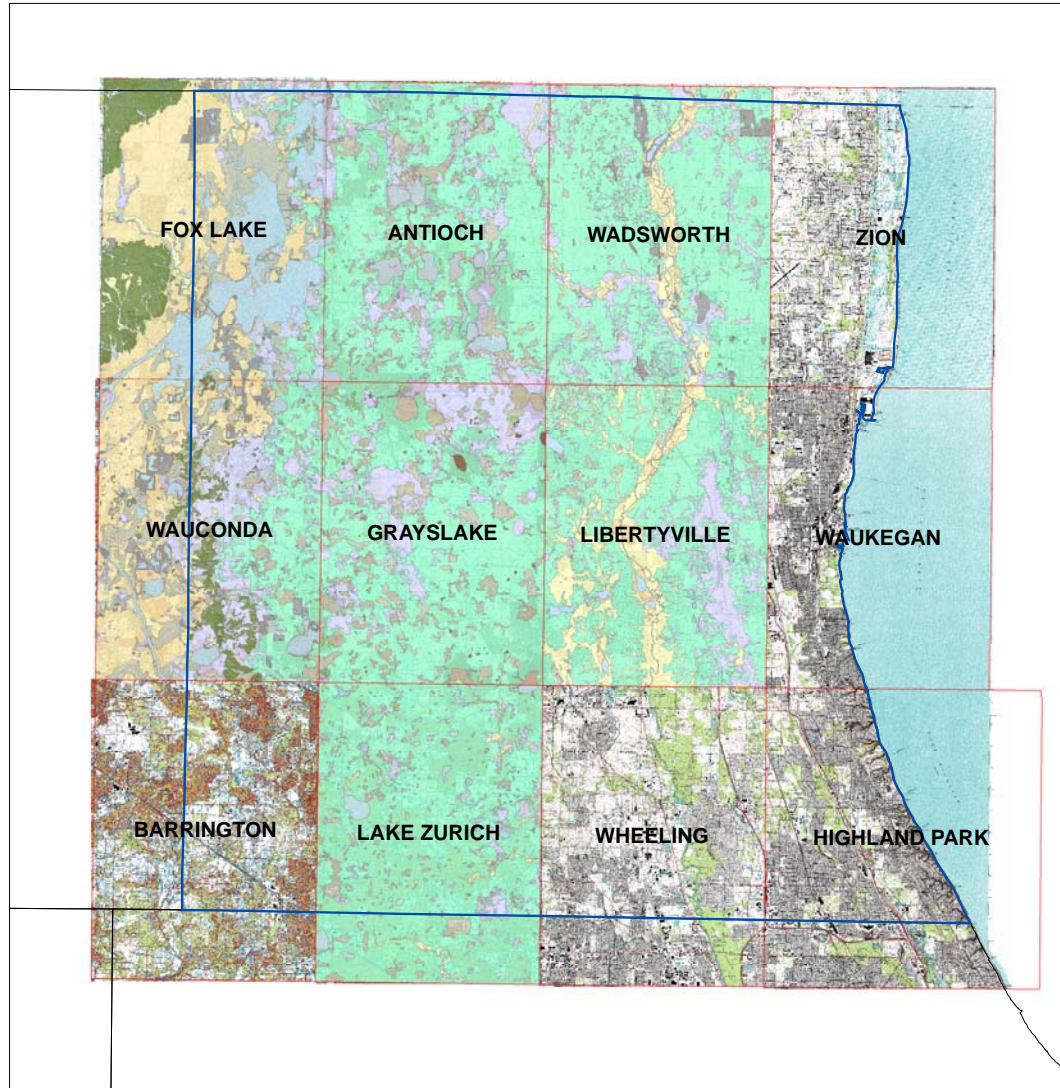
Geology of Lake County













What is the value of high resolution geologic mapping?



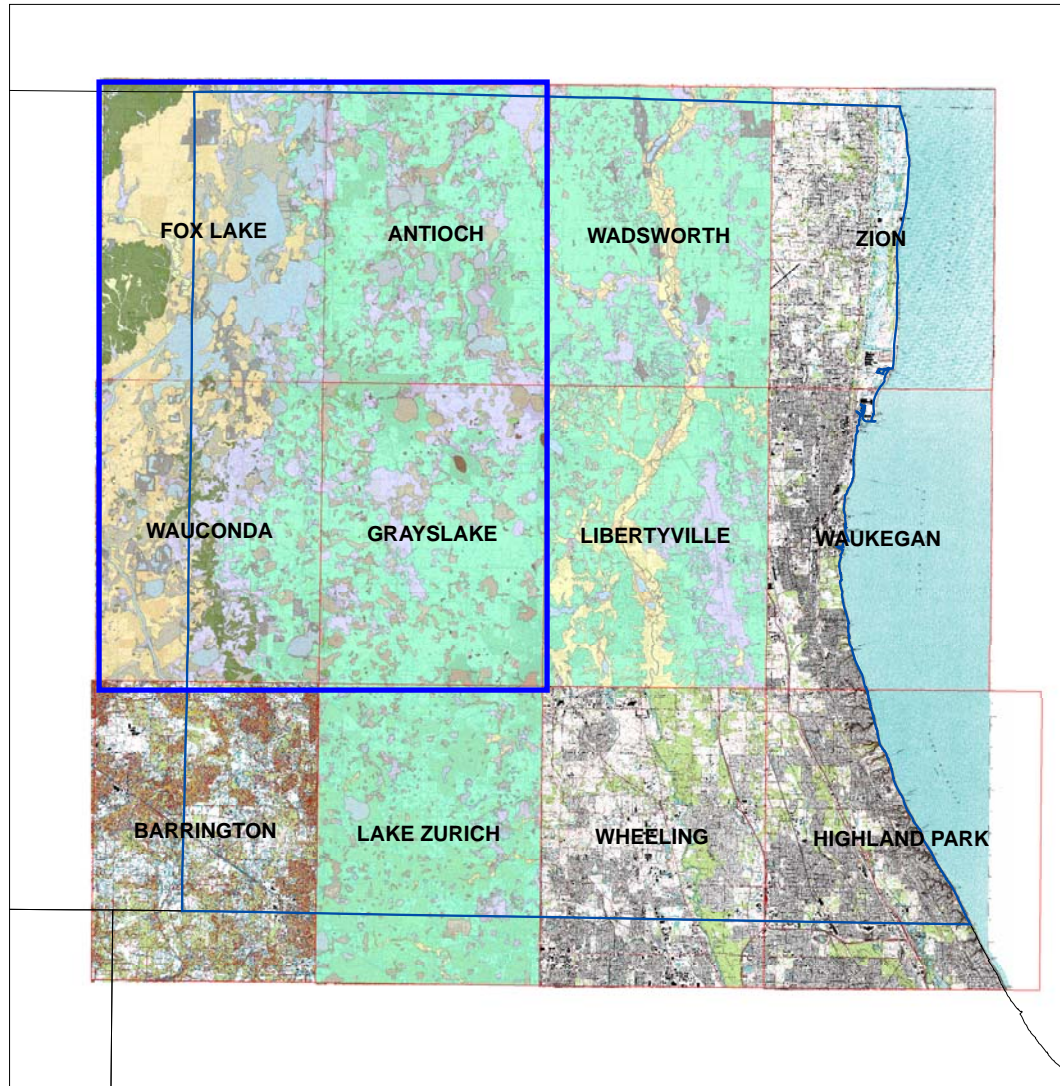


Legend

Lithostratigraphic units

-  Cahokia Formation (alluvium)
-  Disturbed Ground
-  Equality Formation (lake sediment)
-  Grayslake Peat (organic)
-  Henry Formation (outwash)
-  Wadsworth Member (diamicton)
-  Haeger Member (diamicton)
-  Water



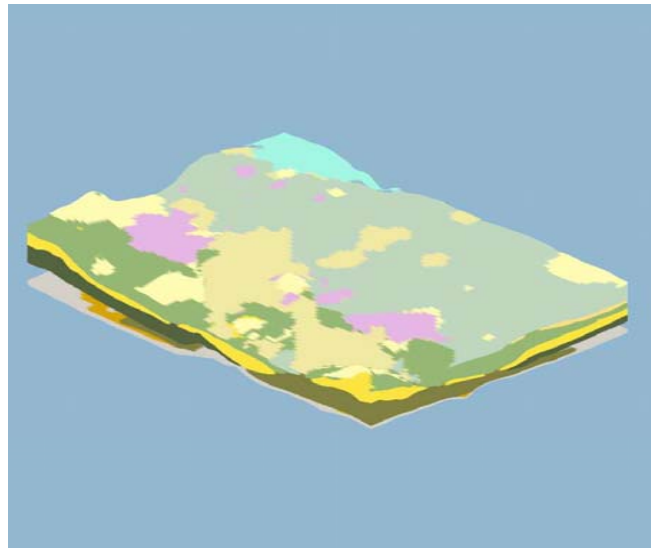
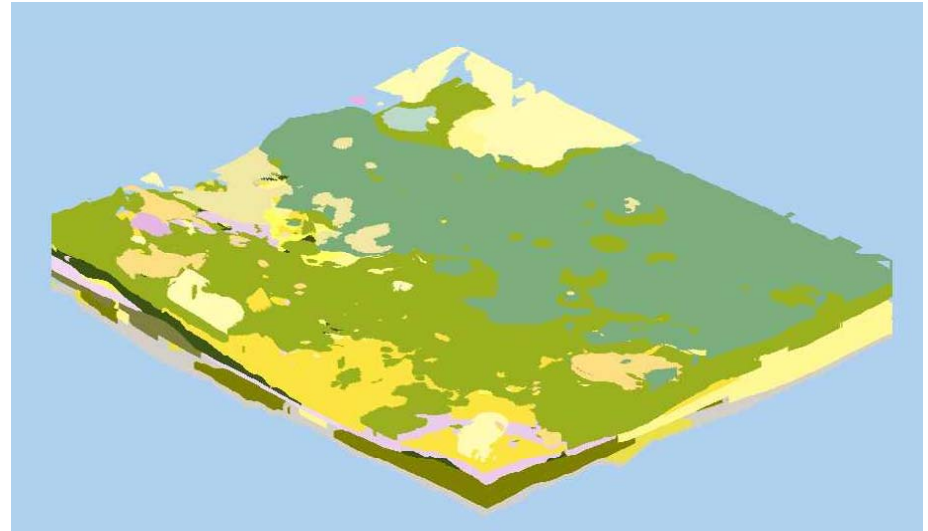
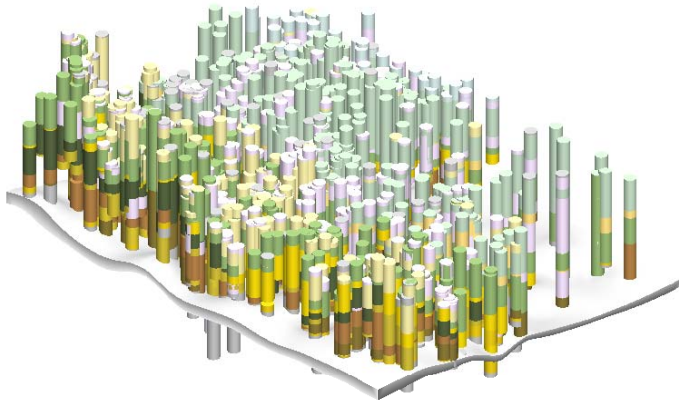


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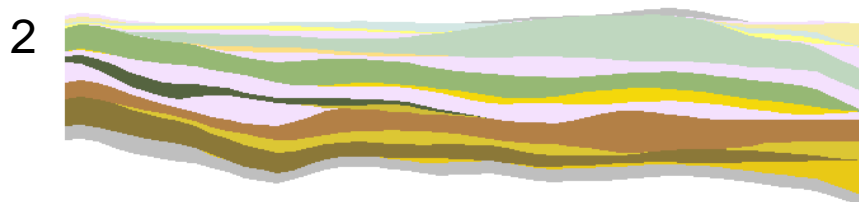
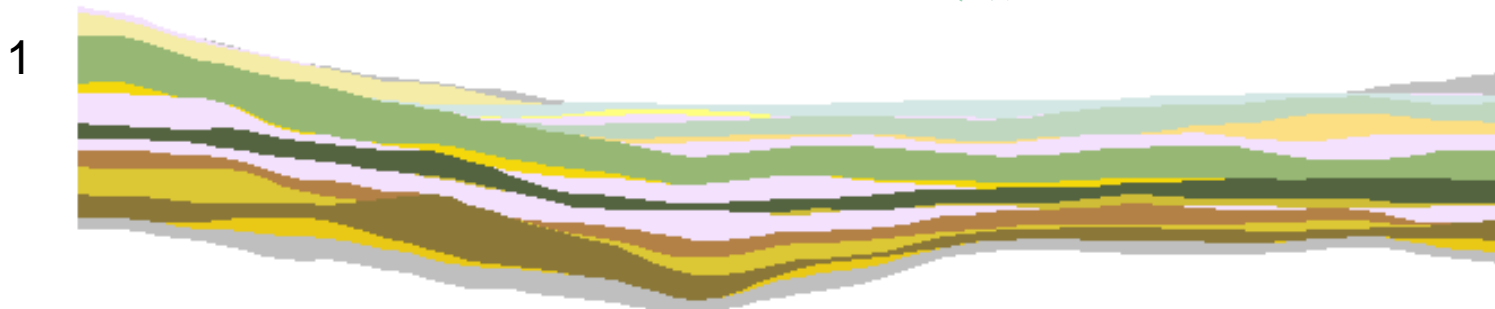
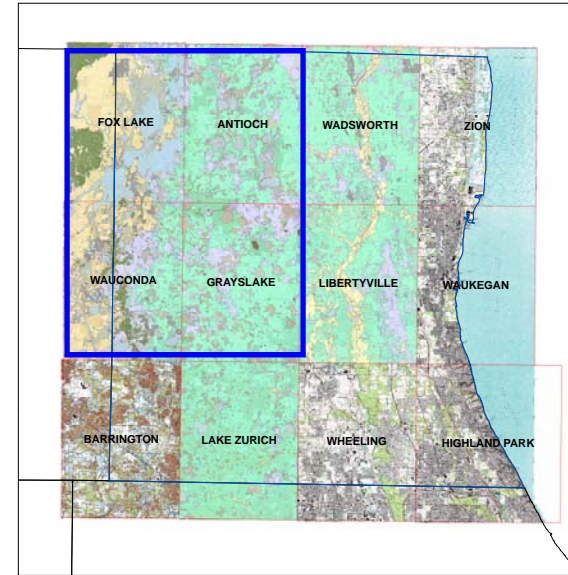
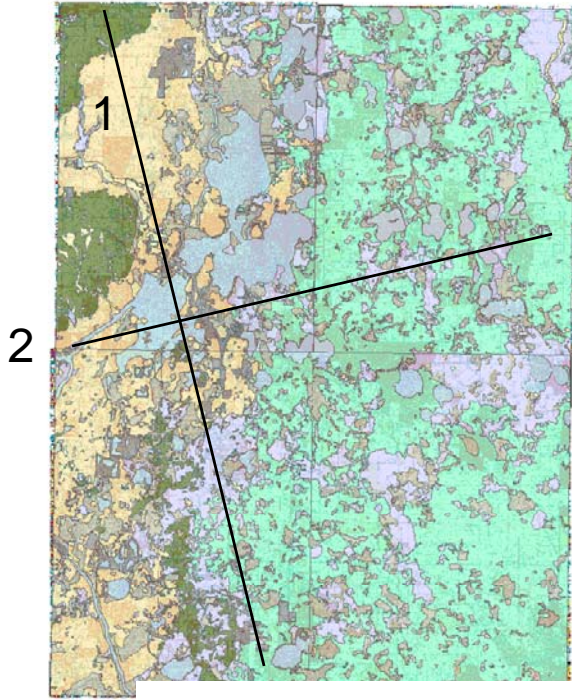
Lithostratigraphic units

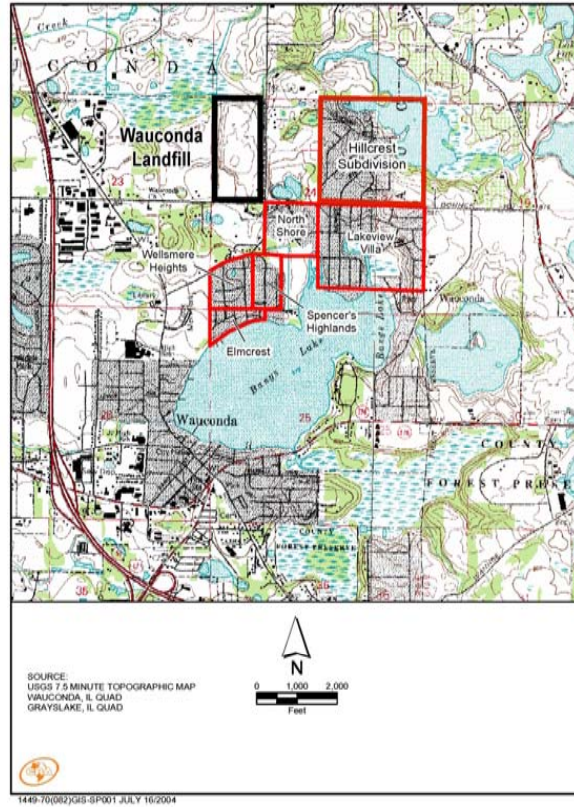
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3D Geologic Mapping in Lake County, IL



3D Geologic Mapping in Lake County, IL





(Above): Location map noting the subdivisions adjacent to the Wauconda Landfill where well sampling and groundwater monitoring has occurred to detect vinyl chloride.

(Top Right): Five stratigraphic units identified by Conestoga-Rovers and Associates Limited (CRA) during the initial site investigation at the Wauconda Landfill in the mid 1980's.

(Bottom Right): Vinyl chloride concentrations in water sampled from residential wells in the Hillcrest Subdivision following the initial detection of the contaminant in 2003. Sampling was undertaken in early 2004.

STRATIGRAPHY/FLOW DIRECTION	HYDROPHYSIC DESCRIPTION	APPROXIMATE THICKNESS (ft)	USAR GROUNDWATER VARIETY (ft/y)	HYDRAULIC CONDUCTIVITY (cm/s)
	UPPER FINE GRAINED UNIT	0 - 80	-	-
	UPPER AQUIFER	20 - 95*	20	5.7×10^{-4}
	AQUICLUD	0 - 85	0.9H-4.1I	4.1×10^{-8}
	LOWER AQUIFER	5 - 25*	20	3.1×10^{-3}

LEGEND
 * CONCRETE UPPER AND LOWER AQUIFER THICKNESS (ft)
 → DIRECTION OF GROUNDWATER FLOW

Well Sampling Results Subdivision by Subdivision					
Subdivision	Wells Sampled Since September 2003	Vinyl Chloride Concentration			
		Not Detected	0.10 - 0.99 ppt	1.0 - 1.9 ppt	> or = 2.0 ppt
Hillcrest Subdivision	130	46	76	5	3
North Shore Subdivision	5	1	0	4	0
Lakeview Villa Subdivision	4	3	0	1	0
Wellshire Heights Subdivision	6	5	0	1	0
Spencer's Highlands Subdivision	5	5	0	0	0
Elmcrest Subdivision	2	2	0	0	0
Between Landfill & Hillcrest Subdivision	8	6	0	0	0
Other Areas	13	13	0	0	0
TOTALS	173	83	76	11	3

Subdivision	Wells Resampled in June 2004	Vinyl Chloride Concentration			
		Not Detected	0.10 - 0.99 ppt	1.0 - 1.9 ppt	> or = 2.0 ppt
Hillcrest Subdivision	9	3	2	3	0
North Shore Subdivision	3	0	1	2	0
TOTALS	11	3	3	5	0

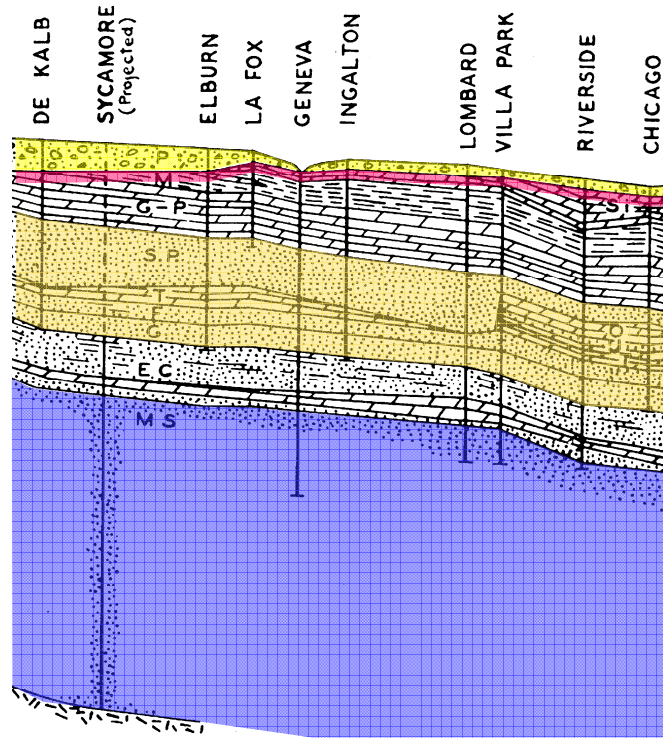




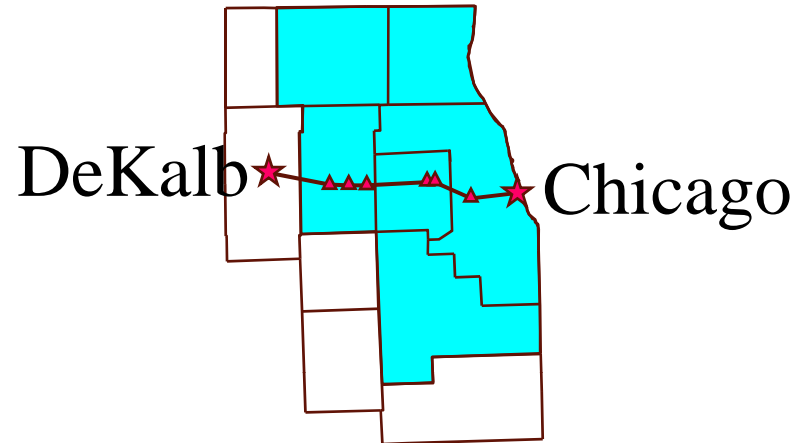
Aquifers of Northeastern Illinois


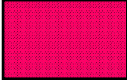


West

East



Cross-Section Modified from Bretz (1939)



-  Unconsolidated Aquifer System
-  Shallow Bedrock Aquifer
-  Deep Bedrock Aquifer System
-  Elmhurst-Mt. Simon Aquifer

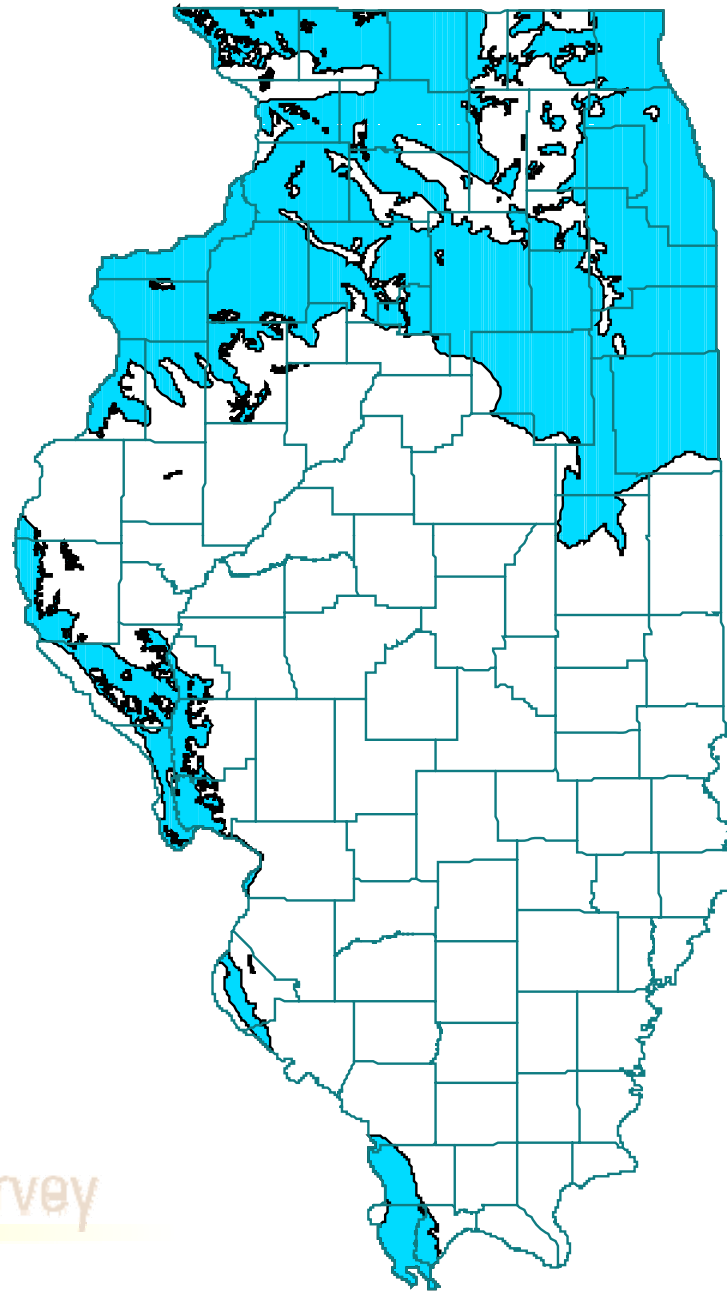


Sand and gravel pit on the Fox River





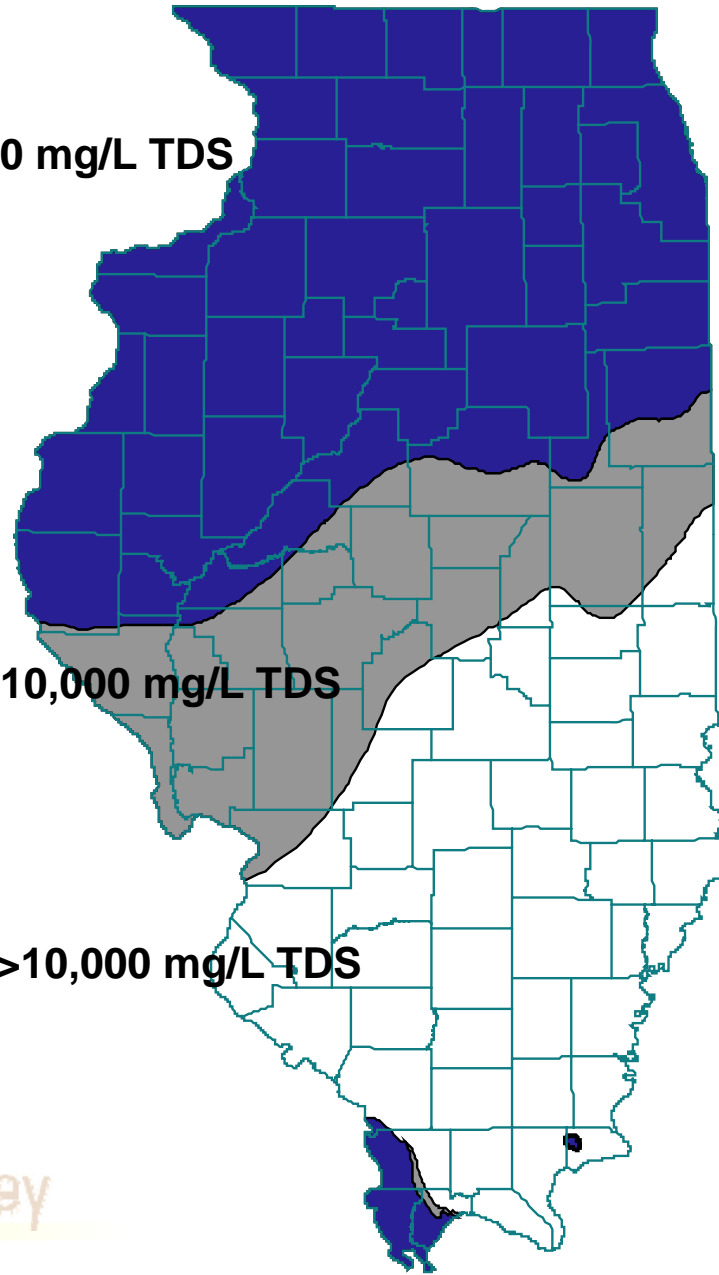
Fractured Dolomite



<2,500 mg/L TDS

2,500-10,000 mg/L TDS

>10,000 mg/L TDS





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